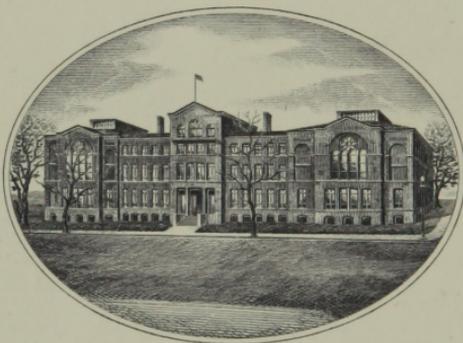




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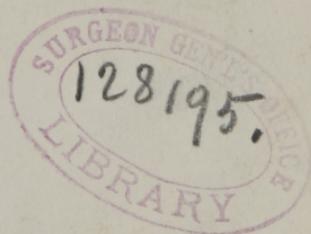


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THEORETICAL AND PRACTICAL  
TREATISE  
ON  
HUMAN PARTURITION.

BY H. MILLER, M. D.,

PROFESSOR OF OBSTETRICS AND THE DISEASES OF WOMEN AND  
CHILDREN, IN THE MEDICAL DEPARTMENT OF  
THE UNIVERSITY OF LOUISVILLE.



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## DEDICATION.

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To the PUPILS who have attended his Lectures on Obstetrics, etc., this Treatise,—a faithful remembrancer of the principles and practice which he sedulously endeavored to instill into them,—is respectfully and cordially inscribed, by

THE AUTHOR.

DEDICATION.

To the Friends who have attended his Lectures on  
Opioids, etc. this Treatise—a faithful remembrance  
of the principles and practice which he religiously  
endeavored to impart into them—is respectfully  
cordially inscribed, by

THE AUTHOR.

## PREFACE.

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A MAN, in becoming an author, may be permitted to hold a free and easy colloquy with his reader, without justly exposing himself to the charge of egotism, even should he speak of himself, his plans, hopes, and expectations, more than is seemly in other situations. No one writes without presuming that he is able to teach; and the success of his undertaking depends very much, on establishing at the outset, a degree of familiarity between himself and his reader, on the same principle that a schoolmaster relaxes his magisterial brow, and playfully receives the little urchins at their first meeting, not forgetting to pat their little chubby cheeks, and tell them something about himself. Taking it for granted that this privilege will be conceded, you are to know, indulgent reader, that the author of the work you are now peeping into is a man rather advanced in life ( though you need not be precisely informed of his age—that is a delicate point— ), who has seen much and read some, touching the subjects he proposes to handle; and has withal been accounted qualified to teach others what it has been his chief pleasure to practice, since he was a very young man. He loves his vocation, notwithstanding the difficult and responsible duties it imposes, and would not exchange it for any other; to this attachment, more than to superior capacity, he honestly ascribes whatever proficiency or eminence he may have attained in it. Reader, if you have not this love, you have mistaken your calling. For the rest, the author is a backwoodsman, having been brought to light in Kentucky, by a process which it is his purpose to unfold in this treatise. His education was not acquired in academic halls, but in the primitive schoolhouses of his native state, and upon the ample sward, shaded by forest trees, appurtenant thereunto: so that, you see, he was reared after the fashion of Soc-

rates, imbibing knowledge in the schoolhouse, under the shade of trees, and not unfrequently perched upon their boughs.

But the author prates, you say; he had better tell us why he has taken it into his head to write a book on midwifery, for we do n't see the use of it: we have books enough already;—there are Baudelocque's (an abridged translation of it), Denman's, Burns's, Dewees's, and more recently, translations of Velpeau, Chailly and Moreau, to say nothing of Gooch, Hamilton, Blundell, Rigby, Churchill, Collins, Ramsbotham, Lee, Murphy, Maunsell, etc., etc., whose works have been published on this side of the Atlantic; and has not Dr. Meigs published a book, the "Philadelphia Practice of Midwifery?"

Truly, reader, we have books enough and to spare, as far as numbers are concerned. Far be it from the author to disparage any of the works that have been named; they all have their excellencies, and, like every human production, their faults; but their multitude cries aloud for another. While they have disseminated knowledge and enlightened the highways and byways of practice, and thus been instrumental in achieving much good, they have unsettled the minds of practitioners in regard to points of deepest interest, and made a wreck of obstetrical nomenclature, as far as the presentations and positions of the fetus are concerned.

To justify the first assertion, namely, that doubts and perplexities have been engendered, in relation to matters of fact, which it behooves us to understand clearly, the author will refer only to the discrepant statements to be found among these writers, regarding the manner in which the child is transmitted through the pelvis, in the different presentations and positions. Surely, no man is fit to practice midwifery, or, at least, no man can practice it with facility to himself and in the safest manner for his patient, who does not understand what he may have occasion to imitate, in artificial deliveries. The mechanism of labor, as the child's passage through the pelvis, in obedience to certain mechanical requisitions, has been called, ought, therefore, to be settled. It may be learnt, and can only be learnt, by observation. How, then, has it happened that we have such contradictory accounts of matters of fact? To give a full, correct, and lucid description of the mechanism of labor is a leading object which the author had in view, in writing his

book. In the prosecution of it, he has not hesitated to examine rigorously and criticise freely the statements and opinions of others; and trusts that he has succeeded in tracing the true track of the fetus, in its advent, amid the devious windings of the paths that have been marked out in obstetric charts.

The fetal presentations and positions have been thrown into a hotchpotch, which is the second assertion to be proved; and obstetricians can no more communicate with each other concerning them, in technology generally understood, than could the Babel-builders after the confusion of tongues. The time was, when the classification and nomenclature of Baudelocque, under the auspices of Dr. Dewees, universally prevailed in this country; and although his system was not free from serious objections, it was better with us then than now, for the language of obstetrical science was everywhere understood. In most countries there is, and in all there ought to be, some standard agreed upon relative to this part of obstetrical medicine; but how can such agreement exist, in a country like ours, which tamely consents to receive its science as well as its fashions from abroad. We need, at this time, a native authority to educe order out of confusion, and set up a national standard, under which all our practitioners may arrange themselves, and be cemented by a common bond of union.

To review the whole subject of presentations and positions, with the light which his own experience and that of others has shed upon it, since the time of Baudelocque, and establish for them a classification and nomenclature which, it seems to him, all may adopt, is another object which the author has in view in offering this volume to the profession. The classification which he recommends is that of M. Dugès, but the nomenclature is his own. In venturing to hope that he may be instrumental in giving stability to this fundamental part of obstetrics, at least in his own country, the author knows full well that he may incur the imputation of presumptuousness. What! it will be said, does a backwoodsman presume to erect a standard, and expect all who are engaged in teaching or practicing midwifery, in this great confederacy, to rally around it? Whatever may be the fate of his enterprise, he confesses that this aim, in this particular, is directed to no lower mark. Long ago, it was said or sung, "Westward the star of em-

pire takes its way," and why may it not have reached the banks of the Ohio by this time?

The author will only detain the reader long enough to disclose the drift of his work, in the preceptive and practical parts of it. This may be expressed in few words, by the avowal that his principles of practice are essentially the same as those of Hamilton and Burns, — two eminent Scottish teachers and practitioners of midwifery. For the information of such as are not so familiar with the writings of these northern lights as they ought to be, it may be stated that they regard labor as an exhausting struggle, which, when unusually protracted or difficult, needs the fostering care and the judicious assistance of the accoucheur, although there may be no present indications of danger, lest harm result from its prolongation. This manner of viewing labor necessarily leads to a closer inquisition into it, at the bedside, and greater attention to the removal of whatever may embarrass it, than is agreeable to the expectant practice so much lauded by most, if not all, other writers. Whoever adopts it may, therefore, reckon upon being branded with such epithets as "officious," "pragmatic," "meddlesome," etc.; but he will have the satisfaction to know that his is a ministry of help, at a time when the weakness of human nature most loudly calls for it, and not of idle contemplation.

LOUISVILLE, JANUARY 8, 1849.

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A THEORETICAL AND PRACTICAL  
TREATISE ON  
HUMAN PARTURITION.

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CHAPTER I.

THE OBSTETRIC PROPERTIES OF THE PELVIS.

PARTURITION, consisting in the expulsion of the fetus at maturity, is an active process, and implies, 1. The agency of an expulsive organ; 2. A fetus to be expelled; 3. The transition of this fetus through an appropriate passage. All these are, in fact, concerned in the process. The *uterus* is the organ destined to expel the *fetus*, and the *pelvis* furnishes the passage through which it is transmitted. An acquaintance with these objects possesses us with the rudiments of obstetrics; and as well might we, ignorant of the points of the compass, undertake to study the course of streams, as, unacquainted with the uterus, fetus, and pelvis, attempt to investigate the phenomena of childbirth. We shall, therefore, begin with these rudiments, taking them up, however, in an adverse order to that in which they have been enumerated.

And, first, of the *pelvis*. It is not without reason, that the French writers so frequently compare the passage of the fetus through the pelvis to the process of wire-drawing, in their common allusion to the pelvic canal, as *une espèce de filière*. The size of the fetus corresponds, in fact, so nicely to the capacity of the canal, that it can only be transmitted by having its more voluminous parts presented in the most advantageous manner; and should it offer otherwise, its volume must be reduced or its position changed, before it can be ushered into the world.

The framework of the pelvis, in the adult human female, with whom alone we are at present concerned, is composed of four distinct bones, viz., the *sacrum*, *coccyx*, and two *innominata*. It is an irregular cavity, having the sacrum and coccyx for its posterior wall, and the innominata for its lateral and anterior walls. Each of these last bones consisted originally of three separate pieces, namely, the *ilium*, *ischium*, and *pubis*, whose union becomes, as growth advances, so intimate that the marks of their former separation are entirely effaced.

It is no part of my plan to enter into an anatomical description of these bones, as all writers on midwifery have done. For such a description I refer the uninformed reader to the proper authorities, viz., writers on anatomy, whom he must carefully study, with the bones before him, or else he cannot be prepared to follow me in the general and purely obstetric views, which I propose to take.

The pelvis, considered as a whole, extends from the highest points of the iliac cristæ to the tuberosities of

the ischia. If we contemplate it in this light, in the skeleton, it will be discovered that its lateral walls are much higher than its anterior or posterior wall, above which, especially the anterior wall, there is a great vacuity, between the anterior superior spinous processes of the ilia. The posterior of these vacuities, in the recent subject, is filled up by the lumbar vertebræ and muscles, etc., belonging to this region, while the anterior is occupied by the inferior portions of the abdominal muscles, with their fasciæ and integuments.

The inferior portion of the lumbar division of the spine, to a level with the iliac cristæ, and the intervening soft parts, together with the muscles, etc., occupying the great vacuity in front (namely, the whole of what is called the hypogastric region of the abdomen), may be justly reckoned as belonging to that division of the pelvis which is called, by obstetrical writers, the *greater or false*, to distinguish it from the *lesser or true*, pelvis. This greater pelvis is separated from the lesser by a line, the *ileo-pectineal*, which is sharp on the superior face of the horizontal branch of the *ossa pubis* or *pectinis*, and smooth and rounded on the internal face of the *ilia*.

The greater pelvis, however important it may be during pregnancy (affording, as it does, soft cushions laterally for the gravid uterus to rest upon, and a yielding wall anteriorly to allow this organ to gravitate forward), possesses no interest in a paturient point of view, because it forms no part of the canal, through which the fetus is transmitted in childbirth. The observations I shall offer will, therefore, have reference exclusively to the true *pelvis*, and, this being premised, there will be

no occasion henceforth to apply any discriminating epithet to it. When the term pelvis is used, it will be understood to mean the true pelvis.

The pelvis then, it may be remarked, offers for our study *two straits* and an intermediate *excavation*, with which we must be familiarly acquainted, in order that we may have any just conceptions of its obstetric properties. Let us consider these separately.

*First.* The *superior strait*, called also the *abdominal strait*, *brim* of the pelvis, etc., is the entrance to the pelvic excavation; and is formed by the linea ilio-pectinea anteriorly and laterally, and the superior edge of the promontory and wings of the sacrum posteriorly. Its figure is that of an irregular ellipsis, being notched posteriorly by the promontory of the sacrum, which has caused it to be compared to the heart of a playing card. For the purpose of estimating its dimensions, several diameters are ascribed to it. One of these extends from the symphysis pubis to the top of the sacrum, and is called the *antero-posterior*, the *sacro-pubic*, or *conjugate* diameter. Another crosses this at right angles, bisecting it, and extending, of course, from the middle of the lower edge of one iliac fossa to a corresponding point of the other. This is the *transverse* or *bisiliac* diameter. A third extends from the left acetabulum to the right sacro-iliac symphysis, crossing the strait obliquely at the point of intersection of the former two, and is the *left oblique* diameter. The fourth and last stretches from the right acetabulum to the left sacro-iliac symphysis, being the *right oblique* diameter.

With regard to the designation of the oblique diameters, it is necessary to observe, that I adopt M. Caze-

aux's, rather than Dr. Rigby's, nomenclature. Dr. Rigby, tracing these diameters from the sacro-iliac symphysis to the acetabula, distinguishes our left as the right, and *vice versa*. In describing the mechanism of parturition, it will, I think, be evident that M. Cazeaux's method is much more natural, and will be less liable to perplex the student.

The measurement of these several diameters is variously stated by authors. Without enumerating their discrepancies, it will be sufficient to observe that the *sacro-pubic* is the shortest, and measures about four inches; that the *transverse* is the greatest, when the bones of the pelvis are divested of soft parts, and measures about five inches; while the *oblique* diameters are equal to one another, and measure about four and a half inches. Let it be observed that the transverse diameter is not allowed to be the greatest, except in the naked pelvis. The oblique diameters are, in fact, the greatest in the living body,—the transverse being abridged by the overhanging of the muscles and blood-vessels, that run along the sides of the brim of the pelvis.

The *plane* of the superior strait is necessarily so often referred to by obstetrical authors, that it is very important the student should get a clear idea of it. It is nothing more than the area included within the boundaries of the strait. If, for example, a piece of paste-board be cut to fit the strait, and adjusted to it, it will represent the plane in question. The direction of this plane, relatively to the axis of the body, is to be carefully noticed. The spinal column may represent the axis of the body; and if the pelvis be observed in con

nection with the skeleton, it will be perceived that the plane of the superior strait is not placed horizontally, so as to make a right angle with the axis of the body, but it dips toward the horizon, and forms an obtuse angle with that axis. In estimating the degree of this inclination, it will be sufficiently accurate to say that it makes, with the axis of the body, *upward* and *forward*, an angle of one hundred and thirty-five degrees.

The superior strait has, also, an *axis*, which is an imaginary straight line passing through the center of its plane, perpendicular to its surface. Such a line, produced upward, passes near the umbilicus, while its other extremity is directed toward the last bone of the os coccygis. It makes, consequently, *upward* and *forward*, an acute angle, estimated at forty-five degrees, with the axis of the body.

*Secondly.* The *inferior strait*, called also the *perineal*, is the *outlet* of the pelvis. In the skeleton, it is an exceedingly irregular aperture, having the point of the os coccygis, the inferior notched edges of the ilia, the posterior edges and tuberosities of the ischia, and the rami of the ischia and pubes, for its boundaries. The depth of the notches, between the sacrum and innominatum, on both sides, is greatly diminished by the sacro-ischiatic ligaments, which convert their upper portion into large foramina, through which bloodvessels, nerves, etc., pass out of the pelvis to the inferior extremities. In estimating the dimensions of the inferior strait, it is usual and proper to consider it with these ligaments attached.

That part of the inferior strait, comprised between the rami of the pubis and ischium of each side, and the

symphysis pubis above, and a line drawn from one ischiatic tuberosity to the other, is called the *arch of the pubis*, or the *pubic arch*; and is, obstetrically considered, the most interesting portion of the inferior strait, because through it the fetus emerges into external life, and the facility of its emergence depends very materially upon the proper construction of this arch. Suitable width is one essential requisite, and eversion of the edges of the flat bones that form its sides, is another,—in both which respects, the female differs from the male pelvis.

The inferior strait has the same number of diameters as the superior, viz., an *antero-posterior* or *coccy-pubic*, a *transverse* or *bisischiatic*, and two *oblique* diameters. The *antero-posterior* diameter extends from the under part of the symphysis pubis to the point of the os coccygis, — the *bisischiatic*, from the inner part of the tuberosity of one ischium to the corresponding part of the other,— the *left oblique* diameter, from the junction of the rami of the left pubis and ischium to the middle of the lower edge of the right sacro-ischiatic ligament,— the *right oblique* diameter, from the junction of the rami of the right pubis and ischium to the middle of the lower edge of the left sacro-ischiatic ligament. With regard to the measurement of these diameters, the same differences are to be found among authors, as in reference to the superior strait. Baudelocque, and most of the French authors, state that they are equal to one another, and measure four inches; and this is not far from the truth in the dried pelvis, with the ligaments attached; but in the living body, both the antero-posterior and the oblique may be rendered more capa-

cious than the tranverse, by the yielding of the os coccygis and the sacro-ischiatic ligaments,—the antero-posterior admitting the greatest enlargement, and being the greatest diameter of the outlet of the pelvis, while the *bisischiatic* is the least. Dr. Rigby, however, makes the antero-posterior diameter only three and one-eighth inches, but admits that it may be lengthened to four and one-eighth inches, by the yielding of the coccyx; at the same time he maintains that, even with this forced extension, the antero-posterior diameter is barely equal to the oblique diameters. But Dr. Rigby is an advocate of the *oblique* theory of the mechanism of labor (to be discussed in a future chapter), and this theory requires, decidedly, the amplest capacity in the direction of these diameters.

The inferior strait has its *plane*, as well as the superior; but where is it and how shall it be represented? It is manifest that it cannot be represented by a piece of pasteboard, fitted to such an irregular aperture. The attempt to make such a "fit," would, indeed, be found a difficult, if not an impracticable, undertaking. M. Cazeaux (1) proposes to solve the difficulty by considering the coccy-pubic diameter as the representative of the plane in question. This being assumed, he proceeds to determine the direction of this line, and, consequently, of the plane of the inferior strait. According to most French authors, he observes, this plane is slightly oblique from *below upward*, and from *behind forward*, so as to meet the plane of the superior strait anterior to

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(1) *Traité Theorique et Pratique de l'Art des Accouchemens*, p. 20.

the symphysis pubis. M. Cazeaux refers to the numerous researches of M. Nægelé, according to which the points of the coccyx is placed eight or ten lines higher than the summit of the pubic arch, and consequently the coccy-pubic diameter is slightly oblique from *above downward*, and from *behind forward*. But the remark of M. Velpeau, that during labor (the only condition when it is a matter of any consequence to determine the direction of this plane), the point of the coccyx is pushed downward and backward by the passage of the head, to a level with, if not lower than, the inferior part of the symphysis pubis, satisfies M. Cazeaux that the plane of the inferior strait is somewhat oblique *from below upward and from behind forward*.

M. Dugès (1), to whom we are indebted for the best, though briefest, exposition of the obstetric properties of the pelvis, has, in my opinion, removed the difficulties which embarrassed other authors, by proposing to divide the inferior strait into two nearly equal parts, one anterior and the other posterior, which meet upon the tuberosities of the ischia. The anterior division he calls the *vulvar*, the posterior the *coccy-perineal*, space, and these may be represented by two pieces of pasteboard,—one of which fills up the pubic arch, and the other, the posterior vacuities of the pelvic outlet,—which meet and are united opposite the ishiatic tuberosities. These pieces of pasteboard, it is evident, will form two planes with opposite inclination. Tracing them from their junction, the posterior looks *upward*

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(1) Manuel d'Obstetrique, ou Traité de la Science et de l'Art des Accouchemens, deuxième edit. Paris, 1830.

and *backward*, and the anterior, *upward* and *forward*. I am far from agreeing with M. Cazeaux, that this only complicates the question to no useful purpose; on the contrary, complication is avoided by considering, as M. Dugès does, the posterior division as merely a prolongation, by soft parts, of the posterior wall of the pelvic excavation, while the anterior division alone, *the vulvar space*, is the true plane of the inferior strait.

The plane of the inferior strait, as thus explained, has a much greater inclination *upward* and *forward*, than is allowed by Cazeaux, or any other writer besides M. Dugès. Its inclination is, in fact, so great that, if prolonged above the pubes, it forms by its junction with the plane of the superior strait nearly a right angle, and makes with the axis of the body, *upward* and *forward*, an angle of about forty-five degrees.

Concerning the *axis* of the inferior strait, the same difficulty has been experienced by authors as in relation to its plane, because the direction of its plane determines, of course, that of its axis. Thus, M. Velpeau asserts that "the axis of the inferior strait is represented by a straight line drawn from the interior of the pelvis, and cutting the middle of the coccy-pubal diameter at right angles; the upper extremity of this line most commonly rises as high as the sacro-vertebral angle, and sometimes is found to be even parallel with the spinal column, and may approach even nearer to the axis of the superior strait in very many instances, as is proved by the late researches of Professor Nægélé, and as I have ascertained for myself." (1)

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(1) Elementary Treatise on Midwifery, translated by Professor Meigs. Third Am. edit. Philad., 1845, p. 36.

Again. As to the axis of the *superior* strait, M. Moreau's account agrees with that which I have given; but with regard to the *inferior* strait, he declares that its axis is represented by a line drawn from the sacro-vertebral angle, and that it is *parallel to the axis of the body*, having but a slight obliquity forward, and forming a very obtuse angle by its intersection of the axis of the superior strait (1).

Having agreed with M. Dugès as to the true plane of the inferior strait, I cannot, of course, concur with MM. Velpeau and Moreau on this point. The axis of the inferior strait has a much more considerable inclination forward than they represent; it is, in fact, a line passing from the *hollow* of the sacrum through the center of the vulvar space, and makes with the axis of the body, *upward* and *forward*, an angle of one hundred and thirty-five degrees. It deviates from the axis of the body, then, forty-five degrees, instead of being parallel with it, and makes, by its intersection of the axis of the superior strait, nearly a right angle instead of a very obtuse one.

The sum of what has now been said of the *planes* of the two straits, divested of mathematical lines and angles, may be thus stated: the plane of the superior strait inclines *downward* and forward; that of the inferior strait, traced likewise from behind, inclines *upward* and forward,—and the degree of their inclination is equal, that is, the latter rises as much as the former dips.

In relation to the *axes* of the straits, it may, with

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(1) *Traité Pratique des Accouchemens*, Tom. I, p. 28.

equal freedom from mathematical technicality, be stated, that the axis of the superior strait, traced from without the pelvis inwardly, is directed *downward* and *backward*; while the axis of the inferior strait, traced from within outwardly, is *downward* and *forward*.

*Thirdly.* The *pelvic excavation* is, as M. Dugès has said (1), a cylindroidal canal, with a bold curvature forward, and cut perpendicularly to its axis at its two extremities or apertures, and hence the shortness of its anterior wall, compared with the posterior. The anterior and posterior walls have a curvature corresponding to that of the excavation; but the lateral walls, formed chiefly by the ischia, incline toward each other as they descend, insomuch that they are nearer, by an inch, at the inferior strait than at the superior. These, according to many authors, are the *inclined planes* of the pelvis, which, by their direction *downward, forward, and inward*, conduct the vertex of the child's head toward the symphysis pubis, as it passes through the excavation.

No such rotation takes place in fact, *during the descent of the head*, as I shall have occasion to show, when the mechanism of labor is treated of.

Other authors, again, as MM. Moreau, Velpeau, etc., declare that the pelvis has four planes, inclined toward each other at their points. "Suppose," says M. Velpeau, "a vertical cut, which should divide the lesser basin into four equal parts, there would be found four such planes. The two anterior inclined planes comprise a portion of the lateral regions and the whole of the anterior region of the excavation; the two posterior are

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(1) Op. Cit.

formed by the front of the sacrum and coccyx by the sciatic ligaments and notches, and the sacro-iliac articulations" (1).

It is evident that, according to this view, the entire canal of the pelvis is nothing but a conjunction of inclined planes, and I am not able to perceive either its conformity to nature or practical utility. There are, however, four planes belonging to the pelvic excavation, but these are to be found only on its *sides*, each side possessing two. If the internal surface of either ischium be carefully examined, it will be seen that a slight ridge or rising of the bone may be traced from the origin of the spinous process obliquely upward and forward toward the ileo-pectineal eminence. This rising, on each side of the pelvis, together with the spinous process, divides an *anterior inferior inclined plane* (which looks forward and outward), from a *posterior superior plane*, looking *backward* and *inward* toward the hollow of the sacrum. There is, therefore, a *double-inclined plane* on each side of the excavation, as M. Dugès has pointed out; and these favor the rotatory movement of the head, which does really take place when it reaches the inferior strait,—the occiput gliding upon one of the *anterior inferior* planes, while the forehead moves over the surface of the diagonally opposite *posterior superior* plane.

The configuration of the walls of the excavation having been explained, we have next to inquire into its dimensions, which merit special notice, notwithstanding "it has usually been deemed sufficient," as Dr. Davis

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(1) Op. Cit.

declares (1), "to give the diametrical dimensions of the pelvis only at the brim and outlet." In this inquiry, the same diameters may be ascribed to the excavation as belong to the straits.

It is obvious that the antero-posterior diameter, measured from the inner and inferior part of the symphysis pubis to the middle of the concavity of the sacrum, is *longer* than the corresponding diameter of either strait. This diameter is usually reckoned to be five inches. It is equally evident that the transverse diameter is *shorter* in proportion to the depth at which it is taken, because the lateral walls incline inward, and approach an inch nearer to each other at the inferior aperture. But concerning the oblique diameters, there may be ground for difference of opinion, and accordingly while M. Moreau avers that they successively diminish as we descend into the excavation, Dr. Rigby maintains that they are even more capacious than the antero-posterior. To the latter he allows but four and one-eighth inches, while to the former, "drawn from the center of the free space formed by the sacro-ischiatic notch and ligaments on one side to the foramen ovale of the other," he allows five and a half inches (2).

Dr. Rigby is chargeable with palpable inconsistency in the account which he gives of the pelvic diameters. At the superior strait, he agrees with all writers that the transverse diameter is shortened by the soft parts, situated at its extremities; nay, he asserts that

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(1) Elements of Obstetric Medicine: Second edition. London, 1841.

(2) System of Midwifery: Philadelphia edition, 1841, p. 20.

the "large masses of the psoas magnus and iliacus internus, besides other muscles of inferior size," reduce this diameter so that it is but little more than the antero-posterior. This, he thinks, holds good, especially during labor, because "these muscles being thrown into powerful contraction, their bellies swell and thus tend still further to diminish its length."

But the "free spaces" of the sacro-ischiatic notches and foramina ovalia are also occupied by muscles, which have "bellies to swell" as well, though not so considerably as the muscles of the brim. What spell, less potent than the oblique theory of parturition, could transform these into "soft yielding textures," receding before pressure, as they are ascribed to be by Dr. Rigby?

We conclude, therefore, that the utmost that can be conceded is, that the oblique diameters of the excavation are equal to those of the superior strait (probably they are rather less), and of course they are shorter than the antero-posterior diameter. They are, nevertheless, more capacious than the transverse diameter, which, as has been already stated, is abbreviated by the approximation of the lateral walls toward each other.

We have, lastly, to inquire into the *axis* of the excavation, more famous than the axis of either the superior or inferior strait, because it indicates more precisely the route pursued by the fetus, in its peregrination into this breathing world. The axis of the excavation is a line traversing its center; and as the excavation has a curvature corresponding to that of the sacrum, coccyx and perineum, it is manifest that its axis can only be represented by a line with a similar curvature. To de-

termine this axis with precision, the method of M. Cazeaux is good, as far as it goes, which is to draw, from several points of the curvature of the sacrum, lines at right angles with its surface at such points, and extend these lines to the posterior face of the symphysis pubis. These lines will represent so many planes of the excavation, and if then a perpendicular is let fall upon each of them, which shall pass through its middle, these perpendiculars will represent the axis of each of the planes. It will be easy to see, observes M. Cazeaux, after this double operation, that all these axes are confounded, and that their union forms a curved line, whose concavity looks forward, whose convexity is parallel with the anterior face of the sacrum, and whose extremities are confounded with the axes of the superior and inferior straits. To make a full representation of the axis of the excavation, according to the view entertained by myself, it is only necessary to extend it downward to the *true plane* of the inferior strait, as already explained.

In considering this axis, it is easily discovered that it is not the *arc of a circle*, as professor Carus describes it, and after whom it has been called Carus's curve. Professor Meigs makes frequent mention of Carus's curve, in his pleasant book, entitled, "Females and their Diseases," and gives the following directions for projecting it. "Bisect a dried pelvis from front to rear; set one leg of a compass on the symphysis pubis; open the compass two or two and a quarter inches, equal to the semi-diameter of the superior strait measured from pubis to sacrum; then describe with the free leg an arc of a circle, commencing at the plane of the upper

strait and terminating before and below the crown of the pubal arch." This is truly Carus's curve, but it is not the axis of the excavation, coincidently with which the center of the fetal head moves, in passing through the pelvis, in labor, and down which the womb slides in prolapsion, as the learned Philadelphia professor alleges. The veritable axis of the excavation is nearly a straight line, where it corresponds to the first two vertebræ of the sacrum, as M. Cazeaux has well observed, because these make nearly a straight line, and its curvature is below where it corresponds to the last three vertebræ of the sacrum, and greater still as it comes forward toward the axis of the inferior strait, so that the head of the fetus, in following this axis, must strike against the lower part of the sacrum before it begins to move toward the vulva.

## CHAPTER II.

## OBSTETRIC APTITUDES OF THE FETUS.

UNDER the title of obstetric aptitudes of the fetus, will be considered its *attitude* and *situation* in the cavity of the uterus, and also its *dimensions*, and *structure*. *First: Its attitude.*—At the completion of utero-gestation, the fetus is, on an average, eighteen or twenty inches in length, measured from the summit of the head to the heels; while the cavity of the uterus, when completely expanded, does not exceed twelve inches in length, by nine in its greatest transverse diameter, and six in its antero-posterior. It is, then, obvious that the fetus cannot be lodged in this cavity in a state of extension, and accordingly it is folded up by the flexion of its thighs upon the abdomen, and the legs upon the thighs, the head upon the breast, and the arms are closely applied to the sides, with the forearms crossed upon the chest. In this compact form, its size is not disproportioned to the capacity of the uterine cavity, to which it is further adapted by its ovoidal figure corresponding to the shape of this cavity.

This apparent packing of the fetus, in order that it may occupy the least possible space, is not produced by the want of room in the uterus; for, it is observable at all stages of gestation,—in the early periods, when its size, compared with the cavity, is small, as well as at a more advanced period, when its *comparative* as well as

absolute size is great. At no period is it crowded, and constrained to assume its peculiar attitude. The fetal attitude must, therefore, be regarded as a curious instance of adaptation of the several parts of a complicated process to each other.

*Secondly:* In considering the fetus, thus folded up, in reference to its *dimensions* and *structure*, we may, with M. Moreau, divide it ideally into three distinct parts, viz: 1. *The cephalic extremity*, formed by the head alone. 2. *The pelvic extremity*, including both the pelvis proper and lower extremities. 3. *An intermediate part*, formed by the trunk, exclusive of the pelvis.

*First.* The cephalic extremity or head must be regarded as the most solid and voluminous part of the fetus; and on this account, as well as the greater frequency of its presentation in labor, deserves the particular study of the accoucheur. An accurate knowledge of its structure, form, and size, is, indeed, indispensable to a correct understanding of the mechanism by which the fetus comes into the world.

The head includes the cranium and face, and each of these divisions deserves the notice of the obstetrical student, on account of some peculiarities of structure in the fetus.

The *cranium* may be subdivided into two parts,—one superior, convex, bulging at its sides, and measuring more antero-posteriorly than transversely,—which is its *vault*. The other, inferior, flat, narrower, and shorter, which sustains the first, and is, therefore, its *base*. Six distinct bones enter into the construction of the cranial vault, viz., the two *parietal*, the superior portion of the *occipital*, the squamous portion of the *two temporal*, and

the *frontal* bone. The *os frontis* is, however, usually divided into right and left halves, and seven bony pieces might, therefore, be enumerated as belonging to the vault of the cranium. A greater number of osseous pieces compose the base of the cranium; but these need not be mentioned, for they possess no obstetric interest, being deeply covered by soft parts, and never forming the presenting part of the child.

The imperfect ossification of its several constituents is the most remarkable, and, in a practical point of view, the most interesting, feature of the superior portion of the cranium. In consequence of this, considerable intervals are left between the bones, in the direction of the future sutures of this part of the head. These membranous interspaces have usually been denominated, in advance, sutures, not however, with strict propriety of speech; I prefer designating them, as M. Moreau has proposed, by the term "commissures." The parietal bones are, in the fetal skull, separated from the *os frontis* by the *coronal* commissure, and from the occiput by the *lambdoidal*, while themselves are parted by the *sagittal* commissure, which derives its name as Dr. F. Ramsbotham vouchsafes to inform us, from its being fancifully supposed to be situated between the lambdoidal and coronal, as an arrow is placed in a strung bow (1). The comparison is not, after all, so fanciful as to the fetal skull, for, the *sagittal* commissure extends to the root of the nose, dividing the two pieces of the frontal bone, and thus, like an arrow, projects beyond its bow. It is better, with most authors, to regard this as an extension of

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(1) Process of Parturition; New Phila. ed., 1845, p. 31.

the sagittal commissure, than to call it, as Dr. Ramsbotham does, the *frontal*.

But there are other and larger *soft* places in this part of the fetal cranium, called *fontanels*, and produced by default of ossification at the angles of the bones. Two of these only are worthy of any special notice. One is found at the intersection of the sagittal and coronal commissures, and the other at the posterior extremity of the sagittal, where it meets the lambdoidal. The former is the *anterior or bregmatic fontanel*, which is distinguished by its quadrangular shape, and the openings at its angles caused by the entrance of the coronal and sagittal commissures. It is, besides, the largest of the fontanels. The latter is the *posterior or occipital fontanel*, which is of a triangular figure, and has, likewise, openings at its angles caused by the sagittal and lambdoidal commissures. It is of the utmost importance that the obstetrical practitioner should be able to recognize these fontanels by the sense of touch alone, and this he will be enabled to do by a little care and attention.

The construction of the cranial vault (the most voluminous part of the head), by separate bony pieces, with such large interspaces, is evidently calculated to facilitate its passage through the pelvis in childbirth. There are, perhaps, few labors in which these bones are not made to approach each other more closely, and, in some instances of disproportion, their edges overlap, so as materially to alter the form of the head. We are not, however, to suppose that the absolute size of the head can be sensibly diminished. If it be reduced in one direction, it is elongated in another to make room for its

contents, which are nearly incompressible. It deserves to be remarked, in connection with this, that the pulpy and semi-organized condition of the brain of the fetus enables it to suffer such compression as alters its form, with comparative impunity. At the same time, it is not improbable that, as has been conjectured, this compression produces such a degree of stupefaction as renders the fetus insensible, and prevents it from injuring the maternal structures by the violence of its struggles.

In reference to its structure, the *face* of the fetus is not entitled to any very special notice. Composed of the same bones as in the adult, it is only remarkable for its comparative diminutiveness, so that it detracts from the regular figure of the head but little more than any other of its regions.

The *shape* of the fetal head has been variously described by obstetrical writers. M. Dugès, following Levret in this particular, represents it as a *conoid*,—of which the face is the base, and the occiput the summit. But it is more correctly represented by M. Capuron as an *ovoid*, and having, therefore, *two extremities*,—one large, obtuse, and round, formed by the superior portions of the os occipitis; the other smaller, and more acute, formed by the chin.

Most of the French authors describe five distinct regions as belonging to the head; and M. Moreau fixes their metes and bounds with scrupulous precision. But, in a practical point of view, it is scarcely worth while to preserve more than two of these regions, viz., the *vertex* and *face*, because these alone offer themselves at the superior strait in head presentations, or if one of the temples is found there, it is but a rare perversion of a

vertex presentation, and can easily be detected by feeling the ear, which is its only distinguishing mark. English writers, using the term "vertex" according to its strict import, apply it to that part of the head where the hair grows in a whirl, which is nearly over the posterior fontanel; hence, Dr. F. Ramsbotham affirms "it is not *perfectly* correct to say that the vertex is the presenting part;" while he allows that "for all practical purposes it is enough to describe the vertex as the point of presentation." There can surely be no objection, however, against enlarging the signification of the term, and making it equivalent to the summit or top of the head, as M. Dugès and others have done. In this sense it will be constantly used in this work; and it will, therefore, be understood to include the anterior and posterior fontanels, and the parietal bones, from their protuberances to the sagittal commissure.

The *dimensions* of the fetal head are measured by certain imaginary lines, called its diameters, which have been as variously enumerated as denominated by authors. The following may be considered essential to a correct explanation of the mechanism of labor in vertex and face presentations. In vertex presentations: 1. The *occipito-frontal* diameter, extending from the occipital to the frontal protuberance, measuring four and one-fourth to one-half inches; this I shall call, also, the great diameter of the head. 2. The *cervico-bregmatic*, from the junction of the cervix, or hinder part of the neck, with the occiput, to the anterior fontanel or bregma. 3. The *biparietal*, from one parietal protuberance to the other; the latter two are nearly equal, and, measuring three and a half inches, may be called small diameters of

the head. In face presentations: 1. The *fronto-mental* from the top of the forehead to the chin (*mentum*), four inches, rather less than the great diameter, but exceeding the small. 2. The *gutturo-bregmatic*, from the throat (*guttur*), just above the larynx, to the anterior fontanel,—three and a half inches, and consequently a small diameter. 3. The *bimalar*, from one malar bone to the other,—three inches, and of course the little diameter. Besides these, all authors, without exception, mention another diameter, with which they usually, indeed, head the catalogue,—viz., the *occipito-mental*, from the posterior fontanel to the chin, and measuring five inches, which they call the longest diameter of the head. But I prefer considering this as the *axis* of the head, under which name it will be referred to, though I may occasionally call it likewise the occipito-mental diameter.

To each of these diameters a circumference may be given by describing a circle from their middle with a radius of half the diameter. But there is no practical utility in thus multiplying the circumferences of the fetal head: two only can be advantageously referred to in considering the passage of the head through the pelvis, in vertex cases. These are: 1. The *occipito-frontal circumference*, which passes horizontally, a little below the extremities of the *biparietal* diameter, and divides the vault from the base of the cranium, measuring thirteen inches, which I shall call, also, the *great* circumference. 2. The *cervico-bregmatic circumference*, passing over the extremities of the biparietal, as well as the cervico-bregmatic diameter, belonging equally to both. This I shall call, also, the *lesser* circumference of the fetal head, its measure not exceeding eleven inches. The *fronto-men-*

*tal* and *gutturro-bregmatic* circumferences will be easily comprehended, should there be occasion to refer to them in describing the mechanism of face presentations.

The movements which the head of the fetus can be made to execute safely, by virtue of its connection with the spinal column, are deserving the attention of the obstetrical student. These are *flexion*, *extension*, *rotation*, and *lateral inclination*. The first two are performed by the articulation of the occiput with the atlas, and the laxity of the ligaments in the fetus permits them to be carried to a greater extent than in the adult;—there being, in fact, no limit even to extension, except the check received by the occiput from the posterior part of the thorax. Hence, face presentations, which imply extreme extension, are not such constrained positions for the fetus, as we might imagine from the awkwardness, or rather impossibility, of such a movement in ourselves. Rotation is executed by the articulation of the atlas with the dentatus, which limits its extent to a quarter of a circle, beyond which it cannot be forced without risk of fatal laceration. Hence, in the operation of turning, or in the management of nates presentations, the practitioner should take care not to rotate the child's body beyond this limit, lest the head, yet contained in the uterus, might not participate in the rotation, and the child be destroyed by the injury inflicted on it. There is no special articulation for lateral inclination: it is performed by the yielding of the ligaments and fibro-cartilages of all the cervical vertebræ, and can be carried so far as to place the side of the head upon either shoulder.

*Secondly.* The *pelvic extremity* of the fetus offers

much less to interest us than the cephalic. Its form is spheroidal, and between its two hemispherical surfaces there is a cleft in which the anus and genital organs are found. It is to be observed that the pelvis proper of the fetus is very small, being, in fact, almost in a rudimentary state; but its magnitude, obstetrically considered, is increased by the articulation of the inferior extremities with it, and the peculiar manner in which these are folded upon it. Two diameters only are ascribed to it, viz., the *transverse* and *antero-posterior*. The transverse extends from one ilium to the other, and measures about four inches. The measure of the antero-posterior diameter is not constant, being more or less according as the inferior extremities make a part of it by maintaining their usual position, or depart from it, by the legs being extended upon the abdomen. In the first case, the antero-posterior diameter is greater, in the second case less, than the transverse.

Composed of a considerable number of pieces, which are but imperfectly ossified, some of which are even in a cartilaginous state, the pelvis of the fetus may be somewhat reduced in volume, by the pressure it experiences in its passage into the world. The softness and flexibility of the parts in connection with it, allows this extremity of the fetus to be molded to the shape and dimensions of the maternal pelvis, without much injury to their structures.

*Thirdly.* The *trunk of the fetus*, though quite bulky, is composed of a great number of pieces, some of which, viz., the ribs and sternum, are in a cartilaginous and imperfectly ossified condition. It presents a uniform curvature forward, produced by the flexion of the

spine, which differs from that of the adult in offering but a single curvature, instead of three, in opposite directions. The posterior surface of the trunk is rendered much more prominent and regularly convex by this anterior flexion of the spine. To the superior or thoracic portion of it are reckoned two diameters: 1. The *transverse* or *bisacromial*, which extends across from one shoulder to the other, and measures four and a half inches. 2. The *antero-posterior* or *dorso-sternal*, from the spinous apophysis of the last dorsal vertebræ to the ensiform cartilage of the sternum, measuring three and a half inches. The mobility of the shoulders and ribs, together with their compressibility, easily allows, as M. Moreau observes, the bisacromial diameter to be reduced to three and a half inches, while the flexibility of the spine enables the entire trunk to accommodate itself to the curvature of the pelvic canal during labor.

It remains to inquire into the *situation* of the fetus in utero. It has already been stated that the size and figure of the fetus are adapted, by reason of its peculiar attitude, to the capacity and shape of the cavity in which it is contained. Let us examine this adaptation a little more particularly. The cavity of the gravid uterus is of an ovoidal figure, the large extremity of the ovoid being at the fundus and the small at the cervix. The figure of the folded fetus is likewise ovoidal, its nates being the large, the head the small, extremity of the ovoid. It is obvious, then, that the fetus would be most commodiously *situated* with its head toward the cervix, and its nates toward the fundus, uteri.

Again. The transverse dimension of the uterine cavity is greater than its antero-posterior, while, on the

other hand, the antero-posterior dimension of the fetus, viz., from its back to its abdomen, is greater than its transverse, viz., from side to side. The fetus would, therefore, find more room in its lodging, with its back toward one side of the uterus, and its abdomen and flexed members toward the other. But the remarkable convexity of its back needs a corresponding concavity of the uterus to accommodate it, and this is offered by the anterior wall of the uterus, which is more concave than the posterior. If, therefore, its back were directed forward, it would be accommodated in this respect.

Now, the most usual situation of the fetus in utero is such as to put it in possession of all these comforts. Its head is toward the cervix, its nates toward the fundus, while its back is turned, neither laterally nor anteriorly, but toward the left anterior or right anterior portion of the cavity of the uterus. This accounts for the more frequent presentation of the head at the time of parturition; but, it may be inquired, what causes the fetus to assume, and generally to maintain, this position in the womb, during the period of gestation? This question has excited the curiosity, and exercised the ingenuity, of medical philosophers in ancient and modern times, and still it can hardly be considered as satisfactorily answered. It was formerly believed that the fetus sits in the uterus, with its fore parts directed toward the mother's abdomen, until the seventh or eighth month of pregnancy, when, from the development of the head, and its preponderance over the rest of the body, it turns topsy turvy, the head falling forward and downward, while the nates rise to the fundus uteri.

This opinion was completely refuted by the observations of Delamotte, Smellie, and Baudelocque, and is now universally abandoned. But it is still commonly taught that the weight of the head, compared with the rest of the body, at all stages of fetal development, is the cause of the great frequency of its presentation.

This purely physical theory has been combated, and in my opinion, satisfactorily refuted, by M. Paul Dubois (1). Whether the explanation which he has offered in lieu of it, is to be regarded as equally satisfactory, may admit of doubt; but surely his researches are entitled to more notice than they have received, on account of the valuable facts which have been disclosed by them. I shall, therefore, offer no apology for presenting my readers with an abstract of his interesting memoir.

In opposition to the theory in question, M. Dubois alleges:

*First.* If we take a dead fetus, from the fourth to the ninth month of gestation, and put it, by means of bandages, in the attitude natural to it in the uterus, it may be plunged into tepid water without the head sinking more rapidly than the rest of the body. This is the ordinary result, when vessels are used for the experiment as nearly as possible the size of the uterus, at the different periods of gestation to which the fetus belongs. But the experiment is rendered more convincing, if the fetus be plunged into a larger quantity

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(1) "Mémoire sur la cause des presentations de la tête pendant l'accouchement et sur les déterminations instinctives ou volontaires du fœtus humain."—(*Mémoires de l'Académie Royale de Médecine, tome deuxième. p. 266.*)

of water,—into a bathing vessel, for example,—when, falling more slowly and through a larger space, time is allowed for the head to descend foremost, if it be really heaviest; but it is found, in fact, that every part of the fetus descends with equal rapidity, the trunk preserving the horizontal position it had when first plunged into the water, and the back or a shoulder first reaching the bottom of the vessel.

This experiment, frequently repeated, constantly yielded the same result, which is no more than reasoning ought to have led us to expect,—for, if the fetal ovoid be divided into two equal parts, one consisting of the head and superior extremities, the other of the abdomen and inferior extremities, their weight is about the same. If the head contain the brain, greatly developed, the abdomen contains the liver, equally large, besides the meconium, sometimes accumulated in large quantity in the intestines, and a certain quantity of urine in the bladder.

*Secondly.* According to the hypothesis that the laws of gravity preside over the position of the fetus in utero, the head ought to be more irresistibly carried toward the os uteri in the earlier periods of gestation, when it is relatively more developed, when also the cavity of the uterus is proportionably larger, and the quantity of liquor amnii comparatively greater. But the reverse is true: *presentations of the cephalic extremity are proportionably less frequent in the earlier than in the latter months of gestation.* In confirmation of this, M. Dubois appeals to observations made in the Paris Maternity during four consecutive years, from which it appears, that in the year 1829, *thirty* children

were born before the seventh month, of which twenty-two presented the vertex, seven the pelvic extremity, and one the right shoulder. In 1830, *thirty-five* children were born before the seventh month, of which sixteen were vertex presentations, eighteen pelvic, and one shoulder. In 1831, of *twenty-three* children born at the same period of pregnancy, thirteen were vertex, nine nates, and one left-shoulder presentations. In 1832, of *thirty-four* children, not arrived at the seventh month, fourteen were vertex, seventeen nates, two shoulder, and one expelled enveloped in the membranes, its position not ascertained. Total number of premature births, one hundred and twenty-one, of which sixty-five were vertex, fifty-one nates, and five shoulder presentations. The proportion of nates to vertex was, therefore, as four to five, instead of as one to thirty-six, which obtains at full term, according to Baudelocque's statistics.

*Thirdly.* In quadrupeds, the head of the fetus presents with as much constancy as in the human species; and yet, on account of the direction of their trunk, the ovum or ova, contained in their unilocular or multilocular uterus, have nearly a horizontal position in the early period of gestation, and, in the latter period, an inclination opposite that of the fetus of the human female, seeing the fundus uteri comes, by the yielding of the abdominal parietes, to be the most dependent part of the organ. The head ought, therefore, to be furthest removed from the os uteri, on the principles of the physical theory.

If the laws that govern *dead* matter do not regulate the situation of the fetus in utero, M. Dubois concludes that those of *life* do, and that some connection exists

between the vitality of the fetus and head presentation. This conclusion is corroborated by the results of his inquiries as to the comparative frequency of head presentations, where the fetus dies, in the latter months of gestation, some time before its expulsion. During the four years occupied in his researches, *ninety-six* children were born at the Maternity, that had died during the last two months of gestation; of these, seventy-two presented the head, twenty-two the nates, and two the shoulder, making the proportion of nates to vertex presentations as one to three and a quarter, which is a great increase of the proportion that obtains where living children are born at the same period. These facts show the influence of fetal vitality in a strong light, for it would not have been surprising if the relative proportion of vertex and nates presentations had not been affected by the death of the fetus at such an advanced period of gestation. The force of this remark will be acknowledged when it is recollected that in the latter months of pregnancy, the fetus is too large, relatively to the cavity of the uterus, easily to allow any essential change to take place in its situation; and it might, therefore, be supposed that whatever position it happened to occupy at the time of its death, would be preserved in spite of the disturbing influence of extraneous causes. Such causes,—violent exercise, jolting, stooping, lifting, etc., for example,—would be more powerfully operative upon the dead fetus, were there more room in the cavity containing it; and accordingly it appears, from observations collected in the same ample field by M. Dubois, that if the fetus die *during the seventh month*, it will be born as often under a nates as

head presentation. Thus, in the years 1829, 1830, 1831, and 1834, *forty-six* children, dying in the seventh month of pregnancy, were born at the Maternity; of these, twenty-one were head presentations, twenty-one nates, and four shoulder,—a remarkable result, compared with that of living children born at the same period of pregnancy; for, during the same years, *seventy-three living* seven months' children were born, sixty-one of whom presented the vertex, ten the nates, and two the shoulder.

These facts leave no doubt of the influence of the life of the child over its situation in the uterus; but if it be inquired how is this vital influence exerted, it would perhaps be presumptuous to speak with equal positiveness. After establishing, by a great number of observations, the fact that the fetus possesses sensibility and performs muscular motions, in consequence of the various impressions it receives, M. Dubois contends that its voluntary or instinctive movements, in obedience to an internal sensation, cause it to occupy the position it does. In answer to the question, what is the nature of this internal sensation? he asks whether the abnormal situation of the fetus, in which its nates correspond to the small extremity of the ovum, is inconvenient or painful and gives rise to spontaneous movements to change this position for one of ease, or whether, as both extremities of its trunk are best accommodated to the form of the ovum, with the nates above and the head downward, it is the comfort (*bien-être*) of this situation that determines the fetus to seek and retain it? He does not pretend to decide the question, but observes further, that the fetus executes its greatest

movements with the inferior extremities, and that these are easier, more extensive, and less trammelled when its pelvic extremity corresponds to the large extremity of the ovum, and that possibly this circumstance has something to do with the choice of its relations to the uterus.

Whatever may be the cause of the peculiar situation of the fetus in the womb, there can be no doubt but it is to be reckoned among the most felicitous of its obstetric aptitudes.

## CHAPTER III.

## OF THE APPURTENANCES OF THE FETUS.

THE fetus does not exist in its mother's womb, in an isolated manner, having no other dependence upon her than for lodging, but it draws from her likewise its nourishment, and even breathes through her. These necessary offices are performed for it, through the medium of what I have called its appurtenances, namely, its *membranes*, the *placenta*, and the *umbilical cord*, constituting together what are commonly called the *secundines* or *afterbirth*, because they are usually cast off *after* the birth of the child. As obstetricians, we are only concerned with these appurtenances of the fetus, at the close of gestation, and it is at this advanced period I shall consider them, except so far as reference to their earlier history may be necessary to a correct understanding of their structure and uses.

(A.) *The fetal membranes.* These consist of three layers, forming a complete envelop of the fetus, and upon the outer surface of one of them the placenta is formed, at a certain stage of gestation. The most external of these membranes is the *decidua*, which is produced upon the internal surface of the uterus, very early after conception, to fit it for the reception and nourishment of the ovum, but which, at the period we

are now considering, is very much attenuated, everywhere except in the placenta, to whose formation it contributes. The decidua can, in fact, at this period, be demonstrated with difficulty, being seen only in shreds and patches, as I have, many times, satisfied myself by examining recently ejected secundines. It is, therefore, no wonder that its existence has been called in question by Baudelocque, Capuron, and others.

The other two membranes, viz., the *chorion* and the *amnion*, are the property of the fetus; they are brought with the ovum when it enters the cavity of the uterus, and their growth keeps pace with the development of the fetus. The chorion is the outermost of these, and appears, at the period we are contemplating it, like a membrane of fibrous structure,—possessing considerable thickness, being smooth, diaphanous, destitute of visible bloodvessels, and connected to the amnion and vestiges of the decidua by very fine cellular tissue. At an earlier stage, its external surface is shaggy, being thickly set with villi, which become vascular; but when the placenta is formed upon a portion of this surface, the rest of it assumes the smooth, non-vascular appearance just described. The innermost layer, the amnion, appears to belong to the class of serous membranes. It is thinner than the chorion, and has a smooth, polished, internal surface, looking toward the fetus and bathed by the waters which it secretes, namely, the liquor amnii. Its union with the chorion, over the internal face of the placenta, is so slight that it will generally be found detached from it, in a good degree, and lying loosely upon it.

(B.) *The placenta.* The placenta is a thick,

spongy, and exceedingly vascular structure, of a circular or slightly oval figure, measuring seven or eight inches in its greatest diameter, and thinner toward its margin or circumference than in its center. It has two surfaces,—an external or uterine surface, and an internal or fetal one. The *external* surface adheres, with no great firmness, to the inner surface of the uterus; it may be connected with any portion of the organ, but most frequently it forms its attachment posteriorly and at some distance from the os uteri. When separated from the uterus, this surface of the placenta offers many smooth lobes, by some called, though improperly, *cotyledons*, and between these, fissures, which have been called *sinuses*, in which may be seen, here and there, large, smooth openings, communicating with the spongy substance of the placenta, through which blood may be made to exude by compression. The *internal* surface of the placenta is more even; it is covered by the chorion and amnion, the former being inseparably united to it, and exhibits, very conspicuously, the large branches of the umbilical bloodvessels, which diverge from its center, like the rays of a parasol.

The placenta is the organ of intercommunion between the mother and the fetus. The anatomical structure that fits it for such an office is as curious as it is interesting, and has not until recently been well understood. The account which I shall give of it, is taken from Weber, a German authority, and is derived from a note by Dr. Willis, in his translation of Wagner's Physiology, as quoted in Braithwait's Retrospect, Part XIII, page 320. According to the views of Weber, the placenta consists of a fetal and maternal portion,

the former being developed upon a part of the chorion, and the latter consisting of the inner and exceedingly thin coat of the uterine arteries and veins, that go to the placenta. To get a clear idea how these constituents are connected to compose such a structure as the fully matured placenta, we must consider them separately. And first as to the fetal portion. It has been already stated that when the ovum first comes into the uterus, its outer membrane, the chorion, is thickly covered with villi, which are not at first vascular. These villi are, at that period, nothing more than spongiolles, which probably absorb nutriment for the embryo from the surrounding fluids. But as development progresses, they become vascular, and shoot forth as processes from the surface of the chorion. These processes, in growing, form large and numerous divided stems and branches, in the manner of little trees, and are hence called *dendritic*. "Into each of these dendritic processes of the chorion there penetrates a branch of the umbilical artery, and a branch of the umbilical vein. Both vessels divide into branches in the same manner as the process of the chorion in which they run. At the extremities of the branched processes of the chorion, the divisions of the umbilical artery come together in loops or coils; these coils, however, are for the most part not simple; the same capillary winds several times hither and thither, and forms several loops;—loops are also frequently formed by the anastomosing of two neighboring capillaries. From these convolutions and loopings of the capillaries little thickenings or enlargements of the extreme divisions of the processes of the chorion are produced. Each particular trunk, with its

divarication of the shaggy chorion, forms a lobe or lobule of the placenta, which is covered by the tunica decidua, to which many of the terminal branches of the chorion will be found to have grown."

Suppose such a process of growth to have taken place from the chorion, without anything on the part of the uterus to mate it, it is obvious that among this branched work, there would be numerous interstices, not occupied by any organic product. But while this fetal portion of the placenta is being developed, the maternal portion is forming and pushing itself in the opposite direction.

This maternal portion of the placenta consists, as already stated, of the delicate, internal coat of the uterine veins and arteries, opposite the new fetal formation, and as it expands, it carries a thin layer of the deciduous membrane before it, and becomes molded to the interstices of the dendritic processes of the chorion. This delicate vascular coat, with its investing decidua, does not fill the interstices, or hardly appreciably diminish their spaces, but, coming in contact with the processes of the chorion, furnishes them with a very thin covering. The arrangement of the fetal and maternal constituents of the placenta is such as would result, if we imagine, for the sake of illustration, that, prior to the sprouting of the chorion, the uterine vessels form, by their protruded internal coat and the help of the decidua, one large sack on the inner surface of that portion of the uterus, where the placenta is to be, and then the dendritic processes of the chorion impinge against this sack at various points, and as they elongate, they invert the sack at these points, bringing it

into contact with the uterine surface, where the extremities of these processes come into contact with that surface.

To render this account still more clearly intelligible, we may borrow an illustration from Dr. Chowne, a writer in the London Lancet. In one of his interesting articles, "on the source of hemorrhage in partial separation of the placenta," he uses a glove to represent the structure in question, which, as he says, is a very humble illustration, but, as a compensation for its humbleness, has the advantage of its being by no means difficult for any one to carry it into effect. "If, for instance," Dr. Chowne observes, "he takes his glove, and places it on the table with the palm downward, and the tips of the fingers toward himself, and then puts the points of his own fingers against the tips of those of the glove, and pushes them (the tips of the fingers of the glove) inward, inverting them within themselves, until his fingers have pushed them up into what might be called the body or hand part of the glove, and each finger is enveloped in the inverted finger of the glove which it has pushed up before it, he produces a representation of the manner in which the fetal vessels and the maternal vessels come together, while the current in each remains distinct." (1)

The uterine arteries and veins do not enter the placenta, and divide into twigs and branches, but immediately terminate in a network of vessels, the canals of which are of far too large diameter to permit them to be

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(1) Republication of the London Lancet, New American Series, March, 1848.

spoken of as capillaries, and of which the parietes are so thin, that they cannot be shown apart by the most careful dissection. "This vascular rete," says Weber, "which connects the uterine arteries and veins with each other, completely fills the spaces between the branched divisions of the chorion, and the extremely thin parietes of the canals of which it is composed, insinuate themselves at all points into the most intimate contact with the branches and convoluted masses of the capillaries of the umbilical system of vessels. This network of vessels, however, with reference to the passage of the uterine arteries into the uterine veins, performs the same office as a rete of true capillaries, so that it may be regarded as a rete of colossal capillaries."

That this description may be clearly comprehended, it is necessary to bear in mind, that the large uterine veins, whose inner, delicate coats penetrate the placenta, open by extremely large orifices upon the internal surface of the uterus, opposite the placenta, and may be easily seen, for some time after parturition, in women dying in childbed. These orifices *appear* to be the terminations of the veins: they are perfectly smooth, and by their oblique manner of piercing the coats of the uterus, they are partially covered with membranes in the form of valves. This is, in fact, the natural disposition of many of the veins of the uterus, independent of pregnancy, and besides other uses, may be supposed to have reference to the peculiar structure, namely, the placenta, which is to be developed, whenever pregnancy takes place. Baudelocque (1) describes the lining membrane

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(1) L'Art des Accouchemens, par. 9, 160.

of the uterus as having so many pores, or openings, that it may be said to be reticulated: some of the openings, he says, lead to tortuous cavities, called uterine sinuses (only another name for veins). There is reason to believe, that the menstrual blood escapes through these orifices,—an idea which is strongly countenanced by an observation of a late English writer, Mr. Whitehead, of Manchester. The subject of the observation alluded to, was a young woman, who died of menorrhagia, and whose system appeared, in the post-mortem examination, drained of blood. The inner surface of the uterus, after removing from its cavity a clot of blood, which completely filled it, presented, in the language of the author, “numerous openings scattered over every part of it, obvious to the naked view, some being sufficiently large to admit a good-sized bristle, or the end of a lachrymal probe. The largest and most numerous were at each side of the fundus, near the horns of the uterus, and at the contracted part of its body near the commencement of the cervix. The openings had a valved arrangement, a great number passing downward toward the cervix, while those at the upper part of the organ appeared to pass toward the fallopian orifices.” (1) I do not know that there is any such provision made for uterine gestation in the disposition of the arteries; but it is well ascertained, that the *utero-placental* arteries, examined shortly after the separation of the placenta, *appear* to terminate abruptly upon the inner surface of the uterus, being yet of

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(1) Causes and Treatment of Abortion and Sterility. Philadelphia: Lea and Blanchard, 1848, p. 51.

considerable magnitude, and after having made two or three close spiral twists upon themselves.

Although Weber's description of the placenta is *anatomically* different from that of John Hunter, it is not *physiologically* or *practically* different. It is well known that the great English physiologist taught, that the placenta is formed entirely by the fetus, and is composed principally of the ramifications of its vessels. Into its spongy structure, nevertheless, he taught, that the large uterine veins and arteries open. The arteries, said he, which are not immediately employed in conveying nourishment to the uterus, go on toward the placenta, and, proceeding obliquely between it and the uterus, pass through the decidua without ramifying, and making two or three close spiral turns upon themselves, they open at once, and without any diminution of size, into the spongy substance of the placenta. These curling arteries, he describes as being about half the size of a crow-quill, and sometimes larger. The veins of the uterus, appropriated to bring back the blood from the placenta, commence, according to Mr. Hunter, from this spongy substance *by such wide beginnings as are more than equal to the size of the veins themselves.* (1) Here, then, we have the interstices of the placenta in communication with the arterial and venous vessels of the mother, whose blood circulates through these interstices, being *detached*, as Mr. Hunter expresses it, from her common circulation. There is, therefore, in his account, a *virtual*, though not an *anatomical*, maternal portion of the placenta, and Weber has

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(1) Complete Works of John Hunter; edited by James F. Palmer, Vol. IV.; Observations on the Animal Economy.

added nothing to our knowledge of the physiology of the placenta; he has only taught us, that the placental interstices, in which the maternal blood flows, are lined by the inner coat of the uterine arteries and veins prolonged into them, and that, therefore, this blood continues to be held in its own system of vessels, and is not extravasated.

The placenta is deciduous; after the expulsion of the child, it, together with the membranes connected with it, is easily separated from the uterus and ejected. In this respect, as well as in its peculiar structure, there is, I believe, nothing like it to be found in the inferior animals, unless it be in the monkey, whose secundines, in a single instance observed by him, are described by Mr. Hunter, as resembling those of the human female. In quadrupeds, or I should rather say more restrictedly, in the *ruminants*, whose gravid uteri I have examined with some care, the connection between the fetus and mother is formed by the implantation of tufts or tassels of the chorion in the cotyledons of the uterus. These cotyledons are cup-like elevations upon the internal surface of the uterus; they are very numerous, being found not only in the body of the organ, but also in both horns, even to their termination. They appear to be the natural structure of the internal coat of the uterus (I have seen them in the calf of six weeks), and are only greatly developed by pregnancy. The vascular tufts of the chorion do not adhere to the cotyledons so firmly but they may be eradicated without laceration, and I infer (for I confess I have not happened to witness all the phenomena of parturition in these animals) that they are thus detached by the action of the uterus, leaving the cotyle-

dons, which could not, indeed, be cast off without bringing an entire coat of the uterus along with them.

Having unfolded the structure of the placenta, we are prepared to understand its uses in reference to the fetus. *First; it is its organ of respiration.* The umbilical vessels, already described as terminating in capillaries upon the dendritic processes of the chorion, belong exclusively to the vascular system of the fetus. They consist of three trunks, two arterial branches of the internal iliacs, and one large vein, the umbilical, a branch of the inferior vena cava, and have no communication whatever by anastomosis with the bloodvessels of the mother. The umbilical arteries convey no inconsiderable portion of the blood of the fetus to the placenta, which after circulating freely and minutely through it, is returned to the fetus, not a drop passing into the vessels of the mother. While circulating in the placenta, this blood is brought in contact with the blood of the mother, flowing through the canals of the maternal portion of the placenta, or at least nothing intervenes but the thin walls of these canals, and the delicate coats of the fetal capillaries. The fetal blood is thus enabled to abstract oxygen from, and impart its superfluous carbon to, the blood of the mother; and although it may be supposed that this vital operation is not as freely performed as in animals that inhale atmospheric air, it is at least as advantageous an arrangement as the branchial respiration of such as inhabit the waters, to which it is, in fact, analagous,—fishes getting their oxygen from water, and the fetus from maternal blood.

It deserves to be remarked (and this did not escape the sagacity of Mr. Hunter), that the whole constitution

of the maternal portion of the placenta is calculated to produce a slow movement of the blood flowing through it: for the utero-placental arteries are coiled where they open into it, which diminishes the force of the circulation, and then when the blood gets into the placenta, its impetus is abated by its being diffused through channels, incomparably wider than the small arteries through which it is received. The motion of the blood is so much diminished by this mechanism as, in the opinion of Mr. Hunter, *almost to approach to stagnation*. The blood of the mother being detained for a longer time in the placenta, permits the fetal capillaries to extract its oxygen, and freight its sluggish tide with carbon, more perfectly than they could do, were its motion as rapid here as in other parts of the mother's system.

In animals with cotyledons instead of a placenta, the arterialization of the fetal blood is accomplished by the juxtaposition of the fetal with the maternal capillaries in the cotyledons,—a disposition not near so favorable to this vital function as the placentary, both because there is less maternal blood in the same area, and its motion is more rapid. Hence, as I judge, the necessity of a larger extent of uterine surface, and a great number of cotyledons, to obtain which, horns are appended to the uterus. In the human female, such a structure of the uterus would not have been compatible with the symmetry and beauty of her form. The womb must occupy as little space and be as little conspicuous as possible. In such a contracted cavity, the object being to economize room, without compromising the interests of the offspring, we can think of no device better than that of a placenta.

But notwithstanding the placenta offers a structure

apparently adapted to aerate the blood of the fetus, and no other reason can be assigned why so considerable a portion of its blood is sent thither, except that it may undergo this indispensable renovation, it may be asked, is there any positive proof that such a function is performed by the placenta? Such a question is the more likely to be put, since so eminent a teacher as Dr. Blundell expresses doubt upon the subject. He has, as he informs us, been at some pains to get blood from the umbilical arteries and vein at the same time, and has not observed any difference between them, in point of color, or, if any, only a mere shade. But Dr. Blundell did not make proper allowance for the peculiar economy of the fetus, if he expected to observe as marked a difference of color between the arterial and venous blood of the cord, as between that of the pulmonary artery and veins. For it should be remembered that the blood of the mother is not, and cannot be safely, as highly charged with oxygen as atmospheric air; and could it be, there is reason to believe, that it would prove destructive to the tender organization of the fetus, its delicate tissues not being able to bear the infusion of highly oxydized and proportionably stimulating blood. There is yet another circumstance which, if duly considered, would not have allowed Dr. Blundell to look for a *scarlet* current in the vein and *purple* currents in the arteries of the cord; namely, the blood that flows to the placenta through the umbilical arteries is not, strictly speaking, *venous* in its qualities, but it is just such blood as is distributed to every part of the fetal system, for its nourishment and growth. It is a mixture of arterial and venous blood, detached from the circulatory torrent, and

sent forth to the placenta for a *small* additional dose of oxygen, and to part with a little carbon. The blood in the two sets of vessels ought not, therefore, to be expected to differ more than a *shade* in color.

The observations of Dr. Blundell, if they were carefully made, go far to corroborate the old English doctrine in relation to a cardinal point in the physiology of the fetal circulation, which, nevertheless, I consider firmly established by other facts and reasoning. The cardinal point referred to is, the necessary admixture of arterial blood from the placenta, and venous blood from the head and superior extremities, in the cavities of the heart of the fetus, and the equal distribution from thence to all parts of its body of this mixed blood. In opposition to this, it is well known, the French school of anatomy and physiology maintains that the arterial and venous currents, in their transit through the cardiac cavities, are kept, in a great measure, separate; arterial blood being distributed to the head and upper extremities, and venous blood to the nether parts of its body, as being good enough for them.

A full discussion of this controverted point would be irrelevant to our present subject; but I may be permitted to remark, that if the doctrine of the French school were true, the blood of the umbilical arteries would be found to differ more than a shade from that of the umbilical vein, although, for a reason already given, there would not be the striking contrast that is observed between the blood of the pulmonary artery and that of the pulmonary veins in a breathing animal.

If, however, not even a shade of difference in color could be detected in the blood of the umbilical vessels,

the fact might be explained by the imperfection of the placental functions which must exist whenever it is possible to make observations of this kind. The child is expelled, and the womb is, of course, very considerably reduced in volume; the placenta may be actually detached, though still in the uterine cavity. If the placenta be detached, although the umbilical vessels may continue, for a time, to carry on their accustomed circulation, there can be no aeration of the fetal blood in the placenta, nor is it needed, the lungs having come into play. If the placenta be adherent, the diminished caliber of the uterine arteries and veins, resulting from the reduced size of the womb, must render placental respiration less perfect than before the birth of the child.

We have abundant proof that the fetal blood is aerated in the placenta, in the consequences that arise from compression of the cord to such a degree as to arrest the circulation of the blood in its vessels. Such compression is liable to happen, during labor, when the cord prolapses before the head of the child, in vertex presentations, and also while the head is passing through the pelvis, in nates presentations; and whenever it does, death is the consequence, while both the celerity and manner of death show clearly that it is caused by suffocation. The cord ceases to pulsate, and the fetus, after a short convulsive struggle, evinces no further indications of life.

*Secondly; The placenta is the organ through which the fetus derives its nourishment from the mother.*

Of this, it must be confessed, there is no *positive* evidence; but, at the same time, it may be safely



affirmed that, in relation to this point, *negative* evidence is altogether satisfactory. There is absolutely no other medium through which the fetus can obtain its supplies of alimentary matters. The only other possible source is the liquor amnii, the fluid which surrounds the fetus; and the doctrine that this is appropriated, either by absorption or deglutition, has long since been exploded, by facts and arguments that cannot be answered, which need not be rehearsed in this place. How or in what form nutriment is received through the placenta, is not known; most probably there is a set of vessels, in connection with the umbilical capillaries, which open into the maternal portion of the placenta, and, abstracting from thence the needful supplies, convey them at once into these capillaries, to be incorporated with the fetal blood. Whether these hypothetical vessels take up blood, or only certain of its elements, we do not know; nor, as far as I can see, is it a matter of the least practical moment that we should know. Nature here, as elsewhere, is chary of her revelations that might gratify the curiosity, without adding to the resources of her votaries.

(C.) *The umbilical cord.* The umbilical cord is a vascular rope, of varying length and thickness, stretching from the umbilicus or navel of the fetus to the placenta. It consists of bloodvessels, surrounded by more or less gelatinous substance, and enveloped by two membranes, which are reflected upon it from the internal surface of the placenta, being nothing more than continuations of the two fetal membranes proper, viz., the chorion and amnion. No nerves or absorbents be-

long to it, and hence it is devoid of sensibility, either in relation to the child or mother.

The bloodvessels of the cord have been partially described already. The placenta is so essentially connected with them, and, indeed, constituted in such large part by them, that no account of it would be intelligible without some knowledge of them. The umbilical arteries, arising from the internal iliacs of the fetus, or being rather the main trunks of these vessels, ascend into the cavity of the abdomen, conducted by the sides of the urinary bladder (which is, in the fetus, an abdominal organ), and pass out at the umbilical opening. When they make their exit, they begin to wind around the umbilical vein, and run in a spiral manner to the placental termination of the cord, where they divide into several large branches, conspicuous upon the internal surface of the placenta. These branches penetrate the placenta, and, dividing into smaller and smaller branches, end in the system of capillary vessels, belonging to the dendritic processes of the chorion.

The umbilical vein, taking its origin from the capillaries of its associate arteries, traverses the cord in the opposite direction, as a single large trunk, enters the abdomen of the fetus, at the umbilical aperture, ascends along the linea alba to the under surface of the liver, when it assumes a horizontal direction, to reach the inferior vena cava, sending in its course two large branches to the liver. Through it a part of the blood, renovated in the placenta, is conveyed directly to the heart, and the remainder is distributed minutely to the liver, to be still further depurated by its secretory action,—its superfluous carbon, with other elements, being converted

into bile. What a heterogeneous mixture takes place in the cardiac cavities of the fetus! Here comes a stream of blood directly from the placenta, through the main channel of the umbilical vein, most uselessly called the *ductus venosus*! There comes a stream of black venous blood, from the inferior parts of the body of the fetus!! Here comes a stream of depurated blood from the liver!!! And these three kinds of blood, poured into the heart by the inferior cava, meet and mingle with a stream of venous blood from the superior cava. They are all commingled in the heart, and sent forth in harmonious union to all parts of the body, except what is dispatched to the placenta as a purveyor of oxygen for the corporation,—not that itself needs oxygen more than the blood it leaves circulating in the fetal vessels. But it is time to arouse from this pleasing, physiological revery, and resume our plodding way.

Of the two membranous coverings of the cord, the outermost is the amnion, and in tracing them toward the fetus, they are found to terminate abruptly within half an inch or so of its abdomen,—the line where they end, and the skin or common integument of the fetus begins, being indicate by a marked difference of color. There is no reason, I judge, to believe that one of these tissues is transformed into the other, as some have imagined, and it is always at the line of demarcation between them that the cord separates and becomes detached, in a few days after the birth of the child.

The umbilical cord exhibits, even to a superficial observer, several nodosities, which appear like varicose dilatations of its vein; but these will be found, on dissection, to be owing to that vessel doubling upon it-

self, that is, at such points, the vein turns back a short distance and then proceeds forward,—a contrivance which may possibly be a substitute for valves, of which it is entirely destitute. But besides these nodes, the cord sometimes presents a veritable knot, single or double, and occasionally even triple, an instance of which last occurred to the celebrated Baudelocque, and was deemed by him so curious that he gives a figure of it, in a plate (*No. VII*), devoted to this knotty subject. In that instance the cord was unusually lengthy, the triple knot was about a foot from the umbilicus, being as tightly drawn as is possible in such a case, and the cord, thirty-six or seven inches in length, was besides coiled twice about the neck. The circumstance last mentioned, viz., the cord encircling the neck,—an exceedingly common thing whenever it is longer than usual,—affords the key to an explanation of these knots, at least when they are single. They are tied by the fetus slipping through the circle about its neck; but I must confess, with Baudelocque, that it is difficult to account for such a triple knot, as he has figured, not being able to perceive clearly how the fetus could have tied it with its neck.

It was, at one time, a topic of disputation, whether these knots could be so tightly drawn as to destroy the fetus. It is difficult to believe in the possibility of such a catastrophe, seeing that the knot can only be tightened by such tension of the cord as would probably tear off the placenta from the uterus. Dr. Smellie assigns this, nevertheless, as one cause of the death of the fetus in utero, and in one of his Collections (*XIX, No. 2, Case I*), relates a case occurring in his own prac-

tice, in which, when he was first called, the membranes had ruptured, brownish and offensive waters were escaping; and the child, when expelled, was of a livid hue, its abdomen tumid, the epidermis easily peeling off, and the cord, about ten hands breadth long, was swollen and livid, having a *tightly-drawn knot* on its middle. The knot and death may, however, have been only coincidences.

In asserting, at the opening of this chapter, that the fetus is indebted to the mother for more than lodging merely, it was not meant to disparage comfortable accommodations in this respect, for the provision made for it, albeit unwittingly as far as the mother is concerned, is admirable, and points to a higher and tenderer hand that spreads its bed and protects it from harm. The provision, alluded to, is found in the *liquor amnii*, the *waters*, as they are sometimes called, which requires a brief notice, before we dismiss the present subject. This is usually a limpid, though sometimes turbid, fluid, consisting of serum, holding a small quantity of salts in solution, which surrounds the fetus and fills the sack of the amnion. It serves to protect the fetus from external injuries, and at the same time secures a certain space for its gambols. It is, moreover, the mother's defense against the pain which she would otherwise experience from the movements of the fetus, and, when labor sets in, it expedites the process by which the fetus is ushered into the world.

## CHAPTER I V.

## THE UTERUS,—CONSIDERED AS AN ORGAN DESTINED TO EXPEL THE FETUS.

THE texture of the uterus is not homogeneous, but consists of several of the anatomical elements or tissues, which compose the various organs of the body. It possesses a serous, cellular, muscular, and mucous, or sero-mucous coat, and is abundantly supplied with nerves, both sympathetic and cerebro-spinal, with bloodvessels and lymphatics. In reference to its parturient function, one of the most interesting of these tissues is the muscular;—the disposition of whose fibers merits the special study of the obstetrician. A suitable knowledge of the size, form, divisions, and relations of the uterus being indispensable to the study of its structure, I shall first offer a brief description of it, as observed in a state of vacuity.

The uterus is of a pyriform shape, flattened upon its anterior and posterior surfaces, and is contained entirely in the pelvic excavation, being situated between the bladder and rectum. Its base or largest part looks upward and forward, and is not above the level of the superior strait; its apex looks downward and backward toward the inferior extremity of the sacrum. The axis, or length of the uterus, then, corresponds with the axis of the superior strait. The base of the uterus, smoothly covered with peritoneum, reflected from the bladder, is loose or float-

ing, and is brought into relation with the abdominal viscera; while its apex is contained within the vagina,—this canal, extending from the vulva in the direction of the axis of the inferior strait, and embracing the uterus, to which it is firmly united about half an inch above its apex.

Being flattened upon its anterior and posterior surfaces, the uterus has three borders or edges,—one, *superior*, which is convex, and two *lateral*, which are slightly concave. Its lateral borders being concave, at the points corresponding to the greatest depth of the concavities, the uterus is narrower across than either above or below. Three *angles* are formed by the meeting of these borders,—two superiorly, where the fallopian tubes enter the uterus, and just below which the round ligaments take their origin, and one inferiorly, at the apex. The peritoneal covering of the anterior and posterior surfaces of the uterus, reflected from the lateral borders to the sides of the pelvis, constitutes the broad ligaments, and incloses the round ligaments, tubes, and ovaria.

Since the time of Levret and Rœderer, it has been usual to divide the uterus into the *fundus*, *body*, and *cervix*. Suppose a section of the organ made across its greatest width, that is, from the entrance of one fallopian tube to that of the other, the solid above this section is the fundus; make another section across the narrows (already described), and the solid, intercepted between this and the first section, is the body; what remains beneath the second section is the cervix. (1)

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(1) Maxima uteri latitudo est inter tubarum fallopianarum insertiones. Fingatur ibidem transversim sectus, solidum enatura supra hanc sectionem *Uteri Fundus* vocatur. Ab hac sectione imaginaria

I prefer, however, the division which nature has clearly indicated, into *body* and *neck*,—the body being above, and the neck below, the narrows. The fundus is entirely an arbitrary division; it makes, as we shall see, no part of the cavity of the uterus, being merely, as indeed the term imports, the *bottom* of the cavity, and is consequently no more entitled to be reckoned a division than the *sides* of the cavity. I shall continue to employ the term, fundus, but always in the sense now explained.

If we cut into the uterus, from its fundus to the apex, a cavity is brought to view, whose shape corresponds to the external configuration of the organ: it is plainly divided into two portions, one belonging to the body and the other to the neck. *The cavity of the body* is of a triangular figure, and has an orifice at each of its angles: 1. one inferiorly, which communicates with the cavity of the neck, and is called the *os internum*, or *cervico-uterine orifice*; 2. two superiorly and laterally, which are the minute orifices of the fallopian tubes. The fundus not only does not make any part of this cavity, as has been already observed, but in the virgin uterus it even encroaches upon it,—its internal surface being convex, as well as its external, so that it somewhat resembles the bottom of certain bottles. But in the gravid state of the organ, it is prodigiously expanded, and made to bulge outwardly, so as to contribute most largely to the

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ad sectionem alteram imaginariam, quæ concipitur transversa in loco, ubi minima uteri latitudo, interceptum solidum *Uteri Corpus* constituit. Reliquum, quod infra hanc sectionem superest, *Cervix* audit. (Ræderer — *Element.*, *Art. Obstet.*, s. 34.)

augmentation of its cavity. The same is true likewise of the sides of this cavity.

*The cavity of the neck* is narrower than that of the body, and is fusiform, or spindle-shaped; that is, it is larger above than below, and is somewhat bulging in the middle. It communicates with the vagina by an orifice in the form of a transverse slit, with an anterior and posterior lip, which is called the *os externum*, or vaginal orifice. That part of the neck which projects into the vagina (the apex of the uterus), upon whose summit this external orifice is found, is the *os tincae*, or OS UTERI.

Having premised this short description of the uterus, which seemed essential to our purpose, I proceed to notice its *muscular structure*, to which, as I have said, it is largely indebted for its properties as an expulsive organ. It is not now, as it once was, necessary to enter into an argument to prove the genuine muscularity of the uterus, for this is, at the present time, generally admitted. In the vacant state of the organ, it must be confessed, this structure is so little apparent, and the fibers belonging to it are so destitute of anything like methodical arrangement, that it is no wonder many authors refused to give it a more distinctive appellation than *fibrous coat*, or even *tunica propria*, which signifies nothing as regards its nature. In the quiescent state of the organ, there is no use for a well-ordered muscular coat, and hence nature, always economical in her endowments, allows it to remain in a rudimentary condition. The fibers are all there, but they are but little developed, and instead of observing any definite distribution, they cross each other at all angles, and form an inextricable tangle. But when touched by the magic wand of generation, these fibers

begin to appear in their true character, and to arrange themselves in the most advantageous order, and by the close of gestation, they are ready to fulfill what is required of them.

The foregoing remarks are strictly true of the fibers belonging to the *body* of the uterus (to which, as we shall see, the expulsive trust is confided), but only partially true of those of the *neck*. Upon laying open the cavity of the neck, especially of the virgin uterus, a longitudinal column of fibers will be observed upon the mesial line of its anterior and posterior walls, and two others, not so prominent as these, at the sides of the cavity. From the mesial columns little fasciculi of fibers proceed upward and outwardly, on both sides, in a peniform manner, to meet and unite on the lateral columns.

This peculiar arrangement of its fibers gives to the interior of the cervix uteri an arborescent appearance, which has been called the *arbor vitæ*, whether from a fancied resemblance to the shrub so named, or because under its branches lies the pathway to life, I know not.

The arrangement of the muscular fibers of the uterus, particularly of its body, even at the term of gestation, is not a little intricate and complex; it is no wonder, therefore, that Baudelocque and most of the French obstetricians abandoned all hope, as M. Velpeau says, (1) of being able to determine it, and adopted the *idea* of Müller, that these fibers are all disposed in loops parallel to the axis of the uterus, or in horizontal circles,—the first chiefly forming the body and fundus of

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(1) *Traité Complet de l' Art des Accouchemens*; deuxième ed. Paris, 1835. Tome 1, p. 86.

the uterus, while the second are found more especially in the neck. Dr. Dewees, I know not by what authority, invests the uterus with a *complete suit* of circular as well as longitudinal fibers, extending from the os uteri to the fundus, and was, for his pains, exceedingly puzzled to make the creature of his fancy behave itself seemly during labor.

We are indebted to the researches of Sir Charles Bell (1) and Madame Boivin (2) for more satisfactory views of the subject; we may, indeed, flatter ourselves that it is now sufficiently well understood for all useful purposes. From these researches it appears —

*First.* When the peritoneal covering of the uterus is removed, an *external muscular layer* is discovered upon the superior part of the body of the uterus, consisting of fibers that part from each other on the mesial line of its anterior and posterior surfaces, and run obliquely downward and outward, to the borders of the uterus. The fibers from the fundus are continued upon the fallopian tubes and ligaments of the ovaries, while the rest, from both surfaces of the uterus, converge toward and are continued upon the round ligaments which they, in fact, constitute. Madame Boivin, tracing these fibers from the mesial line, very aptly compares their appearance to that of the long hair of the human head, parted the whole length of the mesial line of the cranium, smoothly combed on both sides of the forehead, and tied a little anterior to each ear. Sir Charles Bell,

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(1) Paper on "The Muscularity of the Uterus."—*Med. Chirurg. Transact.*, Vol. IV, p. 338.

(2) *Traité Pratique des Maladies de l' Uterus*, par Mme. Boivin et A. Dugès, Paris, 1833. Tom. II, et Atlas.

on the contrary, describes them as arising from the round ligaments, and spreading in a diverging manner over the fundus until they unite and form the outermost stratum of the muscular substance of the womb; the round ligaments he regards as their tendons. His view of them is, I think, the most correct; but we may call them, with Madame Boivin, the *oblique* fibers of the uterus. When it is remembered how largely the fundus of the uterus is developed during pregnancy, and that the whole of its expanded surface, even down to the insertion of the round ligaments, is invested with these fibers, we may form some idea of their extent.

*Secondly.* Upon inverting the uterus and brushing off any portions of decidua that may be adhering, an *internal layer* of fibers will be easily seen, consisting of *concentric circles* around the orifices of the fallopian tubes. These circles are, of course, small next to the orifices of the tubes, but enlarge as they recede, until the outermost ones meet and mingle upon the mesial line of the anterior and posterior surfaces of the uterus. These concentric fibers are described in the same manner by Sir Charles, and Madame Boivin, and any one may easily satisfy himself, as I have several times, of their trustiness, by simply opening and looking into a recently gravid uterus.

With regard to the fibers belonging to the inferior part of the body of the uterus, viz., the part below the insertion of the round ligaments (which is comparatively small, owing to the predominant development of the superior part), nothing very definite can be said; they preserve much of the intricate interweaving that characterized them anterior to pregnancy, and somewhat

of the same may be observed still in the superior portion of the organ, intermingled with the regular order just described.

*Thirdly.* As to the fibers of the neck, Madame Boivin describes them as *circular*, with some remains of the arborescent appearance peculiar to them in the vacant state of the uterus. Sir Charles Bell informs us that he "has *not* succeeded in discovering circular fibers in the os tinæ, corresponding in place and office with the sphincter of other hollow viscera," but he does not tell us what he *has* discovered. I will endeavor to supply the omission. If we lay open the cavity of the uterus of a woman who has died during parturition, or at an advanced period of pregnancy, when the neck is unfolded, and look toward the os tinæ, we shall see that its external orifice is surrounded by a series of circles, enlarging as they recede from the orifice. Each circle belonging to this set is composed of four segments, united upon the mesial line anteriorly and posteriorly, and at the sides of the neck, and we have no difficulty in recognizing these *circular fibers* as the penniform fibres, rendered horizontal by the expansion of the neck, which their peculiar arrangement is apparently adapted to favor. Such is the disposition of the fibers of the neck, as it appeared to me in the examination of several gravid uteri, even without the aid of dissection, and as one preparation in my collection will serve to show.

The natural division of the uterus into body and neck has been already mentioned; we have noticed likewise a very remarkable difference between these parts of the same organ, in regard to the arrangement

of the muscular fibers belonging to them, in the unimpregnated state, viz., penniform fibres in the neck,—an undefinable web in the body. Let us inquire whether there are any other points of anatomical difference.

From the most accurate investigations that have been made, it appears that they differ as to the tissue of their lining membrane. A mucous membrane has been ascribed to the uterus, by most authors, as the lining of its entire cavity; but M. Moreau observes (1) that it is not possible to demonstrate the existence of such a membrane *in the cavity of the body*, by any of the processes resorted to by anatomists for such a purpose. Mucous membrane can be traced from the vagina within the os tinæ, but does not extend beyond the cavity of the cervix: here also there are imbedded in it a great number of mucous follicles, some of which are so large that they were mistaken for germs, by Naboth, and are hence called *ova Nabothi*. These follicles occupy the sulci between the penniform fibers; whereas the surface of the cavity of the body is smooth, being alike destitute of rugæ and muciparous follicles, and is correctly described by Moreau as soft and pulpy, of a brownish or dark-red color, and usually containing a brown or dirty-gray fluid. The anatomical evidence against the existence of mucous membrane in the cavity of the body is corroborated by a number of facts, one of which only I shall refer to: it is the complete obliteration of the cavity, frequently observed in old women as the natural consequence of its disuse, which has not

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(1) *Traité Pratique des Accouchemens*; Tom. 1, p. 124.

been known to extend lower than the cervico-uterine orifice. Now, the cavity of organs furnished with true mucous membrane is not liable to be obliterated by such cause; in cases of artificial anus, for example, the portion of intestine below the accidental opening continues pervious for life, although it no longer gives passage to fecal matter.

The membrane lining the cavity of the corpus uteri is exceedingly delicate,—so delicate, indeed, that its existence has been called in question by Madame Boivin and Dugès (1), and M. Moreau is perplexed to determine its anatomical character. The latter remarks that the internal surface of this portion of the uterus has neither the brilliancy of the peritoneum nor the whiteness of the vaginal mucous membrane, and he regards it as a *perspiratory surface*, intermediate, in respect to its organization and uses, between the serous and mucous tissues.

These anatomical differences awaken a suspicion that the body and neck of the uterus are destined to perform different offices, and as the doctrine that they do perform different and antagonistic parts in the drama of labor will be maintained in the next chapter, we shall inquire now what evidence there is of this diversity of office under other circumstances than parturition.

*First.* The body and cervix do not concur in the production of the menstrual discharge, which is exhaled entirely from the lining membrane of the body. This statement rests on the observations of Madame Boi-

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(1) See joint work, already quoted.

vin (1) who says expressly that she has often had occasion to examine the uterus of young girls, who died at the menstrual period, and has found the internal surface of the organ covered with a layer of bright-red blood; that compression causes it to escape in numerous little drops from the body, but never from the neck, of the uterus; and that it is now satisfactorily demonstrated that, in health at least, the menstrual discharge has its seat in the cavity of the body alone. Baude-locque (2) asserts, however, that the menses distil from small orifices which may be observed over the whole extent of the cavity of the uterus, including its neck and perhaps the vagina, and other writers concur in this view. The observations of Madame Boivin, therefore, need confirmation; but in the meanwhile we have but little doubt of their correctness, and believe that they furnish a strong argument in favor of the separate functions of the body and neck of the uterus. If the organ were a unit, in such a sense as to forbid its division into parts, anatomical or physiological, ought not the menses to flow equally from every portion of its internal surface?

*Secondly.* The body and neck perform different offices during *gestation*. To the body it belongs to make preparation for the reception, growth, and accommodation of the ovum; to the neck, to make provision for its retention and safe keeping. Let us examine, in detail, these several offices of the body and neck, in or-

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(1) Mémorial de l' Art des Accouchemens, quatrième edit. Paris, 1836, p. 62.

(2) L' Art, &c. Tome I, p. 176.

der to exhibit the isolated parts they play during pregnancy.

The preparation made for the *reception* of the ovum consists in the formation of a membrane that lines the uterine cavity and becomes the outermost covering of the fetus. Many discrepancies are to be found among authors concerning this deciduous membrane, but thus far all are agreed at present, viz., that it does not extend into the neck, but lines only the cavity of the body. Dr. W. Hunter, it is true, describes and figures it as continued down the passage in the neck of the womb and insensibly lost or blended with the glutinous cement (1). But later observers, who have investigated the matter on a large scale, aver that the decidua does not pass the cervico-uterine orifice, but is stretched across it and also over the orifices of the fallopian tubes, and that thus it forms a perfect sack without any openings, filled with a fluid, limpid at first, but afterward slightly lactescent. According to M. Breschet (2), the decidua or the *perione* (as he calls it, from its surrounding the ovum) extends several lines, sometimes half an inch, into the fallopian tubes, appearing like appendices when the membrane is removed entire from the cavity of the uterus. These appendices, more evident at an early period of pregnancy, are solid, and do not, therefore, extend or prolong the cavity of the uterus, and they serve, as M. Breschet conjectures, to fix the decidua, whose feeble adhesion renders it easily

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(1) *Anatomy of the Gravid Uterus*, London, 1815.

(2) "Etudes de l'Œuf."—*Mémoires de l'Académie Royale de Médecine*, Tome. II, p. 1.

liable to separation and displacement. M. Breschet agrees with Velpeau and others, in declaring that the decidua does not dip into the cervix uteri, which he thinks very singular, considering that it might have been prolonged in that direction more readily than into the fallopian tubes. But we cease to wonder at this, when we reflect that the body and cervix are distinct parts of the uterus, and have separate offices assigned them.

The utility of the decidua in fitting the womb for the reception of the ovum is manifest: entangled in its pulpy substance, the minute and delicate ovum is prevented from dropping into the common cavity of the uterus, and is held steadily in apposition with the fundus or upper part of the organ until its connection is formed. If there were no decidua, the ovum would fall into the general cavity of the womb, and might as readily unite itself to the cervix as to the fundus — a location fraught with disasters and death, as we are taught by the melancholy cases of placenta prævia that occasionally occur in practice.

The provision made by the body of the uterus for the *growth* of the ovum is found first in this same deciduous membrane, and subsequently in the maternal portion of the placenta, which is composed in part of the decidua. The fluid which is secreted into the decidual sack, the *hydro-perione* of M. Breschet, is the first nourishment that the uterus prepares for the ovum, and this is probably appropriated by imbibition. When its attachment is effected by the formation of the placenta, the hydroperione ceases to be secreted, and the umbili-

cal vein of the fetus takes up nourishment from the cells of the placenta by means of its numerous radicles. From this statement it is evident that the nourishment of the fetus is committed to the body of the uterus and not to its neck.

The growing ovum requires for its *accommodation* the gradual enlargement of the cavity of the uterus. Does the cavity of the body or neck, or of both, enlarge to furnish this accommodation? Baudelocque taught that both contribute, in a certain established order, that is, that during the first six months of pregnancy, the body only of the uterus enlarges, on account of its fibers being more supple than those of the neck; that at the sixth month the neck begins to be developed to furnish its quota toward augmenting the cavity occupied by the fetus; that henceforth the fibers of every part of the uterus are equally developed until near the close of gestation, when those of the body, having been developed first, offer the greatest resistance to further distention, and then there is no longer an equilibrium between them and those of the neck; that, the equilibrium being broken, the fibers of the body begin to make efforts to expel the fetus, discoverable by the alternate relaxation and tension of the membranes, felt by the finger at the uterine orifice; and that henceforward the fibers of the neck, receiving the whole of the distending force of the uterine contents as well as the reaction of the body, are much more rapidly developed, and all further increase of the uterine cavity is obtained by their distention, which is so great that at the commencement of labor, the parietes of the neck are not

thicker than two or three sheets of ordinary paper (1). It will be perceived that this account of the development of the gravid uterus is based upon Levret's doctrine of the antagonism of the body and neck. The antagonists, in the hands of Baudelocque, are made to operate in such a way as to explain the phenomena, as they were believed by him to exist. First the neck predominates, then there is an equilibrium between it and the body, and ultimately the body becomes predominant and continues so until the induction of labor. Divested of speculation, the account is simply this: during the first six months, the distention is confined to the body, but from this period the neck gradually shortens, its upper part being imperceptibly added to the cavity of the body until the end of gestation, when it forms together with the body one common cavity, and nothing remains of it but the cushiony circle of the external or vaginal orifice.

This view of uterine development has been generally adopted by writers, who differ only as to the period of pregnancy when the expansion of the neck commences and is completed. But lately its truth has been questioned, and now there is scarcely a doubt but it is entirely erroneous. According to the observations of M. Cazeaux (2), the neck, especially in women who have borne children, preserves the whole of its length until the last fifteen days of pregnancy, or at least until the commencement of the ninth month. He avers that he

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(1) *L'Art des Accouchemens*, Septième edit. Paris, 1833, Tom. 1, p. 110.

(2) *Traite Theorique et Pratique de l'Art des Accouchemens*. Paris, 1841, p. 59.

has repeatedly verified this fact, which had already been noted by Professor Stolz, of Strasburg, and publicly taught by Professor Dubois since 1839. "At this time" (November, 1839), says M. Cazeaux, "I have in my course a woman advanced to the last fifteen days of her pregnancy, in whom the internal orifice is not yet opened, though the neck below it is sufficiently dilated to admit the whole of the first, and half of the second, phalanx of the finger." It thus appears that, in women, who have borne children before, the expansion of the neck commences below, and extends upward, reaching its middle by the seventh month, and nearly to the internal orifice toward the end of the ninth, when the cavity of the neck resembles an inverted funnel. At this time, the internal orifice is puckered and closed like a purse; but it finally dilates, and permits the finger to reach the membranes, after passing through a cylindrical canal, an inch to an inch and a half long. The membranes can sometimes be touched as early as the seventh month, by passing the finger through this cervical canal.

In primiparæ, the cervix uteri offers some peculiarities, which, as far as our present subject is concerned, consist in its shortening somewhat, instead of preserving, its usual length, throughout the greater part of pregnancy, as in multiparæ, and in its expansions commencing, according to M. Cazeaux, above, and extending downward. Professor Stolz (1) explains this shortening in the following manner: At the sixth month, the vaginal portion of the neck begins to shorten,

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(1) Quoted by M. Cazeaux, *Op. Cit.*

while *it widens at its superior part*. The external orifice, continuing closed, approaches the internal, and consequently the cavity of the neck becomes larger in the middle, *until the two orifices are brought near each other*; the *internal orifice then opens first*, which happens during the last fifteen days of pregnancy; the rest of the body disappears much more rapidly than it done before, and a projection can no longer be felt; the external orifice remains closed.

M. Cazeaux, while he will not reject the explanation of M. Stolz, acknowledges that he cannot reconcile these two phrases, which he underlines—*the superior part of the neck expands, then the internal orifice opens first*. If the superior part of the neck widens at the sixth month, he inquires, how can the internal orifice still exist at the end of pregnancy? This would truly offer an insurmountable difficulty; but Professor Stolz, as quoted by M. Cazeaux himself, does not say that the superior part of the *neck*, but of its *vaginal portion*, widens at the sixth month; and in saying that, some time after this occurs, the internal orifice opens, there is nothing that needs to be reconciled.

The observations of Professor Stolz are substantially confirmed by M. Chailly; and the entire account, which he gives of the changes that the neck undergoes during pregnancy, contradicts the hitherto received opinions of writers on the subject.

There is one well-known fact, to which we may allude, that goes far to establish the accuracy of these researches of MM. Stolz, Dubois, Cazeaux, and Chailly, if it be not of itself sufficient to refute the opinion formerly entertained. It is this: When the neck of the

uterus is so much developed as to allow the finger to be passed to its upper orifice, which it is by the seventh month in multiparæ, the membranes can be felt and are organically united to the uterus around the margin of the orifice. When, again, the neck is entirely obliterated, as it is at term, the membranes can be felt and are still attached around the os uteri. Now, as it is admitted that during the first five or six months, the ovum is confined to the cavity of the body, and that the neck is not lined with decidua, were the obliteration of the neck owing to the expansion of its upper part, either the membranes would be too high to be reached by the finger; or if they were sufficiently extensible to be pushed down into the expanding neck by the growing ovum, they would not be found adhering to its surface. The latter declaration is authorized by the fact that, in the progress of gestation, the membranes become less vascular, and the disposition of the internal surface of the uterus to throw out organizable lymph no longer exists. But in either case, at the seventh or ninth month, the membranes are found to have vascular connection around the uterine orifice, for when separated by the finger, or by the uterine contractions, as in the latter case they are, so soon as labor commences, there is a slight effusion of blood.

We conclude, therefore, that the neck contributes nothing to the cavity of the gravid uterus, which is made up entirely of the dilated cavity of the body, and consequently it has been shown that the body of the uterus fulfills the various offices imposed upon it by pregnancy.

We have next to inquire how the cervix uteri ac-

quits itself of the custody, which I have said is confided to it. In the first place, shortly after impregnation, the muciparous follicles pour out an abundant secretion of their peculiar viscid mucus, which concretes into a plug that stops up its cavity, as effectually as a cork does a bottle. Dr. Burns says that this plug may be extracted entire by maceration, when a mold of the lacunæ will be obtained by floating it in spirits saturated with fine sugar (1). It is necessary that the uterine cavity should be sealed in this manner, to prevent the escape of its contents, or the intromission of anything that might disturb its delicate arrangements. No stronger proof of the functional difference between the neck and body of the uterus can be required, than is afforded by the different products of their action, excited by the same stimulus, that of impregnation. While the body secretes plastic lymph, that becomes organized into a membrane having vascular connection with its internal surface, the neck secretes tough mucus that forms an inorganic cement, having no vital communication with it.

In the second place, the cervix uteri acts as a sentry over the product of conception, by not participating in the development of the body until gestation is considerably advanced, and then only in a gradual manner, and after a fashion peculiar to itself. Should it begin precipitately to be developed, or progress too rapidly, it loses its efficacy as the antagonist of the body, and the premature expulsion of the ovum is the consequence.

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(1) Principles of Midwifery, with notes, by T. C. James, M. D. Amer. edit. from the 5th London edit., Vol. I, p. 170.

Baudelocque was fully persuaded that this is a frequent cause of abortion: he avers (1) that he has met with a number of cases wherein premature expulsion was attributable solely to the organic feebleness, natural or acquired, of the cervix uteri; and in watching the development of this part, he has confidently predicted that miscarriage would take place at the fifth, sixth, or seventh month, according to the degree of development at the time of examining, and the event uniformly verified the prediction. M. Gardier (2) confirms the truth of Baudelocque's statements: "There is no doubt," says he, "but premature labor is often the consequence of the slight resistance, natural or accidental, of the cervix uteri; and by touching a woman we may, as I have often shown the pupils assisting my practical courses, predict that labor will come on at the sixth, seventh, or eighth month, forming our judgment upon the changes which the cervix has undergone in its length and density." Levret had, indeed, made the same observation before Baudelocque or Gardier; for without the antagonism of the cervix, he declares that the product of conception would entirely escape before term, and that, in the majority of cases, this accident is to be ascribed to default of this "mechanical action," as he terms it (3).

If, then, the neck contributes nothing to the cavity destined to contain the fetus, nothing to the reception or maintenance of the ovum, but shuts up the cavity

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(1) *L'Art des Accouchemens*, Tom. I, p. 113.

(2) *Traité Complet d'Accouchemens*, Tom. I, p. 162. Troisième edit., Paris, 1824.

(3) *L'Art des Accouchemens, démontré par des Principes de Physique et de Mécanique*. Paris, 1766, p. 89.

and opposes the exit of the contents, it is truly the *sphincter* of the uterus, for such is the very definition of the term. What avails it to object with Sir Charles Bell (1) that there are no circular fibers in the os tincæ corresponding in place and office with the sphincters of other hollow viscera," or that the "loosening of the orifice, and softening and relaxation which precedes labor, is quite unlike the yielding of a muscular ring?" Such a sphincter as that of the rectum or urinary bladder, would be altogether unfit for the uterus, which has to retain its contents nine months. The uterine sphincter ought to be constructed and endowed with reference to a more persistive exercise of its office, else premature expulsion of what it is appointed to keep must, as we have seen, be the consequence. A mere ring of muscular fibers, like that of the rectum or bladder, would be inadequate to the retention of the contents of the gravid uterus for nine months. Again: the uterine sphincter must not yield to the expulsive efforts of labor, as readily as that of the rectum or bladder, in defecation or micturition, else the woman and her offspring will be exposed to the dangers that are known to attend precipitate delivery. Hence the necessity of a sphincter that will offer considerable resistance to the escape of the child—precisely such a one as the uterus possesses (2).

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(1) Medico Chir. Transact. Vol. IV, p. 345.

(2) "And even if experience (which after all is of the most importance) did not distinctly show that easy and rapid labors are always dangerous, and seldom without injurious consequences, analogy on the one side, and a nearer consideration of this great phenomenon of nature on the other, would lead to the conclusion

The facts and observations which have now been adduced, are sufficient to prove the distinct and opposite offices of the body and neck of the uterus, or we know not how any truth in physiology can be proved.

But the uterus, notwithstanding its natural division into body and neck, and its complete equipment of muscular fibers, would fail to fulfill its offices as an organ of expulsion, were it not suitably endowed with *nerves*, to put it in relation with other organs, and enable it to receive and respond to impressions made upon it. It is accordingly supplied with nerves in great abundance, and from the two great centers of the nervous system, namely, from the great sympathetic and the cerebro-spinal axis. For a full description of the uterine nerves, the reader is referred to the works of Dr. Robert Lee, of London (1), who has labored more successfully, as it appears to me, in this branch of obstetrical anatomy, than any of his predecessors. I shall attempt nothing more than to give an abstract of his observations, and, in doing this, use, as much as possible, his own language.

The nerves that are sent immediately to the uterus from the great sympathetic are derived from the *hypogastric plexuses*, and a large, oblong *ganglion* upon either

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that a certain duration of time, certain difficulties, an effort of the strength, a struggle, &c., belong to the essential requisites of the safe, uninjurious, and, in short, healthy progress of the function."—*C. F. Nagelé, on the Mechanism of Parturition, translated from the German, by Dr. Rigby, section 12.*

(1) The Anatomy of the Nerves of the Uterus, with two plates, London, MDCCCXLI; Lectures on the Theory and Practice of Midwifery, delivered in the theater of St. George's Hospital, Amer. edit., sect. 11.

side of the neck of the organ. The hypogastric plexuses are situated upon the sides of the pelvis, behind the peritoneum, and in the vicinity of the bloodvessels of the same name, viz., the hypogastric arteries and veins. These plexuses are formed by the numerous branches of the right and left hypogastric nerves, which issue from a plexus higher up, namely, the *aortic*, formed by the two cords of the great sympathetic nerve, over the last lumbar vertebra, at the bifurcation of the aorta. The trunks of the hypogastric nerves proceed through their plexuses to the lower part of the uterus, where they terminate in the cervical ganglia, already mentioned. Each of the hypogastric plexuses give off several branches to the ureter, rectum, and uterus; those sent to the uterus being of considerable size, and spreading themselves extensively under its peritoneal coat. The uterine arteries and veins receive large branches, which accompany them in their ascent along the sides of the organ, and, becoming thin and broad, terminate in great plexuses that completely encircle the vessels. These plexuses about the vessels are joined by several branches from the cervical ganglia, and they send branches to accompany all the ramifications of the vessels, passing with them into the muscular coat of the uterus.

The body of the uterus is encircled by a great transverse plexus of nerves,—regarded by Dr. Lee as the special nervous system of the uterus,—into which nerves, both from the hypogastric plexuses and the cervical ganglia, enter. This transverse plexus is described as arising near the mesial line on the posterior surface of the organ, from a mass of fibers which adheres so firmly

to the peritoneum as well as the muscular coat, that it is difficult precisely to determine their arrangement; and from thence the plexus proceeds across the uterus, in the form of a thin web, to unite with a plexus on the anterior surface of the organ, spreading out into a great web under the peritoneum. This great transverse plexus is loosely attached through its whole course to the subjacent muscular coat, by soft cellular tissue. From every part of it, branches of nerves are seen passing between the fibers of the muscular coat, and, like nervous branches in other muscular organs, dividing into smaller branches as they enter.

The *spermatic* nerves, from a higher source of the great sympathetic, attend the spermatic vessels in their course to the ovaria, and after supplying these organs with many branches, form anastomoses with branches of the hypogastric and uterine plexuses.

*Finally.* From the second, third, and fourth sacral nerves, but chiefly from the third, branches pass into the posterior borders of the ganglia at the cervix, and are lost in their mass. These accessions to the ganglia are, of course, from the cerebro-spinal system of nerves; and now let Dr. Lee's account of the nerves proceeding from the ganglia, be particularly noted. From their inner surfaces, he says, numerous small, white, soft nerves are given off to the neck of the uterus, some of which ramify under the peritoneum, and others pass deep into the muscular coat. From their anterior and inferior borders, many large nerves are given off to the bladder and vagina, and from their posterior margins to the rectum.

The researches of Dr. Lee have completely settled

the controverted question whether the nerves of the uterus are enlarged by pregnancy. The nerves were found to be larger in gravid than in unimpregnated uteri (much larger in the ninth month of pregnancy), and, as early as even the tenth day after delivery, in a woman who died suddenly, it was discovered that the hypogastric plexuses, and those both on the anterior and posterior surfaces of the body of the uterus, were very much reduced in size from what they are observed to be in the uteri of nine or even six months. "This observation made it certain," as he justly remarks, "that the nerves of the uterus, after having performed their proper function during gestation and in labor, gradually return to the condition in which they are found in the unimpregnated uterus."

## CHAPTER V.

## LABOR—ITS EFFICIENT CAUSE.

FOR human parturition, the term "labor" is a very appropriate cognomen, because seldom does woman bring forth except "in the sweat of her face;" and the most excruciating sufferings are fitly compared to the pangs of childbirth, because none can be imagined greater. The word, labor, whose original meaning is fatiguing or painful exertion of any kind, is, therefore, more significant than "parturition," which expresses the act, but none of the concomitants, of child bearing. I shall accordingly employ the term, not, however, to the exclusion of that of "parturition," but convertibly. Labor was formerly regarded as the result of the active efforts of the fetus itself, instinctively exerted to procure its release from confinement. It is strange that such a crude notion received the sanction of even the illustrious Harvey, whose incidental allusions to it show plainly that he no more questioned its truth, than that of the discovery which has immortalized his name. In his description, for example, of the case of a lady, the mother of several children, who became pregnant again, notwithstanding extensive adhesion of the walls of the vagina, resulting from injury in her last confinement (insomuch that a probe could scarcely be passed from the vulva to the uterus), he relates her despair, when

the time of her delivery arrived, and expresses his own astonishment at *the unexpected and powerful effort*, by which a very robust child broke through the vaginal adhesion, making his triumphant entrance into the world, and leaving the way open for others who might follow (1).

This notion, so repugnant to reason and observation, is no longer defended by any one; and it is now well ascertained, that *contraction of the uterus, aided by that of the diaphragm and abdominal muscles*, is the efficient cause of the child's release from the womb. Of these agencies uterine contraction is the principal, as every one must be convinced, who has felt its power exerted upon his hand in a difficult case of turning. It alone performs the first stage of labor, which consists in the dilatation of the os uteri, preparatory to the passage of the child; and may, also, suffice for its expulsion, which has been seen to take place in cases of proclivitas of the uterus, wherein the organ being entirely external, forming a large tumor between the thighs, could not receive the aid of the diaphragm and abdominal muscles (2). That the chief expulsive force resides in the uterus is furthermore proved by the number of instances in which the child has been born, and sometimes alive too, shortly after the sudden death of the mother from

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(1) Opera Omnia, de Partu Exercitatio.

(2) "Wimmer a vu l'accouchement se faire d'une manière régulière dans un cas où la matrice formait entre les cuisses une tumeur longue de dix pouces et demi et large de six et demi, dont l'ouverture était dirigée en bas." (*Burdach-Traité de Physiologie, traduit de l'Allemand, par A. J. L. Jourdan, Tome IV, p. 204.*)

violence or spasmodic affection. Nieth (1) has collected a series of cases of this kind.

It cannot be doubted, nevertheless, that the abdominal muscles and diaphragm coöperate in the expulsion of the contents of the gravid uterus, in a subordinate manner. The learned Haller doubtless erred in ascribing to these secondary agents the principal, if not exclusive, office in expelling the fetus (2). To him it appeared that the fibers of the uterus are too feeble to produce the effects required of them, viz., to propel the fetus against considerable resistance, to compress its head into a long cone, to repel the os coccygis, &c., much more, to cause disruption of the joints of the pelvis, which sometimes happens in labor. With these he strongly contrasts the abdominal muscles and diaphragm in the throes of labor, and is scarcely able to conceive how the delicate fibers of the uterus can act at all, under their overpowering compression. He concludes, therefore, that the uterus performs but a subordinate and indirect part in labor—a conclusion at which he could not have arrived, had his practical knowledge of obstetrics been equal to his profound erudition. We may consider these parturient powers separately; and First, *Of uterine contractions as the chief efficient cause of labor.*

The uterus displays two distinct modes of contraction during labor; one being intermittent and attended with pain, the other permanent and free from pain. The former consists in action of the muscular fibers of the

(1) Diss. de partu post mortem, Berlin, 1827; quoted by Burdoch, *loc. cit.*

(2) Elementa Physiologiae, Tom. VIII., Lib. xxix, sect. 5; causæ partum efficientes.

uterus, analogous to that of muscular fibers in other parts of the body, which is always alternated with intervals of repose, during which the fibers are in a state of relaxation: we may, therefore, denominate it the *muscular contraction* of the uterus, which seems to me more appropriate than "paroxysmal" or "spasmodic," by which it is commonly distinguished. The latter, viz. the permanent contraction, results from contractility of tissue; a vital property that pervades all animal textures—and it, as well as the former, occurs in the muscular tissue of the uterus. This is denominated the *tonic contraction*, and we may conceive that it is exerted chiefly in the intricate fibrous web that pervades all parts of the uterus, while the muscular contraction is performed by the several orders of fibers, whose arrangement has been described.

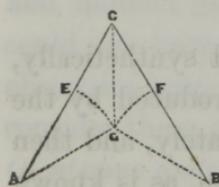
These two modes of contraction are equally essential, and each is worthy of our careful study.

(A.) *Of the muscular contraction.*

This may be studied analytically and synthetically, that is, we may first consider the effect produced by the contraction of each order of fibers separately, and then the effect of their simultaneous contraction, as is known to occur in labor.

In pursuance of this method, it is to be observed, in the first place, that contraction of the *oblique fibers* draws the fundus toward the os uteri, or, in other words, shortens the axis of the uterus, and that in a more considerable degree than, supposing them to exist, longitudinal fibers could. To demonstrate the truth of this statement, let us take those fibers on one surface of the

uterus, the anterior, for example. The fibers from both sides of the organ, running obliquely upward and meeting on the medial line, compose but a single muscle, of the penniform kind, with the round ligaments for its fixed points. These ligaments are to be regarded as its fixed points, in consequence of the connection of their lower extremities with the tendinous insertions of the abdominal muscles. J. Hunter, in his second Croonian Lecture on muscular motion, observes "that there are many half-penniform and complex muscles in the human body, but hardly one instance of a distinct complete-penniform muscle" (1). Ever since I have known the arrangement of the oblique fibers of the uterus, it has appeared to me that they constitute as perfect a specimen of such a muscle as anatomy has yet revealed; and I shall explain its action according to this view of its construction,—making use of Mr. Hunter's diagram, intended to illustrate the principle of the action of this kind of muscles generally.



Let A C and B C represent two fibers of a penniform muscle in their extended state, A and B being their origin, and C the point of their insertion. Suppose these fibers contracted to the points E and F, it is evident that such contraction will bring the point of insertion from C to G, and that the motion of the point of insertion will be to the contraction of the muscle as C G is to C F or C E; for A G is equal to A E, and B G is equal to B F, or A and B are the centers of the circles A G E and B G F.

(1) Complete Works, edited by James F. Palmer; Vol. IV., Amer. edition, 1841.

From this demonstration, it is plain that the oblique fibers shorten the axis of the uterus more than any other disposition that could have been devised, and that the advantage gained is in proportion to their obliquity.

Sir Charles Bell (1) observes that "this layer of muscular substance operating on the round ligaments, is well calculated to assist in expelling the fetus;" but he does not enter into any explanation of its action, unless it be included in his remarks on longitudinal fibers, and assigns to it other offices, which, he appears to think, more peculiarly belong to it. These offices are, to bring down the womb in the first stage of labor, and to give the uterus and the head of the child the right position with regard to the axis of the pelvis; for, without its aid, he is at a loss to conceive how the uterus, by its own action, could adjust the position of the orifice for the delivery of the child.

In the second place, the contraction of the *concentric circles* of the body must cause the walls of this part of the uterus to approximate so as to diminish its cavity in every direction. The fundus of the uterus must at the same time be depressed by them, so that they assist the oblique fibers in diminishing the length of the uterus. Another use of these concentric fibers may be that attributed to them by Ruysch, viz., to detach the placenta, for which they appear to be well fitted, seeing the placenta is a circular mass, attached to the uterus most commonly over these fibers.

In the third place, contraction of the *circular fibers*

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(1) Op. Cit.

of the neck diminishes its caliber, and closes or diminishes its vaginal orifice. The bands of fibers mentioned by Sir Charles Bell, as running upon the internal surface of the uterus from about the mouths of the fallopian tubes to the os uteri, may (if they exist) perform the office ascribed to them by him, viz., that of drawing the lower segment of the womb over the child's head; but their existence, or that of any other fibers, having such an office, is doubtful.

Before we proceed to investigate the effect of the combined action of these several orders of fibers, it is necessary to prove that they are all excited to contraction at the same time, as this has been denied by some, who contend that while those of the body contract, those of the neck are in a state of repose.

That true parturient contraction of the uterus is general, is proved by observation, as any one may satisfy himself by placing his hand on the abdomen during a pain, when the organ will be felt everywhere hard and resisting; and if, now, the finger be introduced within the os uteri, the orifice will be found contracted at the same time. In the intervals of the pains, relaxation having succeeded to contraction, no such hardness is to be felt over the uterus, and its orifice may be easily dilated, to a certain degree, by the finger. When it becomes necessary to introduce the hand into the cavity of the uterus, additional evidence is obtained, which makes the proof as conclusive as can be desired;—while the hand is, during a pain, benumbed by the contraction of the body, the orifice contracts, also, and acts as a strong ligature round the wrist.

The tendency of the simultaneous contraction of the

fibers belonging to the body of the uterus, evidently is to cause the fetus to move in the direction of the os uteri. Proceeding from the round ligaments, and dividing into two layers that spread over the anterior and posterior surfaces of the fundus uteri, the *oblique fibers* of each side grasp the organ like a pair of hands, and as the round ligaments are their *points d'appui*, they push down the fetus, while the *concentric fibers* prevent it from diverging in any direction. Could we imagine a section made across the body, at its junction with the neck, and the resistance of the bony pelvis to be removed, it is obvious that the fetus would be immediately expelled from its cavity.

But the neck *resists*, and resistance to the escape of the fetus is the alone effect of the contraction of its fibers; it is this that makes parturition necessarily *laborious* — *hoc opus, hic labor est*.

Labor, then, according to our view of it, is a contest between the body and neck of the uterus, — the former aiming to expel the fetus, and the latter to retain it. This is no novel doctrine; it was distinctly taught by the celebrated Levret (1), who maintained that, as the neck of the uterus is the antagonist of the body, during pregnancy, and serves to hinder the product of conception from being expelled, so the body is the antagonist of the neck, during labor, else the fetus could never escape; and if the neck prove too strong for the body, one of them must necessarily be ruptured. I shall hereafter attempt to explain how the battle is lost and won.

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(1) *L'Art des Accouchemens*, Troisième edit., Paris, 1766, p. 89.

(B.) *Of the tonic contraction.*

The term by which Baudelocque designated this action of the uterus, *action de ressort*, or elasticity, is expressive of its character and uses. In virtue of this contraction, the uterus, in fact, constantly tends to resume its unimpregnated volume, whenever the cause that distends it is removed.

It has been much disputed whether the gravid uterus really suffers itself to be distended by its contents, or enlarges with their growth, by a sort of *active dilatation*, so as to remain free from anything like mechanical distention during the entire term of pregnancy.

M. Gardien (1) enters, at some length, into the discussion of the question, and decides in favor of active dilatation. He thinks that the observations of Bertrandi (who, in opening the bodies of women dying in the earlier periods of pregnancy, always found the cavity of the uterus enlarged, although no fetus was contained in it) prove that its expansion is active, shortly after conception. Extra-uterine conceptions are, also, referred to by him in support of this view, because the uterus is known to acquire considerable magnitude in such cases, although no fetus or even deciduous membrane be contained in it.

The increased volume of the uterus, prior to the descent of the ovum into its cavity, may, however, be easily explained by the determination of blood that takes place toward it, immediately after impregnation. And when extra-uterine conception occurs, even should no deciduous membrane be formed, the enlargement of

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(1) *Traité Complet d'Accouchemens*, &c., Tom. I, p. 172.

the organ may be ascribed to the same cause. But in far the greatest number of such cases, the cavity of the uterus is lined by an organized membrane, and full preparation is made for the reception of the ovum. In such instances, the enlargement may be produced, in part at least, by the agency of its contents. According to M. Breschet (1), indeed, one of the uses of the fluid that fills the decidual sack, the *hydro-perione*, is gradually to dilate the cavity of the uterus by acting with a moderate but regularly increasing force, and when the *hydro-perione* is consumed, the liquor amnii takes its place in this respect.

Some, who contend for the active dilatation of the uterus during the first weeks of pregnancy, admit that it becomes somewhat passive toward the last,—the organ being solicited by the liquor amnii to dilate actively. But even this mollified mechanical agency does not meet with favor from M. Gardien, for if we do not admit, says he, that the uterus possesses the faculty of *distending itself actively*, it is impossible to conceive how the force, that pushes additional fluids into the amniotic sack, can surmount the resistance which the fluid, already contained there, makes against the mouths of the exhaling vessels, seeing this fluid reacts with equal force upon all points of the internal surface of the uterus. In other words, the pressure of the ovum that dilates the uterus ought, in M. Gardien's estimation, to stop the mouths of the uterine exhalants, and thus arrest the progress of dilatation by cutting off the supply of the

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(1) Mémoires de l' Academie Royale de Medicine, Tom. deuxième.

fluid dilator,—an objection more specious than solid. Why, it may be asked, is not the progress of dropsical effusion into the various cavities of the body arrested on the same principle, if it be really a valid one? The truth is, there is no degree, compatible with the preservation of vitality, to which the distention of animal tissues can be carried, but exhalation, as well as other vital actions, will still go on.

Lastly, M. Gardien alleges that mechanical distention would destroy the contractile power of the uterus, as it is known to do that of other muscles. But there is a wide difference between the gradual distention of the uterus, solicited by its contents, with which the growth of the organ keeps pace, and the forcible stretching of muscles to which he refers. Upon the whole, it appears that pregnancy establishes a genuine hypertrophy in the uterus, affecting all its tissues, and thus fits it for undergoing the degree of distention required by the ovum,—this distention taking place according to its requirements, and therefore under a sort of coercion, not by any imaginary faculty of active expansion.

Be this as it may, the uterus, in the exercise of its tonic contraction, acts as though it had been distended; for in proportion as the fetus is expelled, its tissue is permanently condensed, and its cavity diminished, until but little of it remains after its depletion. Nor is this all. Even before the fetus begins to be expelled, the tonic contraction is brought into operation. The muscular contractions, it is true, cannot, before the rupture of the membranes, reduce the volume of the uterus in any considerable degree, on account of its contents being nearly incompressible; but to whatever degree this

reduction may be carried, when the muscular contraction subsides, the tonic interposes and prevents the organ from relapsing to its former dimensions. Some permanent advance is thus made toward diminishing the size of the organ.

After the rupture of the membranes and escape of a portion of the waters, the tonic contraction has a fairer chance, if we may so express it, to display itself. The cavity of the uterus is not then filled by the fetus, and its walls would hang flabby and relaxed about it but for the tonic contraction, which tightens and brings them into contact with the fetus, and succors the muscular in expelling it. This succor is rendered by maintaining the ground gained by each successive muscular contraction, without which it is difficult to conceive how the expulsion could be achieved at all. In truth, it could not be, unless a single muscular contraction were sufficient; for, upon its subsidence, the uterus would relapse to its former dimensions, and the fetus recede. In order that any number of muscular contractions may expel the fetus, it is, therefore, necessary that some means be devised to secure the advance made by each, and the tonic contraction is the means appointed for this purpose, which, besides rendering this indispensable aid, protects the woman against hemorrhage afterward, by diminishing the caliber of the utero-placental vessels.

*Secondly; Of the contractions of the diaphragm and abdominal muscles, as accessaries to labor.*

Although the diaphragm and abdominal muscles are but auxiliary forces during labor, yet they render very efficient service, especially in the second stage, when the

fetus comes to distend the os uteri and vagina, and by its pressure, excites sensations, comparable to those preceding the evacuation of the rectum and bladder, called by Baudelocque "*le besoin de se délivrer.*" A glance at the physiology of the effort, which they make, will be sufficient to convince us of its utility.

The diaphragm is the principal muscle of respiration. In its quiescent state it is arched above, but in contracting it becomes more plain, and the longitudinal capacity of the chest is increased, while that of the abdomen is diminished, and consequently its viscera are pressed downward.

The abdominal muscles are chiefly concerned in expiration, being in a state of relaxation while the diaphragm is contracting, and by yielding they make room for the viscera pressed upon by the diaphragm. But when they contract, the diaphragm relaxes, and, yielding in its turn, is pushed upward into the cavity of the thorax.

Thus we see that in respiration the abdominal viscera are not forcibly pressed upon, the alternate contraction and relaxation of these two sets of muscles securing the cavity, that contains them, from any material variation of its capacity. But in labor, both sets of muscles are called into action at the same time: first, the diaphragm contracts, causing a full inspiration; before it relaxes, the abdominal muscles contract, and, the exit of the air from the lungs being prevented by the closure of the glottis, the abdominal viscera are subjected to the pressure of their joint forces. This compound pressure, acting upon the uterus, propels the fetus

in the direction of the pelvic outlet, because such is the *resultant* of the forces producing it (1).

Writers are generally agreed as to the instrumentality of the diaphragm and abdominal muscles during labor; but according to the researches of MM. Cloquet and Bourdon, as we learn from M. Cazeaux (2), the diaphragm does not exert any *active* pressure upon the superior part of the uterus, but, sustained by the resistance of the air in the lungs, its contraction fixes the base of the chest, and thus affords solid "points d'appui" to the insertions of the abdominal muscles, which alone are active in expelling the fetus.

The fixedness of the thoracic parietes gives, doubtless, greater efficacy to the contraction of the abdominal muscles, as their whole force is expended in pressing upon the uterus, instead of drawing down the ribs, as in expiration; but I am not able to understand on what grounds an *active* agency can be denied to the diaphragm. If it be admitted that its contraction is simultaneous with that of the abdominal muscles, it must press downward, or at right angles with those muscles, and thus cause the fetus to move in the diagonal of the two forces, which, as already stated, is in the direction of the inferior aperture of the pelvis.

But, besides this propelling agency, the abdominal muscles and diaphragm are subservient to labor, by embracing and supporting the uterus while it is in action. The support, thus rendered, is a great protection

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(1) Gardien, *Traité Complet d'Accouchemens*, Tom. 2, p. 210.

(2) *Traité Theorique et Pratique de l'Art des Accouchemens*, p. 265.

against ruptures, while it excites the organ to increased energy of parturient contraction. Who does not know that firm pressure upon the uterus, through the abdominal walls, is our main reliance to excite its contraction, in cases of hemorrhage from inertia after delivery?

## CHAPTER VI.

## OF THE DETERMINATIVE CAUSE OF LABOR.

THE determinative cause of labor is that which brings into operation the expulsive contractions of the uterus and its auxiliaries; it may, therefore, be properly denominated the "exciting" cause of labor, and I shall accordingly designate it by this epithet as well as by the other.

What is it that excites the uterine contractions, when gestation arrives at its term? This inquiry has been considered as impracticable, if not impious: thus, one of the latest French writers, M. Chailly, after alluding to the views of various authors, says, "I do not insist upon these various causes; for none of the theories advanced is entirely satisfactory, and we are compelled to return with M. Velpeau, to the opinion of Avicenna: "At the proper time, delivery takes place by the grace of God" (1). Dr. Dewees, too, commences his chapter on the "Cause of Labor," (in which there is much *ink shed* to little purpose) in the same strain: "Avicenna, centuries ago, declared that labor was a law of God, and that it came on at the appointed time. I would ask, has any hypothesis since that pe-

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(1) Practical Treatise on Midwifery, translated by G. S. Bedford, M. D.; New York, 1844, p. 168.

riod, enlightened us more upon this subject than the humble confession of this good old man?"

Labor does, indeed, take place by the divine appointment; but this is carried into effect by the operation of secondary causes, and it is not more presumptuous to inquire into these than into the causes of the numerous other phenomena by which we are surrounded. We cannot but think, therefore, that there is more piety than philosophy in Avicenna's hackneyed apothegm, and more indolence than learning in quoting it.

Baudelocque's theory of the induction of labor, is nearly allied to that by which he explained the peculiar development of the uterus during pregnancy; it is, in fact, only an extension of the same principle. He contends that the determinative cause of labor, at the end of gestation, resides in the uterus itself; that this cause acts constantly during pregnancy, although its effects are not usually sensible until the end of nine months; that, every moment, the developed uterine fibers are urged to expel the fetus, which affects them disagreeably; that, if they do not expel it at an earlier period, it is owing to their not being all equally urged, because, as all are not developed at the same time, the action of some is strongly counterbalanced by the natural resistance of others. The structure of the organ is such that the neck resists, during the first six or seven months of pregnancy, while the fibers of the body obey, the agents that distend and develop them: but toward the end of pregnancy, the fibers of the neck, becoming more supple, alone supply the necessary expansion, so that in less than two months, this part is entirely obliterated, and is so enfeebled that it can no longer sustain the

efforts of the body. It is then that the latter exert a *sensible action* upon the product of conception, and push it forward; if this action is not painful to the woman, its effects are discoverable by the finger, introduced to the uterine orifice and applied to the membranes. This is the first degree of labor, although the commencement of strong pains is usually reckoned as such. The time for these pains is not far distant; more powerful contractions of the uterus soon succeed this species of prelude (1).

There is no evidence of such contractile efforts of the uterus as this theory assumes, except the occasional tension of the membranes, sometimes observed toward the completion of gestation, the os uteri being then sufficiently open to admit the finger. Slight contractions of the fundus may produce this tension, but these are not such as constitute labor, for they are unaccompanied by pain, and take place without the consciousness of the individual herself. Allowing, however, that they are laborpains in disguise, their presence at so advanced a period of pregnancy is no proof of their existence during the earlier periods; and in the complete absence of such proof, we are loth to admit the assumption that they do exist, because it makes the uterus the strangest anomaly in the body, if not in nature. It is destined first to contain and nourish the fetus, and then to expel it, when its maturity is acquired. But, according to this assumption, the first is an irksome task imposed upon it which it continually endeavors to quit by expelling its contents. Such a constitution of the gestative

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(1) L'Art des Accouchemens, par. 584-5-6-7.

organ could hardly exist, and abortion be not perpetually threatened, without, as far as we can perceive, any compensating benefit; for we cannot imagine that its development could be promoted by it. There is, in fact, no conceivable way in which contraction of the uterine fibers during pregnancy could favor their development, except that imagined by Baudelocque, viz., one class of fibers stretching another by the superior force of their contraction, by which he attempts to account for the development of the cervix uteri. How, then, are the fibers of the body of the uterus developed during the first six or seven months of gestation, the neck being quiescent all the while? If these need no such force to aid their development, neither do those of the neck: both are developed after their own peculiar fashion, without the interference of one with the other. The neck, as we have seen, is developed in women who have borne children, in a manner inconsistent with the idea that any sort of force is exerted upon it by the body, that is, from below upward. If, therefore, there is no evidence of the existence of these insensible contractions of the uterus, and, from the nature of the case, none can be acquired, until the os uteri is somewhat open, may they not be excited at this time in some way unknown to Baudelocque? And is not that which excites them the determinative cause of labor?

M. Adelon (1) indorses the theory which we have been examining, and which he ascribes, no doubt correctly, to *Ant. Petit*, with the declaration that it is now universally received. "The mode in which the uterus

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(1) *Physiologie de l'Homme*, seconde édit. Tom. IV, p. 123.

is developed," says this learned physiologist, "must necessarily bring on labor. In fact, only the fundus and body enlarge at first; the cervix is the last to become dilated in its turn, its dilatation being such that it becomes as thin as a sheet of paper: henceforth, the equilibrium between the fundus and cervix is completely broken, and the continual retraction of the uterus irresistibly pushes the ovum against the cervix, opens the orifice, and engages the child in it." But, as if sensible of the insufficiency of this *irresistible* cause of labor, he seeks for adjuvants in the vital properties of the uterus, and in certain changes that take place in the placenta, the organ of attachment of the fetus. With regard to the first he alleges, that the susceptibility of contraction gradually augments during pregnancy, until in the end, the slightest irritation is sufficient to excite it into action. As to the second, he asserts that the placenta receives at first, with great facility, the blood both of the umbilical and uterine arteries; but that, in the progress of gestation, some of its vessels are obliterated, and it becomes less accessible to the blood that flows toward it: a congestion of blood consequently takes place, particularly in the uterus, which proves a sufficient stimulus to excite its contractions. The congestion, according to M. Adelon, is slight at first, and the uterine contraction that it provokes, dissipates it by forcing the surplus blood into the collateral vessels; but recurring incessantly, and increasing on account of the gradual maturation of the placenta (that is, obliteration of its vessels), the uterine contractions are also incessantly renewed, until at last they are so multiplied that labor is established.

To prove that the congestion, which is asserted to exist, is capable of producing the effects ascribed to it, M. Adelon refers to the efficacy of even small abstractions of blood, in preventing habitual abortion, to the enfeebling influence of large hemorrhages over the uterine contractions, and to the continuance of contractions after delivery, until the uterus is disgorged of blood.

It will not be denied that the vital properties of the uterus, its sensibility and contractility, are highly exalted by pregnancy; nevertheless, it would remain in a state of inertia, unless it be aroused to action by some appropriate stimulus. This is admitted by M. Adelon, who thinks he finds an appropriate stimulus in the blood, by which, he supposes, the organ is surcharged in consequence of an interruption to its free circulation through the placenta. The assertion, however, that a part of the vessels of the placenta become impermeable, as the time of its separation draws nigh, is altogether gratuitous. M. Adelon has not stated the evidence on which it rests, and I know not that any one pretends to have discovered obliterated vessels in the placenta; but I do know that, when cast off at the period of delivery, it is abundantly vascular, and that every part of it is penetrated and distended by injections thrown into it. But supposing that some of its vessels are obliterated, this must take place *gradually*, and could not the blood, that had circulated through them, be passed off by the collateral vessels, without the intermediate agency of uterine contractions? When the course of the blood in a large vessel, in other parts of the body, is *suddenly* interrupted by a ligature, it flows into collateral channels without any extrinsic help. Is the uterus less able to

protect itself against contingencies than other organs? It ought to be more able, if its office necessarily exposes its circulation to the interruptions supposed, for in that case the interruption is not accidental but natural, and nature qualifies an organ for the office she commits to it.

Let it be conceded, finally, that some of the placental vessels do become impervious, and that the uterine tissues are surcharged with blood, because the collateral vessels here cannot aid, as they do in other parts of the body, what proof have we that a mere redundancy of blood can excite the uterine fibers to contraction? It is true, that when the uterus is excited to action, an afflux of blood is invited to it, and its vascular activity is increased. But here increased vital action precedes the congestion, and is not produced by it. We cannot conceive, indeed, how a mere surplus of blood from remora can have any other effect than to oppress the vessels that are overloaded by it.

Without consuming more time with learned and ingenious speculations, I proceed to state what I believe to be the real exciting cause of labor, at the completion of uterine and fetal development, which is *irritation of the cervix, and especially of the os uteri, arising from the contact of the ovum with it*. Dr. John Power (1), the author of this theory, proposes to distinguish, by the phrase "orificial irritation," that state of the cervix which first awakens the parturient contractions of the uterus, and I shall adopt the term, for the sake of its convenience. To show that the uterus is not singular in

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(1) Midwifery, second edit., London, 1823.

being aroused to action in this manner, Dr. Power observes, that "every organ of the body is excited into proper action by a stimulus or exciting cause: the eye by the irritation of light; the ear by the impulse of sound; the voluntary muscles by mental stimuli; and the involuntary organs by their peculiar stimuli, as, for instance, the heart by the irritation of the circulating blood; the rectum by feces; the bladder by urine, and the uterus by the stimulus of its contents." He remarks, furthermore, that "all organs which are intended to retain for a time, and afterward expel, their peculiar contents, are furnished with sphincters placed at their evacuating orifices. The most remarkable of these are the rectum, the bladder, and the uterus."

Having proposed and illustrated our doctrine of the determinative cause of labor, I proceed to prove it, or, at least, to adduce such facts and arguments in support of it, as render it much more credible than the theories we have examined, or any others that have been suggested. Some considerations may first be mentioned which create a strong *presumption* that it is in this way that the uterus is excited to parturient contraction.

*First; The peculiar manner in which the uterine neck is unfolded during pregnancy.* It has been shown, in a previous chapter, that the neck of the uterus does not participate in the changes going on in the body, having for their object amplification of the cavity, but remains quiescent for a considerable time, and then undergoes changes peculiar to itself; that its unfolding, so as to admit the ovum into contact with it, is deferred to a very late period of pregnancy, until, in fact, a short time before labor sets in. What other use can be as-

signed for this singular deportment than that of guarding the neck from premature irritation, which might endanger the premature expulsion of the ovum? If it be objected, that such a peculiar mode of development of the cervix is not established by sufficient observation, and the account formerly given of the matter be preferred, still the order in which the uterus is developed, even according to that account,—viz., the body expanding for the first six months, and the neck, during the last three months, from above downward,—would appear to have no other object than to screen the entire neck from the ovum for two-thirds of the period of pregnancy, and the os uteri until a short time previous to its full term. If the neck have no special offices to perform, and is only required to contribute its quota to the aggrandizement of the uterine cavity, why is it, or why should it be, so tardy in complying with the requirement? He must be puzzled to answer this question, who denies that the cervix has any special offices to perform, and the particular one, too, which our doctrine ascribes to it.

The force of the inference in favor of the doctrine of “orificial irritation,” deduced from the peculiar mode in which the neck is developed, is corroborated by the consequences resulting from a deviation from it. It has been heretofore shown, on the high authority of MM. Baudelocque and Gardien, that premature unfolding of the neck leads inevitably to premature expulsion of the contents of the uterus. How is this to be explained upon any other principle than that of orificial irritation? It cannot be alleged that the body of the uterus continually endeavors to expel the ovum, and that

the neck is unfolded by these efforts, for it has been proved already that no such active efforts are made by the body during pregnancy.

*Secondly; The rectum and bladder being excited to expel their contents by irritation of their orifices, affords strong ground of presumption that the uterus is excited to action on the same principle.* It is hardly necessary to prove that the feces and urine are expelled in consequence of the irritation their accumulation produces at the anal and urethral orifices of the rectum and bladder. The reality of such irritation is certified to every individual, by the internal or organic sensation that accompanies it, which, like all other organic sensations, it is difficult to describe or even accurately to locate. We are, nevertheless, conscious of its existence, and may satisfy ourselves, by attending to it, that it is seated in the lower part of the rectum or bladder. When this irritation acquires a certain degree of intensity, it irresistably provokes expulsive contractions of the muscular fibers of the bladder or rectum.

The uterus may, I had almost said *must*, be presumed to be excited to expel the fetus on the same principle, because it is intimately associated with the rectum and bladder, and receives its nerves, in part, from the same sources. It will be remembered that it was stated, on the authority of Dr. Lee (whose observations on this point only confirm those of Tiedemann and others), that the ganglia upon the cervix uteri, composed of spinal and sympathetic nerves, distribute branches equally to the uterus, vagina, bladder, and rectum. It is difficult to resist the conclusion that organs, which receive their nerves from the same source, have

an essential identity of functions to perform. Like the rectum and bladder, the uterus is moreover constrained to call in extraneous aid at a certain period of parturition, and this aid is afforded it by the same powers which the rectum and bladder invoke, viz., the diaphragm and abdominal muscles, which render like efficient service in defecation, micturition, and parturition.

Whether the uterine orificial irritation that excites parturient contractions is attended by *sensation*, analogous to that of the rectum or bladder, it may be difficult to determine. I strongly suspect that it is; but this, like its kindred sensations, is so exceedingly vague that it can hardly be defined by those who are the subjects of it. Females will not be apt to speak of it, unless closely questioned; and even then all they could say would be that *uneasiness* is experienced in the region of the uterine neck. Is not such uneasiness sometimes complained of among other premonitory indications of the approach of labor? Be this as it may, however, sensation cannot be considered as essential to the existence of such orificial irritation as may serve to stimulate the uterus to action.

We need not dwell longer on presumptive evidence, when demonstrative proof of the truth of our doctrine is within reach. Here it is: *The uterus can be excited to expulsive contractions, especially in the latter months of pregnancy, by artificial irritation of its orifice.* This artificial irritation is established by the introduction of a finger within the orifice, and pressing upon its circle to stretch or dilate it. The knowledge of this fact led M. Puzos, a century ago, to propose his memorable innovation upon the previously-established practice in

cases of flooding, occurring in the latter months of pregnancy. The method of Puzos did not consist in merely rupturing the membranes, as it has been represented by nearly all succeeding writers, but in first inducing labor, where it does not exist, or strengthening it, where it is too feeble, by dilating the orifice with the fingers, as gently as nature is accustomed to proceed in ordinary cases; and when the orifice is somewhat dilated, and the membranes are rendered tense by the pains, in rupturing them to enable the contracting walls of the uterus to diminish the caliber of the bleeding vessels, as the liquor amnii flows away.

To rupture the membranes, when there is no or but feeble parturient action of the womb, would only expose the woman to increased hazard from hemorrhage, and yet, it would be easy to show, if this point of practice were our theme, this has been repeatedly done by renowned practitioners, under the pretended sanction of Puzos's authority. On this important subject, I can render no greater service than by earnestly recommending *writers*, as well as practitioners, to peruse carefully Puzos's "*Mémoire sur les Pertes de Sang*," first published in the second volume of the Memoirs of the Royal Academy of Surgery, in 1743, and subsequently in his posthumous works, entitled "*Traité des Accouchemens*, Paris, 1759.

But not only may parturition be *induced* by official irritation, artificially excited, but when labor has commenced naturally, if the uterine contractions be languid and inefficient, they may be made stronger and more effective in the same way. The principle is, therefore, susceptible of useful practical application, in the man-

agement of lingering labors, occurring under certain, well-defined circumstances, which it will be my duty to point out hereafter. Nor is this all. Many interesting phenomena are occasionally observed, in the progress of labors, which serve to confirm our doctrine, and can be explained on no other principle. These will be noticed as they come up in the course of this volume, and I shall not fail to derive from them whatever support they are fairly entitled to yield.

Notwithstanding the weight, and, to my own mind, conclusiveness, of the testimony that has now been adduced, in support of the doctrine of orificial irritation, objections have been raised against it, as they may easily be against any doctrine, or even the plainest matter of fact. Dr. Dewees criticizes it at considerable length, in his chapter on the Cause of Labor; but his criticism is more plausible than profound, and derives much of its edge from mistaken notions and gratuitous assertions concerning the economy of the gravid uterus. Asserting, for example, the existence of an expulsive nismus, in the body and fundus of the uterus, during pregnancy, as an undeniable and admitted fact, and holding the commonly-received opinion, that the cervix begins to expand at the sixth month, to make room for the ovum; he objects that the propulsion of the ovum against the sensitive cervix, by the contractions of the fundus and body, ought to produce premature expulsion much more frequently than it actually occurs, if the doctrine in question be true. And so it ought, of this nismus were not itself a chimera, and the account which he gives of the development of the cervix fallacious.

But there is one objection urged by Dr. Dewees,

which merits a moment's consideration, because it presents a seeming difficulty, that might prove embarrassing to some. It is thus stated by him: "Labor ensues sometimes before the entire obliteration of the neck takes place, and does not necessarily ensue immediately after it is completely effaced; nay, the mouth of the uterus will sometimes be opened to some extent for days, now and then even for weeks, without the parturient effort declaring itself." Let us examine the positive and negative poles of this objection, and try whether it be as *shocking* as the doctor imagined.

First. It is certainly true, as he alleges, that various causes, such as the death of the fetus, blows, falls, ergot, drastic purgatives, etc., may excite premature expulsion of the ovum, without acting directly upon the sensitive os uteri; nay, abortion is so much more painful and difficult than labor at term, partly because the cervix must first be developed, and then its resistance overcome by the expulsive contractions. The exciting causes appear to act by producing morbid irritability of the muscular fibers of the uterus, in consequence of which they are aroused to contraction by the mere presence of the ovum, even if the fetus be alive, much more if it be dead, because it then acts as an extraneous body. This only proves, however, that the uterus may be excited to expel its contents in another mode beside the normal one, nor is it at all singular in this respect. The intestines and urinary bladder are ordinarily excited to expel their contents, by sensible irritation referred to their orifices respectively; but in morbid states, as, for instance, when their mucous membranes are irritated or inflamed, they are thrown into contraction by the direct stimulus of

the feces and urine, and diarrhea or strangury is the consequence. Abortion may be said to be strangury of the uterus; its occurrence proves, at any rate, that the uterus is in a morbidly irritable condition. As well, therefore, might it be argued that irritation of the orifices of their emunctories is not necessary for the evacuation of the feces and urine, in a healthy state, because they are otherwise ejected in diarrhea and strangury, as that orificial irritation is not the usual medium through which the uterus expels the fetus, because it is otherwise expelled in abortion.

Secondly. It must likewise be admitted, that parturient contractions are not always, or even generally, excited, immediately after the cervix uteri is fully expanded and the ovum brought into contact with the os tinæ. Our own experience testifies to the fact that several days may elapse before the occurrence of labor, although the cervix may be obliterated and its orifice be somewhat open. But it does not follow, in any case, that a cause is inoperative because its effect is not *immediately* produced: on the contrary, a longer, or shorter interval, according to the nature of the cause, must be allowed, in most cases, before the effect ensues. To borrow an illustration from medicine. Tartar emetic, introduced into the stomach, will excite vomiting in *fifteen* or *twenty minutes*, epsom salts will purge in *two* or *three hours*, and calomel in *ten* or *twelve*. The same cause, moreover, may require different periods of time to produce its peculiar effects on different individuals, as is notorious with regard to miasmata and animal poisons. When therapeutists shall discover why tartar emetic, salts, and calomel, do not operate *instantly*, and patho-

logists explain why the same causes of disease have different periods of incubation in different individuals, obstetricians should bestir themselves to discover why a longer or shorter contact of the ovum with the os uteri is required in different individuals to excite labor.

There is another objection, offered by Dr. Dewees, which ought not to be passed over in silence, lest it should be taken for granted that it is entitled to the stress which he has laid upon it. He affirms that, in cases of extra-uterine pregnancy, the uterus takes on regular parturient action, at the period when gestation naturally ceases, because the deciduous membrane, which lines the uterus in these cases, as well as in uterine gestation, loses its vitality at this time, by a law of nature, and must be expelled as a foreign body. From the tenor of his remarks, the reader is left to infer that well-marked labor comes on at about the regular time, in extra-uterine, as in normal, pregnancy. Admitting, for argument's sake, that this statement is correct, it only proves that the uterus may be excited to contract, by the direct irritation resulting from the presence of a foreign body in its cavity. It is probable, moreover, that the decidua does not become fully organized, and that, having no office to perform, it loses its vitality, and becomes more completely a foreign body than it ever does in utero gestation.

But the uterus is not always lined with decidua, in extra-uterine pregnancy; nor, in a large number of cases, does any pain occur that can be referred to the uterus. It is well known that if the fetus be lodged in one of the fallopian tubes, the cyst containing it is ruptured at an early period of pregnancy, the fetus escapes

into the abdominal cavity, and the woman dies of internal hemorrhage, to which is superadded peritonitis, if the accident be not speedily fatal. Before this catastrophe takes place, she may have frequent attacks of violent pain; but the pain is the consequence of disease, not of labor, and uterine contraction has no share in producing it. When gestation is protracted to the ninth month, or later, as it may be in the ventral species of extra-uterine fetation, pains occur resembling labor, which may be partly uterine, as they are accompanied with a sanguineous discharge from the genital organs; but much of the tenesmus and bearing down complained of, is undoubtedly produced by the pressure of the cyst upon the pelvic viscera. In other instances, the pain is referable to the cyst itself, which alternately contracts and relaxes like the uterus, whose functions in other respects it provisionally performs. This is doubted or denied by Dr. Dewees; but he ought to have remembered that Baudelocque, to whom he professes so much indebtedness, and from whom to differ he declares to be so very unsafe, verified this fact beyond all doubt in one of the cases recorded by him (1).

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(1) "Le kyste renfermant le fœtus se contractoit comme le fait la matrice; il s'arrondissoit et se durcissoit pendant ces douleurs, puis il se détendoit et se relachoit. On pouvoit, en l'observant attentivement d'une main placée sur le ventre, annoncer le douleur qui alloit se faire sentir, sa force et son déclin. Malgré leur récidive assez fréquente, durant plusieurs jours, l'état du col de la matrice ne changea point. L'orifice externe ou vaginal ne s'ouvrit pas au delà de ce qu'il étoit d'abord, et l'interne demeura constamment trop étroit pour admettre le doigt. Il n'y eut aucune espece d'écoulement, d'exsudation, ni de sang, ni d'eau, ni de mucosités; toutes ces parties restèrent sèches."—(*L'Art des Accouchemens, par. 2235.*)

## CHAPTER VII.

## PHENOMENA OF THE FIRST STAGE OF LABOR.

THE phenomena of labor are the sequences of the causes, which we have been considering. For the purpose of classifying these sequences, as well as with a view to practical utility, labor is usually divided into several stages. I prefer the division into three stages, which will be adopted without criticising the merits of other classifications that have been proposed. The first stage extends from the commencement of labor to the complete dilatation of the os uteri; the second stage embraces the expulsion of the fetus, —the third, the detachment and expulsion of the secundines.

The first stage of labor is characterized by four principal phenomena, which it will be my object to elucidate in this chapter.

1. *Pains.* The muscular contractions of the uterus are so invariably accompanied with pain, that it is not surprising that the effect has been confounded with its cause, and has received credit for all the efficiency exerted in labor. Hence, the terms, *pains, laborpains, uterine contractions*, are used metonymically by obstetrical writers and practitioners,—a usage which I shall respect, because it is often convenient, and cannot mislead, if it be remembered that, when used in this sense, *pains* has no reference to the sufferings of the patient, which may be excruciating, in nervous or susceptible

individuals, although the pains are trifling, that is, inefficient.

The uterine contractions are not accompanied with pain in the first stage of labor only, but also in the subsequent stages; it is, nevertheless, to be observed that the character of the pain is different in the different stages. In the first stage (with which alone we are concerned at present) it is described as *cutting* or *grinding*, and as not unfrequently continuing, during the intervals of the contractions, in a sufficient degree to worry the patient. From this cause, together with the absence of consciousness that these pains are accomplishing any thing, she is fretful, impatient, agitated, and desponding; and from her behavior, the experienced accoucheur may form his judgment of the stage of labor under which she is suffering.

We are not to imagine that the uterine contraction, in any of the stages of labor, is in itself any more painful than muscular contraction in other parts, for example, in the abdominal muscles, bladder, or rectum. In the first stage, the pain appears to be seated in the cervix uteri, and is owing to the resistance it opposes to the contractions of the body, which, notwithstanding, are powerful enough to distend and stretch it.

Such is the explanation given by Madame Boivin, whose opinion, on a point at once so delicate and vague, is entitled to great deference, considering that she was both an accomplished *sage femme* and a fruitful mother. Madame Boivin says, "we dare affirm, and our sensations have not deceived us, that, when the contraction begins and while it lasts, the woman experiences only a *pressing* sensation, more or less strong, which seems to

originate along the mesial line of the posterior wall of the uterus, and extend round its sides to the anterior mesial line, which rises, becomes hard, and distends the middle of the abdominal walls. This uniform pressure throughout the whole fundus and body of the organ is accompanied with a feeling of numbness, which is propagated to the internal orifice. To this numbness succeeds a *painful stretching*, which begins along the posterior wall of the neck, toward the base of the sacrum, descends obliquely around the sides, in the direction of the internal orifice, and terminates at the os tincae, profoundly in the vagina, where the pain is most severe" (1).

In the commencement of the first stage of labor, the pains are slight, both as to force and duration, and the intervals between them are considerable. But in its progress, they increase in frequency, duration, and intensity, until they are gradually merged in the stronger throes of the second stage. A satisfactory reason may, perhaps, be assigned for their gradual augmentation; it accords, at all events, with our theory of labor, and may be received for what it is worth. It is this: the mere contact of the ovum, aided by its gravity, is sufficient, after a longer or shorter time, to produce such a degree of *orificial irritation* as serves to awaken the parturient contraction of the womb. Labor being thus started, the pressure of the ovum against the neck, during the pains, increases the *orificial irritation*, which, in its turn, excites stronger contractions, and by the continuance of

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(1) Mémorial de l' Art des Accouchemens, p. 206.

this action and reaction, labor is quickened until it acquires its greatest intensity.

2. "*The show*" of nurses, "*glaires*" of French writers. This may commonly be regarded as a certain indication of labor, or, at least, of its near approach. It is a transparent, ropy mucus, escaping from the vagina, secreted chiefly by the follicles of the neck, one of whose offices it is to furnish this albuminous fluid to lubricate the parts, preparatory to the passage of the child. The immediate cause of this increased secretion appears to be the irritation resulting from the distention of the cervix uteri, which may exist, in a slight degree, several days before labor, properly so called, is established. In fact, slight contractions of the fundus, for a week or two previously, is no unusual prelude to labor; and in consequence of these, the uterus subsides in the abdomen, giving greater liberty in the epigastric region, but encroaching on the pelvis, and embarrassing the functions of the bladder and rectum.

When labor has commenced, if not before, this mucous discharge is very apt to be streaked with blood, effused from ruptured decidual vessels about the cervix uteri. Sometimes this effusion is considerable without amounting to hemorrhage, properly so called. If there is default of this secretion, the woman is said to have a "dry" labor; more commonly, however, she is not, according to my experience, in labor at all,—this dryness being quite characteristic of what are called "false pains."

3. *Dilatation of the os uteri.* At the commencement of labor, the uterine orifice may be felt as a circular aperture, of small size,—at most barely receiving

the point of the finger,—whose margin is commonly thinner in primiparæ than in women who have borne children. Under the influence of the uterine contractions, its circle is gradually widened, and its margin rendered thinner, until it is fully expanded. Although the effect of every pain is some increase of its dilatation, it is to be observed that during the pain, the orifice is more contracted than just previous to it, and its margin feels firm and rigid. The actual, successive yielding, then, immediately follows each pain; and during the intervals, the os uteri is more and more disposed to yield. From this we should expect what all writers have taken notice of, and which cannot have escaped the observation of any one engaged in practice, viz., the greater rapidity of dilatation as it draws toward its completion, so that although it may have required many hours of severe suffering to dilate the orifice to the size of a dollar, a few more pains, nay, sometimes a single pain, may finish its dilatation.

4. *Formation of the membraneous pouch.* That portion of the membrane, which is denuded by the opening of the os uteri, yielding to the pressure of the uterine contraction, is forced through the orifice, and projects into the vagina as a tense tumor during the pains, but is retracted and flaccid in the interval. This is known by the name of the “membraneous pouch,” the “aqueous cyst,” or the “aqueous pouch,” because it contains, of course, a portion of the waters of the ovum. The form of this pouch varies according to that of the orifice, being most frequently round and hemispherical, sometimes ovoidal, when the neck dilates more in one direction than in another. When the membranes are

unusually extensible, and contain but little water, they may project into the vagina, even as far as to the vulva, in the form of a cylindrical purse. The pouch is generally less voluminous in vertex presentations than in any others, being sometimes flat and scarcely recognizable, whereas, in less favorable presentations, as, for example, the nates, it forms a remarkably large projection, and effectually hinders us from ascertaining what part of the child lies above it.

Connected with the membraneous pouch, there is a phenomenon, which has given rise to what I consider a singular mistake or delusion; I allude to the apparent elevation of the presenting part of the child at the beginning of each pain, and its depression before the pain goes off. In view of this, Müller declares, that "the uterine contractions appear to commence at the os uteri, to be propagated toward the fundus, and again to return thence toward the mouth of the uterus. By this succession of muscular contractions, the fetus is first raised, and then propelled downward toward the os uteri, when the lips or sphincter of the latter part become thinned and dilated"(1). Dr. Churchill adopts this idea: "The pains, as I have already said," he remarks, "commence in the cervix, and gradually involve both the body and fundus; their first effect, as Wigand has observed, being to elevate, as it were, the presenting part, and afterward to force it down"(2). Such a mode of

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(1) Elements of Physiology, translated by Dr. Baly, and arranged by Dr. Bell, Philadelphia, 1843, p. 849.

(2) Theory and Practice of Midwifery, second Amer. ed., 1846, p. 192.

uterine action is not more repugnant to Madame Boivin's *sensible* description of it, than to reason and common sense. The truth appears to be, that as the pouch fills with the waters of the amnion, during the pains, it withdraws from the presenting part, which makes this appear to rise up; or, if there be actual elevation, it may be owing to the reflux of the waters from the pouch, until their equilibrium is reëstablished by the steady persistence of the pain, when this part descends again. Be the matter as it will, there is surely no such inverted action of the uterus as the theory of Wigan alleges. The *formation* of the pouch closes the first, and introduces the second, stage of labor.

Among the phenomena, which have now been enumerated as belonging to the first stage of labor, dilatation of the uterine orifice is the most important,—it alone, indeed, constituting the end and aim of this stage. There has been much speculation, and not a little controversy, as to the means employed by nature to attain this end; and as the inquiry is interesting, on account of its practical bearings, I shall not shun it. It has been already proved (chapter on efficient cause of labor), that the body and neck of the uterus are antagonists in labor—the tendency of the contractions of the former being to expel the ovum, while the contractions of the latter tend to retain it. Now, it is evident that were these antagonists endowed with equal strength, labor would be an interminable contest; but, in point of fact, they are unequal—the body being much thicker, and possessing two well-developed layers of muscular fibers, instead of one only, which belongs to the neck, the preponderance of strength is, therefore, in favor of

the body; but, as the battle is not to the strong, let us inquire how its forces operate to achieve victory, and open the os uteri.

It must be remembered, then, that the gravid uterus at term is of an ovoidal figure, the fundus being its large, and the cervix its small, extremity, and that it is completely filled and distended by the fetus, with the waters surrounding and the membranes inclosing it, which together constitute the ovum. This ovum possesses, of course, the same figure as the gravid uterus; and is nearly, if not quite, incompressible by any force that is brought to bear upon it. The force of the body, which I shall call its *propelling* force, may be represented by lines, drawn from every point of its surface, covered by the oblique and concentric fibers, toward the center of the organ,—for the pressure, exerted by the contraction of these fibers on every point, acts in that direction. The force, for example, exerted at the center of the fundus is in the direction toward the os uteri,—that, at either extremity of the transverse diameter of the uterus, is in a direction at right angles with the first,—and that, at a point midway between these, is in a diagonal direction. As the ovum cannot obey all these forces, it is moved in what is called their *resulting direction*, which, it is obvious to those in the least conversant with physics, is in a straight line from the center of the fundus to the os uteri,—in other words, in the direction of the axis of the uterus. The scattering rays of propelling force are thus brought to a focus upon the os uteri, and the efficiency of this force is evidently increased by its concentration upon the point to be assailed.

But the propulsion of the ovum against the os uteri is not the only effect produced by the operation of this force. During every parturient contraction, the ovum is subjected to pressure at every point of its surface, not excepting the inferior segment of it, in contact with the cervix uteri. Were this pressure everywhere equal, it is evident that the ovum would be condensed toward its center, to the extent allowed by its slight compressibility; and it would undergo no change of figure whatever. But this pressure is not, in fact, equal—that of the fundus being by far the most powerful—hence, during every pain, the inferior segment of the ovum is expanded by the more forcible compression to which the superior segment is subjected, and its figure, together with that of the uterus, is altered—it is less acuminate toward the cervix. The expansion of the inferior segment of the ovum distends the cervix uteri in such a manner as is tantamount to pulling asunder its parietes and stretching its vaginal orifice. I will try to illustrate this idea. The first effect of each uterine contraction is to propel the ovum toward the os uteri; but this being resisted by the os, the inferior segment of the ovum begins to expand, and the starting point of this expansion is at the os uteri, from which it spreads in all directions, operating as a great number of cords pulling from the os toward the circumference of the cervix. The tonic contraction assists the muscular, in this dilating operation, by giving permanency, in some degree, to the altered figure of the ovum; for, although in the intervals of the pain the membranes are not as tense as during their continuance, yet it would be contrary to its nature to suppose that the tonic contraction will fail

to preserve, in a good degree, the ground gained by the muscular ; and this it is, perhaps, which gives rise to the uneasy sensations, which, as I have stated, women often experience in the intervals of the pains.

When the resistance of the cervix is considerably subdued, and the external orifice is opened to some extent, a portion of the membranes becomes insinuated within it, and the pouch thus formed contributes materially to complete its dilatation. The agency of this pouch has not, however, been properly understood by authors, and their erroneous appreciation of it has led to malpractice. Dr. Denman asserts that “it forms a soft pillow, which, at the time of every pain, *acting upon the principle of a wedge*, operates with increasing force according to the size it acquires ; in consequence of which the latter part of the dilatation usually proceeds with more expedition than the former, unless the membrane containing the waters be previously ruptured” (1). British writers, since the time of Denman, have cleaved to the wedge-like operation of the pouch with peculiar pertinacity. It is, notwithstanding, obnoxious to the very serious objection that the membranes do not, as we have seen, enter the os uteri, until the resistance of the cervix is so far overcome, that it is disposed to dilate, when there is no need of a power that acts upon the principle of a wedge. This dilatability of the os uteri results from, and is evidence of, the declining energy of contraction in the cervical fibers, which have been partially paralyzed by the propelling force.

The formation of the pouch, then, is the conse-

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(1) Introduction to Midwifery, chap. IX, sect. 6.

quence, not the cause of the dilatation, or, at least, of the dilatability of the os uteri. But supposing the order to be reversed, and that the pouch is formed first, to be the instrument to overcome the resistance of the cervix,—could it procure the dilatability of the os uteri as efficiently and kindly as the method ordained by nature? No one, who has made the attempt to introduce his hand into the uterine cavity prematurely, that is to say, before the os uteri is easily dilatable, will answer this question in the affirmative, for it is found that the os uteri could sooner be lacerated than forced to open in this way. The reason is very obvious; the hand, acting in this manner, operates at first only on the circles of fibers immediately surrounding the orifice, and then on the next, and so on until the whole series is reached in detail; whereas nature, wiser than art, brings her force to bear simultaneously on the whole extent of the cervix. Hence, we are at no loss to understand why the dilatation of the os uteri proceeds so much more rapidly toward its completion than in the commencement. It is not, as Dr. Denman suggests, because the pouch “operates with increasing force according to the size it acquires,” but because the cervix having been conquered, the inferior part of the ovum has only to take possession of its orifice.

Dr. Dewees is entitled to much credit for his satisfactory refutation of the doctrine against which we are contending; but it is to be regretted that, in his zeal to demolish it, he lost sight of the real utility of the membranes, both before and after the protrusion of a portion of them at the uterine orifice. The premature rupture of the membranes and discharge of the waters will not,

he thinks, retard labor or render it more painful, except this occurs under one special condition, viz., before genuine expulsive action of the uterus has commenced, and where uterine contractions speedily follow the accident. If labor have commenced, no matter how slight may be its progress, or if the uterus be not "surprised into contraction" by the accidental rupture of the membranes, before it is "prepared for the regular routine of labor," dilatation will take place as rapidly and favorably as if nothing had happened (1). These assertions contradict the experience of the profession, as far as I know, in all ages and countries; and I cannot, therefore, help suspecting that there is some fallacy in the observations on which they are founded. They are no less at variance with the explanation of the process of labor which I have given, as the following considerations will show.

First. The integrity of the membranes, before the pouch is formed, is valuable, because the propelling force has then a more suitable medium wherewith to act on the cervix than any part of the fetus would be. This medium is the waters inclosed by the membranes, which, adapting themselves to the shape and inequalities of the cervix, make more equable pressure on its fibers, and consequently subdue their resistance more equally; whereas any part of the child, that can present, is not so well adapted to distend the cervix equally, and hence while some of its fibers may be benumbed by pressure, others are not conquered, but provoked

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(1) See chapter "on the manner in which the os uteri is opened," Midwifery, p. 180, fifth edition.

to inordinate resistance, thus retarding labor by the irregular contraction which is excited.

Secondly. The integrity of the membranes, after the pouch is formed, is beneficial until the dilatation of the os uteri is considerably advanced, if not completed; because the pouch, though it does not cleave like a wedge, opens the portals for the egress of the child, in the gentlest manner. Should it rupture before the orifice is prepared to allow the presenting part of the child to take its place, the ruder contact that ensues not unfrequently irritates the cervix to a renewal of its opposition, and labor is thus protracted and rendered more painful.

Thirdly. The pouch serves, by its presence in the uterine orifice, the most sensitive portion of the neck, to sustain and enliven the propelling contractions, upon the principle of orificial irritation. By its agency, these contractions are, in proper time, rendered truly *expulsive*, and the auxiliary forces of the diaphragm and abdominal muscles called into action. When the pouch ruptures, the presenting part of the child takes its place, and keeps up the requisite grade of irritation until the labor is completed. That this is no fancy sketch, the phenomena of shoulder presentations will abundantly prove. In these cases, the membranes frequently protrude in the form of a long, cylindrical purse, which inadequately stimulates the os uteri, and consequently the pains are feeble, for an unusual length of time; and when at length they rupture, if the shoulder is not ready to occupy the orifice, as often happens, there is *an entire suspension of the pains for several hours*.

Having rejected the agency of the membranes, Dr.

Dewees was forced to invent some other method of accounting for the dilatation of the os uteri, which, it may be fairly presumed, he found to be no easy task; for, notwithstanding he devoted a whole chapter to the subject, he reverts to it repeatedly in various parts of his work. He has thus made it a task not less difficult for his reader to gather his views, dispersed as they are, and not always expressed in the most perspicuous manner. Discussing the cause of labor, he inquires (p. 149), whether it is not "*probable*, that the uterus possesses some organic power by which it effects the opening of the os uteri, and which is *totally independent of the mechanical influence of the distended membranes*; since a certain degree of dilatation takes place without their agency?" On the next page but one, he explains, in a note, his meaning rather obscurely worded in the text, by saying, that "The circular fibers of the neck and mouth of the uterus *relax themselves*, and thus give to the longitudinal fibers the control; for, by the contraction of the latter, the uterus becomes shorter, and consequently will widen itself at its opening, by drawing the circular fibers upward. When this happens, the mouth of the uterus is drawn or has a tendency to be drawn upward, and the presenting part escapes from it," etc. Here he seems to be getting into the twilight of truth; but in another place, discussing the nature of rigidity of the os uteri, he refers it to a "failure of the reciprocity of sympathy in the several parts concerned in labor," in consequence of which "the ordinary and essential changes for an easy delivery do not take place;" "in other words," he says, "to employ the language of Mr. Hunter, the stimulus of relaxation is not

given or is not obeyed ;” and then, in the next paragraph, he adds, “in the ordinary course of a healthy labor, the mouth of the uterus opens by *some secret agency*, or, at least, without any apparent force.”

And, now, even twilight has forsaken him, and he gropes in profoundest mysticism, fancying, perhaps, that the os uteri is, after all, opened by some such spell as that which swayed the mouth of the robber’s cave, in the Arabian Nights’ Entertainments,—“*Open, Sesame!*”

## CHAPTER VIII.

## THE TREATMENT OF THE FIRST STAGE OF LABOR.

THE first is the most dilatory of all the stages of labor,—it being the preparation for what is to follow, and preparation, in most things, usually requiring a longer time than execution. It may, therefore, be reckoned a prime duty of the accoucheur to wait patiently, as a general rule, until this stage is naturally accomplished. But is there no limit to the patience he must exercise? Is there no dilatoriness on his part which is reprehensible? Must the first stage of labor be always left to take its course, unless there be some uncommon and palpable necessity for interference?

These are important questions, and their solution, more than anything else in obstetrics, settles the practical complexion of each individual to whom they are propounded. Hear the answer of Dr. Denman;—  
“*Whether a short or a long time* be required for this purpose (the dilatation of the os uteri), it is the duty of the practitioner to abstain from interfering in this part of the process. It may sometimes be necessary to pretend to assist, with the intention of giving confidence to the patient, or composing her mind. But all artificial interposition contributes to retard the event so impatiently expected, by changing the nature of the irritation and the action thereon depending, or does mischief by inflaming the parts, and rendering them

less disposed to dilate; in short, by occasioning either present disorder or future disease" (1). So spoke the British oracle, in the latter part of the last century; and, with two or three exceptions, his successors, to the present time, have echoed the authoritative response. The published lectures of one of them, who is yet living (2), are full of kindred advice, eloquently and vehemently enforced,—exhorting the pupil to abstain from every species of interference, unless urged by dire necessity, and turn where he may, almost upon every page, the apothegm stares him in the face,—“a meddling midwifery is bad.” The deepest impression which his teaching is calculated to make, is, that nature is particularly careful not to be at fault in the matter of childbirth, and that it is a fearful thing to do aught but admire her proceedings.

I have said that one's cast as a practitioner is determined by his views of professional duty, in the management of the first stage of labor; if he perform the part of an *expectant* in the first act of the drama, it is not likely that he will appear in any other character in the subsequent acts. Now, it is notorious that Dr. Denman, for example, is hesitating and indecisive in the advice he gives, touching the conduct of the obstetrician in every branch of his duties; and after most carefully considering his views, one can hardly determine whether, upon the whole, he had best to do something or nothing.

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(1) Introduction to Midwifery, chap. IX, sec. 6.

(2) Lectures on the Principles and Practice of Midwifery, by James Blundell, M. D., edited by Charles Severn, M. D. Philadelphia, 1842.

With the tenets of Dr. Denman contrast those of the late Professor Hamilton, of Edinburgh, who states that he was but a very short space of time in practice, when he saw reason to believe that the management of the first stage had been much misunderstood by the profession. Observing that when the natural powers alone are trusted to, this stage is often greatly protracted, he inferred, from reasoning upon the subject, that injurious effects must be the consequence. "He considered," to use his own language, "that upon the occurrence of every uterine contraction, there must be a certain influence on the action of the heart and arteries, and that if pain and sleeplessness were continued beyond a limited time, there must be an exhaustion of a sensorial power. He concluded, therefore, that where the first stage of labor is not completed within a certain time, the strength of the patient must be proportionably lessened, the uterine action must be enfeebled, and the circulation of the blood must be disturbed"(1). But, finding that the most respectable practitioners, both British and foreign, deprecated all interference with the first stage of labor, he felt diffident in promulgating his opinions, and did not do so until the year 1800, when he stated as the result of his observation and experience, for about fifteen years, that "unless the first stage of labor (supposing that there are regular pains) be completed *within twelve or fourteen hours* from its real commencement, the following consequences may be dreaded:

"Firstly. That the powers of the uterus may be

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(1) Practical Observations on various Subjects relating to Midwifery. American edit., Part 1, p. 60.

inadequate to expel the infant with safety to its life, or to the future health of the parent.

“Secondly. That after the birth of the infant, the uterus may contract irregularly, so as to occasion the retention of the placenta.

“Thirdly. That after the expulsion of the placenta, the contractions of the uterus may be too feeble to prevent fatal hemorrhage. And,

“Lastly. That, supposing the patient should escape all those untoward circumstances, febrile or inflammatory affections of a most dangerous nature may ensue, from the previous protraction of pain and the irregular distribution of the blood.”

In view of these facts, Dr. Hamilton adopted it as a rule of practice, that *the termination of the first stage of labor should be secured within twelve or fourteen hours from its actual commencement.*

In prescribing limits to the first stage of labor, he is careful to guard against any mistake or abuse that might grow out of the restriction: there must be a continuance of regular pains for the period specified, “for it sometimes happens that, after regular pains have commenced, the agitation of the patient, or the mismanagement of the attendants, occasions a suspension for some hours. If there be no injurious pressure upon the passages during that suspension, the patient’s strength is recruited, and the duration of the first stage is to be reckoned from the recurrence of the pains.” And then again, spurious pains are to be discarded from the estimate; these may precede the true ones for hours, or days, producing no tightening of the edges of the os

uteri; and unless this is present, labor has not really commenced.

By the adoption of this rule, the author asserts confidently that "*no patient under his charge, for the last thirty-five years, has been above twenty-four hours in labor, and, except in cases of disproportion, none so long.*"

Such a result as this,—so encouraging to those who are expected to alleviate the sufferings, and abridge the anguish of the sex, and who derive unfeigned pleasure from the fulfillment of their responsible mission,—challenges the candid consideration of every one, who is qualifying himself for the practice of obstetrics. It is entitled to the sober second thoughts of such as are already engaged in practice under a different creed; but, alas! with how little prospect of success can they be appealed to, since the principles, from which this result was obtained, are condemned as heretical by nearly all authors, except Professor Burns. The latter even abridges the period prescribed by Dr. Hamilton, within which the first stage of labor should be completed. "If," he says, "the pains be continuing without suspension, for an interval of some hours, and the labor be going on all the time, but slowly, it is a good general rule to effect the dilatation of the os uteri within *ten or twelve hours*, at the farthest, from the commencement of regular labor" (1). In relation to the necessity of this he speaks thus confidently: "It is an undeniable proposition, that there is in every case a period beyond which it cannot be protracted without exhaustion; and it is

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(1) Principles of Midwifery, American Edition, with notes by Professor James, Vol. I, p. 417.

no less certain, that if we wish to avoid this exhaustion, which may be followed by pernicious effects, we have only the choice of either suspending the action altogether for a time, or of endeavoring to render it more efficient, and of effecting the desired object within a safe period."

The doctrine of Hamilton and Burns, on this subject, I have ever considered sound in the main, and their practice worthy of imitation. It is, therefore, incumbent on me to explain the one a little more fully, and defend the other. The doctrine assumes that the uterus is incapable of continuing its parturient action beyond a definite period, notwithstanding its frequent respites, without falling into a state of exhaustion that unfits it for the proper performance of its function. And does any one doubt the truth of this assumption? If so, let him refer to any treatise on practical midwifery, worthy of its title, in which there is not a distinct recognition of a *powerless state* of labor,—not that the uterus is so completely exhausted as to cease its action altogether, but it is so enfeebled as to be disqualified for efficient action, and the delay and danger, incident to such a state, call loudly for assistance. It is worthy of observation that before the uterus reaches this deplorable state, it is liable to become morbidly irritable and sensitive, so that it is disposed hastily to eject its contents, the instant the obstacle is removed, which provoked this morbid state. This irritable condition, as I may have occasion to show, is scarcely less dangerous than the exhaustion of which it is the precursor.

But although it may be conceded that the uterus is liable to exhaustion from long-continued exertions, it

may be denied, as in fact it has been by Dr. Churchill (1), that the pains of the first stage have any such pernicious tendency. In his chapter on "Tedious Labor," Dr. Churchill lays down the following propositions: "1, When the delay is excessive, the *relative* duration of the two stages is destroyed, so that they bear no steady proportion to each other; thus, for instance, in a labor of sixty hours, the first stage may occupy fifty-nine, and the second only one, or *vice versa*; 2, That the effects of a prolonged labor upon the constitution of the patient, depend upon the stage in which the delay occurs; and 3, That delay in the first stage involves very little if any danger, no matter how tedious it may be, but that delay in the second stage, beyond a comparatively short time, is always of serious import.

These deductions, Dr. Churchill thinks, are involved, though not distinctly enunciated, in the practical remarks of writers on midwifery, who distinguish the cause of delay in the first stage from those in the second, as being much less dangerous: and in further corroboration of them, he publishes a tabular synopsis of one hundred and forty-three causes, to exhibit the relative duration of each stage, in labors of twenty-four hours and upward, in which the delay occurred in the first stage, and the results to mother and child. The table offers such cases as the following;—first stage  $34\frac{1}{2}$  hours, second  $\frac{1}{2}$  hour,—first stage  $41\frac{3}{4}$  hours, second  $\frac{1}{4}$  hour,—first stage  $59\frac{1}{2}$  hours, second  $\frac{1}{2}$  hour,—first stage 176 hours, second 1 hour. Notwithstanding

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(1) Theory and Practice of Midwifery, Philadelphia, 1846.

the tediousness of the labors, all the mothers recovered, and but ten of the children were lost, one of which was putrid. It is plain that these statistics, supposing them to be accurate, are fatal to the views of Professor Hamilton; for it would appear from them that the powers of the uterus are not enfeebled in the slightest degree, by the utmost prolongation of the first stage; on the contrary, the second stage is, notwithstanding, executed with remarkable facility, and without involving the least risk, present or prospective, to the mother; the only disadvantage being the loss of a larger proportion of the children, than in labors performed in better time.

I was, I confess, greatly astounded when my attention was first directed to these statistics; not because they militated against a favorite doctrine or theory (that I could have easily surrendered at the summons of truth), but because if they are to be relied on, I have yet to learn the alphabet of practical midwifery. Experience for more than a quarter of a century (a long time to be under delusion), has seemed to teach me that if the first stage be unusually protracted, the second is *liable* to be so too; or where it is not correspondingly delayed, it is *liable* to be executed so precipitately as to endanger both mother and child,—the uterus having acquired the morbid irritability to which I have alluded. In the latter case, irregular contraction is apt to follow the expulsion of the infant, producing difficulty in the third stage.

In rehearsing my experience, in general terms, I have been careful to say “liable,” because there is no rule without exceptions, and it does sometimes happen that tedious first stage is followed by safe and reasona-

ble promptitude of the second. These exceptions are not, however, numerous enough to account for Dr. Churchill's one hundred and forty-three cases, which he says expressly were not culled for the occasion. How, then, are they to be accounted for? I could never have answered the question, if, in turning over his pages, I had not stumbled on his definition of the first stage, which is as follows:—"extending from the commencement of labor to *the passage of the head through the os uteri*" (p. 199). When the head has passed through the os uteri, it is, I opine, near its journey's end; for nothing is more common than for the anterior edge of the os uteri to be felt in advance of the head, a few moments before it emerges, although the pains may have been decidedly expulsive, that is, the second stage existed, for hours previously.

The complete dilatation of the os uteri, spoken of as the end of the first stage, is never its obliteration, so that it cannot be felt and does not even require a degree of force to engage the head in it,—but such an opening of it as will allow the head to pass with no more resistance than the other soft parts, the vagina, perineum, and vulva, ordinarily offer,—for labor is a struggle throughout. Before the os uteri is dilated to this degree, the membranes protrude through it, and with *sufficient* dilatation of the orifice and the *formation* of the membranous pouch, the first stage of labor closes, and the second is ushered in by *expulsive* contraction, only slightly different at first from the *propelling* contractions of the former.

According to my understanding of what belongs to the several stages of labor, then (which accords with

the best writers), Dr. Churchill's second stage is indebted for its remarkable brevity to his gratuitous bestowal of a goodly portion of it upon the first stage, and his table is, therefore, valueless and proves nothing. I shall only add that, in this same chapter, he concedes the point in dispute when he allows, that "undoubtedly a prolonged first stage is a bad preparation for any accidental complication of the second." Why is it "a bad preparation," but because the patient is fatigued and worn out with unprofitable suffering, and the energy of the uterus is impaired?

Having thus endeavored to establish general principles for our guidance, I proceed to notice the most common causes of delay in the first stage of labor, and the best means of removing them.

1. *Obliquity of the uterus*, by which is meant a want of correspondence between the axis of the uterus and that of the superior strait. A slight degree of obliquity, forward or to one side, usually to the right, exists in all cases, which, as it is spontaneously corrected, is not worthy of serious notice. But if the aberration of the uterine axis be so considerable as to place the os uteri against one of the sides of the pelvis, or the promontory of the sacrum, where it can be barely reached, or is beyond the reach of the finger, it becomes a cause of such retardation as demands the attention of the accoucheur, for the woman may suffer for hours or even days, if nothing be done to relieve her, and yet the os uteri be but little opened, and the membranes not at all engaged within its orifice. The laborpains have not the character of the genuine, but are productive of much suffering and distress, and even when they become of

the bearing-down sort, the woman is not inspirited by them as in natural labor, but is conscious of their worthlessness.

We cannot be at a loss to account for the slow and painful progress of labor, in these cases. To awaken proper parturient contractions at first, and to bring them gradually up to the healthy standard, gradually increasing orificial irritation is required. When there is no vicious obliquity, the situation of the uterus is such that its axis corresponds, or nearly so, with the axis of the superior strait of the pelvis, and the os uteri, being in the route of the fetus, receives the impulses, impressed upon the fetus, by the uterine contractions. The os uteri is, therefore, in the *way* to receive and communicate irritation. But if there be obliquity, the axis of the uterus does not correspond to the axis of the superior strait, which, nevertheless, must still be the route of the fetus, for it can be moved only in that direction. Propelled in this direction, the fetus is made to bear upon a point of the uterus, more or less remote from the os uteri, which point becomes the most dependent part, and usurps the place of the os uteri, without any qualifications for performing its offices.

In bad or mismanaged cases, this dependent part becomes greatly attenuated and inflamed,—descends before the child until it appears externally, and becoming gangrenous, is ruptured.

In the treatment of obliquity, the indication is, to restore the os uteri to its natural position. This may generally be effected, by regulating the posture of the patient, enjoining her to lie on the side opposite that toward which the fundus inclines. If, for example, there

be inclination of the fundus toward the right side, she must be required to lie on the left, and *vice versa*; if anterior obliquity exist, she must be confined to her back. When the latter species of obliquity exists, in a great degree, a properly adjusted bandage around the abdomen will materially contribute toward restoring the uterus to its natural situation.

Should strict attention to posture, continued for a reasonable time, fail to correct the obliquity, and the labor in the meanwhile make but tardy progress, it is proper to hook the os uteri by inserting the extremity of the finger within its orifice, and draw it toward the center of the pelvis, in the intervals of the pains. When a pain comes on, its tendency to relapse to its former position is to be resisted, with as much force as can be safely employed. If this tendency is too powerful to be resisted, the finger must yield to it; but, as soon as the pain ceases, bring back the os uteri to the center, and again endeavor to maintain it there during the next pain. By cautiously and gently, but perseveringly, acting thus, the os uteri will, after a succession of centripetal and centrifugal movements, be restored to its proper place, and, the parturient forces having been brought to bear upon it, its dilatation will be effected as speedily as in ordinary cases.

The importance of obliquity of the uterus was, doubtless, overrated by Deventer, who regarded it as the most common cause of difficult and preternatural labors, which cannot be true, as Baudelocque justly remarks, because such labors are rare, and obliquity is so common, that scarcely one woman in a hundred is exempt from it. It is furthermore true, as this same

celebrated author asserts, that the greatest degree of obliquity does not necessarily derange the mechanism of labor, or render it more difficult;—the uterine contractions, aided by the flexibility of the fetus, being often sufficient to correct it. Baudelocque recognized it, however, as an obstacle to labor, of considerable moment, requiring *sometimes* the interposition of art, and he assisted in the manner which has just been recommended. He records the following case as a specimen of many others that occurred in his practice: “A robust and well-formed woman, the mother of several children, presented herself, toward the close of 1773, for delivery in the presence of my pupils, and afforded them, by her indocility, an opportunity of observing the effects of obliquity and its treatment. The uterus was manifestly inclined forward, and to the right side, to such a degree, that its orifice, which was situated backward, could not without difficulty be discovered by the touch. The waters were evacuated, the pains frequent and violent, and the child presented well. The patient could not be persuaded to keep in a recumbent posture, and allow the presence of the finger. but would sit or stand, and, as often as she felt the pains, make improper efforts to aid them. The head of the child, after the lapse of twelve or fifteen hours, came down to the bottom of the pelvis, covered by the anterior-inferior part of the uterus. The uterine orifice could not be discovered upon any part of the sphere, presenting in this manner; but by directing the finger backward and upward, as high as the base of the sacrum, its anterior edge could be reached. The portion of the uterus pushed before the head, and covering

it like a hood, which could only be seen at first by separating the labia, became more apparent as the labor progressed. It was smooth, shining, tense, remarkably injected, displaying a fine network of vessels, and too sensitive to bear the slightest touch. The lower part of the abdomen was also threatened with inflammation, having become so painful as to be annoyed by the clothes. Notwithstanding she had been bled, fever was kindled, and her mind began to wander, when a fortunate incident caused her to become sufficiently docile to listen to the salutary advice she had rejected for about forty-eight hours. Intimidated by the unexpected presence of two officers of the law, dressed in their robes, she went to bed: I raised the abdomen with one hand, to diminish the obliquity of the uterus, while with two fingers of the other, having previously pushed up the head a little, I hooked the anterior edge of the orifice, to bring it toward the center of the pelvis, where I held it during a few pains, and then permitting the woman to bear down with the strength she had left, she was delivered in the space of a quarter of an hour. The child did well, and the mother had a good recovery" (1).

A distinguished British teacher, Dr. William Hunter, differed altogether from M. Baudelocque in his estimate of the influence of obliquity over labor, and declared that as far as he had been able to observe, "the mere obliquity of the uterus never occasions so difficult a labor, as to require any artificial arrangement to bring the os uteri into a proper situation," and that "in such

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(1) *L'Art des Accouchemens*, Tom. I, p. 168.

cases, as in many others, art can do little good, and patience will never fail." The decision of Dr. Hunter has been generally acquiesced in by the writers of his own country, who have succeeded him, or if some have admitted the necessity of confining the patient to a proper position, they agree in repudiating all attempts to restore the os uteri to its lost place. Nor are some of the later French writers much more deeply imbued with the doctrine of Baudelocque, in regard to obliquity of the uterus. M. Velpeau, not to mention others, confesses that, whereas he once faithfully labored to correct obliquity, an incident, which occurred in his practice, convinced him that he had been spending his strength for naught. "One day," says he, "I was under the necessity of leaving a case in charge of a pupil, who neglected the instructions I had given him. I returned in three hours and found the cervix completely dilated, the membranes ruptured, and the head well engaged. Since that time I have done nothing in such cases, and the organism has always succeeded in bringing everything right" (1). I would ask M. Velpeau whether he thinks that the *organism* would be sufficient in such a case as that quoted from Baudelocque?

In deliberating, however, upon the propriety of artificial aid, in cases of obliquity of the uterus, the ability of nature ultimately to overcome the difficulties which they offer, is not to be taken into consideration. The primary question is, can obliquity seriously retard labor? and this has been answered in the affirmative, even by Dr. Hunter, in his commendation of *patience*, but less

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(1) *Traité Complet de l'art des Accouchemens*, deuxième edit. Paris, 1835. Tom. II, p. 230.

equivocally by Dr. Denman and others of the same sect. Obliquity ought, then, to be remedied in all cases, when it unduly protracts the first stage of labor, if the principles of Dr. Hamilton should govern our conduct. Labors, rendered tedious from this cause, may undoubtedly hobble to their end, even to the expulsion of the fetus in some way,—nevertheless all the mischiefs that grow out of delay, are justly chargeable to the obliquity, and might have been averted had it been remedied.

This is the true ground on which to rest the vindication of the treatment I have recommended, and on this it might be safely rested, were it more hazardous than it really is. British writers, without exception, as far as my memory serves me, condemn all manipulation in these cases as useless, if not pernicious. Dr. Churchill, for example, declares that he does not think that interference with the os uteri is ever justifiable (1); and Dr. F. Ramsbotham avows that he is “decidedly opposed to any forcible attempts being made to drag the os uteri into a more convenient situation, lest it should be lacerated or bruised, or excited to inflammatory action, by the irritation necessarily attendant on our endeavors; and I have,” he adds, “at best very little faith in obliquity of the os uteri producing serious protraction, unless, indeed, there be present also more or less rigidity, or some disproportion between the pelvis and head” (2). Does Dr. Ramsbotham really believe that there is any danger of inflicting such direful injuries upon the os uteri, as are here depicted? I can

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(1) Theory and Practice of Midwifery, Amer, ed., 1843, p. 237.

(2) Process of Parturition, p. 197.

hardly conceive how any one, restricted to the use of a single finger, could bruise and lacerate the part at such a rate, even were it his design to do all the mischief in his power. The truth is, the os uteri is made of sterner stuff than it has credit for, else would it be unfit for its post, which exposes it to the risk of contusion and laceration, in the most natural labor that can occur. The utmost that can be conceded is, that *awkward* and *unskillful* attempts in this kind may produce inflammation of the uterus, but this is chargeable to the *operator*, not to the *operation*, which need not cause pain, much less any such serious consequences. For my own part, I can safely declare that no mischievous effects of any kind have ever resulted, in my practice, from such tractions upon the os uteri as have been recommended, and the testimony of Dr. Dewees is equally decisive in regard to their safety and efficacy. Nay, this eminent practitioner deemed them of so much importance as to advise the introduction of the entire hand, well lubricated, into the vagina, in order to get hold of the os uteri, with the finger, when it cannot be reached by a well-directed search in the ordinary way; and, under the circumstances that he has specified, I should not hesitate to follow his advice, although I have not as yet had occasion to do it.

2. *Inefficient action of the uterus*,—recognized by all writers as a very common cause of delay, in the first stage. For this condition of the uterus it is not easy to account satisfactorily; it has been ascribed to constitutional weakness, to disorder of the digestive organs, plethora, peculiar temperament. Whatever may produce it, the simple fact is, that the uterus is not disposed

to exert the force it possesses, in the most advantageous manner: the pains may be recurring with regularity, and may be sufficient to worry the patient, and exhaust her strength and spirits, yet they do little or no good. The parturient passage is cool and moist, the os uteri is not rigid; on the contrary, it is pliant and soft, but it is little affected by the pains, and does not dilate so as to give promise of being duly prepared for the passage of the child, within a reasonable time.

If any morbid state of the system can be reasonably assigned for this condition of things, it ought to be corrected: if the pulse is full and strong, blood should be abstracted: if the bowels are confined, they ought to be relieved by an enema, or a dose of castor oil. If these means fail, or not being indicated, are not resorted to, the proper remedy is, *irritation of the uterine orifice by means of the finger, for the purpose of exciting more efficient contractions of the organ.*

In the first place the manner of doing this must be explained, in order to guard against any misapprehension or abuse of it. It is rarely necessary to employ more than the index finger, the extremity of which is to be introduced within the orifice, in the absence of pain, with its pulp or feeling surface turned toward the anterior lip of the os uteri. The patient is placed on her back, which is certainly the most convenient position for the manipulation. When a pain comes on, or after the lapse of the usual interval, whether there be pain or not, and for the purpose of exciting one, pressure is to be made with the finger, moved slowly around so as to bear successively on every part of the anterior semicircumference of the orifice. Having described a

half circle in one direction, for example, toward the right side of the patient, the finger is to be moved in the same manner in the opposite direction, and these movements are to be continued during the pain, or, if there be no pain, for a minute or so. It is then to be withdrawn from the orifice, but retained in the vagina, or if kept within the orifice, it must rest from its work for a few minutes. When pain recurs, or should recur, the finger is to be used in the same manner, and so on, until the uterine contractions become stronger, and act with more efficiency upon the orifice, when it is to be withdrawn from the vagina. The invigorated contractions may finish the dilatation of the orifice without any further assistance. Should they flag, however, or progress slowly, the finger may be reintroduced, from time to time, to freshen them. If the membranes are ruptured, and the os uteri contracts much during a pain, there may not be room for the finger between it and the presenting part of the child: in this case the finger must be used, as directed, in the interval of pain, and when contraction comes on, it must be withdrawn and made to press on the verge of the orifice. To produce the requisite orificial irritation, the finger must press, with different degrees of force, in different cases; but in all cases, the pressure should be gentle at first and gradually increased, and it is never allowable to use such force as would be required, literally, to stretch the os uteri. The mere contact of the finger is not sufficient to excite the os uteri; it is, therefore, necessary to make pressure with it, but it must be remembered that this pressure is intended to *stimulate*, not to *force open*, and that it acts upon a *vital*, not upon a *mechanical*, principle.

Speaking from abundant experience, I can truly say that it is equally surprising and gratifying to observe the prompt effects of this manipulation, in many cases of the kind under consideration. Not unfrequently, a few movements of the finger are sufficient to impart such energy and aim to the uterine contractions, that the waters begin to gather, as the phrase is, and cause the membranes to protrude.

In recommending the practice of artificial irritation of the os uteri, I am, of course, well aware that I stem the strongest current of authority that runs through obstetrics, and expose myself to the shafts of ridicule. No practice has met with such unqualified and almost universal reprobation. Instead of burdening my pages with a great many, I shall quote only a few, of the sentences of condemnation pronounced upon it.

“Every man who has had occasion to use the lever, or other obstetric instruments, the lever especially, must be aware, that when he gets a bearing on the head, and begins to draw down upon the outlet, not unfrequently pains are excited. Previously, perhaps, the pains have been few and rare; but when the head is drawn down, the irritation gives rise to a powerful action of the uterus; and hence we may enumerate, among the causes well fitted to excite the uterine movements, that compression and irritation of the mouth and neck of the uterus which may be produced by the action of the lever, or by means that are analogous. *On this principle it is, that some practitioners have advised us to press with the fingers on the mouth and neck of the womb, and others have recommended, that the fingers of the right hand, being deposited on the back of the*

vagina above, these fingers should be repeatedly drawn down over the front of the rectum, with pressure of the parts, so as to stimulate and excite the pains. Both these practices, however, I mention with a view to give a caution against them. I am not prepared to say that, under prudent management, they may never be safe and serviceable; but I regard them with fear, and think it better to refrain. If the womb is to be stimulated at all on these principles, *the vectis is, perhaps, the best instrument for the purpose*" (1).

"Nor must I allow the custom of irritating the mouth and neck of the womb with the finger, and rubbing it down the back of the vagina, along the rectum, to pass unnoticed; nor that still less justifiable mode of proceeding — the endeavor to dilate the os uteri by the first two fingers introduced within it; which last means also has received the sanction of the deservedly great name of Professor Burns, as applicable to some states of the os uteri; but which I do not feel myself warranted in mentioning except in terms of reprobation" (2).

"I do not deny that dilatation may thus be effected; but I believe it to be hazardous in skillful hands, positively dangerous in unpracticed ones, and unnecessary in all cases" (3).

Even Dr. Dewees, with the inconsistency he was prone to fall into, when any point of practice really or

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(1) Blundell — Lecture on Principles and Practice of Midwifery, p. 361.

(2) F. Ramsbotham — Process of Parturition, p. 170.

(3) Churchill — Theory and Practice of Midwifery," p. 235.

apparently clashed with one of his favorite dogmas, condemns it. Criticising the position of Professor Burns, that the dilatation of the os uteri ought, as a general rule, to be effected in ten or twelve hours at farthest from the commencement of regular labor, he observes — “ This position is followed by the necessary directions for the fulfillment of this intention by mechanical means; and though we acknowledge the mode pointed out for this purpose, and the conditions necessary to render them profitable, are as well guarded as the assumption of the principle will permit; yet we must declare our unfeigned aversion to the practice, for we are every way certain that it can be done with advantage in but very few instances, even by the skillful; and never, without the risk of much mischief, by the unskillful or inexperienced practitioner. When the os uteri remains unyielding for a long time, it is an evidence that the natural processes, which so beautifully, kindly, and safely effect this change, have from some cause or other been interrupted. And *though mechanical force* may be made to usurp the organic function, it nevertheless will always be at the expense of the health, or even the integrity ( be this more or less ), of that portion of the uterus to which the force is applied. So well assured am I of this fact, that I never employ force to open the os uteri. Nor do I hold the argument, “ that no mischief has been seen to follow this plan,” of the slightest weight; as we have it not in our power at the moment, to determine satisfactorily any consequence, but the proximate or immediate effect of the violence; which may be, and most probably is, but slight or even unappreciable at the instant it is committed. But can we with any cer-

tainty declare, that many of the severe and dangerous chronic affections of the neck of the uterus, do not owe their origin to this cause?" (1)

Dr. Dewees may well be charged with inconsistency in displaying such aversion for the practice of artificial irritation of the os uteri, and expressing such groundless fears as to its consequences, when, as we have just seen, he had no such dread of hooking it with the finger and holding it in the center of the pelvis, in cases of obliquity of the uterus. Now, I leave it to the reader to decide which of these manipulations is most likely to do violence to the os uteri, and plant the seeds of future disease, which spring so luxuriantly before the excited imagination of the doctor. It is very manifest that Dr. Dewees had no correct apprehension of the principle upon which the manipulation acts, and that he regarded the finger as a wedge cleaving its way into the uterus: hence, it is no wonder that he was shocked at the contemplation of it.

It is equally manifest that the other writers, whom I have quoted, have formed their opinion of the practice, from the dangers incident to the grossest abuse of it—the literal opening of the os uteri by the mechanical power of the fingers, formerly in vogue, which I deprecate as much as they. In this case, as in many others, the abuse of what is good has discredited its use, and disseminated most erroneous notions concerning the capabilities of the os uteri. Because it cannot bear the rudest handling and stretching, it has acquired the character of being remarkably delicate, and we are forbidden to *touch*

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(1) Midwifery, p. 349.

it oftener than is absolutely necessary, in our examination to ascertain the progress of labor. Now, while I would not be understood to encourage too great familiarity with the os uteri, I am entirely convinced that it is not a *touch-me-not*, and that no harm ever did arise from such manipulations as I have recommended. I have, for many years, been in the habit of employing them, under the circumstances which have been pointed out, in a great number of cases, and no evil consequences whatever have resulted, but labor has been greatly assisted, and many accidents, as I am firmly persuaded, have been averted, which would otherwise have happened from its undue protraction. My testimony, founded on experience, is therefore in favor of the safety and efficiency of the practice; while those who condemn it so vehemently, do not even pretend that they have tested it for themselves.

But as my single testimony, positive as it is, may not be deemed sufficient to settle a disputed point of so much importance in practice, I shall corroborate it with that of one of the most sober and judicious writers on obstetrics, Professor Burns, of Glasgow. In cases of tedious dilatation from premature rupture of the membranes, where the os uteri is lax and thin, or soft, he advises that it be gently dilated with the finger during a pain: "If this be done cautiously," says he, "it gives no additional uneasiness, while the stimulus seems to direct the action of the uterine fibers more efficiently toward the os uteri, which sometimes thus clears the head of the child very quickly, and the pains, which formerly were severe, but, in the language of the patient, unnatural, and doing no good, become effective

and less severe, though more useful" (1). But he does not limit the practice to this condition alone, for he declares, that "*in most cases of tedious labor it is beneficial.*" When we connect this declaration with the general rule, so earnestly contended for by him, "to effect the dilatation of the os uteri within ten or twelve hours, at the farthest, from the commencement of regular labor," there can be no doubt but that Professor Burns very frequently resorts to artificial irritation of the os uteri. It makes, however, no great figure in his writings, nor has he any theory of labor to maintain, which increases the value of his testimony. Dr. Power is also a decided advocate for the practice, and gives several very striking cases in illustration of its efficacy; but his testimony will naturally be received with distrust, because it goes to support a favorite theory of his. I cannot, nevertheless, refrain from citing one of his cases, because I have kept no record of my own; and cases, like examples, are more persuasive than precepts.

"February, 1819. I was sent for to Mrs. C., in the habit of suffering very painful and lingering labors, and who had been many hours ill, under the care of a female midwife. I found her greatly dejected, under a high state of febrile excitement, and the soft parts remarkably puffed and swollen, so that I found a difficulty in detecting the presentation, which proved the head, with one hand, and the umbilical cord descended before it. The pains were very slight. After bleeding her freely, the inflammatory state of the vagina seemed diminished, and I succeeded in returning both the hand and the

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(1) Principles of Midwifery, vol. I, p. 416.

cord. Being under the necessity of seeing another patient, I directed the midwife, during my absence, to apply hot fomentation, with a view of eliciting uterine action. On my return, two hours after, I found her much in the same state, the action very slight, and the head high up, so as to make little pressure on the os uteri. I now applied a bandage tightly round the belly, in hopes of pressing the child's head more firmly downward; after which I began to stimulate the os uteri itself with my finger. These plans had a wonderful effect in increasing the efficacy of the pains, and, more particularly, the latter; so much was my patient sensible of its advantage, that, during the pains, she would not allow me to intermit it for an instant. After the head began to make way upon the perineum, the pressure of the finger was continued, with the same good effect. Toward the latter part of the labor, we experienced some interruption and delay, from violent pains in the left side and right thigh, which were soon relieved by friction of the parts affected. The patient was delivered of a large still-born child, in about four hours from first commencing the abdominal pressure and stimulation of the os uteri" (1).

I refer with some reluctance to the testimony of patients themselves, because, although it may serve to strengthen our own faith, it will not weigh much with the inquirer, while an opposer may sneer at it. But I have assisted in many lingering labors, where the patients have been sensible that no progress was making, and in a few minutes after I had stimulated the os

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(1) Midwifery.

uteri, the pains have become brisker and more effective,—the orifice has rapidly dilated, and the child has been expelled with surprising promptitude; and when my ministry was over, the patients have spontaneously ascribed their delivery to it, declaring, in parturient phrase, that before it commenced the pains had altogether “worked upward,” but that when I began to assist, they “worked downward.”

## CHAPTER IX.

## TREATMENT OF THE FIRST STAGE CONCLUDED.

IN pursuing the subject of the last chapter, I mention, 3. *Impeded action of the uterus*, as no uncommon cause of delay of the first stage. By "impeded action" I mean action of the ordinary degree of force, or even greater than is usual in the first stage, but which is rendered unavailing by the circumstances attending it. The circumstance that most frequently operates to impede the uterine contractions in producing their intended effect, viz., opening the os uteri, is, the *premature rupture of the membranes*. It sometimes happens that the membranes are so frail as to give way, during the first few pains of labor, or even before there is any pain complained of; and, although the labor may not be affected by this occurrence, the first stage is rendered both more tedious and painful, in a sufficient number of cases, to justify Dr. Hamilton, and others, in considering it as untoward, especially in a first parturition.

The os uteri dilates more tediously and painfully, because the cervix is not so equally distended by the head or other presenting part of the child, as it is by the membranes with the fluid they inclose, and unless there be this equal distention, the propelling force is not transmitted to the orifice first, and then equally radiated to the circumference of the cervix, but is ex-

pended upon such points of the cervix as are most pressed upon by the head of the child. Suppose, for example, the os tinæ is too acuminated to allow the head to press upon it as firmly as it presses upon the outer circles of the cervical fibers, then, although these circles will be greatly distended during the pains, there will be but little retraction of the os toward them, and consequently but little tightening of the edges of the orifice, notwithstanding the pains may be severe. This unequal pressure operates, moreover, to disturb the equilibrium of the circulation in the neck of the uterus; being prevented from returning across the outer cervical circles, the blood is accumulated in the os tinæ, and hence its tumidity and puffiness, noticed as of frequent occurrence by all practical writers.

Among the causes which may seriously retard the first stage of labor, Dr. Hamilton mentions: "the interposition of a portion of the cervix uteri between the head of the infant and the bones of the pelvis;" and the band thus caught between the head and pelvic bones operates, he thinks, as a cause of retardation, by preventing the contractions being extended to the os uteri. This state of things he ascribes to premature rupture of the membranes — to the entrance of a part of the child and cervix uteri into the pelvis, previous to the commencement of labor — or to the large size of the head or smallness of the aperture of the pelvis. Dr. Gooch speaks of a "soft, flabby, and edematous" state of the os uteri as a cause of tedious dilatation, which, he also says, is generally induced by an early rupture of the membranes, "owing to which the cervical portion of the uterus is compressed between the head of the child

and the pubes; and the return of the fluids being obstructed, the os uteri becomes thickened, and its dilatation is in consequence extremely slow" (1).

That a band of the cervix may be thus intercepted between the head of the child and the pelvis of the mother, in cases of decided disproportion, I should not be warranted in denying (such appears to have been the fact in the fatal case recorded by Dr. Hamilton); but that this occurs from premature rupture of the membranes, I cannot believe, even on the authority of two such distinguished teachers. The grounds of my dissent are, 1. Such an interception is not necessary to explain what is observed—the unequal pressure of the head upon the cervix, without the counter pressure of the pelvic bones, being sufficient. 2. There is no particular reason why premature, any more than *mature*, rupture of the membranes should cause this interception, seeing, as has been already observed, nothing is more common than for the os uteri to continue between the pubes and head until a short time before the egress of the latter, and yet the symptoms ascribed to this interception are most commonly observed in cases of premature rupture of the membranes.

I conclude, therefore, that the "soft, flabby, and edematous" state of the os uteri is not the cause of its tedious dilatation, but that this morbid state and the accompanying tardy dilatation are *effects* of the same cause, viz., the disadvantageous manner in which the propelling contractions act upon the cervix uteri, in con-

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(1) Practical Compendium of Midwifery, prepared for publication by George Skinner. Philad. : 1832 : p. 173.

sequence of the premature rupture of the membranes. This altered state of the os uteri is not, however, always present, for the action of the uterus may be so impeded as to retard the dilatation of the cervix, without sensibly affecting its circulation.

In the treatment of tedious dilatation, resulting from this cause, it will be proper to detract blood freely, if the os uteri be hot, tender to the touch, and rigid as well as tumid: but the judicious employment of the fingers in aid of the uterine contractions is much more frequently indicated, and is often the only thing that can be done to assist the patient. The fingers are *not* to be used to excite uterine contractions (for they are already too strong), nor to stretch the os uteri, but *to press upon its margin*, during the pains, in order that their counter pressure may keep it in as firm contact with the head as the rest of the cervix, and the orifice be thus brought within the pale of the dilating influence of the uterine contractions. Both Hamilton and Gooch highly recommend this practice, but their object is to *push up* the edge of the orifice over the head of the child; to liberate the band of the cervix, supposed to be incarcerated,—a condition which, if it really existed, could scarcely be reached by such a procedure. As affording a happy illustration of the difficulty we are considering, and its remedy, I quote the following case from Dr. Gooch: “I attended a lady whose former labors had been very quick; on my arrival I found the *pains were strong*, and though the os uteri was only dilated to the size of half a crown, I, like a simpleton, patted her on the shoulder, and told her to keep up her spirits, for the child would soon be born. A man must be a goose

under such circumstances to give such a prognosis; for he knows not when the labor will be over; and if his prognosis is not verified, he loses credit. Hour after hour passed, and the pains continued, but the os uteri was not more dilated, the laborpains became still more rapid and violent; she complained also of a constant pain near the symphysis pubis, and I feared a laceration of the uterus would take place. I bled her to the amount of fourteen ounces; she fainted; I kept her in an upright posture in order that the syncope might produce its full effect; the pains were suspended for about half an hour, when they returned, and her cheeks resumed their natural color. I examined, but found the bleeding had done no good. I then applied two fingers against the edge of the os uteri next the symphysis pubis, and pushed it up at the time of a pain, and kept it up after the pain was gone off: at the next pain I pressed the os uteri still higher, and repeated the same proceeding at about a dozen pains, when the os uteri slipped quite over the head of the child, and the labor was soon over" (1).

4, *And lastly; Morbidly resisted action of the uterus*, by which I mean inordinate contraction of all the fibers of the sphincter or cervix uteri, commonly called *rigidity of the os uteri*, is the most formidable cause of protracted dilatation, encountered in practice. Although referred by some to "natural toughness" of this part, it consists really, in most cases, in morbid irritability of the cervical fibers, in consequence of which they refuse to yield as readily as in a healthy

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(1) Loc. cit.

state. It is always attended with more suffering than labor in which no such morbid condition exists: "there is," as Dr. Hamilton observes, "a feeling of wretchedness which is not relieved during the intervals of the pains: sickness at stomach, with excessive retchings, are very usual symptoms — restlessness and despondency are the natural consequences." In an examination per vaginam, it is discovered that the os uteri, besides feeling remarkably rigid and being more or less painful and hot, is so strongly contracted during the pains, that its margin is unusually tense — all which distinguishes between this and the case just considered.

We may form some estimate of the strength of the resistance, which these fibers are capable of making, when inordinately excited, by observing its effects upon the head of the child. Every one, who has been much engaged in obstetrical practice, must have seen children born after tedious first labors, with the head prodigiously elongated and resembling a sugarloaf. That the alteration of shape was owing to the difficult manner in which the head was squeezed through the resisting os uteri, and not to any want of room in the pelvis, might be inferred from the fact that rigidity of the os uteri occurs most frequently in first labors; and the correctness of the inference is proved by the same mother giving birth subsequently to children, with greater facility, and without any such deformity of the head.

Besides acting as a barrier to the egress of the child, rigidity of the os uteri hinders the head from executing the rotatory movement, essential to its easy escape through the inferior aperture of the pelvis, and thus perpetuates itself sometimes almost indefinitely, especially where its

treatment is not properly understood. To make this apparent to any one who comprehends the mechanism of labor, it is only necessary to observe that rigidity, though it may resist the passage of the head through the os uteri, cannot prevent it from descending in the pelvis, bearing the cervix before it. Urged by the propelling contractions of the uterus, the head does in fact descend to the bottom of the pelvis, and seems to be on the point of emerging from it: but arrived there, it can advance no farther, even if the os uteri were to open, without previously undergoing rotation. This arrest of the head at the inferior strait deprives the expulsive contractions of the means of efficiently overcoming the resistance of the cervix, viz., the forcible intromission of the head into its orifice, and consequently it is enabled to hold out so much the longer, in the resistance which it offers.

The condition above described, viz., the head descended low in the pelvis, and held by the cervix uteri as it were in a sling, is, as it seems to me, the ultimate effect of rigidity of the os uteri, though Dr. Dewees does not so consider it, while he allows that it has all the effects of that condition. The descent of the anterior portion of the cervix before the head may, doubtless, be produced by causes unconnected with rigidity, such as obliquity of the uterus, for example; but rigidity, when obstinate, necessarily produces it, if the contractions of the uterus become powerfully expulsive. It is not a little singular, by the way, that Dr. Dewees should not have known that any writer has noticed this cause of tedious labor, when it was as familiar to Smellie as to him, who recommends, also, precisely the same

management of it (1). Dr. Smellie, moreover, relates cases produced by both of the causes above mentioned, rigidity and obliquity.

With regard to the treatment of rigidity of the os uteri, it must be observed that it should be vigorously applied, at as early a period as possible, for the affection is apt to gather strength by continuance. Practitioners of the cast of those who attended upon Job in his afflictions, sadly abuse the misplaced confidence of their patients, upon occasions such as these. Whatever is to be done must be done quickly, and with unwearied diligence, until the patient is rescued from suffering and danger. *A meddlesome midwifery is bad, but a shilly-shally midwifery is worse.*

The first and most successful remedy is bloodletting, which should be so copious as to make a decided impression on the circulatory system. "As much blood should be abstracted by one venesection," says Dr. Hamilton, "as would be taken from a patient of a similar constitution, if she were laboring under an acute inflammatory disease." Bloodletting appears to diminish the morbid resistance of the cervical fibers, without impairing the healthy propulsion of those of the superior portion of the uterus. Should venesection disappoint the expectations of the practitioner, the question will arise as to the propriety of its repetition. It is a sound principle in obstetric practice, though lamentably disregarded by some, to be as economical as possible in the shedding of blood, lest, in the progress of the labor, the further unavoidable loss of it should sink the patient

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(1) Cases in Midwifery, Collection XVII.

below the point of recovery. It is therefore best, as a general rule, to prove at once the power of the remedy by bleeding from a large orifice — in order that the desired effect may be produced, with as little sanguineous loss as possible — and to resort to other means in the event of its failure.

Among these, opium, in the form of an enema, deservedly stands high. Administered with due attention to the circumstances that should govern its use, it greatly soothes the sufferings of the patient, and promotes the dilatation of the os uteri. Dr. Hamilton's practice in this particular may be safely imitated: "If strong and frequent pains, continued for six or eight hours, do not decidedly promote dilatation, the opiate enema should be had recourse to, and it will seldom disappoint the expectations of the practitioner. But if the first stage (with strong and frequent pains) be allowed to go on for twelve hours or upward, without having completed the dilatation of the os uteri, there is the risk that the opiate will so far interfere with the progress of the labor, that instrumental delivery shall become necessary" (1).

Tartarized antimony is another remedy which may be tried, when bloodletting fails, and the opiate enema is judged to be improper, or has been tried in vain. This medicine is very highly commended by Dr. Evory Kennedy, of Dublin, and it is mentioned on his authority more than from my own experience of it. In a valuable paper, contributed by this distinguished gentleman to the American Journal of the Medical Sciences, for

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(1) Op. Cit.

February, 1836, entitled "*Observations on the use of Tartar Emetic in Obstetric Practice,*" the advantages of tartar emetic over blood letting are thus set forth: "It is an agent by which the system can be with safety brought into a much greater degree of temporary depression; between which state and relaxation of the contractile tissues, a marked connection holds, if they do not absolutely stand in the relation of cause and effect. The principal recommendation, however, to tartar emetic in these cases is, that in its use, the power of regulating the necessary degree of lowering the system, exists completely in the hands of the practitioner, as he has only to increase or diminish, or suspend the dose, in order to produce the effect he wishes; and, when the necessary effect is produced, the withdrawal of the medicine leaves the vital energies but little impaired." He gives the medicine in conjunction with small doses of laudanum; five or six grains of the tartrate, dissolved in eight ounces of water, with the addition of twenty drops of laudanum and a small quantity of syrup, make a mixture of which one, two, or more tablespoonsful may be given at intervals of from fifteen minutes to two, three, or four hours, according to the effect it produces, and the necessity that exists for bringing the patient speedily or otherwise under its influence. "Sometimes," Dr. Kennedy remarks, "it is necessary to cause free vomiting in the first instance, or the ordinary doses produce no nauseating effect; in such cases the laudanum is better withheld, but may be added afterward if necessary. In other cases, the medicine acts too violently as an emetic or produces purging; here increasing the quantity of the laudanum, and diminishing the

doses, or allowing a longer interval to intervene between the doses, will be necessary."

The extract of belladonna, made into an ointment (1), has been applied to the os uteri with good effect in a number of cases. It was introduced into the practice of the Paris Maternité, I believe, by the celebrated M. Chaussier, and since that time has been prescribed by most of the French obstetricians. It is necessary to use it with caution, as it is liable to produce head symptoms and depression of the pulse; and in one case, mentioned by Dr. Kennedy, in the paper just quoted, insensibility and stertor were induced by it.

The stramonium is a kindred remedy, which may be tried under the same circumstances. More than twenty years ago, before I was aware that belladonna had been recommended or used by any one in the case under consideration, I was led to make trial of the stramonium in a very obstinate case of rigidity of the os uteri. The case occurred in the country; having exhausted the usual resources to no purpose, and observing the stramonium to grow in great abundance about the premises, it struck me that it might possibly affect the os uteri in the same manner that it does the pupil of the eye. A strong ointment was accordingly prepared from the leaves of the plant, and freely applied to the os uteri with the effect of rendering it less rigid and materially promoting its dilatation. Since that period I have occasionally used the stramonium and belladonna, but they have failed, oftener than they have succeeded, in procuring any marked relaxation of the os uteri. One or

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(1) Ex. belladon. ℥ij., Aquæ flav. ℥ij., Adip. Suill. ℥j.

the other should, however, be tried when the means precedently recommended do not succeed.

Tepid baths and demi baths have been much extolled by French writers ; but in Great Britain and in this country they are hardly ever used. It is probable they have been slighted by us, or too hastily condemned. M. Capuron, in particular, speaks in terms of most decided commendation of them: "We have," says he, "derived great advantage from them under many circumstances, and prefer them to all other means, when it is necessary to relax the vulva, vagina, or even the os uteri."

Lastly. Should all the means above recommended fail, or but partially succeed, in overcoming the rigidity of the os uteri, and the cervix descend in advance of the head of the child, it is necessary *to raise and support the os uteri*. As this is a measure of considerable importance, I shall endeavor to explain how it is to be practiced. The index finger is to be applied just underneath the anterior lip of the os uteri, and with its edge or palmar surface pressure is to be made, in the interval of the pains, so as to push up the os uteri as high as possible, or the extremities of two or three of the fingers may be used in the same way. When a pain comes on, the tendency to descent is to be resisted, unless this be so strong as to require more force than it would be prudent to employ: in that case, the finger or fingers must gradually relax its counter pressure and allow the descent to take place. But as soon as the pain goes off, the os uteri is to be pushed up again, and its descent is again to be resisted during the next pain. In this manner, acting with gentleness and caution, but, at the same time, with firmness and perseverance, the os uteri must

be supported until it is sufficiently dilated to allow the head to execute its rotatory movements, and emerge from under the symphysis pubis.

The principle upon which this maneuver acts does not appear to have been well understood, even by those who have practiced it. The support given to the os uteri prevents it from prolapsing, to be *backed*, if the expression will be allowed, by the floor of the pelvis, and places it in a position that will permit a portion of the head to become insinuated within it during a pain. The finger is not used to stretch the os uteri, as many writers direct, but to hold it up that it may be dilated by the head, which can then be pushed, by the uterine contractions, lower than the level at which the os uteri is held. The head dilates the os uteri far better than the finger could, because it acts upon the whole extent of the cervix, whereas the finger could act only on the circle of the os uteri.

Dr. Hamilton describes a modification of cervical resistance, consisting in what he calls "an undeveloped band of the cervix uteri." This cause of protracted labor is discovered by the edges of the os uteri swelling during the pains, as if distended with air, and becoming relaxed in the intervals of the pains, and, notwithstanding strong labor throes, neither the membranes nor the child are brought in contact with them. "If," says he, "during the interval of the pains, the finger be carried up within the os uteri, the stricture of the cervix will be distinctly perceived." The resistance, offered by this contracted band of fibers, is capable of greatly protracting labor,—Dr. Hamilton says for above thirty hours,—and is productive of much suffering, with febrile

excitement, nausea, and occasional tremors, resembling convulsions. I attended a female in two successive labors, in both of which this cause of difficulty was distinctly detected. She had borne a number of children before she became my patient, and it is probable that the same condition existed in all her labors, for they were tedious and attended with alarming symptoms, particularly with hemorrhage immediately following the birth of the child.

Dr. Hamilton's treatment of this obstacle consists in, "*first*, venesection, if the patient's health will permit; *secondly*, the administration of an opiate enema; *thirdly*, half an hour after the opiate, pressure on the resisting band of the uterus with the point of the finger during each successive pain. The finger is to be carried above the stricture, and the pressure is to be made from within outward." The latter means alone promptly relieved it in both instances, in the female whose case I have mentioned.

## CHAPTER X.

## COMMON PHENOMENA OF THE SECOND STAGE OF LABOR.

THE phenomena of the second stage of labor are more numerous and diversified than in the first stage, because the manner in which the fetus is transmitted through the pelvis must be varied according to the circumstances of its presentation and position. The phenomena connected with these circumstances are strictly mechanical in their nature, and constitute what is commonly called the mechanism of labor,—an extensive subject, and one of which none can be ignorant and yet fit to practice midwifery.

In considering these phenomena, I shall divide them into the *common* and *special*; the common phenomena being such as belong to all labors, irrespective of the situation of the fetus in utero,—the special, such as belong to, and grow out of, the different presentations and positions.

*The common phenomena of the second stage* will be the subject of the present chapter. These are, the rupture of the membranes, and the ejection of the fetus.

1. *Rupture of the membranes.* The more vigorous contractions of the uterus, excited by the presence of the membranous pouch within the circle of the dilated ori-

fice, soon ruptures the membranes composing the pouch, which are no longer supported by the uterus.

The rupture takes place during the acme of a pain, and with an audible noise, if the pouch contains much water; otherwise without the observation of the patient or of those about her. A more or less considerable discharge of liquor amnii, according as the pouch is prominent or flat, immediately follows the rupture, but this is soon arrested by the presenting part of the child being pressed against the orifice. As the pain goes off, the discharge is resumed, but ceases again when the pain entirely subsides. During the subsequent pains, a small portion of liquor amnii escapes at their commencement and decline, being arrested during their acme, until the presenting part occupies the orifice, when its further discharge is prevented, and thus a remnant of it is retained.

The retention of a portion of the liquor amnii until the fetus is expelled, serves to maintain more efficient contractions of the uterus, and shields the child from the dangerous compression to which it would be exposed, were the uterine parietes in direct contact with the surface of its body. Some explanation of this proposition may be desirable.

In proportion as the liquor amnii escapes, the cavity of the uterus is diminished in size, by the tonic contraction of its parietes, which constantly, in a healthy state, tightly embrace the uterine contents. The fibers of the uterus are necessarily shortened by this process, and like all other muscular fibers, their power of contraction diminishes in proportion as they are shortened.

The actual force which these fibers are capable of exerting is, therefore, greater in consequence of a portion of the amniotic fluid being retained. But this is not all. Were the whole of this fluid evacuated, the uterine parietes would close in upon the fetus and become molded to the inequalities of its body, and thus the equilibrium of the parturient force would be broken, for the fibers not being all equally shortened, the contractile power of all is not equally diminished. The remnant of fluid serves to keep up uniform distention of the uterus, and preserves that equability of action among its expulsive fibers, which renders their joint force most effective.

2. *Ejection of the Fetus.* The pains of the second stage are, it has been already stated, stronger than those of the first; they have, moreover, a peculiar character or expression, and are described as *bearing down* or *expulsive*, in distinction from the *cutting* or *grinding* pains of the first stage. They are not unfrequently suspended, for a short time after the rupture of the membranes, until the tonic contraction brings the uterine walls in close contact with the ovum, and then they return with augmented force. We are not to imagine that the uterus is really capable of acting with greater force after the rupture of the membranes than before, as is commonly intimated by authors, for it is in fact less capable, as I have just shown. The only exception to this (if indeed there be any) is where the uterus is so enormously distended with liquor amnii that its fibers are partially paralyzed by their extreme extension, but even then the apparent proof of their disability, viz; the coming on of brisker action after the artificial evacua-

tion of the liquor amnii, may be otherwise explained. Whether the membranes be ruptured spontaneously or artificially, and whether much or little liquor amnii be discharged, the more powerful stimulation of the os uteri, resulting from the direct approach and entrance of the head or other presenting part of the child, is the cause of the more forcible parturient contractions.

Under the influence of these expulsive contractions, the presenting part of the fetus engages in the *uterine orifice*, which is now much more widely dilated than before, and is sometimes slightly lacerated at one of its sides, most usually the left, in consequence of the greater frequency of right obliquity of the uterus.

The *vagina* receives this presenting part, as it is protruded through the os uteri, and is so distended, in all directions, as to have its rugæ effaced. As it engages in the vagina, the fetus enters, of course, the pelvic excavation, and the os uteri, pressed against the walls of the vagina, may not be perceptible when this canal is fully occupied. But it must not be forgotten that the presenting part of the child may be deeply engaged in the excavation, and yet be contained entirely in the uterus,—the os uteri advancing before it,—and this is, according to my observation, a very common case. The *vulva* (meaning the genital fissure and its appurtenances) is next reached by the presenting part, and begins to be distended. The perineum loses its thickness and becomes more and more prominent; the genital fissure is carried forward in the direction of the axis of the inferior strait, its opening appearing small in comparison with the large tumor of the perineum, while the anus is dilated; the labia are unfolded, and the

clitoris, vestibule, and meatus urinarius are pushed before the pubic arch. In this distended state, the fourchette, as M. Dugès remarks, is found three or four inches from the margin of the anus, and five and a half inches from the point of the os coccygis, instead of being, as ordinarily, about fifteen lines from the former and three inches from the latter. The pains at this time are *rending* or *tearing*, described by the French writers as *conquassantes*, and irresistible requisition is now made upon the diaphragm and abdominal muscles; the patient is tormented with tenesmus, frequently the contents of the rectum are evacuated; and cramps of the muscles of the lower extremities are excited by the compression of the nerves passing to them through the pelvis.

The vulva is finally opened to a sufficient extent to allow the child to pass, not, however, without a slight laceration involving the fourchette in most first labors; in such cases, also, greater resistance is made to its opening by the perineum, which suffers itself to be greatly distended during the pains, giving promise of a speedy termination of the labor, but reacts as soon as the pains go off, and pushes back the child. This bandying may last for some hours (as I know to my cost), but the perineum becoming tired at last, allows the presenting part to pass, and this is usually soon followed by the remainder.

Such is a rapid sketch of the more palpable common phenomena of the second stage of labor, which any one may easily observe for himself: but besides these, there are others of a more recondite nature, which do not the less deserve the study of the accoucheur because they are concealed from his superficial examination; on the

contrary, they must be acknowledged to be of the utmost practical importance. I allude to the changes which the circulation of the blood in the uterus undergoes during the progress of labor. These changes are not, indeed, peculiar to the second stage, being observable in the first also; but as they are more considerable in the second stage, and are then alone capable of becoming mischievous, this is their proper collocation.

The circulation of the blood, in all muscular parts, is necessarily affected by the condition of the muscular tissue composing them. While this is in a state of repose, the arteries penetrating it are freely permeated by blood, which is not returned by the veins, at a more rapid rate than that which regulates the balance between these two orders of vessels, in other parts of the system. But when the muscular tissue is in a state of contraction, it is condensed,—its molecules are approximated, and it becomes harder and more resisting than it was while in a state of relaxation. The caliber of its bloodvessels is necessarily diminished, during the continuance of its condensation, and an impediment is offered to the flow of blood into it through the arteries, while the exit, through the veins, of what was circulating in it, at the moment of condensation, is hastened.

This is familiarly exemplified by what occurs, every day, in the operation of venesection. The flow of blood can be augmented at pleasure, by directing the patient to vigorously contract the muscles of the arm, by grasping a cane. The accelerated flow of blood from the orifice is, doubtless, to be ascribed partly to the aid received by the venous circulation from muscular action; but it is caused chiefly by the streams of blood

that are pressed out of the muscles, swelled by those which are turned toward the cutaneous veins, because they are debarred from entering the muscles. These effects of muscular contraction will be more considerable, and may amount to a total suspension of the circulation, if the muscular fibers are so interwoven with each other as to constitute a dense network, through whose interstices the capillaries are distributed, while these fibers are so arranged as to form circles around the larger branches.

Now, such precisely is the texture of the muscular coat of the uterus, and such the arrangement of its fibers. We are, therefore, prepared to suspect that its contraction must exert a powerful control over the circulation of the vessels distributed through it, and this suspicion is strengthened by observing the impotency of all remedial means, in some cases of uterine hemorrhage, in an advanced stage of gestation, unless uterine contraction come to their aid. It is furthermore observable, in such cases, that the torrent of blood is arrested during the contractions of the uterus, but resumes its course in the intervals of relaxation.

Such observations as these have been deemed, by judicious writers, sufficient to establish the fact, that the uterine circulation is suspended or greatly impeded during the pains of labor. But as this is a point of no little importance, as well on account of its physiological as its practical bearings, it may not be amiss to corroborate it by other evidence. This is abundantly furnished by obstetric auscultation. The circulation of the blood through the enlarged vessels of the gravid uterus is attended with a murmur, resembling the sound of a bel-

lows, and called hence, by the French writers, *bruit de souffle*. M. Kergaradec, its discoverer (1), was of opinion that it is heard exclusively in that portion of the uterus to which the placenta is attached, and that it is produced by the circulation of the blood through the cells and tubes of the placenta. M. De Lens, who entered upon the investigation of this newly-discovered phenomenon of pregnancy, as soon as Kergaradec opened the way, adopting the idea of the latter as to its cause, proposed (2) calling it the *placental souffle*. Both Kergaradec and De Lens concluded that it is emitted by the maternal uterine circulation, because they constantly observed its synchronousness with the pulse of the mother. Many subsequent writers admit, also, its connection with the circulation of the blood through the vessels of the uterus, while they deny that it is confined to that part of the organ to which the placenta is attached. They propose, therefore, to call it the *uterine souffle* or *murmur*. But M. Bouillaud and a few others contend that it is altogether extraneous to the uterus, being caused by the pressure of this organ, enlarged by gravidity, upon the iliac arteries and aorta, and prefer hence to call it *abdominal souffle*.

M. Cazeaux, finally, attempts to reconcile these discrepancies, by alleging that two distinct modifications of this *souffle* may be heard, in examining the abdomen of pregnant women;—the one *intermittent*, and the other,

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(1) Mémoire sur l'Auscultation appliquée à l'Etude de la Grossesse — read before the Royal Academy of Medicine, December 1821, by J. A. Lejumeau Kergaradec, Paris, 1822.

(2) Appendix to M. Kergaradec's Memoir.

*remittent*;—the former produced by the pressure of the gravid uterus upon the aorta and iliac arteries, and the latter by the united sounds of all the arteries distributed through the uterine parietes. The intermittent souffle, he observes, is nearly always heard in the inferior lateral regions, right or left of the abdomen,—the remittent, which resembles the noise of a child's top (*bruit de diable*), is perceived at the superior part of the abdomen, in front or upon its sides.

However this may be, there can be no reasonable doubt that the souffle, which is usually and most readily heard, on applying the ear to the abdomen, in advanced pregnancy and during labor, is really produced by the uterine circulation. Although my own limited observation inclines me to the belief that it is emitted from the most highly vascular portion of the uterus, corresponding to the insertion of the placenta, yet, to avoid the use of terms, which imply certainty where there is still doubt, I shall denominate it the uterine, instead of the placental, souffle or murmur.

If the emission of this murmur from the uterus is caused by the more abundant and accelerated flow of blood through its tissues, the faintness or extinction of it will prove conclusively that the vascular currents are retarded or arrested in their course. Such faintness of the uterine murmur, gradually increasing until it can no longer be heard, is to be observed during every contraction of the womb, from the commencement to the close of labor. In proof of this statement, I offer the following testimony of Dr. Hohl, as quoted by Dr. Rigby (1).

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(1) Midwifery, p. 159.

“ The moment a pain begins, and even before the patient herself is aware of it, we hear a sudden, short, rushing sound, which appears to proceed from the liquor amnii, and to be partly produced by the movement of the child, which seems to anticipate the coming on of the contraction: nearly at the same moment all the tones of the uterine pulsations become stronger: other tones, which have not been heard before, and which are of a piping, resonant character, now become audible, and seem to vibrate through the stethoscope, like the sound of a string which has been struck and drawn tighter while in the act of vibrating. The whole tone of the uterine circulation rises in point of pitch. Shortly after this, viz., as the pain becomes stronger and more general, the uterine sound seems as it were to become more and more distant, until at length it becomes very dull, or altogether inaudible. But as soon as the pain has reached its height and gradually declines, the sound is again heard as full as at the beginning of the pain, and resumes its former tone, which in the intervals between the pains is as it was during pregnancy, except somewhat louder.”

We have next to inquire into the effects of this interruption of the uterine circulation upon the fetus. To comprehend these, we have only to recur to the nature of the vital connection subsisting between the fetus and mother. We have seen, when studying the “appurtenances of the fetus,” that a function equivalent to respiration is performed for the fetus in the placenta, for its blood is arterialized by its proximity, in the umbilical capillaries, to the blood of the mother flowing through the maternal portion of the placenta. Hence,

it may be inferred, that if the intromission of fresh arterial maternal blood into the placental cells be interrupted, fetal respiration must be suspended, and that this interruption cannot, therefore, be borne by the fetus any longer than a breathing animal can bear the suspension of its respiration. Such an interruption occurs during at least the greatest intensity of every labor-pain. It must, however, be observed, that the disturbance of the uterine circulation is more considerable in the second than in the first stage of labor, because the parturient contractions are the more forcible and of longer duration, and, a portion of the liquor amnii having escaped, the uterus is reduced in size by its tonic contraction, which permanently diminishes the caliber of the vessels. We ought not, therefore, to be surprised at the death of the fetus, if the second stage of labor be protracted by any obstacle, requiring unusually powerful efforts on the part of the uterus to overcome it. In such cases, not only is there extraordinary resistance to the entrance of the blood of the mother into the placental cells, but these cells are probably flattened or effaced, as Baudelocque suggests (1), by the compression

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(1) On this whole subject, consult his admirable section, *Des Changemens que produit le travail de l'Accouchemens dans la circulation qui se fait reciproquement de la mere à l'enfant, &c.* *L'Art des Accouchemens, Tom. 1, p. 226.*

As the title of this section declares, Baudelocque entertained the notion that there is a reciprocal interchange of blood between the fetus and mother, through the uterine sinuses, which differ, as he supposed, from both arteries and veins. They are, according to him, a species of reservoirs, into which the uterine and umbilical arteries pour blood, and from which the veins of the same name

to which the placenta is subjected between the walls of the uterus and the child's body. Nay, the umbilical cord is liable to suffer from this compression, and thus even the imperfect arterialization of the blood, which the placenta is capable of performing, may be intercepted.

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take it, the one, to convey fetal blood into the system of the mother—the other, to convey maternal blood to the fetus.

But although the proofs of this doctrine (which he does not adduce in his immortal work) appeared very conclusive to him, there does not seem to be any foundation for it. This error does not, however, affect the justness of his views in regard to the influence of labor over the maternal and fetal circulation of the blood.

## CHAPTER XI.

## COMMON TREATMENT OF THE SECOND STAGE OF LABOR.

THE conduct of the second stage to a favorable issue imposes certain duties on the accoucheur, which he is not justifiable in neglecting in any case, although it be true that in a large majority of cases, no harm whatever would result from his inattention. Experience having taught us, for example, that women are least obnoxious to dangerous accidents, when the second stage pursues a certain course, it is our duty to secure, as far as possible, this most favorable course, in *all* cases, notwithstanding the possibility, or even probability, that no mischievous consequences would arise from its being allowed to deviate in *the* case under our management.

The accident to which a parturient woman is most exposed, at the close of the second stage, is uterine hemorrhage; and we know that this is not unfrequently caused by *the too rapid progress of the second stage*,—the expulsion of the child immediately following the rupture of the membranes. Under such circumstances, the tonic contraction has not time to perform its office; it is, indeed, paralyzed by the sudden emptying of the uterus, and the organ is consequently left in an entirely flaccid condition. Should the placenta be detached, in whole or in part, by the muscular contraction that expelled the fetus, it is plain that blood must be poured

out from the open mouths of the uterine arteries and veins, where it was lately attached. And there is never more risk of this perilously sudden expulsion of the child, than where the first stage has been protracted, and the uterus has acquired the morbid irritability, of which I have spoken in a former chapter; nor under any other circumstances is uterine hemorrhage so much to be dreaded. As an instructive illustration of the danger attendant on the ejection of the child following too closely upon the discharge of the waters, I will give the substance of a case recorded by Madame Lachapelle: A woman, aged thirty-two years, habitually healthy, and the mother of several children, came to the hospital at eight o'clock in the morning, having had laborpains for four hours. The os uteri was found dilated to the extent of fifteen lines, and the membraneous pouch was tense. Dilatation progressed slowly, the membranes descending to the vulva, although the head of the child continued at the superior strait. The membranes finally giving way; a very large quantity of liquor amnii was discharged; the head suddenly cleared the orifice and instantly escaped through the vulva. The placenta was expelled with equal rapidity, much water following. The uterus remained contracted but for a moment; complete inertia succeeding, hemorrhage ensued which could not be arrested by cold, or by the injection of vinegar into the uterus; the introduction of the hand and the tampon were equally unavailing, nor could the prodigal exhibition of stimulants, such as ether, wine, etc., prevent a fatal syncope, preceded by convulsive movements of the face (1).

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(1) *Pratique des Accouchemens*, Tom. II, p. 475.

In the natural progress of the second stage, the membranes rupture shortly after the uterine contractions assume an expulsive character, and then before the child can be expelled, the uterus is gradually prepared by the tonic contraction to safely revert to its vacant state. It is, therefore, with me a fixed rule of practice, *in all cases without exception, to rupture the membranes, when, the dilatation of the os uteri being completed, the pains become expulsive, or even in the absence of expulsive pains and with a view to excite them.* Had this rule been acted upon, in the case cited from Madame Lachapelle, there cannot be a doubt, I think, that the result would have been different. The membranes can be easily ruptured in most cases, by pressing firmly against them with the extremity of the finger, during a pain, and our aim should be to push the finger through them while the pain is at its acme. If the simple pressure of the finger is not sufficient, we can often succeed by boring with it at the same time. I have not found it necessary to notch the fingernail, like a saw, in the manner recommended by Dr. Gooch (an accoucheur's nails ought to be always closely pared); should the finger fail, it would be better to use a probe or a writing pen.

There is yet another reason for the practice here recommended, viz., the toughness of the membranes may be so great as to seriously retard labor by hindering the presenting part from engaging in the pelvis, and thus the sufferings of the patient are protracted, and the powers of the uterus may be so enfeebled that the child will not be expelled in good time, after the membranes give way spontaneously. Dr. Hamilton mentions

a case (a fortunate one, but confirmatory of the fact just stated), where the os uteri was fully dilated Thursday night, but notwithstanding strong and regular pains, the membranes were whole on Saturday morning: upon rupturing them, a few pains expelled the child.

Writers, almost unanimously, denounce the practice above recommended, and none more strenuously than Dr. Francis Ramsbotham. "It is desirable in practice," says he, "to preserve the membraneous bag entire as long as possible; or, at least, until it has performed the whole of the office destined for it by nature; namely, the dilatation of the os uteri, the vagina, and somewhat of the external parts. When the membranes appear externally to the vulva, indeed, we may suppose that they have then effected all the good that can be expected from them; that their remaining entire may possibly be retarding the labor; and we may in that case venture to rupture them, provided the head present. *But it is one of the first axioms to be learned in obstetric practice, not officiously or unnecessarily to destroy the cyst, so long as any advantage can be gained by its dilating powers*" (1). I agree with Dr. Ramsbotham that the membranes should be preserved, as a general rule, until they have performed their office; but do not believe that dilating the vagina, and "somewhat" of the vulva, is any part of that office, because, in the great majority of cases, they naturally give way shortly after the os uteri is dilated. I maintain, consequently, that to rupture them when the os uteri is dilated is but *intelligently* to imitate nature, instead of *blindly* follow-

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(1) Process of Parturition, new Amer. edition, 1845, p. 92.

ing her in all her vagaries. Contrary, therefore, to what Dr. Ramsbotham has advanced, it is one of the first axioms to be learned in obstetric practice, to rupture the membranes, whenever their integrity can do no good but may do mischief.

Dr. Dewees erred, in my judgment, to the opposite extreme, which, though not so pernicious, is not to be commended. "Should the pains be efficient," says he, "and the os uteri well dilated, *or even easily dilatable*, and the membranes entire, let them be ruptured by the pressure of the finger against them, or by cutting them with the nail of the introduced finger" (1). The experience and tact of Dr. Dewees may have enabled him to pursue this course with safety; but those, less highly favored, who may imitate him, will soon have reason to repent their rashness. It is not an easy matter to know certainly that the os uteri is *so dilatable* that it will yield readily to the presenting part of the child, when this is made to take the place of the membranes; and if it do not, the dilatation will be retarded, because no part of its body is so well adapted to promote it as the soft and pliant membranes. Nay, the process may be rendered much more painful as well as protracted, in consequence of the increased resistance of the os uteri, provoked by the ruder approaches of the head, should this part present.

In the conduct of the second stage, there is another matter that deserves to be carefully attended to, viz., *supporting the perineum from the time it begins to be distended until the child is completely expelled.*

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(1) Midwifery, p. 189.

The primary object of giving this support is to prevent laceration of the perineum, a slight degree of which, it has been already stated, unavoidably occurs in nearly all first labors; but the laceration would, doubtless, be more considerable in such cases, and of more frequent occurrence in all labors, but for the precaution now recommended. To support the perineum, the palm of the hand is to be applied across it, with the index finger next the posterior commissure of the vulva, and the thumb extended along the outside of one of the labia,—forming an arch with the index. The counter pressure, made by the hand, should be so regulated as to promote, rather than retard, the advance of the child, which is accomplished by bearing with most force upon the posterior part of the perineum and pressing the presenting part toward the symphysis pubis. Pressure, exerted in an opposite direction, would act as an impediment to the emergence of the child, and be much more likely to invite, than avert, rupture of the perineum.

In relation to several minor points connected with this part of the accoucheur's duty, writers differ considerably; and it appears to me that Dr. Hamilton attaches more importance to these little matters than they deserve. I cannot regard it as of any moment whether we apply the naked hand to the perineum, so much insisted on by Dr. Hamilton, or interpose a folded soft napkin. The latter I generally prefer, but if asked my reason for it, could, perhaps, assign no other than *voilà ce qui est à mon gré*; and I shall not find fault with others, because their taste is different, for *de gustibus non disputandum est*. It may be allowed, however, that

in primiparæ, where the perineum is long on the stretch, and is become sore, dry, and painful, it is commonly better to apply the naked hand and make a plentiful use of fine hog's lard, which undoubtedly soothes the parts and promotes their dilatation. Dr. Hamilton tells us that he has used as much as a pound of lard in a single case, and with great benefit.

Again. Whether the patient shall be placed on her back or her left side is, I think, a question hardly worth disputing about. In France and on the continent generally, women are required, by an absolute obstetrical decree, to lie on the back, when the time of delivery draws near, while in England they are as sternly pinioned on the *left* side. I commonly prefer the dorsal position, simply because I am most accustomed to it; but I never refuse to allow my patient to lie on the left side, and I have even had the hardihood to wink at her lying on the *right* side.

The second stage of labor may be protracted as well as the first; and as delay is confessedly most injurious here, both to the mother and the child, there can be no doubt as to the propriety of expediting it, when this can be safely done, or delivering artificially, when the natural resources are inadequate, in such time as will be most advantageous for all concerned. The most usual causes of protraction, in this stage, are, 1, *Inefficient action of the uterus*; and 2, *Impotent action of the uterus*. To one or the other of these states of the parturient organ may be referred every case of labor, retarded in the second stage, except such as are owing to malposition of the fetus, or deformity of the pelvis.

1. *Inefficient action of the uterus*. This condition is

indicated by the feebleness or irregularity of the pains, and the little or no effect produced by them, in advancing the child, notwithstanding the absence of any assignable obstacle,—the presentation being favorable, and the parts in a healthy state. It may be the continuance of a corresponding condition that had existed in the first stage, or it may manifest itself in the second, although the first may not have been particularly protracted.

In the treatment of this condition, the most signal good effects may be often derived from blood letting, especially where there is any undue excitement of the heart and arteries, as shown by the force and fullness of the pulse, by heat of the surface, headache, thirst, etc., If the bowels be confined, a large dose of castor oil or a stimulating saline enema will often succeed in arousing the uterus to more vigorous action. But the remedy, which is most usually resorted to for this purpose, is the *secale cornutum* or *ergot*. Administered in the dose of ten grains to a scruple of the article finely powdered, and repeated once or twice, if need be at intervals of twenty or thirty minutes, it seldom fails to excite powerful uterine contractions, which promptly expel the child, if all the requisites for an easy delivery exist, viz., if the os uteri be dilated, the vagina and vulva relaxed and moist, the presentation natural or such as to offer no great impediment to the birth of the child, that is, the vertex, face, or nates; and, lastly, if there be no disproportion.

These requisites for a prompt termination of the labor are so many *conditions* which must exist, else it will be altogether improper, and may be ruinous to the

child or mother, to administer ergot. As there is reason to believe that this powerful article is daily employed without such restraints, and that sad havoc is committed by it, the consideration of its *modus operandi*, with its necessary consequences, may serve to inspire us with salutary caution in its use.

From the exposition that has been made of the changes induced in the uterine circulation, by the parturient contractions, it is evident that if these contractions were not alternated with intervals of repose, the fetus would be inevitably destroyed, in every case of parturition, before its expulsion could possibly be effected. Such unrespited contractions of the uterus, as we have supposed, are, it is very well known, produced by ergot; when it is exhibited and takes effect fully, the uterus is urged to one long and unceasing effort until its contents are evacuated. A radical change is, therefore, induced in the mode of uterine contraction, which is tantamount to wresting the process of parturition from the hands of nature. No respite from her sufferings is allowed the mother,—no breathing time for the fetus. What wonder, then, if the former is more exhausted by the labor, and the latter ushered into the world completely asphyxiated,—its countenance swollen and livid, and its vital organs engorged, or oppressed with extravasations of blood!

This ergotic contraction of the uterus may, moreover, produce fatal compression of the child's brain, by the too rapid molding of the head to the parturient passage, where there is any disproportion, or even unusual resistance, in the soft parts. Under such circumstances, nature, if permitted to perform her work, would

proceed cautiously and methodically,—content to obtain the desired accommodation, in a gradual manner.

It is strange that many writers and practitioners deny that any such pernicious consequences ever result from the administration of ergot. If such a position be taken after sufficient opportunities to witness its effects, the attempt to convince them of their error were hopeless. But, for the benefit of the unprejudiced and inexperienced, the following extracts are offered, from an interesting paper by Dr. J. B. Beck, entitled "Observations on Ergot," published in the Transactions of the Medical Society of the State of New York, Vol. V.

"Dr. Ward, of New Jersey, whose experience with this article appears to have been extensive, and who speaks of it as a valuable agent in many cases, nevertheless admits the danger which attends the child from its use. 'In all the cases,' he says, 'in which I have given it, unless the child was expelled very soon after the powerful contractions came on, it suffered very much, and would lie for some time without breathing.' Again he says, 'From my own observations, with regard to the ergot, as well as from other correct sources of information, I am led to conclude that, in most cases, after giving it, unless the child is expelled in forty minutes after the powerful contractions come on, it will be borne dead' (1).

"The late Dr. William Moore, a veteran practitioner of obstetrics in this city, after detailing some cases, gives his opinion of ergot in the following terms: 'It appears to be injurious to the child at all times; for in

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(1) New York Med. and Phys. Journal, Vol. IV, p. 212.

every case in which I have seen it exhibited, the child has been stillborn, and in the greater part of them it was not possible to restore it to life' (1).

"Dr. Holcombe, of New Jersey, says, 'more children, I am satisfied from what I have seen and heard, have already perished by the injudicious use of ergot, during the few years which have followed its introduction into the practice of this country, than have been sacrificed by the unwarrantable use of the crotchet for a century past' (2).

"Dr. Davies, of London, reports ten cases in which the ergot was used. In four, the child was stillborn. In a fifth, the child was apparently stillborn, but soon recovered. In all the stillborn cases, it appears that the child was not delivered until upward of an hour had elapsed after the administration of the ergot. In the first, two hours elapsed; in the second, a little more than an hour; in the third, six hours; in the fourth a little over an hour (3).

"Mr. T. Chavasse, of Birmingham, states that in eighteen cases in which the ergot was used, the children were stillborn" (4).

To these testimonies I shall only add that of John Patterson, Esq., of Aberdeen, copied from the Edinburgh Medical and Surgical Journal, into Braithwait's

(1) Compendium of Midwifery, by Samuel Bard, M. D., p. 214, fourth ed.

(2) Philadelphia Journal of the Med. and Phys. Sciences, Vol. XI, p. 318.

(3) New England Journal of Med. & Surg., Vol. XV, p. 18.

(4) Transactions of the Provin. Med. & Surg. Association, Vol. IV.

Retrospect of Practical Medicine and Surgery, No. 1., p. 133. His testimony is adduced, not because it is needed to strengthen the evidence already collected, but for a purpose that will presently appear. "In eight cases where I used the medicine in half drachm doses," says Mr. P., "and closely watched its action, it fully answered my expectations, by acting strongly in less than five minutes after it was administered; and I will venture to say that, if properly used, given in proper doses, and the medicine fresh (which it seldom is), it never will disappoint the medical attendant as to its stimulating effects. In every one of these cases there was in the symptoms produced a uniformity very surprising; all the patients expressed their feelings in the same language, viz., that they never felt themselves in a similar state, as their pains were never away. Could the action, therefore, of this medicine be in any way regulated by the accoucheur, I am satisfied that, to a great extent, it would supersede the use of instruments: but until that can be accomplished, it has that great disadvantage, and will always require to be given with extreme caution. Out of this eight cases in which I used the ergot, I lost three children, than which no stronger evidence need be adduced of its extreme danger. In the works which I have read in reference to this medicine, I have been struck at finding so little allusion made to its bad effects upon the child—very few instances being recorded of its fatal effects. In the three cases alluded to, I satisfied myself, before its administration, that the children were not only alive, but apparently strong and healthy; but so soon as the action of the medicine commenced, these impressions gradually be-

came less sensible to me and the mother. On these three occasions I regretted very much that no inspection was permitted. In two of them in particular, the conjunctiva was literally gorged with blood; *and I have little or no doubt that death was occasioned by the uninterrupted pressure of the uterus upon the brain.* In that way, and by premature separation of the placenta before birth, produced by the same action, I doubt very much if more deaths are not occasioned than by the use of instruments; at least my experience leads me to that conclusion."

Braithwait dissents from the opinion which Mr. Patterson advances with respect to the *modus operandi* of ergot on the child, and ascribes its death rather to the want of proper oxydation and decarbonization of its blood. In a word, his explanation corresponds precisely with that which I have given. Now, it is proper that I should say explicitly, that I have publicly taught this, and with as great emphasis as I could, for the last eleven years, viz., since the first session of the Medical Institute of this city (1837-8), as numerous pupils might testify, and therefore I did not derive it from Braithwait, whose Retrospect, No. 1, was not republished in this country until 1844, nor in Great Britain, I believe, until 1840. Whether it was received from any other writer I will not positively affirm, but my impression is that it was not. I do not, however, claim any great merit for it: it is, in truth, but a very simple deduction from the physiology of parturition, and the peculiar action of ergot on the womb.

But the destructive tendency of ergot, as already intimated, is not limited to the child. When prema-

turely or incautiously administered, it may cause rupture of the uterus, by goading it to exert a degree of force incompatible with its integrity, but yet insufficient to overcome the obstacles that may oppose it. Especially is this true in cases of disproportion between the size of the child and that of the pelvis, and when there is unusual resistance of the os uteri and perineum.

Mr. Patterson, in the article referred to, in Braithwait's Retrospect, states that he has not, in a single instance, found that injury has been done to the mother, "thus giving the ergot in one respect," says he, "a great advantage over the forceps," and many writers agree with him in this opinion, while none, as it seems to me, are sufficiently aware of the danger to be apprehended in regard to the mother.

That rupture of the uterus has been often caused by the exhibition of ergot, I cannot doubt, after a careful examination of cases that have been reported in the medical journals. One journal published in this country, in a single month (April, 1841), not to refer to others, contains two cases, in which fatal rupture of the uterus was owing to the use of ergot, though the true cause of the accident does not appear to have been suspected by the reporters. It may be useful to give an abstract of these cases,—premissing that the title of the journal, referred to, as well as the names of the parties concerned, are suppressed, lest offense should be given, and I be accused of a spirit of ill-natured personal criticism, which does not at all actuate me.

The first occurred in the practice of —, at the time one of the editors of the journal. The patient, who had given birth to a dead child two years previ-

ously, was taken in labor about four o'clock, P. M., Friday, 16th March; seven hours afterward the os uteri was well dilated, the head presenting in the first position; the protrusion of the scalp indicated its compression on account of the small size of the pelvis, and but slow progress was made for the next five hours; the head became jammed in the pelvis, and was stationary for the next eight hours, when twenty drops of the wine of ergot were administered "in the hope that more efficient contractions of the uterus might perhaps mold the head of the child to the cavity in which it was impacted:" the ergot having no effect, in an hour and a half, an attempt was made to deliver with the forceps, which failed on account of the pelvis being so absolutely filled up with the head, that "it was not possible to introduce the smallest-sized catheter into the bladder:" the patient was next bled and *got a scruple of powdered ergot*; this was at four o'clock, and at six, *the pains being strong*, forty drops of laudanum were given, shortly after which *the alternate contractions of the uterus entirely ceased*, and she was attacked with *pain in the epigastric region and vomiting*; an attempt to deliver with the forceps was again made, with no better success than at first, when it was determined to deliver by embryotomy, which was accomplished with great difficulty, and "literally with main force." It is not necessary to pursue the subsequent history of the case; suffice it to say that the patient died, and a post-mortem examination revealed the existence of rupture of the uterus, with extravasation of blood into the abdominal cavity, and intense peritoneal inflammation.

Now, who can doubt but that goading the uterus

with ergot, to overcome the insurmountable obstacle, offered by the contracted pelvis, was the cause of its rupture? Ergot was altogether inadmissible under the circumstances, nor was the case a proper one for the forceps. Had the head been perforated, instead of attempting to "mold it" by ergot, the woman's life might have been saved, and the child would have fared none the worse.

The second case, entitled "Utero-Vaginal Rupture," is communicated by ——. The patient was in labor with her third child, and had complained of slight pains during the whole of the day before the doctor was called: the os uteri was found to be but partially dilated, although it was very easily dilatable; he ruptured the membranes, which failing to improve the labor, ten grains of ergot were given with the effect of increasing the pains, but these soon beginning to languish, the dose was repeated, shortly after which she had a *few very severe pains*. The action of the uterus then gradually declined, and the os uteri became less dilatable, for which it was judged proper to bleed her, but *she did not bear the abstraction of blood well*, the loss of eight ounces rendering her pulse "weak and frequent;" four hours after the bleeding, the os uteri was more dilated, but the pains were still weak and inefficient; an anodyne was given, and she was left for the night; at nine o'clock next morning, it was reported that she had passed *a very restless night*, and had complained much of pains, but few of which the patient thought efficient: on examination it was found that the os uteri was fully dilated, the breech presenting, and advanced three-fourths of an inch to an inch lower than at last examination: inef-

fectual attempts were made with the hand to bring down the feet, and ergot was again administered, but did not produce the least effect. It was now determined to deliver with instruments; the feet were with difficulty brought down with the blunt hook; the body was soon expelled and the arms brought down, but when the head came into the pelvis, the patient was so much exhausted, that it was deemed prudent to defer the extraction until the patient was revived by stimulants; the head was then delivered with the crotchet, but not without extreme difficulty, and there was not the least subsidence of the abdominal tumor until the delivery was nearly completed. It is needless to follow the further details of the case: the patient died the next day after delivery, and the autopsy disclosed metrorrhagia, effusion into the abdominal cavity, with coagula of blood, and transverse rupture of the left side of the neck of the womb, extending into the vagina.

The reporter remarks that it would be interesting to determine at what time the laceration happened; but as there was "no violent screaming at the time of its occurrence, followed by vomiting of dark-colored fluid, ghastly countenance, oppressed breathing, fainting, etc.," he is at a loss to come to any satisfactory conclusion. It does not appear to me that there is the least uncertainty on this point: the symptoms, enumerated by him, do not always follow rupture of the uterus, as his own case shows; but the declension of the uterine action, succeeding to the few violent pains produced by ergot, and the prostrate condition of the system, evinced by the inability to bear the abstraction of even eight ounces of blood, indicate with sufficient clearness that

the uterus was ruptured by the "few violent pains;" and this indication is confirmed by the total failure of every means resorted to, to restore sufficient uterine contraction.

A little reflection, but much more, a little practice, will satisfy any one that it is not an easy matter to decide confidently that all the conditions exist, which will justify the exhibition of ergot, and it is, therefore, gratifying to know that, when there is doubt upon this point, we have other resources. The manipulations, which I have recommended in the first stage, may also be usefully employed in the second, with marked effect. The anterior margin of the os uteri, although it be sufficiently dilated to allow the fetus to pass, may be commonly felt behind the pubes, and the finger is to be insinuated between it and the presenting part of the child, in the absence of pain, and press it upward, performing, at the same time, semicircular movements, as already explained. When a pain comes on, the finger is still to retain its place and continue its operations, unless the cervix contract with such force as to compel it to give place, in which case it is to be withdrawn, but be reintroduced when the pain subsides, and act as before.

It is, however, sometimes the case that the head is so low down in the pelvis, and the os uteri so amply dilated, that its margin cannot be felt; still the manipulation, somewhat varied, is capable of exciting the uterus to more vigorous contraction. The vagina and rectum receive nerves from the hypogastric plexus, and the stimulus of pressure with the finger upon the posterior wall of the vagina arouses the expulsive contrac-

tions of the uterus, diaphragm, and abdominal muscles, through the same medium that orificial irritation operates. To accomplish this, the finger is to be carried up as high as possible, between the head of the child and the posterior wall of the vagina, with its feeling surface directed posteriorly, and then slowly withdrawn in a zigzag line, making pretty firm pressure as it moves. This may be repeated, at short intervals, until more powerful uterine contractions are excited, which I have known to occur very promptly, and with the effect of speedily terminating lingering labor. There is yet another means of exciting more efficient action of the uterus, preferred by Madame Lachapelle, which I have often practiced with good effect, viz., pressure upon the posterior part of the labia pudendi and anterior commissure of the perineum, by two or three fingers introduced within the vulva. "By pressing thus upon the transverse perineal and levator ani muscles," says this author, "especially when the head is in the vagina, I unequivocally obtain advantageous results: a tenesmus is excited, which forces the woman to bear down, at the same time that it increases sympathetically the spasm of the uterus" (1).

To guard against the abuse of these manipulations, I may say of them, as of those recommended in the first stage, that they are not intended to *dilate*, but to *excite*;—in the language of Madame Lachapelle, "as dilatations, their effect is more hurtful than useful, but as excitations, they are capable of rendering the greatest services." Notwithstanding this explanation, I do

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(1) Premier Memoire.

not flatter myself that ignoramuses will not abuse this valuable resource, or that the ill-natured will cease to slander it by sneering at "orificial irritation," and by prating about "rubbing down the vagina," "stretching the vulva," etc. Such we must ever leave to their folly and spleen.

## CHAPTER XII.

## IMPOTENT ACTION OF THE UTERUS.

THE terms "inefficient" and "impotent" are not unfrequently used synonymously; it is, therefore, necessary that I should explain the sense in which I employ them. By the former, I mean "inadequately exerted," though the ability to act exists in full vigor; by the latter, "inadequately exerted," because the ability to act more vigorously is destroyed. The former is the *inertie par torpeur*, the latter the *inertie par épuisement*, of Madame Lachapelle. It is only necessary to observe further, in the way of explanation, that "impotent action of the uterus" is equivalent to the "powerless," "difficult," and at least two orders of the "laborious," labors of systematic writers. The matters it includes are, therefore, of great practical interest, and challenge the most careful examination of the accoucheur.

We shall, in the first place, inquire into the actual condition of the uterus, when it is brought into this impotent state, and the influence of this upon the contiguous parts and the general system. Its condition appears to be analogous to that of the muscles of voluntary motion, when these have been inordinately exerted, that is, there is *swelling* and *stiffness*, *soreness to the touch*, and *painfulness* upon any further exertion.

One who takes a long and fatiguing walk, without being accustomed to pedestrian exercise, brings the muscles of his legs into this condition; and the accoucheur experiences it in the muscles of his arm, after every case of extraordinarily difficult turning, no matter what may be his practice in such performances.

In reference to the muscles of voluntary motion, it is well known that these symptoms are produced by the engorgement of their tissue, resulting from the unusual or prolonged exercise, and that this engorgement may run into inflammation, if exercise be persisted in. Inflammation, ending in suppuration, is not unfrequently thus produced in the femoral muscles of soldiers, after forced marches. The deranged balance of the circulation is caused by the increased afflux of blood to the muscles continuing after they have lost the power of vigorous contraction; as the contractile power becomes enfeebled, the blood is less and less perfectly expelled from them, while in action, until its accumulation amounts to engorgement.

That the muscular fibers of the uterus, when exhausted by the long continuance or severity of the parturient contractions, are in an analogous condition, may be inferred from the similarity of the symptoms, as already mentioned. Let us look at these more particularly. The uterus, as far as it can be examined by the finger, has lost its natural properties: the cervix, instead of being cool, moist, and pliant, feels hot, dry, and stiff,—this stiffness differing altogether from the rigidity which arises from preternatural activity of its fibers, already noticed as a cause of protracted first stage. The stiffness, of which I am speaking, is connected

with tumidity, and gives the impression of the tissue of the part being stuffed, so that its natural pliancy is destroyed. Both the neck and body of the organ, as felt through the abdominal parietes, are sore to the touch, and the parturient contractions are in themselves painful; that is, while they last, the woman complains of suffering, diffused over the whole extent of the uterine globe, which is not much harder than during the intervals.

These contractions have no effect as to the advancement of labor,—the presenting part of the child remaining stationary, and becoming swelled on account of its being begirded by the rigid circle of the os uteri.

The impotent action, exerted by the uterus in bad cases of exhaustion, is often revealed to an experienced practitioner, by the altered expression of the pains, and the behavior of the woman during their continuance. The pains are irregular in their recurrence, last but a short time, and are accompanied with little or no bearing-down effort; they inspire the patient with no courage or hope; hence she endures them impatiently and doggedly.

This morbid state of the parturient function never exists, however, without producing more or less local and constitutional disorder. The pressure of the presenting part of the child upon the soft parts lining the pelvis and the organs contained within it, disturbs their circulation and innervation, and hence they become congested, and not unfrequently inflamed,—the inflammation, like that produced by a similar cause in other parts, having a marked tendency to ulceration and sloughing. Hence, the patient may escape from the

danger that threatens her, but have an extensive fistulous communication between the vagina and rectum or bladder. The stomach is disordered, and the patient is distressed with nausea and vomiting; fever is kindled, the pulse being permanently accelerated, accompanied with thirst, heat of the surface, flushing of the cheeks; the nervous system is affected, and the mind begins to wander.

The state of the uterus and maternal system, in impotent labor, is fraught with danger to the child, and if the struggle be so protracted as to jeopard the mother, its life is commonly forfeited. The observations of Dr. Collins, in the Dublin Lying-in Hospital, led him to the conclusion that where the patient has been properly treated, from the commencement of her labor, the death of the child takes place, in protracted and difficult cases, before the symptoms become so alarming as to call for delivery on her own account (1). The changes of the uterine circulation, described in a former chapter, are not, it is probable, so great here as in energetic or *ergotic* labor (the blood is not so perfectly excluded from the uterine tissues during the parturient contractions); but there is a permanent lesion of the uterine circulation, viz., engorgement, which unfits it for arterializing the fetal blood in a healthy manner; and, besides, although the muscular contractions be impotent, the tonic contraction is in full exercise, and keeps up constant pressure on the child's body, which is so much the more injurious as the amnion is drained of its waters by dribs.

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(1) Practical Treatise on Midwifery, Boston, 1841, p. 17.

It is always desirable, and sometimes practically useful, to know certainly whether the fetus be alive or dead; and we may as well here, as elsewhere, inquire whether such knowledge is attainable. Various signs of the life or death of the child, during labor, have been enumerated by authors, but they are all more or less fallacious, with the exception of those furnished by auscultation. It is true that if the head present, and no swelling be formed upon it, notwithstanding the labor has been long protracted and has become impotent, more especially if, at the same time, its integuments are flabby and slippery, and bones loose and disjoined, offering their sharp angles or edges,—we may conclude certainly, not only that the child is dead, but that it died before labor commenced; for had it been alive, then such a cranial swelling would necessarily have been formed, by the long continuance and severity of the labor. But the existence of this swelling does not prove that the child *is*, but only that it *was*, alive since labor commenced. We are, indeed, told that if the child be alive, this swelling is tense and elastic, whereas if the child be dead, it is flabby and crepitant, and the bones are loose and disjoined; but some time must elapse after the death of the child before the swelling will exhibit these altered characters, in such a marked degree as to leave no doubt, and it may be that, during this intervening time, we are most anxious to solve the question of the child's life or death.

It is not necessary to waste more time in considering other signs, either in head or other presentations, that have been commonly relied on; suffice it to say, they are all deceptions, or only occasionally available.

How valuable, then, is the aid which we can derive from auscultation, and how important is it that all, who practice obstetrics, should seek an experimental knowledge of it! The tree of this knowledge does not, as some vainly pretend, grow only in foreign climes; it does not spread its branches only about large hospitals, but its fruit may be gathered as well everywhere,—in the private mansion, and even in the solitary hut. A little patience and perseverance are necessary to train the ear so as to detect at first the sounds it is in quest of: but these, once discovered, are ever afterward easily recognizable.

On applying the ear to the abdomen of a woman in advanced pregnancy, if the fetus be alive, the action of its heart can be discovered by the sounds emitted from it. These sounds, compared by Kergaradec to the ticking of a watch, may be recognized as cardiac by their resemblance to those of the adult heart, with which they cannot be confounded, on account of their much greater frequency. The action of the fetal heart is much more easily discoverable in the second stage of labor, because the liquor amnii being discharged in whole or in part, it is brought nearer to the walls of the mother's abdomen. The examination being made in the interval of the pains, a practiced ear will not unfrequently hear the cardiac sounds, the instant it comes in contact with the abdomen.

If it be discovered that its heart is in action, the evidence of the life of the child is, of course, complete. But if we fail to make this discovery, it has been questioned whether the evidence of its death is quite as satisfactory. The proof is, it is true, of a negative char-

acter, and it is certainly possible that the child may be alive; and yet, owing to its peculiar situation in the uterus, we may not succeed in detecting the action of its heart. I cannot but believe, however, that if a careful examination of every region of the abdomen, occupied by the gravid uterus, discloses no trace of the heart's action (supposing, of course, that the examiner has the requisite experience and tact), the fetus has lost its vitality, or at least the probability of this is too great to justify us in adopting any method of delivery, based on a contrary supposition. The fetus is, therefore, dead to all *practical* intents and purposes. Under certain circumstances, the cessation of the cardiac sounds is conclusive proof of the child's death as ocular examination could afford; I mean where, in the early part of the labor, we can distinctly hear these sounds, but discover that they grow less and less audible, as labor progresses, until they become entirely extinct. My own practice is to seek an early opportunity to apply my ear to the abdomen, in every case of labor; and then, if the labor should be protracted, I have a sure index of the child's condition, which should always be taken into estimation, when we are deliberating as to what measures shall be adopted.

There is another auscultatory sign of the child's life or death, which, though of inferior value to the one just considered, is worthy of some attention;—I allude to the *uterine souffle*. While the child continues alive, the general tone of the uterine circulation, on which its welfare so intimately depends, is maintained; but when it is dead, the motive being lost that had excited it to a high rate of vital activity, the uterus falls into a lethar-

gic state, and neither its circulation, innervation, nor muscular contraction is performed with as much vigor as before. No wonder, then, if the uterine souffle should become faint or altogether extinct, after the death of the fetus, and this is, as far as my observation goes, generally true.

Dr. Kennedy's more enlarged observations are to the same effect. In the majority of cases, according to him, this sound ceases, and in the instances in which it continues, it is impaired and differs from the usual sound: "It is observed," says he, "to be more abrupt, of shorter continuance, wanting its protracted terminating whiz, and generally confined to a circumscribed spot. In some cases it is even little more than a pulsation, such as is observed on applying the instrument (stethoscope) over one of the large arteries (1).

But although the uterine souffle is annihilated or greatly modified by the child's death, we oftener fail to detect it than the cardiac sounds, though the child may be alive. We should hardly be warranted, therefore, in drawing a positive conclusion from this *alone*; but undoubtedly it may serve to corroborate the proof afforded by the absence of the cardiac sounds: while, on the other hand, should the uterine souffle be discovered, full and distinct, we should hesitate to affirm the child's death, even though we fail to hear its heart.

I cannot dwell longer on the signs of the life or death of the child, but must proceed to notice the *causes of uterine impotency*. According to the doctrine,

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(1) Observations on Obstetric Auscultation, New York edition, 1843, p. 242.

which I have endeavored to maintain, whatever is capable of seriously protracting the first stage of labor, may be reckoned a cause of impotency in the second stage. Of the causes that strike at the second stage through the first, I have already spoken, and need not repeat what has been said. But I may be allowed, I hope without a breach of charity, to say here that, if the doctrine referred to be sound, the *indirect* causes of this class are all those expectant practitioners, who consider it treason against nature to *stir a finger* in contravention to any of her vagaries in the first stage. In plain terms, it is my decided conviction that mismanagement of the first stage is a fruitful source of incompetency in the second.

Dr. Churchill, in his chapter on "Powerless Labor," admits our doctrine within a certain range, by no means a limited one, where he says, "Women of a *weak constitution*, especially in their first confinement, not unfrequently find the uterine powers fail, after some hours of endurance, and that without our being able to restore them. These are the cases, and these only, in which there is any thing to fear from a prolonged first stage; *for the exhaustion produced by it, and which in healthy women is of no consequence, may be the cause of inefficient (impotent) action in the second.* In women of an *irritable nervous* temperament, there is also occasionally a failure of uterine powers in the second stage."

Mismanaged first stage is not, however, the only cause of impotent second; for,

First. Although there may have been no injurious delay in the first stage, the action of the uterus may be

simply *inefficient* in the second; and if this *inefficiency* is allowed to continue, it will more certainly and rapidly end in *impotency* than in the first stage. Here again, with my views of the subject, I am constrained to believe that the mischief that results is generally chargeable to the inefficiency of the practitioner; for had he required the uterus to use its powers to the best effect, instead of dallying with them, it might have been prevented.

Secondly. The first stage may have been performed in good time, and the uterus may act well in the second, but, notwithstanding, have its powers exhausted by the extraordinary resistance of the perineum and orificium vagina, by the malposition of the child, or by its relative large size. Malpositions belong to the special phenomena of the second stage, and will be hereafter considered; but the relative large size of the child, regarded as an obstacle to labor, may be considered here. By this phrase, I mean too great magnitude of the child, not as compared with other children, or with the capacity of other pelves, but the pelvis of its mother. The child may, in this sense, be large, although it be *under* the ordinary dimensions, or it may be small, although *larger* than common.

The relative large size of the child is often wrongfully accused of being the cause of delay in the second stage. The accusation is easily made, and, no matter how false, the touch is readily suborned to prove it. The diagnosis of disproportion between the child and the pelvis is not so palpable as might be supposed; for, except in extreme cases (where there is actual deformity), the touch cannot estimate it, so as to enable us

to determine whether it is really the cause of difficulty, much less to decide that the child cannot be made to pass by vigorous contractions of the uterus. The only tangible evidence, upon which I place the least reliance, is the head remaining stationary, notwithstanding the pains continue regular and strong, and the gradual approximation, and eventually the overlapping, of its bones, together with an extraordinary degree of flexion, bringing the posterior fontanel nearly or quite to the center of the pelvis. This is evidence which is only attainable in head presentations, and in its absence we must be content with probability. All the signs, enumerated by authors, are entitled to no more weight, and most of them belong to all impotent labors, by whatever causes induced. Thus, the pelvis being so filled with the presenting part as to leave no space for the introduction of the finger between them, or for the passage of a catheter into the bladder; retention of urine, acute pain, on pressure in any part of the abdomen, hurried pulse, and failing strength, while the progress of the head is arrested,—mentioned by Dr. Collins as signs of disproportion,—all these are observable in any bad case of difficult labor. The progress of the head is stayed by the want of sufficiently potent uterine contractions; while the engorgement of the uterus and pelvic viscera, together with the swelling of the child, as effectually fills the pelvis as disproportion ever does. There is one other sign, given by Dr. Collins, which is, perhaps, entitled to more weight, viz., the continuance of regular and strong uterine action for twelve or twenty-four hours after the os uteri is dilated, or nearly so, without

any progress: but here the want of progress may be owing to other causes, malposition for instance.

It is not intended to deny the reality of too great relative magnitude of the child as an obstacle to labor, which is occasionally met with in practice; but when this occurs, it derives all its importance from its power to wear out the energies of the uterus and bring it into the impotent state, which so many other causes may, and in fact much more frequently do, produce. In confirmation of this remark, it may be confidently affirmed that, had the uterus the inexhaustible energy which some seem to suppose, it would triumph over any case of disproportion that could occur, by compressing the yielding parts of the fetus and molding them to the parturient passage. None can doubt this, who has witnessed the rapid strides of a vigorously contracting uterus, in the face of disproportion, malposition, or any other obstacle that can be surmounted by force. I conclude, therefore, that it is of much more importance to husband the resources of the uterus, and bring them into requisition at the proper time, than to busy ourselves in trying to measure the child and pelvis.

In the treatment of uterine impotency, but little reliance is to be placed in the remedial measures which are appropriate to inefficient action of the uterus. Blood letting is seldom indicated, and if used largely with a view to make a decided impression on the system, is not free from danger, on account of the general exhaustion of the vital powers. Nor is any effect, either salutary or otherwise, to be expected, as a general rule, from the administration of ergot. The reason is obvious; ergot is an excitant of the uterus, but it cannot restore the

lost excitability of the organ, much less can it restore its tissues to their healthy condition ; and until this is done it is not possible for the uterus to be aroused to its wonted energy of contraction. In the incipient stage of the affection, the remedy may succeed ; but when it is confirmed, it were a waste of time to expect any benefit from this quarter. If those who are in the habit of prescribing ergot were always careful to distinguish between cases of mere inefficiency and decided impotence, they would be less frequently disappointed in their expectations from the article, and we should hear less of the uncertainty of its operation. This medicine will, I am persuaded, seldom fail to excite the uterus in a decided manner, in any case proper for its use, viz., where, the conditions already specified existing, the uterus is in a state of torpid inertia ; but it cannot reach inertia from exhaustion.

Not much more promising are the fingers, employed in the various ways already described, for the purpose of stimulating the uterus. They, like the ergot, may succeed in the commencement, but not in the confirmed stage, of impotent labor. What, then, is to be done ? Shall the case be allowed to take its course, or shall we interpose, and at what time, and under what circumstances, will artificial delivery be justifiable ? These are important questions ; much of the future comfort of the patient, nay, her life itself and that of her offspring, will depend upon the manner in which they are answered in each particular case ; and yet, in a discussion like this, it is impossible to answer them otherwise than in a very general manner : for, from the nature of the subject, much must be left to the sober judgment and ex-

perience of the practitioner. If, on the one hand, nature be trusted to, she may, after a painful and protracted struggle, prove victorious, or (for she abhors the entombment of the child in its mother's womb) a dead child may be ushered into the world as a prelude to the mother's departure from it. If, on the other hand, we have recourse to delivery, harm may result from its being too long deferred; or, if we resort to it early, and any accident happen, we may be reproached for our precipitancy.

Looking at the subject in a general light, I would say that *time* is no criterion to govern us. The march of time is not uniform in its effects on labor, any more than it is on the persons of the sex;—in the lapse of a given number of hours, some women will be brought into a perilous condition, while others, under similar circumstances, as far as we can judge, will be in no manner of danger. In forming our opinion as to the necessity of artificial delivery, our attention should be directed to the evidences of uterine impotency; in proportion as these thicken, the necessity of delivery becomes more and more urgent. It is not wise to wait until the urgency is extreme; and in general, the earlier the woman is relieved by delivery, the better, provided this can be done with facility and safety. Suppose, for example, the head of the child is presenting and has ceased to advance, while the uterus has evidently become impotent: suppose, moreover, this head is within easy reach of the forceps, and can be delivered without risk or additional pain to the mother,—what would be the use of waiting until we are driven to the operation? But if delivery be not so easily and safely practicable, pru-

dence requires that it should be deferred until the necessity of it is more pressing,—so pressing that, in our judgment, it is better to incur whatever risk the operation may involve, than wait longer.

The mode of delivery, instrumental or manual, depends upon the presentation of the child, and will be considered as a part of the special treatment of the second stage, upon which we are shortly to enter.

## CHAPTER XIII.

## PRESENTATIONS AND POSITIONS OF THE FETUS.

THE special phenomena of the second stage of labor, being, as I have said, such as belong to the different presentations and positions of the fetus, must, of course, be studied in connection with them. A general view of this branch of our subject will be attempted in the present chapter.

We have seen that in the most usual situation of the fetus, especially during the last months of pregnancy, and consequently when labor sets in, the head is its dependent part. The head is, therefore, most frequently found presenting at the superior strait. But other parts may, from various causes, usurp the place of the head; and, as the process of expulsion is materially affected by these differences of presentation, their careful study is essential to any correct knowledge of the mechanism of labor.

Most recent writers on obstetrics employ the terms, *presentation* and *position*, in reference to the situation of the fetus at the time of labor;—meaning, by the former, the part which offers at the superior strait,—by the latter, the relation of this part to different points of the strait. I shall use these terms in accordance with this definition; but shall, also, take the liberty to con-

sider presentations as genera, and positions as species, in any systematic classification of them.

The celebrated Baudelocque is, perhaps, to be regarded as the first obstetrical writer, who attempted to collect and classify every kind and species of presentation, which either his own experience or a perusal of the cases of his predecessors furnished him. His elaborate researches resulted in the establishment of such a multitude of presentations and positions as is truly appalling, and calculated to perplex, if not to disgust, the most zealous pupil in this branch of his studies. Not that M. Baudelocque did not arrange the mass of materials, which his industry collected, as judiciously as was, perhaps, possible, allowing that they were all equally essential to the edifice he was laboring to construct; but if such be really the complexity existing in nature, the student might well despair of mastering it, and the practitioner tremble at the idea of encountering it.

M. Baudelocque's classification embraced *twenty-three genera* of presentations, consisting of as many distinct regions of the fetal body, which he supposed might offer at the superior strait. Four of these genera he found at the cephalic and pelvic extremities of the fetus, viz., presentations of the *vertex*, of the *feet*, *knees*, and *nates*,—while the four planes of the body, between these extremities, furnished him,—the anterior, with the *face*, the *forepart of the neck*, the *breast*, *abdomen*, and *thighs* (five genera); the posterior, with the *occiput*, *nape of the neck*, the *back*, and *loins* (four genera); and each of the two lateral, with the *side of the head*, *side of neck*, the *shoulder*, *side of thorax*, and the *hip* (ten genera). These genera include *ninety-four species*, which it would

be as useless as tedious to enumerate. Many of these presentations he does not pretend to have met with in practice, but admits, on the authority of a single observer, whose accuracy may be questioned, and whose love of the marvelous may have misled him. To these apochryphal presentations he assigned such positions as they might *possibly* allow.

It is, however, due to the memory of the illustrious Baudelocque, to whom we owe so much, to state that he lived to perceive the inconvenience of his elaborate and highly artificial classification, as we learn from Madame Lachapelle, who doubts not that he would, had his life been longer spared, have reduced and simplified it. This necessary reform was undertaken by his successors, MM. Gardien, Capuron, Maygrier, Dugès, Madame Lachapelle, etc. It would be tedious to trace its progress, and I shall, therefore, content myself with a survey of its completion, under the auspices of Madame Lachapelle, and her nephew, M. Dugès. In saying that Madame Lachapelle and Dugès have completed this desirable reformation, I must be understood to express only my own opinion; I am not unaware that still greater simplification has been attempted by others, chiefly by Professor Nægelé in Germany, seconded by Dr. Rigby in England, and Professor Dubois in France. Of their attempt I shall presently express my judgment.

The ample experience of Madame Lachapelle, acquired in the Paris Maternity, where she officiated or directed in as many as forty thousand cases of labor, not having offered a single instance of presentation of the trunk, she denied altogether the possibility of any such occurrence, where the fetus is fully developed. By a critical

examination of the few cases of this kind, recorded by her predecessors, principally by Delamotte, Portal, Smellie, and Burton, she shows conclusively that they were really nothing more than perversions of such presentations as she admits. Her own experience authorized her to retain only the *seven* following genera, viz., presentations, 1. Of the vertex; 2. The breech; 3. The feet; 4. The knees; 5. The face; 6. The right shoulder; 7. The left shoulder. Under these genera are included *twenty-four* species, viz., *six* belonging to the vertex; *four* to the breech, *four* to the feet, *four* to the knees, *two* to the face, *two* to the right, and *two* to the left, shoulder. To each of these species belong several varieties, which are merely intermediate or incomplete positions, as, for example, when the posterior fontanel, in vertex presentation, looks toward any other than what are called cardinal points of the superior strait; or when the head is inclined so as to offer the occiput or forehead, or one of its sides, instead of the vertex, to the superior aperture of the pelvis. Similar deviations from the normal positions of the face and breech may exist as varieties, and these mere varieties have given rise to the pretended positions of the back, forehead, and side of the head, the back and fore part of the neck, the hips, loins, abdomen, etc.

It does not, however, require much observation of nature, or any great profundity of reflection, to satisfy any one, whose judgment is not biased by prepossessions, that three of the genera of Madame Lachapelle, viz., the breech, feet, and knees, may be properly united under one, because there is no essential difference between them, either in relation to their mechanism, or the

treatment they require. They cannot, therefore, be considered separately without tiresome and unprofitable repetition. Accordingly, M. Dugès has united them under the common denomination of presentations of the pelvic extremity of the fetus. It is but justice to Madame Lachapelle to state, that she had a clear perception of the utility that might result from such a union, and was restrained from proposing it, only by the apprehension that she might be accused of pushing her reform too far (1). The classification of M. Dugès, which I adopt, admits but *five* genera and *fourteen* species of presentations, and is advantageously exhibited in the following synopsis, extracted from his work (2), in which is, also, shown the comparative frequency of the different presentations and positions in a total of thirty-seven thousand one hundred and twenty-six cases of labor, occurring in the Paris Maternity in the course of eighteen years.

<i>Genera.</i>		<i>Species.</i>	<i>Frequency.</i>
I. Vertex;	35,375.	1st. Back anterior and left;	27,443
		2d. " anterior and right;	7,512
		3d. " posterior and right;	276
		4th. " posterior and left;	144
II. Pelvis;	1,390.	1st. " left; - - - -	854
		2d. " right; - - -	494
		3d. " anterior; - - -	14
		4th. " posterior; - -	26
III. Face;	175.	1st. " left; - - - -	99
		2d. " right; - - -	76

(1) *Pratique des Accouchemens, Quatrième Mémoire.*

(2) *Manuel d' Obstetrique.*

<i>Genera.</i>	<i>Species.</i>	<i>Frequency.</i>
IV. Right shoulder; 103.	{ 1st. Back anterior; - - -	57
	{ 2d. " posterior; - - -	46
V. Left shoulder; 83.	{ 1st. " anterior; - - -	52
	{ 2d. " posterior; - - -	31
<hr/> 5	<hr/> 14	<hr/> 37,126

In this classification, it will be perceived, the genera and species are arranged according to their frequency, respectively, with the exception only of the fourth position of the pelvis. The regularity of its principle of division, as its author justly remarks, greatly facilitates the recollection of it: the *back* of the fetus serves as the point of comparison, and is placed anteriorly or to the left, in the first species of each genus—posteriorly or to the right, in the last.

It has been already intimated that MM. Nagel  and Dubois, with a praiseworthy ambition to divest this part of obstetrical science of its complexity, have carried their reform farther than M. Dug s, and aimed to establish a degree of simplicity, which ought to be welcomed, if it be found to be true to nature. In exhibiting their views, I shall avail myself of the work of M. Cazeaux, heretofore quoted, as the only channel through which I have access to them; for, in the only work of Professor N gel  which I have consulted, viz., his "Mechanism of Parturition," translated by Dr. Rigby, I do not find all the information needed.

MM. N gel  and Dubois agree with M. Dug s in admitting only five presentations, viz., vertex, face, pelvis, right and left shoulder; but Dubois prefers to denominate the latter two, presentations of the right and left *lateral planes of the trunk*—acknowledging, however, with Madame Lachapelle, that it is almost always the

*shoulder* which, as the most prominent part, is found presenting at the superior strait. As to the *presentations* of the fetus, there is, then, no difference between these authors. But, says M. Cazeaux, Baudelocque and his successors admitted a great number of positions, in each of which the mechanism of labor is different; and M. Nægelé has, after a more careful study of them, proposed a reform relative to positions, not less important than that which he has brought about in regard to presentations. To indicate the different positions, Baudelocque established certain points of the superior strait, viz., the acetabula, the sacro-iliac, and pubic symphyses, and the promontory of the sacrum, to which certain points of the fetus correspond. But M. Nægelé simply divides the pelvis into two lateral halves, left and right, and these are his only points of correspondence as to the mother, while, as to the fetus, Baudelocque's points are retained. The vertex, for example, being the presenting part, the occiput may be turned toward any part of the left lateral half of the superior strait:—this constitutes the first position of the vertex, denominated *left occipito-iliac*;—or the occiput may be directed toward any part of the right lateral half of the strait, constituting the second, or *right occipito-iliac*, position of the vertex. The occiput may, it is true, look forward, transversely, or posteriorly, still it is placed more or less laterally; and these are to be regarded as mere varieties of two fundamental positions, because they do not affect the mechanism. Three varieties are admitted for each position, viz., an *anterior*, in which the occiput looks toward the acetabulum; a *transverse*, in which it

looks directly toward the side, and a *posterior*, in which it looks toward the sacro-iliac symphyses.

The same remarks are equally applicable to the positions of the nates and face. Thus, in the first of these presentations, the sacrum of the child may be directed toward the left lateral half of the superior strait (the first or *left sacro-iliac* position of the nates), or it may be directed toward the right half of the strait (the second or *right sacro-iliac* position of the nates). In face presentations, the chin may be directed toward the right half of the superior strait,—first or *right mento-iliac* position,—or toward the left half,—second or *left mento-iliac* position. Finally: The two trunk presentations have each two positions: thus, the right lateral plane being the presenting part, the head of the fetus may be over the left half of the pelvis, constituting its first or *left cephalo-iliac* position; or over the right half, its second or *right cephalo-iliac* position. The left lateral plane may, in like manner, be so placed that the head is to the left (its first or *left cephalo-iliac* position), or to the right (second or *right cephalo-iliac* position). The two fundamental positions of presentations of the nates, face, and right and left lateral planes of the trunk, admit anterior, transverse, and posterior varieties in the same manner as those of the vertex.

From the foregoing summary of their scheme, it must be manifest to the reader that MM. Nægelé and Dubois have reduced the number of presentations and positions to their ultimatum. It is not possible to conceive how any farther purgation could be practiced without a total destruction of the *species* at least. The *apparent* simplicity they have attained, commends their classification

to our approval ; but before adopting it, we should inquire whether it embraces everything, and accords with the principle which ought, undoubtedly, to govern it. The principle is this: *Whenever the presence of any part of the fetus at the superior strait of the pelvis requires a mechanism of its own, it is entitled to rank as a presentation; and if different relations of this part to the superior strait do, or even may, affect its mechanism, these differences ought to constitute so many distinct positions of the presenting part.* M. Nægelé admits the validity of this principle, when he asserts, as a reason for uniting into one position the several varieties which he allows to each, that the mechanism of labor is not affected by these varieties. But this assertion is at variance with the experience of all his predecessors, and is not admitted to be correct by most of his contemporaries, as will be shown when the mechanism of labor is under discussion.

Again. This classification allows no place for those positions of the nates in which the back of the fetus looks directly forward or backward (third and fourth of Dugès), which ought not to be excluded, because they are undoubtedly of sufficiently frequent occurrence to be entitled to a place, and their mechanism is not always the same as that of lateral positions.

Allusion has been made to the apparent simplicity of the classification we are considering ; it is but justice to say that this feature of it is entirely deceptive, and that in reality it is as multiplex as though six positions had been assigned to each presentation instead of two. Admitting that shades of difference only exist among its varieties, in regard to their mechanism, still we are

compelled, for precision's sake, to refer to them, and this makes the nomenclature of position cumbersome. Suppose, for example, it be desirable to note the peculiarity of vertex presentation in any case, it will not be exact to say simply left or right occipito-iliac, but anterior, transverse, or posterior must be prefixed or suffixed thus, *left anterior occipito-iliac* or *left occipito-iliac anterior*, etc.

It appears to me that M. Dugès has attained as great simplicity as the subject of fetal presentation is susceptible of, without a sacrifice of perspicuity, and, what is of more importance, of conformity to nature. Having already adopted his classification, I shall devote the remainder of this chapter to some further remarks upon it, intended to develop its merits by comparing it with others. In doing this it will be necessary to bring under review its several presentations, in the order in which they stand as already exhibited.

*First; Of presentations of the vertex.*

M. Baudelocque, it is well known, admitted six positions of the vertex; in the first, the occiput is turned toward the left acetabulum; in the second, toward the right acetabulum; in the third, toward the symphysis pubis; in the fourth, toward the right sacro-iliac symphysis; in the fifth, toward the left sacro-iliac symphysis; and in the sixth, toward the promontory of the sacrum. Four of these positions, it will be perceived, are *oblique*, and two are *direct*; that is, in four, the occipito-frontal dimension of the fetal head corresponds to the oblique diameters of the superior strait; and in two, to the antero-posterior diameter, which crosses the strait *directly*, instead

of obliquely. Of the two direct positions, his third and sixth, Baudelocque himself declares that they are *on ne peut plus rares*, the third occurring but twice, and the sixth once, in ten thousand three hundred and twenty-two labors which he had observed (1); while Madame Lachapelle never met with a single instance of either of these positions, and declares her opinion that they are purely imaginary (2). M. Capuron rejects these positions altogether; 1, because they are exceedingly rare; 2, because in the course of labor, the round surface of the sacro-vertebral angle will not permit either the forehead or occiput, which are also round, to rest long upon it, but will force them to glance to the right or left and produce one of the positions, which he admits (the same as M. Dugès); 3, because in these positions, the head cannot engage in the pelvis, unless it be very small or the pelvis very capacious; 4, because where difficulty is offered by them, they must be changed to a more favorable position (3). Dr. Dewees met with only a few cases of these positions, and these occurred under the favoring circumstances mentioned by Capuron, while my own experience has not furnished me with a solitary instance of them.

Habit exerts a control which it is difficult for the most vigorous and best disciplined mind to resist, and it was, I suppose, under its influence that Madame Lachapelle brought in two new positions to occupy the place of the third and sixth of Baudelocque, which she had

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(1) *L'Art des Accouchemens*, Tom. 1, p. 305.

(2) *Pratique des Accouchemens*, Deuxième Memoire.

(3) *Cours Theorique et Pratique d'Accouchemens*, p. 199.

expunged. She had, it would seem, become so accustomed to the number six that she could not dispense with it. The two new positions introduced by her, are also of the direct kind, the occipito-frontal diameter of the head corresponding to the transverse diameter of the superior strait—occiput left or right. Although it may not be denied that she met with such positions, it must be allowed that they are rare, not being mentioned by many authors, and my own experience having failed to supply an instance of them. We may well be astonished, therefore, that two of the latest writers on obstetrics in France and England, M. Moreau and Dr. F. Ramsbotham, retain all of Baudelocque's vertex positions, and adopt Madame Lachapelle's two new ones, making eight in all. M. Moreau divides his eight positions into four *direct* or *fundamental*, and four *indirect* or *oblique*, considering the latter as only varieties of the former. His four direct positions are, *left occipito-iliac*, *right occipito-iliac*, *occipito-pubic*, and *occipito-sacral*, so denominated because, in the first two, the occiput corresponds to the extremities of the bis-iliac diameter, and, in the last two, to those of the sacro-pubic diameter. His four indirect or oblique positions are, *left occipito-cotyloid*, *right occipito-cotyloid*, *left occipito-iliac posterior* or *right fronto-cotyloid*, and *right occipito-iliac posterior* or *left fronto-cotyloid* (1).

The oblique positions M. Moreau considers as varieties of the direct, which he admits to be of rare occurrence. But if the direct positions are rare, it may be inquired, with what propriety can they be considered as

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(1) *Traité Pratique des Accouchemens*, Tom. II., p. 69.

fundamental, — as the species, — while the oblique, which are constantly occurring, are regarded as varieties only? The truth is that the four oblique are the usual and natural positions of the vertex; all others are but extraordinary deviations from them, and are not entitled to rank as positions in a well-ordered classification.

M. Dugès adopts Capuron's nomenclature of vertex positions, designating them as follows, viz., 1, *left occipito-anterior*; 2, *right occipito-anterior*; 3, *right occipito-posterior*; 4, *left occipito-posterior*; it being understood that in the first, the occiput is turned toward the left acetabulum; in the second, toward the right acetabulum; in the third, toward the right sacro-iliac symphysis; and in the fourth, toward the left sacro-iliac symphysis. But, in my opinion, names should be preferred which define the positions more precisely: I shall, therefore, distinguish them as the *left occipito-acetabular*, *right occipito-acetabular*, *right occipito-sacro-iliac*, and *left occipito-sacro-iliac*, positions of the vertex. It is convenient to have, also, shorter names for them, and none are better than the ordinal numbers, first, second, third, and fourth, commencing with the left occipito-acetabular (the first in all systems), and ending with the left occipito-sacro-iliac. Again; it is convenient for many purposes to have an appellative for the first and second, or left and right occipito-acetabular positions, to distinguish them from the third and fourth, or right and left occipito-sacro-iliac, positions, for it is sometimes necessary to refer to them as thus classified. In this respect, the appellations of Dugès will be preserved; the first and second being denominated *occipito-anterior*

positions, the third and fourth, *occipito-posterior* positions of the vertex.

The frequency of vertex presentations, compared with others, deserves the attention of the obstetrical student. By reference to the synopsis of Dugès's classification, it will be seen that thirty-five thousand three hundred and seventy-five vertex presentations occurred in a total of thirty-seven thousand one hundred and twenty-six deliveries in the Paris Maternity, showing the great preponderance of the vertex over all the other presentations together. It will be observed, moreover, that of these vertex cases twenty-seven thousand four hundred and forty-three were first or left occipito-acetabular positions, seven thousand five hundred and twelve were second or right occipito-acetabular, two hundred and seventy-six were third or right occipito-sacro-iliac, and one hundred and forty-four fourth or left occipito-sacro-iliac. These results, as to the relative frequency of the several positions, agree substantially with those of most authors; but their accuracy has been questioned by Professors Nægélé and Dubois, whose contradictory observations are entitled to our candid consideration. Professor Nægélé avers that in one hundred cases of vertex presentation we may generally reckon on seventy in the first position, and thirty in the third; and that the other positions are so exceedingly rare in their occurrence, that they may be regarded as exceptions to the general rule. M. Dubois affirms that he has carefully noted nineteen hundred and thirteen cases of vertex presentation, of which thirteen hundred and fifty-five were first positions, fifty-five only were second, four hundred and ninety-one were third, and twelve were fourth.

M. Cazeaux, to whom we are indebted for this information, declares that these results accord with his own observations, and those of Professor Stolz, of Strasbourg.

It is obvious that, between these imposing authorities on the one hand, and Dugès, seconded by Baudelocque, Gardien, Capuron, Boivin, Lachapelle, etc., on the other, there is irreconcilable variance. Future experience must settle the question of accuracy, I say not of veracity, between them, for neither can be supposed intentionally to misrepresent. The sense of touch is confessedly fallacious, but I should have no confidence in it whatever, could I suppose that MM. Nægelé, Dubois, etc., are right in this matter, for my touch continues, to this day, to make contradictory revelations to me: nay, I find, by reference to my note book, that the fourth position has occurred in my practice oftener than the third, but both together less frequently than the second.

*Secondly; Of presentations of the pelvic extremity of the fetus.*

To this genus of his classification Dugès allows the four positions assigned by Baudelocque to presentations of the breech, feet, and knees, and arranges them in the same order. He alters slightly, however, the collocation of the fetus in the first and second positions, in which he makes the back of the fetus look directly left and right, instead of inclining forward at the same time, as Baudelocque has it. But Madame Lachapelle observes that Baudelocque did not sufficiently consider that this forward direction is most frequently imparted by the mechanism of labor or the hands of the accouch-

eur, and she positively affirms that the direct positions are at least as common as the oblique. On this account she thinks that the direct positions ought to be considered as the cardinal ones, more especially as the division of pelvic presentations is thereby rendered more regular. In this she is sustained by M. Moreau, who asserts that, in most cases, the hips enter the pelvic excavation parallel with the sacro-pubic diameter of the superior strait, and that it is only when the fetus is very large that they engage in the oblique diameters. The four positions of the pelvic presentation, then, are all *direct*, instead of *oblique*, as are the vertex positions, or if there be a slight deviation from the directness of the first and second, this is of no importance, because the mechanism is not affected by it. It is not an easy task to prescribe a suitable nomenclature for presentations of the pelvic extremity, either as to the genus or its species. The difficulty arises from its complex character, embracing, as it does, according to our views, presentations of the breech, feet, and knees. We cannot, perhaps, do better for the genus than to adopt Dr. Rigby's proposal to apply the latin word, "nates," to it, which, although synonymous with the English term, "breech," may have its signification enlarged so as to include also the feet and knees. Accordingly, whenever the phrase, "nates presentation," occurs in this work, it is to be understood as equivalent to presentation of the pelvic extremity of the fetus.

The same difficulty exists as to the different positions of nates presentation. Had we only to invent a name for the relative points of the several varieties it includes, viz., breech, feet, and knees, we could be at

no great loss. We might, for example, use the Latin words for these fetal points, and by prefixing them to the names of the maternal points, that is, the parts of the pelvis of the mother to which they correspond, construct phrases to define the exact position of the fetus. This is, in fact, what has been done. Thus, M. Moreau, who adheres to the breech, feet, and knees, as distinct presentations, and whose positions correspond to ours, denominates the first position of the breech *left sacro-iliac*, the second *right sacro-iliac*, the third *sacro-pubic*, and the fourth *sacro-sacral*, because the sacrum of the fetus ( its relative point ) looks toward the left and right ilium, the pubes and sacrum of the maternal pelvis, which are its relative points. And in relation to the several positions of the feet and knees, the fetal portion of their compound names is derived from the heels (*calcaneum*, Latin), and *tibiæ*, because these are their relative points; consequently, *left calcaneo-iliac*, *right calcaneo-iliac*, *calcaneo-pubic*, and *calcaneo-sacral*, express the first, second, third, and fourth positions of the feet; and *left tibio-iliac*, *right tibio-iliac*, *tibio-pubic*, and *tibio-sacral*, indicate the several positions of the knees. But as our classification includes all these varieties under one presentation, our nomenclature must be equally comprehensive, and I propose, therefore, to make the back (*dorsum*, Latin) the fetal constituent of the names of the different positions of the nates; thus, *left dorso-iliac*, *right dorso-iliac*, *dorso-pubic*, *dorso-sacral*, clearly define the relations of the fetus to the maternal pelvis, and if the back be not literally in apposition with the different points of the pelvis, in the commencement of labor, it must necessarily become so

during its progress. Meanwhile, the sacrum, heels, and tibiæ of the fetus, according to the variety of nates presentation that may exist, are the tangible representations of the back.

The frequency of nates, compared with other presentations, is shown in the synopsis, from which it will be seen that in about one twenty-seventh of all the labors in the Maternity, when its statistics were compiled by Dugès, the nates presented; and this agrees pretty nearly with the calculations of other European obstetric institutions. But this proportion is much greater than I have observed in my own practice. Not having kept a record of all the cases that have fallen under my observation, I cannot undertake to state the proportion accurately, but I am persuaded that it is not greater than one fiftieth. By referring to the relative frequency of the several positions of the nates, it will be seen that the first or left dorso-iliac position is, by far, the most common, and that the third or dorso-pubic position is the least frequent of all, having been observed only fourteen times in one thousand three hundred and ninety cases of nates presentation. Allusion is made to this point for the purpose of drawing the attention of the profession to the discrepant statement of the younger Ramsbotham, who says (1), that *under* breech presentation the most usual situation of the child is, with the back toward the abdominal muscles of the mother, and the face toward the spine. This statement, I suppose, can only be explained by Dr. Ramsbotham having taken cases of first and second position, with forward

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(1) Process of Parturition, second Amer. edition, p. 238.

inclination of the back, for directly anterior positions of the back.

As to the relative frequency of the several varieties of nates presentation, it need only be observed that breech cases are more common than feet (I will not deface my page with "footling"), and that the knees are seldom met with.

*Thirdly; Of presentations of the face.*

Two positions only of face presentation are admitted by most modern authors, in common with M. Dugès. In the first, they all agree, the forehead is directed toward the left ilium and the chin toward the right. In the second, the position of the face is reversed, the forehead being toward the right ilium and the chin toward the left.

According to the nomenclature of face presentation, usually adopted, the chin (*mentum*) is made the relative point, determining both the position and its name. Thus, we have seen, that the first position is denominated the *right mento-iliac*, and the second, the *left mento-iliac*, by M. Cazeaux, in his exposé of the views of MM. Nægelé and Dubois; and this nomenclature is ratified by M. Moreau. But the unity of Dugès's classification, in which all the positions of the fetus, in every kind of presentation, are regulated by the relations of the back, requires us to look to the situation of the *forehead* rather than of the chin, in framing our nomenclature of face presentation. I propose, therefore, to call the first position of the face its *left fronto-iliac*, and the second its *right fronto-iliac*. Let it be here observed that M. Dugès bestowed no other names upon any of his posi-

tions than those of their ordinal numbers, except upon vertex positions, to which he applied the nomenclature of Capuron — being apparently more occupied with *things* than *names*, in which respect he set an example worthy of our imitation. To prevent the tiresome repetition of the same word, it is, however, not improper to have more names than one for the same thing, and it is with this view that I shall attempt to make out a complete nomenclature of positions.

*Fourthly and fifthly; Of presentations of the right and left shoulders.*

The two shoulder presentations may be advantageously considered in connection. To each of these belong two positions, in the first of which the back of the fetus and the arm proper (*humerus*) are directed forward, while the forearm and head are toward the sacrum of the mother. But in this first position the head of the child is situated over the left iliac fossa, and the nates over the right, if the right shoulder present, and *vice versa* if the left shoulder present; while in both presentations, the inferior extremities, folded upon the abdomen, are contained in the posterior part of the uterus. In the second position of either shoulder presentation, the back and arm of the fetus are directed posteriorly, while the forearm and hand are toward the pubes of the mother. The head is over the right iliac fossa, and the nates over the left, if the right shoulder present, and *vice versa*, if the left shoulder present; while in both, the abdomen and inferior extremities are contained in the anterior part of the uterus. In harmony with our governing principle, I propose to designate the

first position of both shoulder presentations, *scapulo-pubic*, and the second of both, *scapulo-sacral*. Let the young student fecundate his mind, producing what may be called an *ideal gestation*, and ponder upon the relations of the fetus to the uterus and pelvis in these positions, until he has a vivid conception of them, else he cannot comprehend them, or follow me in the comparison which I shall next make between M. Dugès's arrangement of them and that of other authors.

M. Moreau establishes his positions of the shoulders by the direction of the acromion process of the scapula, which he makes the relative point of the fetus. Thus, in his first position of both shoulders, the acromion is directed toward the left side of the pelvis, the head being toward the left iliac fossa, and the axilla and base of the thorax toward the right iliac fossa, which is his *left acromio-iliac* position. In his second position of both shoulders, or *right acromio-iliac*, the situation of the acromion, head, axilla, and base of the thorax is reversed, viz., the acromion and head look toward the right iliac fossa, and the axilla and base of the thorax toward the left. M. Cazeaux agrees with M. Moreau in this arrangement of shoulder positions, differing from him, as we have seen, only as to their nomenclature, calling the first position of either shoulder its *left cephalo-iliac*, and the second, *right cephalo-iliac*. Such also is the arrangement of Madame Lachapelle, in her "Nouvelle nomenclature des Positions du Foetus" (1).

According to the arrangement of these authors, it is evident that the numerical position of one shoulder is

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(1) *Pratique des Accouchemens, Premier Memoire.*

totally unlike the corresponding position of the other, in regard to the most important relations, practically considered, of the child's body to the mother; for in the *first* position, for example, of the *right* shoulder, the abdomen and inferior extremities of the child are contained in the posterior portion of the cavity of the uterus, while in this same position of the *left* shoulder, its abdomen and inferior extremities are situated anteriorly. Now, the most important inquiry, in any case of shoulder presentation, is, where are the inferior extremities to be found, because in the operation of turning, they are to be seized and brought down through the vagina. The method of operating is also modified by the situation of these extremities, and the operation itself is much more easily performed where they are contained in the anterior, than where they are in the posterior, part of the uterus. The operative procedure, applicable to the first position of either shoulder, is not, therefore, applicable to the same, but to a different position of the other shoulder. It appears to me that this is calculated to produce confusion and perplexity; I know, indeed, that it is, from actual trial of it. No such objection applies to Dugès's arrangement of shoulder positions, which is as natural as it is easily remembered. In the first position of both shoulders, the abdomen and inferior extremities of the child are directed toward the loins of the mother; in the second position of both, they are toward the anterior parietes of her abdomen.

## CHAPTER XIV.

THE MECHANISM, DIAGNOSIS, AND PROGNOSIS OF  
VERTEX PRESENTATIONS.*Mechanism.*

IN order that the head may enter and pass through the pelvic canal, several conditions, particularly enumerated by M. Capuron, are requisite. Among these there is one, which may be said to be so essential that it is, in fact, the principle that governs all the movements of the head during its transition. It may be thus stated: The axis of the head must be brought parallel successively with the axis of the superior and inferior strait of the pelvis, that is, its poles, the occiput and chin, must be placed, as nearly as may be, in these imaginary lines.

If this principle be rightly apprehended, it affords a key to all the mechanical phenomena of labor, as far as the head is concerned, not only in vertex, but, also, in nates and face, presentations. The necessity of this parallelism between the axis of the head and the axes of the straits, arises hence, that it is only when so placed that the head can offer its smallest diameters to the pelvic canal.

This most essential condition, or principle, as I have ventured to call it, does not appear to have been well understood by many writers, I had almost said by any,

except Capuron. Thus, Dr. Dewees mentions, among other circumstances whose concurrence is necessary to propitious childbirth, favorable situation of the head, "or, in other words, the great diameter of the child's head must constantly correspond with the great diameter of the pelvis" (1). By the great diameter of the head, Dr. D. means, with us, the occipito-frontal, at least such is Baudelocque's use of the term, whom he closely follows, and therefore the object, according to him, of all the mutations the head suffers during its passage, is to find room for this diameter—an idea, which, as I shall hereafter show, pervades and vitiates the account which nearly all the British writers give of the mechanism of labor.

M. Dugès describes the mechanism of the first and second positions of the vertex in conjunction, under the common denomination of *occipito-anterior* positions, and that of the third and fourth, as *occipito-posterior* positions. But the uninitiated in the mysteries of obstetrical science will be less apt to get bewildered, by having the attention directed to the several positions, one by one. Nor need this make their studies tedious or irksome, for it will be found that, if the first position be mastered, but little remains to be learned with regard to the second; and that when the third is understood, the fourth is soon dispatched.

1. *Mechanism of the first or left occipito-acetabular position of the vertex.*

In this position, the occiput corresponds with the

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(1) Midwifery, fifth edition, p. 222.

left acetabulum, the forehead with the right sacro-iliac symphysis, the sagittal commissure is in the direction of the left oblique diameter of the superior strait; the posterior fontanel is forward and toward the left, the anterior is backward and toward the right. Previous to the rupture of the membranes and the occurrence of strong expulsive contractions, the head of the fetus is but slightly flexed upon the breast, and its diameters have nearly the following relations with those of the superior strait, viz., the occipito-frontal diameter is parallel with the left oblique diameter, and the biparietal is parallel with the right oblique diameter. The great or occipito-frontal circumference is, of course, parallel with the boundary of the superior strait.

This situation of the head is not favorable to its engaging in the superior strait, for it offers a diameter (the occipito-frontal) to the left oblique diameter of the strait, which is too great, when the diminution of available space, by the soft parts of the pelvis and the walls of the uterus, is taken into consideration. Accordingly, when the uterus assumes strong expulsive contractions, and the head is urged toward the entrance of the pelvis, the first *step* (1) of the mechanism of labor commences, which

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(1) It is customary with French writers to divide the mechanism of labor into several distinct parts, for the purpose of more methodically describing the process. These divisions they denominate *temps* (times), a word which could hardly be adopted by us for such a purpose. The word, stages, would perfectly convey the same idea, and might be more agreeable to a critical ear than "steps," which I employ; but the appropriation of it, by all British and American writers, to the threefold division of the entire function of parturition, forbids its application to the different evo-

comprises the *flexion and descent of the head to the bottom of the pelvic excavation*. Flexion of the head causes the occiput to descend, while the forehead rises, and consequently the cervico-bregmatic diameter takes the place of the occipito-frontal, while the biparietal diameter remains as before. Two of the small diameters of the head, the cervico-bregmatic and biparietal, are thereby brought parallel with the oblique diameters of the pelvis, and its lesser circumference is parallel with the circumference of the pelvic canal, while its axis is parallel with the axis of the superior strait. The essential condition, above adverted to, is then complied with, and the head is prepared to enter the pelvis.

The flexion of the head is doubtless caused by the resistance of the superior strait, aided by the cervix uteri, which, although it may be considerably dilated, does not at once allow the head to engage in its orifice. To understand how this resistance produces flexion, it is necessary to observe that the head forms a lever by its articulation with the spine; and that in consequence of the articulation being nearer the occipital protuberance than the chin, the occipital arm of the lever is shorter than the mental arm. Let it be observed, moreover, that the power, exerted upon the body of the child by the contractions of the uterus, is transmitted to the head through the medium of the spine; and it is easy to see that the resistance being equal at both extremities of the lever, the occiput must descend, because it is

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lutions of the mechanism, which is itself but a part of the phenomena of the second *stage* of labor.

nearest the spine. This may be illustrated by a very simple experiment: lay a foot ruler on the table, and push against it with the point of the finger opposite the figure six, which is its middle; the ruler is forced to move against the resistance of the air and friction of the table, and both extremities move with equal pace. Push next nearer one extremity than the other, and the pace of this extremity will be quickened in proportion to the nearness of the finger to it, causing it to advance before the other. As the occiput descends, the chin mounts up toward the breast of the child, that is, flexion takes place.

Prepared by its flexion, the head descends into the pelvic excavation, moving in the direction of the axis of the superior strait until its further progress is arrested by the sacrum, against which the vertex impinges. At this time, it is evident, that although the head fully occupies the pelvis, and the right parietal bone, which is anterior, is felt considerably below the symphysis pubis, the vertex is still directed toward the sacrum, and the sagittal commissure is placed so far posteriorly that it can only be reached by introducing the finger deeply and curving it forward.

*Second step—rotation.*—Arrived at the bottom of the pelvis, the hand is forced to execute a rotatory movement, the occiput advancing from left to right and forward, toward the symphysis pubis, under which it is finally placed. This movement is sometimes executed with such facility as makes it difficult to be traced; at other times, so tediously that it is tiresome to watch it. Not unfrequently when the rotation is carried so far as to bring the occiput behind the left ischio-pubic ramus, it is arrested for a time, the posterior superior part of

the right parietal bone projecting meanwhile in the pubic arch, and the perineum beginning to be distended. The inexperienced medical attendant might conclude that the birth of the child is at hand, and yet hours may elapse before that event; for the posterior fontanel is still behind the left ramus of the pubes and ischium, and the sagittal commissure still crosses the coccy-pubic diameter quite obliquely.

It is under these circumstances that a swelling is apt to form on the liberated portion of the cranial integuments, viz., over the posterior superior part of the right parietal bone, which may continue some time after birth. This swelling, called *caput succedaneum*, is formed by blood and serum, effused from the vessels of the part, in consequence of their engorgement, resulting from obstruction to the return of blood from it; the obstruction consisting in the close constriction of every other part of the head by the osseous and soft parts of the pelvis. The swelling of the head increases its protrusion at the vulva, and thus tantalizes the accoucheur with the hope of speedy release.

I have said that when the head reaches the inferior strait, it is *forced* to rotate, by which it is to be understood that the head could make no farther progress, without first undergoing this movement. To escape from the pelvic excavation, the head must move in the direction of its inferior aperture, that is, conformably to the axis of the inferior strait, and must offer its lesser circumference to this aperture, otherwise there is not room for it to pass. But this can be brought about only by its rotation, which enables the occiput to emerge first under the symphysis pubis, when the axis of the head is placed parallel with

the axis of the inferior strait, and, the *essential condition* being now complied with, the head is prepared for its sortie. *Previous* to this rotation, the occipito-frontal diameter tends toward the left oblique diameter of the inferior strait,—the occipito-frontal or great circumference tending toward its plane,—and it is demonstrable, with a pelvis and fetal head, that the dimensions it then offers cannot pass out, except the head be very diminutive or the pelvis very capacious; that is, the head cannot, except under peculiar favor, clear the inferior strait, in a diagonal or oblique position. *After* rotation, the cervico-bregmatic diameter is parallel with the coccy-pubic, and the biparietal with the bischiatic diameter of the inferior strait, while the cervico-bregmatic or lesser circumference is parallel with its plane;—the same small diameters and circumference, with which the head entered the pelvis.

*Third step — extension.* After the rotation of the head, the chin receives the principal force of the uterine contractions; it is consequently depressed, or caused to depart from the sternum of the child, against which it had hitherto been strongly flexed, and this depression of the chin produces the extension of the head. While the chin is being depressed, the occiput rises toward the mons veneris, and the perineum is put more and more on the stretch, until finally the head clears the vulva,—the sagittal commissure, the bregma, the coronal commissure, the nose, mouth and chin appearing successively before the anterior edge of the perineum. While the distended perineum makes resistance, it is in fact but a portion of the posterior wall of the pelvis, and bears the head strongly upward toward the mother's

abdomen; but as soon as the great circumference of the head escapes at the vulva, its natural elasticity causes it to retreat rapidly, over the face of the child, and apply itself to the anterior part of the neck.

The cause of the extension movement of the head is well explained by M. Cazeaux, to whom we are indebted for much light upon the whole subject of the mechanical phenomena of labor. At the same time that the occiput engages in the pubic arch, the shoulders and the superior part of the trunk enter the excavation, and the flexibility of the trunk enables it to be conformed to the axis of the canal, that is, it is curved upon its posterior plane. This inflexion of the trunk withdraws it from the chin, and is the beginning of the extension movement of the head. To comprehend how this movement is completed, we have only to consider that, from the commencement of labor, the uterine contractions act both upon the chin and occiput; but until now their force has been chiefly exerted upon the occiput, for a reason already given; and because, moreover, when the head is flexed, the occiput is more in the direction of the force transmitted through the spine. But when the occiput is engaged in the pubic arch, the back of the neck is pressed against the posterior part of the symphysis pubis, and destroys, by its resistance, all that portion of the uterine force that had acted upon the occiput. The chin, continuing to receive its share of the force, is moved forward, while the junction of the back of the neck with the occiput rests stationary under the symphysis, causing the cervico-bregmatic, cervico-frontal, and cervico-mental diameters to clear successively the antero-posterior diameter of the inferior strait.

During this movement, as M. Cazeaux justly observes, the head resembles exactly a lever of the third kind, whose prop is the cervico-occipital point placed under the symphysis pubis, the power being at the great occipital foramen, and the resistance at the chin, augmented by that of the perineum.

*Fourth step-external rotation.* Shortly after its disengagement, the head rotates again, but in a contrary direction, the occiput turning toward the inside of the *left* thigh of the mother, and the face toward the inside of the right thigh. This movement of the head was called by Baudelocque its *restitution*, because he considered its first rotation, in the cavity of the pelvis, a twist of the neck, in which the trunk does not participate, and when the head is free from constraint, it resumes its natural position in relation to the trunk, by the elasticity of the ligaments of the neck. The correctness of this explanation has lately been questioned by M. Gerdy, as we learn from M. Cazeaux, who adopts his views of the matter. According to M. Gerdy, the trunk of the child participates in the first or *internal* rotation performed by the head, so that the shoulders are simultaneously placed *nearly* transversely in the pelvis, instead of remaining oblique as they were when labor commenced. They arrive at the inferior strait, in this nearly transverse position, the right shoulder being a little anterior, where, encountering resistance on account of their bisacromial diameter being offered to the smallest diameter of the strait, they undergo another rotation in an opposite direction, viz., from right to left, toward the symphysis pubis, and the head, being free, simply follows the movement of the shoulders. This movement of

the head he proposes, therefore, to call its *external*, to distinguish it from the *internal*, rotation it had previously executed. The head, therefore, first causes the shoulders to rotate, and is in turn rotated by them. To M. Cazeaux, however, the head has seemed, in certain cases, to execute a double movement, the occiput, immediately after its expulsion, turning slightly toward the thigh, and after remaining a few seconds in this position, experiencing a second movement, caused by the rotation of the shoulders. The first of these movements appeared to be owing to the untwisting (detorsion) of the neck.

One of the arguments adduced by M. Gerdy, in favor of his theory of external rotation, it will be found difficult to controvert, viz., the fact that, instead of turning toward the left thigh, the occiput sometimes continues to look toward the pubes for a few moments, or until there is a recurrence of efficient uterine contraction, and then revolves toward the right, — the interval or first rotation being continued, and the child being expelled under a long spiral movement. I have, on several occasions, distinctly observed this phenomenon, and it is not possible, I think, to reconcile it with the theory of Baudelocque.

*Fifth step — extrication of the shoulders, etc.*

The shoulders, having entered the excavation and performed their rotation coincidently with the restitution of the head, next undergo a movement preparatory to their release. Before describing this, it is proper to observe that the rotation of the shoulders may be complete or incomplete, that is, the right shoulder may be placed behind the symphysis pubis, as Madame Boi-

vin(1) and others describe, or under the right ischio-pubic ramus, as M. Cazeaux affirms that it most usually is. In either case, the shoulder that is anterior (the right), having but a short distance to travel, makes its *appearance first* at the vulva, when it remains stationary, being pressed against the pubes, while the left shoulder sweeps over the inferior part of the sacrum, the coccyx, and perineum, and is *disengaged first* or along with the right. During this movement, it is evident the child's body is strongly curved upon the side that is anterior—its right side—to adapt it to the curvature of the pelvic excavation.

The hips easily follow the shoulders, executing, if they are large, the same movement: ordinarily, however, their expulsion and that of the rest of the child is so rapid that the mechanism cannot be observed.

## 2. *Mechanism of the second or right occipito-acetabular position of the vertex.*

In this position, the occiput is turned toward the right acetabulum, where also the posterior fontanel is found, the forehead toward the left sacro-iliac symphysis, and the sagittal commissure is in the direction of the right oblique diameter of the superior strait.

The several steps of the mechanism are the same in this as in the first position: *flexion and descent, internal rotation, extension, external rotation, extrication of the shoulders, etc.*, follow each other in the same order and from like causes. In this position, however, it is the *left* parietal bone that is anterior, which is consequently

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(1) Mémorial de l' Art des Accouchemens, p. 223.

most easily felt by the finger; the head rotates from right to left, instead of from left to right, to bring the occiput under the symphysis pubis; if the rotation be tediously performed, it is upon the posterior superior part of the left parietal bone that the cranial tumor is formed; and when the head is disengaged, the occiput turns toward the right thigh of the mother, while the left shoulder appears at the vulva, and is the point upon which the right shoulder moves to come out first before the anterior commissure of the perineum.

It is asserted by M. Capuron (1), that the mechanism of labor, usually executed as easily in this second as in the first position, is more liable to be embarrassed in consequence of the frequent existence of right anterior obliquity of the uterus, when the force of its contractions is directed leftward and backward, and may interfere with the flexion of the head, or even increase the extension of it, which existed before labor commenced. It may happen, also, he apprehends, that a loaded state of the rectum will prove an obstacle to the rotation of the head, by hindering the revolution of the forehead and face from left to right. These apprehensions of M. Capuron appear to me to be purely hypothetical; certainly, I have met with nothing in practice to justify them. Although I have not unfrequently encountered second position of the vertex, I am not aware that either delay or difficulty could be justly ascribed to it.

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(1) Cours Theorique et Pratique d' Accouchemens, p. 208.

3. *Mechanism of the third or right occipito-sacro-iliac position.*

This position resembles the first, in that the same diameters of the head correspond to the same diameters of the pelvis, before any change is made by labor; viz., the occipito-frontal to the left oblique, the biparietal to the right oblique, and the sagittal commissure crosses the pelvis in the same direction. But the relative situation of the occiput and forehead is reversed,—the occiput being opposite to the right sacro-iliac symphysis, and the forehead to the left acetabulum,—and the left parietal bone is anterior and most accessible, as in the second position.

The third position may march through its mechanism by the same steps as the first and second, only one of them will be a *stride*; or an *extra step*, altogether peculiar to it and the fourth position, may be requisite, and hence the impropriety of confounding these positions with the first and second, as MM. Nægale and Dubois have done.

*Flexion and descent* of the head are the same in the third position as in the first and second; the peculiarities of it are connected with, or consequent to, the *rotation* of the head, which will, therefore, claim our chief attention. This movement may be accomplished in two modes; first, the occiput may be thrown into the hollow of the sacrum: or, second, it may be conveyed under the symphysis pubis.

*First. Rotation of the occiput into the hollow of the sacrum.*—This takes place subsequently to the descent of the head, and when it is achieved, the occiput is lodged in the hollow of the sacrum and the forehead be-

*hind*, not under, the symphysis pubis. It is then the occipito-frontal diameter which occupies the antero-posterior dimension of the excavation, where there is space enough to accommodate it, but the antero-posterior diameter of the inferior strait is not large enough to allow it to pass out. The axis of the head, moreover, is yet nearly parallel with the axis of the *superior* strait; the head is not, therefore, prepared to pass the inferior strait, the *essential condition*, so often referred to, not having been complied with. An extra flexion of the head now commences, which is the extra step alluded to, under which the occiput is depressed, while the forehead mounts higher behind the symphysis pubis, until the occiput emerges before the anterior edge of the perineum. This extra flexion establishes such relations as allow the head to be delivered, for the cervico-bregmatic diameter is now nearly parallel with the coccy-pubic, and the biparietal with the bischiatic: while the axis of the head is brought more nearly into correspondence with the axis of the inferior strait.

After the emergence of the occiput in this, as in the first, position, *extension* begins; but here its prop is changed to the perineum, instead of the under edge of the symphysis pubis, for the *posterior inferior* part of the occiput rests on the perineum, while successively the bregma, the forehead, nose, mouth, and chin come out under the pubic arch. Sustaining, as it does, the force of this extension movement, it is no wonder that the perineum is much more liable to be ruptured in this position of the vertex. Of this liability there can be no doubt: it is distinctly admitted by many writers, and by none

more emphatically than by Dr. Merriman (1), who gives to such a position the foremost place in his third order of difficult parturition (*Dystocia Perversa*), and remarks concerning it, "It is necessary to pay particular attention, to prevent a laceration of the perineum; for the external parts are excessively stretched when the head passes in this direction. Even women," he continues, "who have borne many children, have had the perineum lacerated under the circumstances of this kind of presentation."

The cause of the extraordinary distention of the perineum, and of its exposure to rupture, does not appear to have been very clearly perceived by writers, who usually ascribe it to the forehead not fitting the pubic arch so well as the occiput, and leaving consequently an unoccupied space which must be compensated by increased dilatation toward the perineum. But it is rather to be sought for, I apprehend, in a peculiarity of mechanism pertaining to the case under consideration. It has been already stated that the head, subsequently to its extra flexion, has its axis brought more nearly parallel with the axis of the inferior strait than it was before. It should be observed, however, that these axes are not, and it is not possible that they can be, brought so nearly parallel as they are, when, as in the first and second vertex positions, the occiput is liberated under the symphysis pubis; for the thickness of the child's neck (to say nothing of the trunk necessarily drawn into the excavation, before the occiput is disengaged) intervenes be-

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(1) Synopsis of Difficult Parturition, first American, from second London, edition, Philadelphia, 1816, p. 57.

tween its chin and the sacrum. It is plain, then, that the mental extremity of the axis of the head is pushed too far forward toward the pubes, and its occipital extremity too far backward. The *essential condition* is not, and cannot, therefore, be complied with; and, strictly speaking, the cervico-bregmatic diameter is not parallel with the antero-posterior diameter of the inferior strait; nor does the lesser circumference of the head offer to its aperture, but one that is greater, though not so large as the occipito-frontal. It is, therefore, the larger circumference of the head that passes out, together with the shifting of the prop of the extension movement, that causes greater distention of the perineum, and endangers its laceration.

*Secondly. Rotation of the occiput toward the pubes.*—In this anterior rotation of the occiput, the head takes a *stride* instead of the corresponding *step* belonging to first and second vertex positions, for the occiput is brought from the right sacro-iliac junction and deposited under the symphysis pubis. The effect of this movement is first to convert the third into the second position, and then to dispose of it as though it had been an original second position. There is a great difference, in different cases, with regard to the facility with which this extensive rotation is executed. In some women, especially in such as have borne children before, and whose pelves are capacious and parturient powers vigorous, it may be effected by a few pains, even by a single one; while in others, particularly in primiparæ, it may take place most tediously,—the posterior fontanel moving forward during a pain, and retreating as soon as the

pain goes off. This bandying may be so protracted as to sorely weary the accoucheur and effectually test his patience, as I have many times experienced.

4. *Mechanism of the fourth or left occipito-sacro-iliac position.*

There is the same resemblance between this and the second position, as there is between the third and first, in respect to the correspondence of cephalic and pelvic diameters, at the commencement of labor, viz., the occipito-frontal is applied to the right oblique, the biparietal to the left oblique diameter, and the sagittal commissure crosses the pelvis in the direction of the right oblique diameter. But the occiput is toward the left sacro-iliac symphysis, instead of toward the right acetabulum, and the right parietal bone is anterior and nearest the vulva, as in the first position.

The mechanism of the fourth position resembles that of the third, with only the trivial difference incident to its location. The head may be expelled by the route of posterior or anterior rotation of the occiput; but if by the former, the occiput moves from left to right, instead of from right to left, as it does in the third position; and after the escape of the head, it turns toward the left nates of the mother (its restitution), instead of toward the right nates as it does in the third position. If its expulsion is effected by the latter (anterior rotation), the occiput describes an extensive arc of a circle, in marching from the left sacro-iliac junction forward and toward the right, instead of moving from the right sacro-iliac symphysis forward and leftward, as it does in the third position.

Having described the two modes in which rotation may take place in the occipito-posterior positions, we may next inquire which of these is most conformable to the natural mechanism of labor, or, in other words, is of most frequent occurrence in childbirth?

Baudelocque considered the rotation of the occiput into the hollow of the sacrum as by far the most common,—so common, indeed, that its anterior rotation is but a rare exception, unfortunately, as he thought, too rare, seeing it is so much preferable for both mother and child (1). And this doctrine was universally accredited, I believe, until it was controverted by the celebrated Professor Nægelé, of Heidelberg, in Germany, who declares that according to his observation, "*the process which has been considered as a regular phenomenon, is a deviation; and exactly that which has been esteemed a deviation from the usual course and rule, is perfectly regular*" (2). He avers that in ninety-six cases of the third vertex position, which he observed with particular care, the head came through the external passage only three times with the face upward or forward, and that even in these few instances, there were circumstances, such as unusual capacity of the pelvis, the small size of the head, or its incomplete ossification, which seemed to favor such a termination.

M. Moreau agrees with M. Nægelé on this point, candidly avowing that he had, for a long time, concurred with Baudelocque; but that his further experience had convinced him that Baudelocque mistook the exception

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(1) L'Art des Accouchemens, Tom. I, p. 316.

(2) Mechanism of Parturition, p. 48.

for the rule, and the march of nature *in the majority of cases* for an exception (1). M. Moreau does not, as far as I have examined, make any more precise statement as to the proportion of cases in which this rotation occurs: but Dr. Rigby, who appears to have been fully imbued with the doctrine of M. Nægélé, by attendance on his lectures at Heidelberg, bears testimony to the exceeding commonness of it. Dr. Rigby speaks (2) of the fourth position, for example, as only a *slight modification*, occasionally observed, of the first, which, he thinks, is not detected so frequently as it really occurs, owing to its changing into the common (first) position *at an early period* of labor. He concurs with Professor Nægélé in reckoning the third as the usual position, where the occiput is turned toward the right side of the pelvis; but that as labor progresses, the occiput forsakes the right sacro-iliac symphysis and, coming forward, assumes its place in the second position.

My own observation has fully satisfied me that the anterior rotation of the occiput is more common than the posterior, although, like M. Moreau, I once thought differently,—too credulously relying on the authority of others, particularly of Baudelocque and Dewees.

While under the influence of this erroneous opinion, I met with a good many cases of occipito-posterior positions, in which anterior rotation was effected; but the efficiency, I verily believed, belonged to me, and not to nature, because I labored assiduously to promote it, after the manner recommended by Baudelocque and

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(1) *Traité Pratique des Accouchemens*, Tom. II, p. 82.

(2) *System of Midwifery*, chap. Mechanism of Parturition.

Deweese. To do this is, indeed, reckoned by the latter so important, that he holds the man "incompetent to practice midwifery, in its best manner, who cannot detect and *change* this malposition of the head, and thus abridge, sometimes by several hours, the misery and pain of his patient" (1). I have since experimentally allowed nature to take her course, in a considerable number of such cases, and I find that the desired mutation is generally accomplished about as well without as with my assistance; and that when it is being executed slowly and difficultly, as when the occiput comes forward during the pains and retreats in the intervals, it will be vain to attempt to turn the head round by the pressure of one or two fingers. After wearying myself by fruitless efforts of this kind, I have sometimes altogether desisted, and nature, though she would not be hastened, has done the work in such time as was most pleasing to herself.

In subscribing to the doctrine of the greater frequency of anterior rotation, I must not be understood to agree with Nægélé and Rigby in the opinion, that it has really taken place in almost every case, where the vertex is found in the second position; that it is, in fact, as the latter states (2), the regular commencement of labor in third positions, which are, according to them, so much more common than original second positions. I have expressed my doubt of the accuracy of this statement, in the preceding chapter, and I may here add that I cannot believe, with Dr. Rigby, that third positions have been so generally overlooked or mista-

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(1) Midwifery, p. 255.

(2) Op. et Cap. cit.

ken, as he imagines; at all events, I cannot suppose that they have so strangely eluded my observation and imposed themselves upon me as second positions. And yet this must have happened, if I have not met with many more cases of second than third positions.

No part of the mechanism of vertex presentations has given rise to such diversity of views among authors, as the rotation of the head. This has been not only variously described, but differently accounted for: and I have, therefore, deferred discussing its etiology, until I had furnished what I consider a correct description of it, in all the vertex positions, in order that I might institute a more extended examination of these conflicting opinions and statements than would have been compatible with the merely descriptive part of the subject.

The first view of the rotation of the head that will claim our attention is that of the deservedly eminent Dr. Smellie,—a practitioner and teacher of midwifery in London, a century ago. His account of the matter is entitled to the more respect because it has passed current with British writers ever since, with the exception of a small detachment, which has recently been impregnated with the doctrines of the German school, presently to be examined.

“When the head first presents itself at the brim of the pelvis,” says Dr. Smellie, “the forehead is to one side, and the hindhead to the other, and sometimes it is placed diagonal in the cavity: thus the widest part of the head is turned to the widest part of the pelvis, and the narrow part of the head, from ear to ear, applied to the narrow part of the pelvis, between the pubis and sacrum. The head being squeezed along, the vertex

descends to the lower part of the ischium, where, the pelvis becoming narrower at the sides, the wide part of the head can proceed no further in the same line of direction; but the ischium being much lower than the os pubis, the hindhead is forced in below this last bone, where there is least resistance. The forehead then turns into the hollow at the lower end of the sacrum, and now again the narrow part of the head is turned to the narrow part of the pelvis. The os pubis being only two inches deep, the vertex and hindhead rise upward from below it; the forehead presses back the coccyx, and the head, rising upward by degrees, comes out with a half round turn, from below the share bone: the wide part of the head being now betwixt the os pubis and the coccyx, which being pushed backward, opens the widest space below, and allows the forehead to rise up also with a half round turn, from the under part of the os externum" (1).

On attentively perusing this description, it will be seen that no account is taken of the flexion of the head, as it descends in the pelvic excavation, but, on the contrary, it turns upon the supposition that the head is perfectly inflexible, and is *squeezed along* until its longitude (occipito-frontal diameter) takes up its position alongside with the transverse or oblique diameter of the inferior strait. Now, there is no part of the mechanism of labor, which may be verified more easily than the flexion of the head; the proof of it is obtained by observing the departure of the posterior fontanel from

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(1) Theory and Practice of Midwifery, fifth edition, London, 1766, Vol. I, p. 87.

the side of the pelvis, and its gradual approach toward the middle. The flexion will be slight or considerable according as the head is small or large, but a degree of it takes place in every case of labor, and I have constantly observed that, in cases of disproportion between the head and pelvis, the posterior fontanel becomes the most dependent part, and is brought near the center of the pelvic cavity. If this observation be true, I hardly need say that it is the cervico-bregmatic, instead of the occipito-frontal, diameter of the head, which sinks obliquely to the bottom of the pelvis; and, as this is one of the small diameters of the head, it follows that rotation is not needed to put it in possession of the greater space that may be found beneath the symphysis pubis. Nor, after rotation has taken place, is it true that the "wide part of the head" is between the pubes and coccyx: it is still the cervico-bregmatic diameter, measuring no more than the biparietal, which, at the same instant, occupies the transverse diameter of the inferior strait.

From what has been said, it is evident that, while Dr. Smellie had a just notion with regard to the *time* and *manner* of the head's rotation, he was unacquainted with the *cause* and *object* of it. It has been already stated that the doctrine of Smellie on this subject is, with a specified exception, the doctrine of British writers generally, and to show how firmly it is ingrafted upon them, I need only refer to one of the most recent and highly valued of this class,—the younger Ramsbotham. In describing the fetal head, Dr. Ramsbotham mentions only three diameters, viz., 1. The long diameter, the face not being included, which is our occipito-

frontal: 2. The short diameter, from one parietal boss to the other: 3. The diameter from the vertex to the chin (occipito-mental). The first he reckons four and a half inches, the second three and a half, and the third five and a half, but capable of being lengthened to seven inches. In Plate V, Figure 19, he gives a view of the vertex, with two oval lines surrounding it, one being an inch greater in its long diameter than the other. The smaller oval is our occipito-frontal circumference,—the larger, our occipito-mental circumference. Now, the advantage of vertex presentations, according to Dr. R., consists in this smaller oval offering itself to the pelvic cavity, which leaves a clear superabundant space of at least half an inch between the cranial and pelvic bones, both in the lateral and conjugate diameters, which is generally quite sufficient for the easy passage of the head. Having premised thus much of the head, he goes on to describe the mechanism of its passage in cases of ordinary labor in this wise: “It enters the brim with the vertex as the most dependent part, with the face to one ilium and the occiput to the other, or more commonly with the face looking toward one sacro-iliac symphysis, and the occiput behind the groin on the opposite side of the body. Descending in this direction, it takes full possession of the cavity, and the forehead and occiput impinge respectively on the inner surfaces of the tuberosities of each ischium. Since, however, in this position, its long diameter is opposed to the short diameter of the outlet,—since the tuberosities of the ischia are unyielding,—and since the long diameter of the head exceeds the short diameter of the outlet by half an inch,—it is evident that a change in

its relative situation must be made before it can be expelled. This alteration is effected by a slight rotation of the cranium; the face is thrown into the hollow of the sacrum, the occiput peeps up under the arch of the pubes, and the head eventually escapes with the face sweeping the sacrum, coccyx, and perineum. This turn is produced by mechanical causes, and depends on the resistance which the peculiar construction of the pelvic bones opposes to the propelling efforts exerted by the uterus:—*The inner surfaces of the ischia, somewhat approaching each other as they descend, together with the spinous processes of the same bones, afford an inclined plane along which the head is directed; the hollow of the sacrum offers an unoccupied cavity, into which the face is received, and the arch of the pubes a wide-spreading sinuosity, through which the occiput insinuates itself*" (1).

The above *description* of the rotatory movement of the head agrees perfectly with that of Dr. Smellie; the same *necessity* of it is likewise alleged; but Dr. Rambotham discloses the agency of the inclined planes in *producing* it, and it is difficult, at least for me, to reconcile their agency with the account which he gives of the thing itself. By the inclined planes of the pelvis, he evidently means the entire inner surfaces of the ischia, approaching each other as they descend; if, therefore, they are operative at all, their influence ought to commence as soon as the occiput and forehead are made to glide upon them,—turning the occiput forward,

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(1) Process of Parturition, second American edition, 1845, p. 33.

and the forehead backward, so as to land the former under the pubic arch, and the latter in the hollow of the sacrum. But according to his own account, when the head reaches the bottom of the pelvis, it is yet so transversely placed that the occiput impinges on the inner surface of one tuber ischii, and the forehead on the other, the occipito-frontal diameter corresponding to the bis-ischiatic diameter of the inferior strait: it is, therefore, as easy to see that the whole of the rotatory movement remains to be performed, as it is difficult to comprehend how *such* inclined planes can produce it. Other authors, who describe this movement differently, but less correctly, can make a better use of their inclined planes.

The concluding remark in the last paragraph leads me to consider, *secondly*, the account given by M. Capuron of the rotation of the head. M. Capuron correctly attributes to the lateral walls of the pelvis two planes, an anterior and posterior one, whose direction is inverted, so that while one of the parietal tubers is gliding downward and forward upon the former, the diagonally opposite frontal boss moves upon the latter, in a contrary direction, into the hollow of the sacrum. This revolution of the head he calls its spiral rotation, because it takes place, as he contends, simultaneously with its flexion and descent, after the manner of the *turning of a screw in its nut*, or the *boring of a gimblet in a piece of wood* (1).

This screw-like movement is described by Professor Meigs, also, as a part of the regular mechanism of labor: speaking of the first vertex position, he says, "and

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(1) Cours, etc., p. 103.

the vertex or posterior fontanel glides along down the ischium, repelled by that bone, and directed by its inclined plane inward and forward, *so that it describes a spiral line in its descent*; and the vertex, which on entering the upper strait was directed to the left, is without any change of posture of the child's body, turned near a quarter or a sixth of a circle, to bring it under the arch of the pubis," etc. (1)

Although I am not sure that I ever observed this boring movement of the head, I am bound to admit that others have, and to agree, therefore, that it may happen as one of the deviations from the natural order. I could not own it as the regular mechanism, without supposing that my touch has grossly deceived me all my professional life. Until I am awakened from this delusion, if delusion it be, I venture to suggest that others may not unfrequently have been mistaken, when they imagined the head had rotated, presuming that it was the occiput they felt, somewhat protuberating under the symphysis pubis, when it was really the adjoining portion of one of the parietal bones, and a more careful examination would have detected the posterior fontanel behind the pubic ramus. Such mistakes, it is well known, have been committed.

There is yet another view of this subject, which will claim a larger share of our attention than either of the preceding, because it is the latest fashion, and on that account, if no other, is attracting many votaries.

According to this, which may be called the German view, because it was proposed by the celebrated Nægélé,

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(1) Philadelphia Practice of Midwifery, First edition, p. 164.

of Heidelberg, and is extensively diffused in Germany, —the head experiences but a slight rotation in the pelvis—so slight that it makes its escape, at the inferior strait, in nearly the same *oblique* position, which it had on entering the pelvis.

In explanation of this doctrine, it will be fair to allow Professor Nægélé, its propounder, to narrate what befalls the head, when it reaches the inferior strait, where it arrives, according to him, without having undergone the least flexion,—for he says sometimes the posterior fontanel is lowest, sometimes the anterior. Speaking of the first position, he says: “By continued pressure of the uterine contractions, the posterior fontanel at last gradually moves itself by slight degrees, repeated at equal intervals, in a direction from left to right (frequently more or less from above downward), and the occipital bone advances from the side of the pelvis under the arch of the pubis. It is not, however, the center of the occiput that advances under the pubal arch, but the head approaches the os externum, with the posterior and superior part of the right parietal bone, and remains in this position until it has passed through the outlet of the pelvis with the greatest circumference which it opposes to it, where it then turns itself with the face completely toward the right thigh of the mother. When the head is engaged in the external passages, and we trace the saggittal suture with the point of our finger from the posterior fontanel, it will, during examination, take the direction of a line drawn from the left descending ramus of the pubis to the right ascending one of the ischias; it is in short the posterior and upper part of the right parietal bone which

passes first through the os externum" (1). With regard to the third position, which, as we have seen, he considers next in frequency to the first, he observes, "As soon as the head is engaged in the cavity of the pelvis, the great fontanel turns toward the descending ramus of the left os ischium, and both can be felt at an equal height as to each other. As soon as the head experiences the resistance which the inferior part of the pelvic cavity opposes to it, or, in other words, the oblique surface which is formed by the lower end of the os sacrum, by the os coccygis, the ischiatic ligaments, etc., by which it is compelled to move from its position backward, in a direction forward, it turns by degrees with its great diameter into the *right* (2) oblique diameter of the pelvic cavity; that is, the posterior fontanel is directed to the *right* foramen ovals, and as the head approaches nearer and nearer to the inferior aperture, it is the posterior and superior quarter of the left parietal bone, which is felt in the cavity of the pelvis, opposite to the pubal arch; so that when the point of the finger is introduced under and almost perpendicular to the symphysis pubis, it touches nearly the middle of the superior and posterior quarter of the left parietal bone; and this is precisely the part, as the head advances further, which first distends the labia, with which the head first enters the external passage, and the spot upon which the swelling of the integument forms itself" (3).

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(1) Mechanism of Parturition, p. 22.

(2) Substituted for *left*, — Nægelé's name for this diameter, extending from left sacro-iliac symphysis to right acetabulum.

(3) Op. cit.

Dr. Rigby, in his *Midwifery*, does but repeat Professor Nægelé's description, and appears to be fully persuaded of its accuracy. Dr. Churchill's entire account of the mechanism of labor is confessedly taken from the great German, and he is to be understood as subscribing to the correctness with which this part of it is delineated; unless, indeed, the rotation of the head be one of the few doubtful points, referred to by him, which he so confidently predicts will be cleared, as his experience increases, and his ability to observe accurately is developed. Such appears to be the import of the following remarkable declaration: "The more closely his (Nægelé's) opinions have been tested by experience and careful observation, the more clear does their correctness appear; and if on one or two points, a doubt yet remains on our own minds, we are ready to believe the cause to be in our deficient experience, or incorrect observation" (1). Dr. Maunsell, although he avows his adoption of the opinions of Nægelé, from a conviction of their general correctness, does not go the length of abolishing the complete rotation of the head, but defers it to the eleventh hour. "As the head descends," says he, "the face turns somewhat into the hollow of the sacrum, and the vertex approaches the symphysis pubis. It is, however, the parietal bone which first escapes, *and the vertex does not reach the anterior central line until in the very act of being expelled from the outlet*" (2).

Having fully stated the opinions of others on the

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(1) *Theory and Practice of Midwifery*, p. 187.

(2) *Dublin Practice of Midwifery*, New York edition, with notes and additions, by Professor Gilman, p. 37.

subject, I feel bound to declare my own unshaken faith in the reality of such a rotation as I have ascribed to the head, in the account already given of the mechanism of labor. This faith does not repose upon authority only, but, as I flatter myself, upon careful and repeated observation. Like Nægélé, I have in numerous instances watched the different evolutions of labor, with my finger, for hours, now on a fontanel, and anon on the commissures, and if I have not almost uniformly verified the *complete* rotation of the head, I have as yet learned nothing in midwifery. When, in a first position of the vertex, the posterior fontanel is, at a certain stage of labor, plainly felt behind the left obturator foramen, while the lambdoidal commissure is to the left of the symphysis pubis, and the sagittal crosses the vagina obliquely from above downward and from left to right, but in the further progress of labor, the lambdoidal is brought completely forward, so that its branches cross the rami of the pubes equidistantly from the symphysis, and the sagittal runs vertically, parallel with the genital fissure, while the posterior fontanel is to be felt on the same line,—when, I say, all this is plainly and nearly invariably felt, the conviction must be riveted upon the mind of the observer, that *the head does verily completely rotate*. Such is my experience—or, if it prove unreal, my dream, for more than twenty years.

Is it inquired how are we to account for the conflicting experience of Professor Nægélé? I answer, I do not know. It would be presumptuous in me to charge him with having mistaken the exception for the rule; but the fact is unquestionable, that the head is sometimes expelled obliquely; how often, is not perhaps

well ascertained. Madame Lachapelle observes (1), that the head sometimes passes out obliquely, and clears the vulva, without experiencing any horizontal rotation, preserving the direction it had while in the pelvic excavation; but, she adds, "it passes with greater difficulty,"—showing that such a passage is an aberration from the normal route, and that nature does not delight in such obliquities.

The question of the degree of the head's rotation, it is evident, must be decided by observation alone, and to such an arbitrament I freely commit it; yet there is one evidence of the truth of his opinion, so frequently adduced and so much relied on by Professor Nægelé, that it ought not to be excluded from notice. I allude to the point of the head upon which the *caput succedaneum* is formed, in cases of lingering and difficult parturition. The admitted fact, that the posterior superior part of the parietal bone that is anterior, is the point in question, proves indeed that this part of the cranium is long opposite to the arch of the pubes, where it is free from the compression to which the rest of the head is subjected; but does not prove that this part is first expelled, or that the head does not rotate, so as to place the occiput eventually under the symphysis pubis. The cranial swelling, it has been shown, occurs in cases of tedious rotation, and proves no more than that the head was obliquely situated while it was forming.

From what has been said, it appears that although obstetrical writers have differed as to the manner and purpose of the head's rotation, they agree generally in

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(1) *Pratique, etc., Deuxième Memoire.*

representing the inclined planes of the pelvis, in one way or another, as its cause. But M. Cazeaux contends that too much importance has been attached to these planes; and that, as in fact the head does not usually rotate, until its expulsion is so nearly completed that the perineum is pressed on, they really exert no influence whatever. He endeavors to explain the movement in question irrespectively of these planes, by considering only the manner in which two forces, viz., uterine contraction and the resistance of the pelvic walls, act on the head. Supposing, for example, that the head is placed in the third position, the uterine contractions, being exerted in the direction of the axis of the superior strait, cause the occiput to descend downward and backward, until it is arrested by the inferior part of the sacrum and the soft parts of the outlet, when it is compelled to change its course. The resistance it meets with may, he thinks, be represented as a force, whose direction is perpendicular to the surface it encounters, and which, therefore, being applied to the right posterior part of the head in contact with this surface, tends to move this part of the head forward and somewhat upward. The occipital extremity of the head thus acted upon by two forces, one urging it downward and backward, the other forward and upward, moves in the direction of their *resultant*, viz., downward and forward and to the right (1).

This theory of M. Cazeaux is certainly ingenious, but it may be doubted whether it will enable us to explain all the phenomena, which are observed in connec-

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(1) *Traité*, etc. *Phenomenes Mecanique du Travail*.

tion with the rotation of the head. So far from explaining the rotation of the occiput into the hollow of the sacrum, in third and fourth vertex positions, for example, it is altogether opposed to such an occurrence, which, by the by, is denied by M. Cazeaux, who contends that when anterior rotation fails to take place, the head is always expelled obliquely. But the posterior rotation is too well attested to be successfully denied. Again, it would appear that if the head is controlled in its movements by the forces assigned, abstracted from all other influences, when the forehead is found in the right posterior part of the pelvis, as it is in the first position, it ought, in obedience to the same resultant, to revolve forward and convert a first into a fourth position.

To express my own views of the subject, I would say that the rotation of the head is produced by a number of concurring circumstances. In the first place, the obstacle offered by the inferior strait to the head's further progression, without a change of its position, may be mentioned as one circumstance, and of such importance that if it do not exist, as, for example, where the head is very small or the pelvis unusually capacious, rotation does not take place, but the head is expelled obliquely. In describing the mechanism of labor, it was stated that the head is *forced to rotate* by this circumstance; in making such a statement, however, it was not intended that there is anything in the mere arrest of the head that determines its rotation rather than any other movement, but that the descent of the head being checked, it is under the necessity of moving in some other way, if it move at all.

In the second place, impelled by the uterine con-

tractions, the head is invited to rotate, by the peculiar structure of the pelvis, its inclined planes offering suitable surfaces for its most prominent convexities to glide upon. To be convinced of this, one has only to take a female pelvis, and place a fetal skull within it, in the first or second position, as it is after its descent is completed. Having satisfied himself that the skull cannot be pushed through the inferior strait, while diagonally situated, let him gradually rotate the occiput toward the symphysis pubis, and he will see that while the parietal bosses easily revolve upon the anterior inferior inclined planes, one of the frontal bosses revolves, with equal facility, upon one of the posterior superior planes. If, now, the fetal skull be placed in the third or fourth position, it will be manifest that, when it is at the bottom of the pelvis, the forehead is entirely above the anterior planes of the pelvis, and the occiput below the posterior, and consequently the structure of the pelvis does not favor the revolving of the forehead toward the pubes. Nay, not only is such a movement not favored; it is positively hindered by the shape of the ossa pubis internally. But while, as far as the structure of the pelvis is concerned, there is nothing to invite the forehead toward the symphysis pubis, one of the posterior superior planes offers it a fit surface to glide upon toward the hollow of the sacrum.

In the third and last place, the head is caused to rotate rather than perform any other movement, by the circumstance of its occipital extremity receiving the largest share of the uterine force, in consequence of its being nearer and more in a line with the spine, through which, as we have seen, this force is transmitted, and

under this impulse the occiput will move in whatever direction the least resistance is offered, which is toward the pubic arch, because here is at once the *outlet* of the pelvis and of the genital organs; and while there is, of course, no resistance from the pelvis, there is but little from the soft parts. The *attraction* which the pubic arch may, therefore, be said to have for the occiput, as well as the repulsion of the forehead by the internal surface of the ossa pubis, causes anterior rotation to occur more frequently than posterior, in the third and fourth positions of the vertex. But neither this attraction nor repulsion is so strong as always to compel the occiput to move forward, in these positions; if the hollow of the sacrum offer unusual space, or the head be small, the occiput will be directed posteriorly.

#### *Diagnosis.*

It is generally easy to distinguish the vertex from any other part of the child that may present; its regular convexity, smoothness, and hardness, together with its commissures and fontanel, one of which at least can always be felt, when the os uteri is sufficiently opened, will scarce allow even the least experienced to mistake it. It may often be felt through the membranes, with a sufficient number of these characteristics, to enable us to pronounce positively as to its presence at the superior strait; but if any obscurity exist then, all doubt may be removed after the membranes are ruptured. It is not so easy a matter to make out the *position* of the vertex, though practice ought to enable any one, possessing ordinary tact, to do this with a great deal of accuracy. To determine this point, the finger

must be introduced deeply and then directed upward, to feel for the sagittal commissure, which looks downward and backward in the direction of the axis of the superior strait, at least in the early stage of labor; the sagittal commissure being found near the center of the pelvis, the finger traces it anteriorly until the fontanel, which is opposite one of the acetabula, is found. To reach this, the finger must be passed, in the absence of pain, between the cervix uteri and head of the child, to a greater or less distance, according to the degree of dilatation of the os uteri and the greater or less flexion of the head. The finger having arrived at the fontanel, the examiner ascertains whether it is the posterior or anterior, which is determined by the number of concurrent commissures belonging to it: if four commissures can be traced into it, and it be lozenge-shaped, it is the anterior fontanel; if, on the contrary, only three commissures run into it, and it be triangular, it is the posterior fontanel. Now, if the sagittal commissure crosses the pelvis, in the direction of its left oblique diameter, and the posterior fontanel is found opposite the left acetabulum, the vertex is placed in its first position; but if, the sagittal commissure crossing in the same direction, the anterior fontanel is opposite the left acetabulum, the vertex occupies its third position. If it be found that the sagittal commissure corresponds to the right oblique diameter of the pelvis, then it is the second or fourth position, according as it may be the posterior or anterior fontanel, which is discovered opposite the right acetabulum.

Both Nægelé and Rigby speak of the equal facility of reaching the two fontanels, and declare that although

the posterior is most frequently lowest, occasionally the reverse is the case, and it is the anterior fontanel, without at all influencing the progress of the labor.

This does not agree with my experience, and I must candidly avow that whether it has been owing to my awkwardness, or the limited reach of my finger, I have not been able to feel both fontanels, in a single instance; and I can never feel the fontanel that is placed posteriorly, except in the occipito-posterior positions, and then only after the head has flexed so considerably as to carry the anterior fontanel above the reach of the finger.

Most British authors direct us to feel for the ear of the child, that is immediately behind the pubes, in order to determine the position of the head. "When you are desirous of discovering the situation," says Dr. Blundell, "make it your first endeavor to distinguish the ear, by interposing the finger between the symphysis pubis and the head of the fetus; and there, *if the accoucheur be skillful*, and the condition of the labor natural, even in the earlier parts of labor, the ear may be felt without difficulty. Again, anxious to ascertain the position of the head, examine the ear once more, taking care not to double the part upon itself, observing carefully which is the *flap* of the ear, and which is that part of the ear which is *bound down* close upon the head; for the flap of the ear lies toward the occiput, as the part which is sessile is lying toward the face, so that where you feel the ear, and take care not to displace and falsify its indications by doubling upon itself, observing respectively those parts which are attached and disengaged, you may make out the situation of the face and

occiput with facility and precision" (1). I must confess that my endeavors to feel and distinguish the ear have been, so far, quite unavailing. As, however, to do this may not be so difficult as I imagine, it is proper that I should vindicate myself from the imputation of extraordinary obtuseness, by stating that I have made but few attempts to feel the ear, being accustomed to rely on the more precise information afforded by the commissures and fontanels, and even in those few instances, the usual position, in which my examinations are made, viz., on the back, is not so favorable for *auricular* researches, as the universal obstetric position of British practitioners.

If an examination be made, for the first time, after labor has been greatly protracted, and considerable intumescence of the scalp has taken place, or sometimes at an earlier period of labor, where the ossification of the head is so advanced as to obscure the commissures and fontanels, it may not be possible to ascertain the exact position of the head. Here, auscultation may afford us some aid. If the pulsations of the fetal heart can be distinctly heard, we may be sure that the back of the fetus is turned toward the side of the mother where they are heard; and if, therefore, they are heard in the left-iliac region, we may be sure that it is a case of either the first or fourth position, most probably of the first, inasmuch as this is so much more common than the fourth. If, on the contrary, these pulsations be discovered in the right iliac region, it is conclusive evidence of

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(1) Lectures on the Principles and Practice of Midwifery, edited by Charles Severns, M. D., Philadelphia edition, 1842, p. 108.

either second or third position, most likely of second, as this occurs more frequently than third position.

*Prognosis.*

Vertex presentation is decidedly more favorable than any other for both mother and child, especially for the latter. The reason of its preferableness will be best apprehended, when the disadvantages of all other presentations are pointed out. But the several positions of the vertex are not equally favorable, the third and fourth being less so than the first and second. The cause of difficulty and danger in the occipito-posterior positions was explained in connection with their mechanism; we know now, however, that they are not so much to be dreaded as they formerly were, because they are apt to be spontaneously converted into occipito-anterior positions, and even where this fails to take place, the expulsion of the head is not *necessarily* very tedious and hazardous. On the contrary, I have witnessed cases of this kind, in which the labor was terminated with reasonable facility, and safely for mother and child. M. Capuron errs, therefore, in considering these positions so unnatural that they might be refused admission among the regular vertex positions, and so difficult, that they necessitate delivery by the forceps (1). While it should not be forgotten that they involve some risk, our confidence in the resources of nature (always proportioned to the care with which we have studied them), should restrain us from resorting hastily to instrumental or other extraordinary assistance.

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(1) Cours Theorique et Pratique d'Accouchemens, p. 200.

## CHAPTER XV.

*Manual assistance when the head or shoulders are passing—or when, the head being born, the cord is coiled round the neck—the expulsion of the head retarded by its occipito-posterior position, or by contraction of the cervico-uterine orifice about the neck of the child.*

It was formerly the established practice of accoucheurs, in vertex cases, to lay hold of the head as soon as it is within reach of the hands, and extract the shoulders without delay, lest the child should be suffocated by its detention in the passage. Mauriceau, for example, directs that when the head is expelled as far as the ears or thereabouts, the midwife is to seize it with both hands, applied upon the sides of the head, some of the fingers being insinuated under the jaw, and then the occasion, offered by the first good pain, must be embraced to bring forth the child, by drawing its head (1). He gives particular directions as to the manner of exerting this extractive force, which must not be always in a right line, but often from side to side, in regard to the head, in order that the shoulders may sooner and more easily take its place, after it has passed, and be made to follow without delay.

Baudelocque does not consider it more expedient to

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(1) Livre II, chap. 7.

take hold of the head with the hands than to pull it forth by the ears, which the vulgar imagine the accoucheur is always careful to do; but he allows that when the head is almost born, it should be assisted by raising it toward the pubes or insinuating the index finger under one side of the lower jaw; and directs that after its disengagement, the face should be turned toward one of the thighs of the mother, that toward which it tends. We are next, according to this celebrated author, to inquire into the situation of the shoulders, or relatively to the inferior strait; push one of them toward the sacrum, and bring the other under the pubes, when they are not naturally thus placed, and then extract them, together with the rest of the trunk, by cautiously pulling upon the head (1). M. Baudelocque is careful to forbid, as unsafe, the application of great force in this manner, when the size of the shoulders offers any considerable obstacle; but advises instead that the index of each hand be introduced under the axillæ, and used as crochets. We must not forget, he emphatically adds, to place the shoulders in the situation already indicated, before we attempt to extract them, for those of the smallest dimensions cannot pass out transversely, without extreme difficulty.

The manipulation recommended by Mauriceau, which appears at one time to have been generally practiced, was, doubtless, part and parcel of the pragmatic midwifery in vogue, and must be presumed to have been often pernicious in its results. To the writings of Mr. Charles

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(1) *L'Art des Accouchemens*, par. 825-7.

White, of Manchester, England (1), we are largely indebted for such an exposure of its absurdity and danger, as has consigned it to merited reprobation. In the chapter of his popular work, on "Natural Births, particularly of the Secundines, and the prevention of afterpains," he shows the folly and risk of such practice, by contrasting it with the operations of nature, when she is permitted to pursue her own course unmolested. According to nature's process, the shoulders are caused to make such turns as best adapt them to the dimensions of the pelvis and soft parts; whereas, when art interposes, in the manner deprecated, the shoulders are pulled along transversely, offering violence to the vagina, and unduly distending the womb and its ligaments, thus producing, as Mr. White had reason to believe, "inflammations, prolapsuses, retentions of urine, and a train of disagreeable symptoms." "This improper and too hasty delivery of the shoulders, in natural labors, occasions," he adds, "the retention of the secundines, and is in some manner the cause of afterpains; for the womb being improperly stretched out, and the body of the child prematurely delivered without a natural pain, the womb, instead of contracting regularly from its fundus, is thrown into spasmodic strictures, either at its mouth or across its middle." There is no difficulty in perceiving how such an irregular contraction of the uterus, or, what is, perhaps, fully as often the case, atony or a flaccid condition of the organ, the consequence of its being too suddenly emptied, may be followed by retention of the

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(1) Treatise on the Management of Pregnant and Lying-in Women, second edit., London, 1777.

placenta, and likewise flooding, if it be wholly or partially detached from the uterus. Of the fact that such a procedure is likely to be followed by unusually severe afterpains, there can be no reasonable doubt; but Mr. White's explanation of the manner in which these are caused cannot be readily admitted. He ascribes them to the closure of the mouths of the uterine sinuses or veins, before they could have an opportunity of gradually contracting and of discharging themselves of the blood which they contained, "the serous parts of which drains away and leaves the crassamentum behind in the sinuses, which grows the more fibrous the longer it remains; and the parts being irritated by this extraneous body, endeavor to disburthen themselves, by what are called afterpains." We rather judge that these afterpains result from contractions of the uterus, provoked by the presence of large coagula in its cavity, the product of internal hemorrhage, permitted by the flaccid or irregular contracted state of its parietes, following such hasty delivery.

The foregoing considerations ought to suffice to settle the conduct of the practitioner, in ordinary cases of labor with vertex presentation; it should be a maxim with him, that nature must be allowed to do her work, in her own good way, seeing everything has been ordered with admirable foresight, to have it accomplished with the greatest safety and the least suffering to mother and child. It does, nevertheless, not unfrequently happen that some assistance may be usefully given, with a view to promote the passage of both the head and shoulders, in vertex cases: and to deny this, and dogmatically to affirm the universal sufficiency of nature, is to humiliate

art without exalting nature, unless it be vainly imagined that she is exalted by the incense of blind adoration.

Let us inquire, then, what may be safely done to favor the release of the head, when it is pressing on the perineum, but its exit is unduly delayed. The delay may arise from the resistance of the soft parts at the outlet, or from the inadequacy of the parturient powers to cause the head to execute the movement, by virtue of which it clears the vulva. The execution of this movement (extension), it has been shown, requires a degree of uterine force, of which they alone have any just conception, who have carefully studied the mechanism of labor. In either case, firm and properly directed pressure on the perineum will avail much in promoting the birth of the head, by aiding the movement in question. The pressure should be, of course, from the extremity of the sacrum toward the symphysis pubis, and so managed as not only to push the forehead of the child in that direction, during a pain, but as much as possible in the intervals of the pains, so as to retain whatever advantage is gained. The patient lying on the back, both hands, with the extremities of the fingers directed toward the sacrum, may be employed in raising the head, as it were, toward the pubes. By acting thus, I have often succeeded in having the head expelled by a few pains, notwithstanding it had made no advance for hours previously, and there appeared to be no prospect of its expulsion by the unaided efforts of nature. Of Baudelocque's maneuver, slipping a finger or two under the jaw, much less of Mauriceau's, laying hold of the head, for the purpose of making traction upon it, I have no experience.

In relation to the passage of the shoulders, it must be remembered that a short respite usually ensues after the expulsion of the head, in the most natural cases — during which the tonic contraction is at work, reducing the uterus to the diminished volume of its contents. We should, therefore, be satisfied to support the head, and wait awhile for the resumption of expulsive efforts. If this respite should, however, be protracted, or if the child be in a suffering condition, from pressure upon its neck interrupting the return of blood from the brain, and producing engorgement and lividity of its face, the interposition of art is not only proper but imperiously demanded. Under such circumstances, the practitioner should get two fingers (one is hardly sufficient) under the axilla, and use such extractive force as may be necessary to advance the shoulders. If the shoulders be found situated nearly transversely in the pelvis, one axilla (that which is most forward, if they be not directly transverse, either if they be transverse) is to be drawn toward the pubes, and then they are to be brought through the vulva, in a manner as exactly imitative of the mechanism as possible. In rendering this assistance, it is important to observe that it must be conformable to nature in other respects beside her mechanism; this might be exactly copied, and yet the woman be left in a most perilous condition. Our extractive force must be cautiously applied, and alternated with intervals of rest, and we must be careful to have the coöperation of the natural efforts, or at least be sure that the uterus is in a contracted state. To pull away the child, while the uterus is altogether passive, would be hazardous in the extreme; but no such hazard is incurred by

a prudent and well-instructed practitioner, for it almost uniformly happens that his efforts are seconded by those of nature—the introduction of his fingers and the displacement of the shoulders, serving to excite a renewal of the suspended contractions of the uterus. Of pulling on the head, as a means of acting upon the shoulders, I have no experience; but it seems to me that it is not free from danger, as far as the child is concerned, while it cannot enable us to conform the transition of the shoulders so accurately to the mechanism, as the method I have advised and often practiced.

After the birth of the head, it is not at all uncommon to find the umbilical cord coiled once or more around the neck of the child. My attention has been particularly directed to this among other points, and I find that the cord is around the neck in a much larger number of vertex cases, than I had previously supposed, or than is suspected by those who have made no particular inquiry concerning it.

It was, at one time, very generally believed that such a disposition of the cord may operate as a serious impediment to the expulsion of the head,—the shortened cord retracting the head upon the subsidence of each pain,—and it was even deemed necessary, in some instances, to divide it with the scissors to allow the head to emerge. Dr. Smellie, who recognized this as an obstacle to delivery, advises a different method of overcoming it. In one of his numbers (1), quaintly entitled, “How to behave when the birth is obstructed by the navelstring, etc.,” he recommends one or two fin-

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(1) V of Section III, Chapter II, Book III.

gers to be introduced into the rectum, before the pain goes off, to press upon the forehead of the child at the root of the nose, taking care to avoid the eyes: "this pressure," says he, "detains the head until the return of another pain, which will squeeze it farther down, while the fingers, pushing slowly and gradually, turn the forehead half round outward and half round upward. By this assistance and the help of strong pains, the child will be forced along, although the neck be entangled in the navelstring; for, as the child advances, the uterus contracts, and consequently the placenta is moved lower: the funis umbilicalis will also stretch a little, without obstructing circulation." Although Dr. Smellie recites some cases, in one of his Collections, in which labor was apparently obstructed by this cause, there is reason to doubt its reality, nor can any assistance that may have been rendered by his anal manipulation be adduced in its support, for the efficacy of pressure, as practiced by him, may be explained upon a quite different principle. The alternate advance and recession of the head may, much more reasonably, be attributed to the resistance of the perineum, aided perhaps by the elasticity of the fetal cranium; and this resistance may be overcome, in a shorter time, by the head being made to press uninterruptedly upon the soft parts at the pelvic outlet.

When the head is expelled, there is still reason to doubt whether the cord, by encircling the neck, can hinder the expulsion of the remainder of the child; but, under such circumstances, both mother and child are undoubtedly exposed to serious accidents. The cord may be lacerated, the placenta may be torn loose from

the uterus, or if its attachment be strong enough, the uterus may be inverted, and, finally, the child may be lost by the ligature of its neck intercepting the return of blood from its brain. I have not met with any instances of flooding or inversion of the uterus from this cause, but I have known the cord to be lacerated and the child's face to be swollen and livid. It should, therefore, be an invariable rule of practice, in vertex cases, to ascertain, as soon as the head is born, whether the cord is around the neck or not: if it be found there, it should be gently pulled and slipped over the head, if a coil of it can be sufficiently loosened to allow this; but if this cannot be done, without too great stretching, it may be pushed over the shoulders, as they emerge from the pelvis. Where several circles of the cord surround the neck so tightly as to choke the child, it will be proper to divide it at once with the scissors, and hasten the birth, as much as is compatible with the safety of the mother, lest it be lost from hemorrhage or asphyxia.

Labor may be protracted, in vertex cases, in consequence of the occiput being turned toward the posterior part of the pelvis, especially if the occiput should rotate into the hollow of the sacrum; and it has, therefore, been deemed an important practical precept to secure the turning of this part of the head toward the pubic arch. For this purpose, we are directed to press upon the coronal region of the head, near the anterior fontanel, with two fingers, and push it toward the sacrum, to convert a *third* into a *second*, and a *fourth* into a *first*, position of the vertex. From the observations already made in the preceding chapter, it may be gathered that

I do not highly appreciate this manipulation. If, however, it should happen that no tendency to this desirable mutation is manifest, although the time when it usually occurs has arrived, it is the duty of the practitioner to interpose and do what he can to have it accomplished. He ought not, and, if he is wise, will not, pretend to more vigilance than nature, and make premature efforts to direct her movements.

A far more serious cause of protracted labor, peculiar to vertex presentations, consists in the permanent contraction of the cervix uteri about the neck of the child. This was formerly described by authors as contraction of the os uteri upon the child's neck, after the head had passed through it and is lodged in the vagina; but Baudelocque was doubtless correct in assigning the upper extremity of the uterine neck (the cervico-uterine orifice) as the seat of this permanent contraction. Numerous observations have proved the remarkable proneness of this part of the uterus to contraction, whenever the cause that distends it is removed. Thus, it is truly remarked by Madame Lachapelle that, for a certain time after natural delivery, the external orifice, as well as the entire neck, is found soft, lax, and open, while the internal orifice is small and contracted; and, in speaking of the difficulties that may be encountered in the operation of version, she says that she has often met with contraction here, consequent upon the escape of the waters, as the only obstacle to the introduction of the hand (1).

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(1) *Pratique des Accouchemens, Deuxième Mémoire.*

This condition of the cervico-uterine orifice offers an impediment to the advance of the shoulders of the child, and, of course, the head is retained in the cavity of the pelvis, and cannot be expelled or extracted until the impediment is removed. It is characterized by the head making no progress, although the pains be strong and regular, the os uteri dilated, and the pelvis amply capacious, or if the head be forced lower during a pain, it is retracted as soon as the pain declines. It cannot, however, be certainly discovered except by a tactual examination, in order to which the head must first be raised, by the entire hand, above the brim of the pelvis; and then the fingers may be pushed up between the os uteri and head, at the base of which the stricture will be detected, if it exist.

Premature rupture of the membranes may be reckoned the most common, if not the sole, cause of the abnormal contraction we are considering. When this untoward event occurs, the liquor amnii is liable to flow or dribble away before the head can stop the os uteri by engaging in it. The uterus being thus deprived of its waters, the tonic contraction brings its parietes everywhere into contact with the surface of the child's body, but more especially and with greater rigidity, at the cervico-uterine orifice, for the reason already stated. To this cause alone it is attributed by Smellie; and in all the instances described by him, it is particularly mentioned that the membranes had long been ruptured, the waters drained off, and the labor lingering.

The treatment consists in the dilatation of the contracted portion of the uterus by the fingers, insinuated

between it and the neck of the child. This can be accomplished only by first elevating the head above the superior strait, for there is not room in the excavation to receive the hand between it and the pelvic walls. When, therefore, the diagnosis is established, in the manner already explained, we should proceed at once, without withdrawing the hand, to remedy the difficulty. The stricture being dilated, the hand should be suddenly withdrawn, upon the access of a pain, that the shoulders may take its place, and prevent a recurrence of the accident.

Should labor be long delayed by this obstacle, it is evident that the parturient powers may become so exhausted, that the case may be mistaken for one of simple impotent action of the uterus, and, under this impression, a practitioner might attempt to deliver with the forceps. Smellie records a very interesting case of this kind, in which the woman had been five days in labor, and had been neglected by the surgeon and midwife. She had lost a great deal of blood, was very weak, and the head of the child was low down in the pelvis. Smellie tried to deliver with the forceps, but was surprised that he did not succeed, because the head was not large, and the instrument was easily introduced, and firmly fixed. Being foiled in this method, he opened the head, and tried to extract it with the blunt hook on the inside of the skull, assisted by his fingers; but could not, with all his strength, bring it along. "However," says he, "by extracting the *occipital* and one of the *parietal* bones, I had room to introduce my hand, so as to find with my fingers the under part of

the *uterus* strongly girt or contracted round the neck of the *fetus*; this I gradually dilated; then bringing down one of the arms, and pulling at that, and the shattered bones and scalp, with both my hands, I at last extracted the child with greater ease than I expected" (1).

(1) Collection XXXI, Case VI.

## CHAPTER XVI.

## INSTRUMENTAL DELIVERY IN VERTEX PRESENTATION.

THE parturient powers may, as we have seen, prove insufficient for the expulsion of the child, in such time as best comports with its and the mother's safety, and it then becomes necessary to resort to various instruments that have been devised by art to terminate the labor. The use of instruments may, also, be demanded on account of accidents, such as convulsions, or flooding, occurring in the progress of labor. Instrumental delivery, in vertex presentations, shall therefore next claim our consideration; and in discussing this subject I purpose to limit my remarks to the use of the common *forceps* and *crotchet*, the only instruments much employed in the practice of this country.

*First. Delivery by the forceps.*

The forceps is an instrument consisting of two branches, which are separately introduced within the organs of the mother, and then joined together, to embrace the child's head and extract it. Its use is compatible with, and is, indeed, designed to save, the life of the child, while the mother is secured against the danger of longer continuance of her travail. A short description of it is necessary to enable the reader to compre-

hend the directions which are to be given for its employment.

The branches of the forceps I shall, after M. Dugès, designate *right* and *left*, because the former is held in the right hand, when it is being introduced, passes up on the right side of the pelvis, and in the great majority of cases (viz. in the occipito-anterior positions), is applied upon the right side of the head, and *vice versa* with regard to the former. We distinguish, as belonging to each branch, a blade, handle, and intermediate part, which serves to lock them, when they are properly brought into apposition. The blade (*cuille* of the French) is broad, concave on one side, convex on the other, and fenestrated in its whole length: the handle is round, straight, or slightly curved, and of various lengths in different forceps: the lock is formed by a conical pivot or screw on one branch, and a mortice or notched hole in the other to receive the pivot. The pivot belongs to the *left* branch, and the mortice or hole to the *right*, and these articular contrivances have given names to the branches themselves, — the left being called the *male*, and the right, the *female*, branch, by Baudelocque, Dewees, and many others.

No instrument of surgery or obstetrics has undergone so many metamorphoses as the forceps, since its first rude conception — almost every distinguished operator having proposed some change of its shape or dimensions. I shall not discuss the merits, real or imaginary, of the different kinds of forceps that have been hence produced; but shall content myself with avowing my predilection for that of the French, admitting, at the same time, that a skillful operator may succeed very

well with any of the instruments in use, and will succeed best with the one he is accustomed to handle. It is proper, I should say, that the forceps I use is the French, curtailed by reducing the length of the handle and lock, which is not essential except for delivering from above the superior strait,—an operation seldom performed in this country, and which, I am persuaded, is too frequently performed on the other side of the Atlantic. The blades of my forceps correspond in shape, breadth, and length with the French, but when joined, they are rather wider apart, as they are not designed to go beyond a contracted or deformed superior strait, and it is necessary that the space between them should nearly include the head, else the (straight) handles would be inconveniently separated, when the head is embraced. It is only necessary to add that the blades of my forceps have, of course, a curvature upon their edges, adapting them to that of the pelvic canal, as well as the curvature upon their faces, common to all forceps, adapting them to the convexity of the head (1).

In treating of forceps operations, the method which I shall pursue will be, first, to make some general observations on this mode of delivery, and then describe the operative procedure, appropriate to the different situations of the head.

*General observations.*—When it is judged expedient to deliver with the forceps, suitable preparation must be

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(1) The Forceps used by me was made, according to my direction, by Mr. Erringer, of this city, Surgical Instrument maker, Third street, who has the pattern of it, and keeps it, in fact, constantly on hand. From him it can be had by any who may desire to possess it.

made for the operation. A mattress must be provided for the patient to lie on, as the sinking of her hips in a feather bed would be inconvenient, and she must be placed in a proper position, with the pelvis near the side or foot of the bedstead. As to the "proper position," there is a diversity of opinion and practice—the French directing the patient to be placed on the back, while the English strenuously insist on the preferableness of their universal "obstetrical position," viz., on the left side. For my own part, I have never attempted to deliver with the forceps, the patient lying on her side; but, it seems to me, that the dorsal position is far more convenient, and permits the operator to recognize more accurately the relations of the head to the cardinal points of the pelvis. Baudelocque, Dewees, and others, direct that the hips should be so near the edge of the bed, that the perineum may be free, the feet being supported on stools, or the laps of assistants: but this is not necessary, unless where the head is high up, or not at all engaged in the pelvis. It will be sufficient, if her hips are placed so near the side of the bed that, her lower extremities being strongly flexed, her feet rest on its verge, and, if necessary, her pelvis can be raised by a cushion or a folded quilt. If there is any distention of the bladder, the urine must be drawn off with the catheter; and if the bowels are loaded, they must be relieved by a purgative injection.

The operation may be divided into two parts; first, the introduction and adjustment of the branches of the instrument, and second, traction with it, when properly adjusted, to extract the head. In the first part of the operation, the object to be attained is to apply the

blades of the forceps upon the sides of the head opposite to each other, being careful to have their concave edges turned either directly or obliquely forward, as regards the mother, according to the situation of the head. The left branch is, as a general rule, to be introduced first; the practitioner takes this in his left hand, and holding it near the lock, between his thumb and fingers, as a pen is held, in writing, he presents the extremity of the blade to the vulva, his hand being perpendicularly over the right groin of the patient. As this branch passes up along the left side of the pelvis, the hand is moved toward the left side until it reaches midway between the thighs of the patient, while at the same time, it is depressed in a very decided manner. The first movement is in accommodation to the curvature upon the face of the blade, whose extremity glides from left to right over the convexity of the head: the second is to accommodate the curvature of its edge, which must correspond with the curved axis of the pelvic canal. Two fingers, or preferably, when practicable, all the fingers of the right hand, previously well-lubricated, are to be introduced as high up as possible, between the head and pelvis, to serve as a conductor of the blade, to prevent its contusing the vagina, and to insure its passage into the cavity of the uterus.

Should any difficulty be experienced in the introduction of the blade, it is to be surmounted by address, never by force; if the vulva be rather contracted, dilate it with the fingers; if the progress of the blade be arrested, vary the direction of its extremity, and advance it gently with a vacillatory motion. When its introduction is satisfactorily accomplished, it should be given in

charge to an assistant, instructed to resist any displacement, which the uterine contractions may tend to produce.

The practitioner then takes the right branch in his right hand, and introduces it in the same manner, *mutatis mutandis*, as the left. That it may lock with its fellow, it is requisite that it be placed precisely in opposition to it. Should this be found to be not the fact, it must not be forcibly twisted into its proper place, for such an attempt might inflict serious violence on the child's head, and also upon the uterus; but it should be partially or wholly withdrawn, and another direction given to it. Proceeding after this manner, repeatedly varying its line of march, if need be, we shall at length safely obtain the desired position, and have no difficulty in locking the instrument.

The instrument, being properly applied, is to be taken hold of with both hands, one at the lock, and the other near the extremity of the handle, the forefinger of the former being at liberty to examine, from time to time, the progress we are making. The handles are to be pressed together with sufficient firmness to clasp the head and prevent the slipping of the blades, when extractive force is used, but not so powerfully as to compress the head, much less to contuse it or fracture its bones. On this point, a young practitioner needs to be cautioned, and he should keep a constant watch upon himself, as he will be very apt to use *compressing*, proportioned to the *extractive*, force he finds it necessary to exert. The extraction now commences, and this is to be performed, from first to last, in conformity at once

with the nature of the instrument and that of the process it is intended to expedite.

On the first topic, it must be considered that the forceps is not merely a tractor, but it is also a lever,— a double lever of the first kind — the prop being at its pivot, the resistance, viz., the head, at the blades, and the power at the handles. It is as a lever, more than a tractor, that we use the forceps; consequently, while we draw toward us, or in the direction of the axes of the pelvis, with moderate force, we move it from side to side, or, as the phrase is, from handle to handle. The head is, therefore, brought along, by describing a succession of slight curves, in alternately opposite directions, of which the pivot is the center, and no more traction is employed than is necessary to preserve the advantage gained by the lever. In moving the instrument to and fro, the operator should be careful not to exceed the limits to which he may safely venture, for it is evident that a reckless swinging of it will necessarily contuse the organs of his patient, and may be followed by the most deplorable consequences. It is, however, proper to observe, for the encouragement of the prudent, that no danger need be apprehended from this source, except from inexcusable negligence or temerity.

The duty of imitating the process of labor suggests, in the first place, that our extractive efforts should be made with intervals of rest. The artificial force ought not to be of longer duration than the natural, nor its respite shorter; it ought not to be put forth, in all its intensity, in the beginning, but be gradually augmented to the required degree; and we should act in concert with the pains, if they continue to recur with their

wanted frequency, though with inadequate force. It suggests, in the second place, that we follow the mechanism of labor, by causing or assisting the head to perform whatever movements remain to be executed, in order that it may emerge easily and safely from the pelvis. When, finally, the head is made to distend the perineum, our extractive efforts must be greatly mitigated, if not altogether intermitted, lest the perineum be torn by its too hasty delivery. The handles of the forceps are now to be held by one hand, which is more than enough to exert all the force that can be needed, while the other hand is employed in supporting the perineum, as in natural delivery. By some authors we are directed to take off the instrument, at this stage of the operation, as the stronger pains and more powerful efforts of the patient, which usually occur, are sufficient to insure the expulsion of the head; but my own practice is to leave it on, as its presence can do no harm, and it might be wanting: I have, indeed, usually continued to make slight tractions with one hand, while, with the other, the perineum is supported until the head is born.

When the head is extracted, the rest of the child may be expelled by the contractions of the uterus; but it is not unfrequently the case, especially where labor has been much protracted, that it is necessary to assist in the manner explained in the last chapter.

These general observations being premised, we have now to consider the special application of the forceps, or the method of proceeding in the several positions in which the head may offer,—it being understood to be

engaged in the pelvis, for, of the use of the forceps when the head is at the brim, I do not propose to treat.

Dr. Dewees enumerates as many as *eight* different positions of the head, requiring different procedures on the part of the operator; but I do not perceive the utility of such multiplication, which appears to me calculated to embarrass rather than assist us at the bedside. An acuteness of tact, enjoyed by but few, is necessary to the recognition of these various positions; and in a considerable number of cases, no acuteness will enable a practitioner to detect them with certainty. Such will, not unfrequently, be his inability if he is called in late, and solely on account of the difficulty of the labor, when the swelling of the head and the approximation of its bones may have obliterated the marks, which usually serve to indicate its position. It would, then, be fortunate for him, if it were only needful to pay attention to as many of these positions as he can satisfactorily discriminate, and this, I believe, is the fact with regard to them. There are but *three* positions, or, as I shall designate them, *situations*, of the head, which need be discriminated in reference to forceps operations. These are, 1. When the length of the head corresponds to the antero-posterior diameter of the inferior strait; 2. When the length of the head corresponds to the left oblique diameter of this strait; 3. When the length of the head corresponds to the right oblique diameter of the strait. By the length of the head is not, of course, meant its greatest occipito-frontal dimension (for it is in a state of greater or less flexion), but only its length in distinction from its breadth across the parietal bones.

It will be perceived, on a moment's reflection, that the second *situation* includes the first and third *positions* of the vertex, and the third *situation* includes the second and fourth *positions* of the vertex, while the first *situation* is only the product of the several vertex positions, after rotation has taken place. These situations of the head may, it has been already intimated, be discriminated in practice, under any circumstances, whether the commissures and fontanels can be felt or not. The diagnosis is made out by attending to the completeness or incompleteness of the occupancy of the different points of the pelvis. The pelvis will be found most completely filled, in whatever direction the length of the head may be placed, while a marked vacuity will be observed in the direction of its breadth. Nor is this anything more than the mechanism of labor might, *a priori*, have led us to expect. In the direction of the length of the head, the pelvis is plenarily occupied, because no greater flexion of the head takes place than is exacted as the condition of its entrance and descent, while the breadth of the head is rarely, if ever, so great as the dimensions of the pelvis. To distinguish the situation of the head, we have, therefore, only to push up a finger, or, if necessary, all the fingers, behind first one acetabulum and then the other; a plenum opposite to the left acetabulum and a vacuum opposite to the right discloses the second situation of the head, and *vice versa* in regard to the third; while the first situation is characterized by vacuities on both sides of the pelvis, and full occupancy of the concavity of the sacrum.

I. *Application of the forceps in the first situation of the head, or where its length corresponds to the antero-posterior diameter of the inferior strait.*

In this situation of the head, the forceps is more easily applied than in either of the others, and less is to be done by its instrumentality. It only remains that the head execute its extension movement, that it may be released from its confinement. But it does not follow, that, because apparently but little is wanting, the forceps will be seldom needed. On the contrary, my own experience has satisfied me that the forceps will be as often required in this, as in any other situation ; nor should we be surprised at the necessity of it, when we remember the disadvantageous lever represented by the head.

Everything being prepared for the operation, as already directed, the left branch of the forceps is to be taken in the left hand and introduced along the left side of the pelvis, conducted by several fingers of the right hand, until the handle is brought parallel with the axis of the vagina. This is to be held by an assistant, while the right hand introduces the right branch along the right side of the pelvis, under the conduct of the fingers of the left hand. When the handle of this branch is brought nearly parallel with that of the first, its notched hole easily receives the pivot, and the branches are locked, without difficulty. It will now be observed that the handle of the instrument is more or less elevated above the horizontal plane on which the patient lies, and the pivot is vertical.

The left hand takes hold near the lock, and the right near the extremity of the handle, and the operator

proceeds to extract, in the manner already described, and in the direction of the axis of the inferior strait. As he progresses, it will be observed that the head advances differently according as the occiput is toward the pubes or the hollow of the sacrum. In the first case, the occiput will easily emerge from under the symphysis, and rise toward the mons veneris, to make room for the forehead and face to pass out over the perineum. In the second case, the occiput moves over the inferior part of the sacrum and the coccyx, and comes out before the anterior edge of the perineum, when it falls backward to allow the forehead and face to pass out under the pubes.

This observation will teach him, if he did not know it before, whether the occiput or the forehead is toward the pubes ; and the manner of using the forceps, as the head is delivered, will be varied accordingly. If the occiput be toward the pubes, the handles of the instrument must, as the extraction proceeds, be raised toward a perpendicular, until at last they are even inclined toward the patient's abdomen, when the head is clearing the vulva. If the forehead be toward the pubes, the handles are raised, as the occiput is brought out before the perineum, and they are depressed as the head is clearing the vulva. The movement of the head, in both instances, strongly tends to impart such directions to the handles of the forceps, but it is right, not only to obey this tendency, but to increase it, or, in other words, to make tractions in conformity to it.

2. *Application of the forceps in the second situation of the head, or where its length corresponds to the left oblique diameter of the inferior strait.*

The head being placed obliquely in the pelvis, in this situation it is evident that its sides cannot be embraced by passing the blades of the forceps directly along the sides of the pelvis. They are, therefore, to be passed as follows: the left branch is held by the left hand, with its handle more elevated than in the first situation, and not quite so much inclined toward the right groin; the fingers of the right hand, introduced along the left sacro-ischiatic ligaments, conduct its blades, which, as it ascends, is to be directed across the sacrum. To do this, the handle must be lowered in a greater degree than in the first situation, while, at the same time, it is inclined toward the left thigh, toward which the pivot also inclines, instead of being vertical. The right branch is introduced under the right ramus of the pubes, and passes behind the right acetabulum, its handle and articular hole inclining toward the left thigh, in conformity with the corresponding parts of the left branch, when the pivot is readily received and the instrument is then locked. This coaptation is not, however, always easily affected. It may happen that the second blade is not inserted exactly opposite to the first, and then, their articular parts not having the same inclination, will not lock. In that case, the direction of the second blade, and sometimes of both, must be varied until they are made to join without force.

The instrument is now to be firmly grasped with both hands, in the manner directed for the first situa-

tion, for the purpose of raising the handles and at the same time turning them over toward the symphysis pubis, until the pivot is made to assume a vertical direction. The object of this maneuver is, to rotate the head preparatory to its extraction. It is usually accomplished with facility, and then either the occiput or the forehead is brought under the symphysis pubes, according as it was a first or third vertex position. The rotation being accomplished, the head is to be extracted as already explained under the first situation.

3. *Application of the forceps in the third situation of the head, or where its length corresponds to the right oblique diameter of the inferior strait.*

The same necessity of introducing the blades of the forceps obliquely, instead of directly on the sides of the pelvis, exists in this as in the second situation. The left branch is introduced under the left ramus of the pubes, its blade is conducted behind the left acetabulum, and as it glides over the head in that direction, the handle, which was held high at first, is lowered so as to incline toward the right thigh, its pivot having also the same inclination. The right branch is then introduced before the right sacro-ischiatic ligament of the pelvis, and crosses the sacrum, its handle being depressed and carried toward the right side, as it enters, until it is brought to lock with the other branch.

To articulate the branches is not quite so easy in this as in the second situation, for the right branch is under the left, and must be placed above it, before the hole can receive the pivot. A little management will, however, obviate this slight difficulty.

The branches being joined, the right hand takes hold near the lock, and the left near the extremity of the handles, which are to be raised and turned over toward the symphysis pubis, until the pivot is vertical. The object here, as in the second situation, is to rotate the head, which brings the occiput or forehead under the symphysis, according as it is a second or fourth vertex position. After its rotation, the head is to be extracted, as in the first situation.

The precept to rotate the head, in the second and third situations, notwithstanding its importance, must not be pertinaciously enforced in all cases, in defiance of the difficulties that may attend it. There are cases, and Baudelocque tells us he met with seven or eight, in which the head cannot be made to rotate without employing more force than would be at all justifiable, as dangerous contusion of the maternal parts, or injury of the child's head, might be the consequence. In such instances, it is better to follow the advice of Baudelocque, and bring out the head in its diagonal position. Considering that in the occipito-posterior positions of the vertex, it is more desirable that the occiput should rotate under the symphysis pubis than into the hollow of the sacrum, the suggestion was made long ago, and has been lately revived by Dr. Simpson, the distinguished professor of midwifery in the university of Edinburgh, that where the forehead is toward one of the acetabula, it should, in forceps deliveries, be rotated into the hollow of the sacrum instead of the pubic arch. But though this might, in some cases, be safely executed, I doubt whether it would be proper, as a general rule, to attempt it; for notwithstanding the decided propension

to such a movement, in ordinary and healthy parturitions, yet where the natural powers are enfeebled (as they mostly are when the forceps is used), art may take the shortest route, and turn the occiput toward the sacrum, the rather because nature is not altogether unused to it, and the forceps will not be required to describe so large a segment of a circle,—an exercise not quite so innocent within the genital organs as upon paper.

*Secondly. Delivery by the crotchet.*

The crotchet need not be particularly described. It is a sharp hook that is to be infixed in the cranium or face to extract the head, and necessarily mangles to such an extent as to destroy the child, if it be living when the operation commences. This mode of instrumental delivery should not, therefore, be resorted to unless the child be dead, or if alive, the exigency be great and the forceps cannot be applied. It ought not to be practiced, in any case, without first opening the head with a common perforator, both with the view of diminishing its size, by removing the brain, and of preventing the shocking spectacle of a mangled child, whose vitality is not yet quite extinct.

The reader cannot have failed to observe that, in delivering by the forceps, the operator is governed, from first to last, by the mechanical laws that preside over the passage of the head; and that his success must depend upon his knowledge of those laws, and his conformity to their requirements. This is universally acknowledged: but it is not so generally known or considered, that, in delivering by the crotchet, close imitation of nature's movements is just as essential to the safety of

the operation as when the forceps is employed. To what but to efforts, not imitative but counteracting, can we ascribe the tremendous difficulty experienced by some practitioners in extracting the head, even after it is perforated, and the brain removed, although no marked deformity of the pelvis exists? I have listened to the recital of cases, in which so much difficulty was encountered, that the operator's own strength and *weight* too were not sufficient to cause the head to *budge* (I ask pardon of Noah Webster), and he was compelled to call upon the midwife to lock her hands around his waist, and be clasped in like manner by a third person, in order that by "a long pull, a strong pull, and a pull all together," the child might be brought to light! No wonder that we so often hear of those deplorable cases of fistulous communications between the bladder or rectum and vagina, while such barbarous midwifery is tolerated, and men will undertake what they are not qualified to perform.

Practitioners ought not, however, to be severely censured for not doing what writers have generally failed to inculcate,—the sum of their instructions in regard to the extraction of the head amounting to this: that the crotchet must be infixed wherever the firmest hold can be had, or on some one part without regard to its eligibility, and the head be pulled along in the direction of the pelvic canal. To show that this is a fair statement of their instructions, let us look into authors, whose writings are more extensively diffused, and have contributed most to fashion the obstetric practice of our day.

Dr. Smellie directs the fingers of the **right** hand

to be introduced above the os uteri and over the head, to conduct the crochet, held with the left hand, with the point toward the child's head, which is to be fixed "*above the chin, in the mouth, back part of the neck, or above the ears, or in any place where it will take firm hold*" (1).

Dr. Denman directs the crochet, guided by the left hand, to be carefully introduced into the opening in the head, "and, fixing the point of the hook as far from the edge of the bone as its curvature will allow, I begin," says he, "to pull moderately by the handle held in my right hand, guiding at the same time the hook of the crochet with the fingers of the left, if it should happen to tear away the bone, or slip" (2). With his characteristic caution, patience, and perseverance, Dr. Denman would continue to make tractions upon the head by this one hold, upon the principle that a degree of force, inadequate to overcome the resistance at first, will eventually succeed, "the resistance gradually diminishing, and the force remaining." Again, in cases of very great difficulty, where all the bones of the cranium have been brought away successively, and nothing of the head remains but the basis of the skull, with the integuments, Dr. Denman recommends the crochet to be introduced again, "and fixed upon the basis of the skull, on any part where we can get a firm hold, and this assuming a more convenient direction will be readily brought down. I have not found, in cases of this

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(1) Midwifery, Vol. I, book iii, chap. 3, sec. 7, number 4.

(2) Introduction to the Practice of Midwifery, chapter 12, sec. 8.

kind," he continues, "that I have acted from a preference for fixing the instrument in this or that part, or in this or that manner; but giving myself time to reflect, the exigence of the case has dictated what I ought to do, so that I am not solicitous about any particular method."

According to Dr. Burns, the crotchet is to be introduced through the aperture of the cranium, "and fixed upon the petrous bone, or such projection of the sphenoid bone, or occiput, as seems to afford a firm fixture" (1). Where the pelvis is so small as to require the head to be broken down, and nothing left but the face and base of the skull, he directs, of course, that this remnant be so placed as to bring its smallest diameter through the pelvis, by converting the case into a face presentation, with the root of the nose directed to the pubes.

After stating that the crotchet may be applied either externally or internally, but that the latter, being the safer, is, on the whole, the better mode, Dr. Blundell observes, "I cannot designate or mark out to you, any one particular part of the head, as a bearing point, on which the instrument may be placed; but I may observe, that passing it into the cranial aperture with the right hand, and guiding it with the left, you may move it about *until it fastens on some part*, either of the basis cranii, or of those bones which form the other parts of the receptacle for the brain" (2). The plain English of

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(1) Principles of Midwifery, American edition, with notes by J. C. James, M. D., 1823, volume 1, p. 465.

(2) Lectures, p. 279.

Dr. Blundell's direction is, that you must get hold of the head wherever you can.

Dr. Rigby advises that the crotchet be passed into the cranial cavity, and fixed upon *some portion of the skull*, affording a sufficiently firm hold for the purpose, the best spot being the petrous portion of *one or the other* of the temporal bones. We should never, according to him, try to fix it upon the "thin bones," that is, those composing the cranial vault, lest it slip or tear away, and he is equally opposed to Smellie's method of fixing it on the outside of the head (1).

Dr. F. Ramsbotham prefers the very hold repudiated by Dr. Rigby, and directs the crotchet to be fixed on the internal surface of the bone, whenever there is sufficient resistance to afford the necessary purchase, advising a finger of the left hand to be kept upon the head externally, exactly opposite the spot on which the extremity of the instrument is fixed within, to receive its sharp point, should it break through the bone or slip from its hold (2).

Dr. Lee directs the point of the crotchet to be fixed on the inside of the head *behind*, meaning on the part which corresponds with the hollow of the sacrum, at as great a distance as possible from the opening in it made with the perforator, and the fingers of the left hand to be so arranged as to form a double crotchet; and if the point of the crotchet tear away, he advises that it be placed upon *another part of the bones of the head* (3).

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(1) Midwifery, p. 260.

(2) Process of Parturition, new Amer. edition, p. 213.

(3) Lectures on the Theory and Practice of Midwifery, p. 306.

But let us look into the work of Dr. Dewees, who had undoubtedly more influence in shaping and regulating the practice of this country than all the British authorities whom we have quoted. After expending sixteen pages on a critical disquisition, of no practical value, he observes, very briefly, that "the mode of performing embryulcia is sufficiently simple, if we merely regard the opening of the head, and the breaking down the texture of the brain; but the extraction of the bones in a confined pelvis is replete with difficulty," and then, having explained the manner of opening the head, he says, "the point of the crotchet is to be fastened in *the nearest portions of bone*" (1).

It might have been expected that Dr. Dewees, who gloried in being a follower of Baudelocque, would have at least equalled his great prototype, in the propriety and precision of his directions for extracting the head. What says Baudelocque? "To obtain the success we propose, it is not a matter of indifference where the crotchet is applied. In fixing it upon the superior margin of the orbit, or upon the petrous portion of the temporal bone, as the greatest number of ancient and modern practitioners have done, the head is made to advance by presenting its greatest diameter, and is thrown upon the back or one of the shoulders of the child; it cannot then be extracted without mutilating it and evacuating the brain, even though its size be not disproportioned to the pelvis. It is upon the occiput that the crotchet must be implanted when the head is the presenting part, and upon the superior maxillary bone, or the fore-

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(1) Midwifery, p. 561.

head, when we are obliged to use the instrument in cases of preternatural presentations, after the trunk is delivered. In acting thus, we shall cause the head to descend, offering one of its extremities and only its smallest diameter throughout the whole of the operation. We must, moreover, have regard to the particular direction which the head should follow, in each of its positions, in order that it may traverse the pelvis with the least possible difficulty" (1).

I have translated the whole of Baudelocque's paragraph in relation to the extraction of the head with the crotchet, because I believe it is worth more than all that has been written on the subject, and, for one who understands the mechanism of labor, embodies all that need be said concerning it. Its value might be illustrated in a great variety of ways, with one of which only I shall content myself, leaving the thoughtful reader to supply as many others as he pleases. Suppose it becomes necessary to deliver with the crotchet, in a case of occipito-posterior position of the vertex: if the point of the instrument be infixed into the anterior part of the base of the skull, who does not perceive that by drawing upon it, the opposite to nature's movement will be forced on the head? The extra-flexion will be defeated, and a degree of extension be produced, bringing the occipito-frontal diameter down into the pelvis first; and, if the mad attempt be persisted in and brute force usurp the place of skill, subsequently the axis itself of the head. Who can think of the head being thus dragged through the pelvis, without shuddering, and wondering

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(1) *L'Art des Accouchemens*, par. 1924.

if the bladder and rectum can preserve their integrity, in spite of such enormous violence!

I will only observe further, in concluding this chapter, that notwithstanding the marked preference, which most authors manifest, for applying the crotchet upon the interior of the skull, it is generally most advisable to apply it exteriorly, because we can thus obtain the firmest hold, and apply it more readily to such part of the head as may be demanded by its particular position, and also by what remains to be executed of its mechanism.

## CHAPTER XVII.

## NATES PRESENTATIONS—THEIR MECHANISM, DIAGNOSIS, AND PROGNOSIS.

It was remarked, in a former chapter, that under the common denomination of "nates," are included presentations of the breech, feet, and knees, which are only modifications of one great class, viz., presentation of the pelvic extremity of the fetus. When the child presents thus, it may be, as M. Cazeaux observes, 1. That the pelvic extremity, composed of all its elements, viz., the thighs flexed upon the abdomen, and the legs upon the thighs, engages in the excavation and in the inferior strait; 2. That the inferior extremities, floated by the liquor amnii, after the rupture of the membranes, deploy in whole or in part, causing the feet or the knees to reach the vulva first; 3. That the legs becoming extended and brought into apposition with the anterior plane of the fetus, the breech alone descends; 4, and lastly, That one of the inferior extremities may be extended upon the abdomen, while the other is deployed, and thus one foot or knee only may present at the vulva.

It is manifest that these modifications cannot materially affect the process of expulsion, and it were, therefore, worse than useless to describe the mechanism of each of them. It will be sufficient for our purpose to

take the most common modification, namely, that in which the breech alone engages in the pelvis, the inferior extremities being extended upon the abdomen of the fetus.

1. *Mechanism of the first or left dorso-iliac position of the nates.*

In this position, the back of the fetus looks toward the left side of the mother, its anterior plane, that is, abdomen, breast and face, is toward the right, its left side is forward, and its right side backward.

*First step—descent of the breech.*—If the breech be not large, it engages in the superior strait as it offers itself, viz., with the bisiliac diameter parallel with the sacro-pubic diameter. But if it be too large to engage thus, it undergoes a preparatory rotation, which brings its bisiliac diameter parallel with the right oblique diameter of the strait. In its descent into the pelvic cavity, the breech moves in the direction of the axis of the superior strait, that is, downward and backward, and consequently the left or anterior hip is considerably below the symphysis pubis, when the right or posterior hip is in the hollow of the sacrum.

*Second step—rotation.*—Arrested by the posterior wall of the excavation, the breech is compelled to move in the direction of the axis of the inferior strait; preparatory for this, if the breech be obliquely situated in the pelvis, rotation takes place, which brings the left hip under the symphysis pubis, and the right into the hollow of the sacrum. If the breech have engaged in the pelvis with its bisiliac diameter parallel with the sacro-pubic, without any rotation, one hip is, of course,

anterior and the other posterior, when it reaches the inferior strait.

*Third step—disengagement.*—The left hip now engages under the symphysis pubis and makes its appearance first at the vulva, where, continuing stationary, it becomes the pivot upon which the right hip moves, describing an arc of a circle, as it sweeps over the concavity of the sacrum, coccyx, and perineum, to be completely released before the left hip is. While the hips are passing out in this manner, the trunk is necessarily incurvated upon its left side, and as soon as they have cleared the vulva, the left hip turns toward the right thigh of the mother, if the breech had been obliquely situated in the pelvis,—otherwise it continues anterior and the right hip posterior.

*Fourth step—passage of the trunk.* While the trunk is passing through the pelvis, its flexibility allows it to be conformed to the curvature of the canal, and it continues, therefore, to be incurvated upon the left side, which is toward the pubes. The shoulders engage in the superior strait diagonally, the bisacromial diameter corresponding to its right oblique diameter, and the arms continue to be closely applied to the sides and the forearms crossed upon the breast, unless the child is very large, when the elbows may be intercepted at the superior strait, and the body continuing to descend, the arms be carried up alongside the head. At the inferior strait, the shoulders rotate, the left passing toward the pubes, and the right toward the hollow of the sacrum, when the left shoulder presses against the inner face of the pubes, while the right moves over the concave surface of the sacrum, coccyx, and perineum, and is first extrica-

ted, drawing down the arm after it, if it had been carried upward. Then follows the extrication of the left shoulder and arm from under the pubes. As the shoulders pass, if not sooner, the feet arrive at the vulva, and as soon as they are released, the inferior extremities are extended and the child is undoubled.

*Fifth step — Passage of the Head.* — The head approaches the superior strait, offering the occipito-frontal diameter to its left oblique diameter; but pressed by the uterine contractions, it flexes so as to have substituted for this, a diameter approximating the cervico-bregmatic. Entering the excavation thus, a rotation similar to that of vertex positions conducts the face into the hollow of the sacrum, the occiput behind, and the nucha under, the symphysis pubis. At this time the uterus can act but feebly on the head, which is partly or wholly in the vagina, but the contractions of the abdominal muscles, aroused by pressure on the rectum and bladder, come to its aid, and their united force produces increasing flexion of the head. The center of this flexion movement is the junction of the nucha with the occiput, which is stationary under the symphysis pubis, while the chin, the forehead, the bregma, and occiput, successively pass out before the perineum. While it is being performed, the head, as M. Cazeaux remarks, represents a lever of the first kind, the power being at the occiput, the prop at the cervico-occipital junction, and the resistance at the chin, and especially the forehead, which are to be depressed. If, as he further observes, radii be drawn from the cervico-occipital point, under the symphysis pubis, to various points of the median line of the face and cranial vault, these radii will exactly represent the

diameters that successively clear the antero-posterior diameter of the inferior strait, the principal of which are the cervico-mental, cervico-frontal, and cervico-bregmatic. In other words, flexion places the axis of the head parallel with the axis of the inferior strait, and then its lesser circumference is offered to the aperture of the inferior strait.

2. *Mechanism of the second or right dorso-iliac position of the nates.*

In this position, the relative situation of the several parts of the fetus is the reverse of what obtains in the first, but the mechanism of labor is essentially the same. It marches to its consummation by the same steps: the breech turns its bisiliac diameter to the *left* oblique diameter of the superior strait, if it be too large to enter directly; when it gets to the bottom of the pelvis, the *right* hip rotates toward the symphysis pubis; in clearing the inferior strait, the *right* hip appears first externally under the pubes, but the left comes out first before the perineum; when the shoulders enter the pelvis, their bisacromial diameter parallel with its left oblique diameter, the *right* shoulder rotates behind the pubes, where it remains until the left clears the vulva by moving over the concavity of the sacrum, coccyx, and perineum; the head, finally, presents its occipito-frontal diameter to the *right* oblique diameter of the superior strait, flexes as it enters, rotates in the excavation, throwing the face into the hollow of the sacrum and the occiput behind the pubes, and then, under increased flexion, the chin, forehead, bregma, and occiput are successively born.

3. *Mechanism of the third or dorso-pubic position of the nates.*

In this position the back of the fetus looks directly forward, its anterior plane, with the inferior extremities doubled upon it, looks directly backward, its right side is toward the left of the mother, and its left side toward the right. The same steps belong to its mechanism as to that of the first and second, only they are a little varied to suit its circumstances. Thus, the breech plunges into the pelvic excavation, with its bisiliac diameter parallel with the transverse diameter of the superior strait, and when it reaches the floor of the pelvis, either hip indifferently may rotate forward, but rotation is not usually carried farther than to place the hips in one of the oblique diameters of the inferior strait, and the breech passes out in this oblique manner, the hip that is most forward appearing first, but that which is posterior being completely expelled before it. The passage of the shoulders is the same as that of the hips, and the head escapes as in the first and second positions.

4. *Mechanism of the fourth or dorso-sacral position of the nates.*

The relations of the fetus to the mother in this position are the reverse of what they are in the third, and its mechanism is considerably, and may be materially, different. The difference pertains chiefly to the manner in which the head is transmitted through the pelvis. The occiput may remain posterior until the head is completely expelled, or, what more frequently occurs, it may come forward and be placed behind the symphysis pubis.

1. *Revolution of the occiput forward.*—This, as M. Cazeaux remarks, may commence with the disengagement of the hips, the trunk and head participating in the rotatory movement, which begins with them and is extended to the occiput, so that the child descends spirally, and by the time the head reaches the excavation, the occiput is brought behind the pubes. But this transmutation of the head may take place even after it is lodged in the excavation, and the trunk is entirely expelled, with the back still directed posteriorly. The head is then placed diagonally in the pelvis, the occiput being at the posterior extremity of one of its oblique diameters, and the forehead at its anterior extremity. It executes a rotatory movement, by which the occiput revolves forward from one of the sacro-iliac symphyses to the pubes, while the forehead rolls backward into the hollow of the sacrum. When the occiput is once placed behind the symphysis pubis, whether in one or the other of the modes now described, the labor is terminated in the same manner as in the preceding positions.

2. *The occiput maintains its posterior station.*—In this situation, the head may be disengaged in two ways. According to the first, which is most common, the head enters the excavation under decided flexion, and soon undergoes rotation which deposits the occiput in the hollow of the sacrum, and the forehead behind the symphysis pubis. It is then extricated by being forced to become more and more *flexed*, and as flexion proceeds, the face, forehead, vertex, and occiput successively appear beneath the symphysis pubis. The center of this movement is the nucha resting upon the anterior commissure of the perineum.

According to the second and rarer method, the head becomes *extended* on entering the pelvis, in consequence of which the chin rises above the pubes, while the occiput is retroverted. This extension is carried to its utmost limit, causing the face to look toward the superior strait, while the occiput is depressed along the posterior wall of the excavation, and is first disengaged before the perineum, to be followed by the vertex, forehead, and face. The center of this movement is the guttural fossa, bearing upon the under part of the symphysis pubis.

Whether the head be disengaged in one of these modes or the other, it is released from the pelvis with much more difficulty than when the face is turned into the hollow of the sacrum. The difficulty was formerly attributed to the chin getting hooked upon the superior border of the pelvis, and rules were prescribed for preventing such an accident. Baudelocque was right in rejecting such an unfounded explanation, but that which he substituted, though not so chimerical, is not more satisfactory. He supposed the difficulty to be owing to the forehead and vertex being too broad to pass under the symphysis pubis, the narrowest portion of the pubic arch. A more correct rationale will be found by adverting to the fundamental principle, governing the head's transmission; for, a moment's reflection will show that in the actual position of the head, it is not possible for its axis to become parallel with the axis of the inferior strait, but it continues oblique — whether the head be flexed or extended, more so in the latter than in the former case, — and therefore not its lesser circumference,

but one approaching the greater, is offered to the inferior pelvic aperture.

*Explanatory and critical remarks.*

Although I have described the hips as rotating, the one under the symphysis pubis and the other into the hollow of the sacrum, in the first and second nates positions, it is not to be understood that this takes place in every instance, or even perhaps in a majority of cases. The rotatory movement is frequently, if not most commonly, only partial, bringing the hip that is anterior (the left in the first, and the right in the second, position) under the corresponding ramus of the pubes, where it remains until the posterior hip is expelled, the breech preserving a certain degree of obliquity as it is passing through the inferior aperture of the pelvis. It is not, however, without the warrant of high authorities that I have assumed complete rotation to be a part of the regular mechanism of these positions; it is so described by Gardien, Capuron, Dugès, and more recently by Moreau and Cazeaux, — the latter, however, affirming that the hips pass the bony outlet of the pelvis somewhat obliquely and become directly antero-posterior, as they pass through the vulva. As we cannot suppose that these eminent practitioners were all deceived, on this point, we are bound to conclude that such complete rotation is no uncommon occurrence; and I adopt it as the regular procedure, for the purpose of placing the mechanism of these positions in contrast with that of the third and fourth, looking at the *directness* of the former and the *obliquity* of the latter.

The more or less oblique passage of the hips is de-

scribed by Baudelocque as the regular mechanism of the first and second positions of the nates—I say more or less oblique, for Baudelocque makes a difference in degree between the same position of the feet and breech, affirming that in the first position of the feet, as soon as they are born, the breech appears at the vulva, *almost always in a diagonal situation, the left hip corresponding to the right leg of the pubic arch, and the right hip to the left sacro-ischiatic ligament*: he adds that the breech continues to advance in this direction, rising slightly toward the mons veneris, as the trunk is disengaged (1); while of the corresponding position of the breech, he says, *as it descends, its greatest dimension (bis-iliac diameter) becomes almost parallel with the antero-posterior diameter of the inferior strait, the left hip being placed a little obliquely under the pubes, and the right before the sacrum* (2).

Madame Lachapelle testifies to the frequency of the more or less oblique passage of the hips. She even affirms that the most usual course is for one hip to pass out under one branch of the pubic arch, and the other along the opposite sacro-ischiatic ligament (3).

This admirable writer makes, moreover, some very judicious reflections upon the mechanism in general of nates presentations, observing that it is far from being as uniformly the same as that of the different regions of the head, nor are its steps and movements as distinct and well-defined. On account of the softness of the parts constituting them, nates presentations accommodate themselves more easily to the different forms of the

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(1) Par. 730

(2) Par. 770.

(3) Pratique des Accouchemens, Quatrième Memoire.

straits; they are readily molded, and have, consequently, less occasion to change their direction to acquire the most advantageous relations with the great diameters of the straits and excavation. If, as she truly observes, the head were soft enough to be conformed to the configuration of the different parts of the pelvis, its mechanism would be null, at least as far as rotation is concerned; nothing would remain but the movements dependent upon the difference between the axes of the two straits. This is almost literally true of the nates; the hips and even the shoulders may traverse the straits in any wise, save with their great diameter, the child being large, directed antero-posteriorly at the superior strait, or transversely at the inferior. The head alone must, of necessity, pursue the same march as in vertex cases, in order that it may escape.

Professor Nægelé subjects nates presentations fully to the dominion of his oblique theory of parturition. In the essay, which has been already several times quoted, he reduces these presentations to the two following species, viz., 1. Presentation of the nates with the back turned forward, toward the anterior parietes of the uterus. 2. Presentation of the nates with the back turned toward the posterior parietes of the uterus; remarking, however, that the back of the child, at the beginning of labor, is usually turned more or less sideward, the ischia running parallel with one or the other of the oblique diameters of the pelvic entrance. In either species and in every case, he maintains, the hips pass through the *entrance, cavity, and outlet* of the pelvis in this oblique position; the shoulders follow in like manner, and lastly the head, entering obliquely, sinks into

the excavation in the same direction, or with its occipito-frontal diameter "more approaching the conjugate diameter." "After this," says he, "it passes through the external passage and the labia in such a manner, that while the occiput rests against the os pubis, the point of the chin, followed by the rest of the face, sweeps over the perineum, as the head turns on its lateral axis from below upward."

Drs. Rigby and Churchill fully adopt the views of the German teacher, in relation to the obliquities of the nates as well as the head; but Dr. Maunsell revokes as to the disposition of the head in nates cases, which, he allows, is turned with the face into the hollow of the sacrum.

From the statements which have now been made, it appears that the oblique theory of parturition, as far as nates presentations are concerned, has not even the merit of novelty, except in affirming, that what is observed, in many instances, is universally true.

There is one interesting, and, practically considered, important feature of nates presentations, only slightly alluded to as yet, which deserves to be exhibited in higher relief; I mean *the strong tendency of the back parts of the child, in the dorso-posterior position, to revolve forward so as to bring the occiput toward the pubes as the head engages in the pelvic cavity.*

For the promulgation of this important truth, and its ameliorating influence upon the management of nates presentation, we are indebted to Professor Nægelé, to whom it gives me pleasure to ascribe all just praise. Baudelocque describes the head as entering the pelvis, in this position, with the forehead directed to one of the

acetabula at first, but rotating afterward under the pubis; and he does not, as far as I can discover, hint at the possibility of a different course. But Nægelé affirms, more truly, that after the hips pass out along one of the oblique diameters, the anterior surface of the child turns first toward the pubes, and then backward, either immediately, or as the rest of the trunk advances; and that the manner in which the head presses through the entrance, cavity, and outlet of the pelvis, is the same as in the other positions. He mentions a remarkable fact, which shows the strength of the tendency to this auspicious revolution of the child's body, viz., should the anterior surface of the body continue to be directed obliquely forward, even until the shoulders engage in the pelvis, it may yet turn from the side completely forward, and then to the opposite side, during a single pain by which the shoulders are expelled; and this extensive rotation of the body, which brings the head so much more favorably into the pelvis, may take place "in the twinkling of an eye" (1). That this change does not, however, *always* occur, even Nægelé admits, and the experience of others abundantly confirms; hence the propriety of recognizing posterior, in contradistinction from anterior, positions of the nates as well as of the vertex.

#### *Diagnosis.*

Considered in a diagnostic point of view, nates presentations possess several characters in common, but they differ, also, from each other much more than in re-

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(1) Mechanism, p. 137.

spect to their mechanism. We may, therefore, consider first the signs which denote nates presentation in general, and afterward point out the marks which serve to distinguish its three modifications, viz., presentation of the breech, feet, and knees. Among the signs of nates presentation, those most to be relied on are the following :

1. *The form of the abdomen.*—It is sometimes the case, particularly in lean women who have borne children before, and in whom the abdomen is consequently relaxed, that we are able to feel the head of the child, more or less distinctly, at the fundus of the uterus, and inclined toward one side. If we are not able to define the head satisfactorily, we may nevertheless feel the prominences formed by it and the shoulders, giving to the upper part of the womb an irregularity not observable when it is occupied by the nates. The evidence then is, however, reduced to greater or less probability.

2. *Hearing the fetal heart's action above the umbilicus.*—The sounds produced by the action of the fetal heart are transmitted through the posterior and superior part of its thorax, and heard mostly in whatever region of the mother's abdomen this part may be opposite. These sounds are consequently detected, in cases of vertex presentation, in the inferior lateral, but seldom in the umbilical, region of the abdomen; and if they are distinctly heard in such high region and not in the lower, strong proof will be afforded that the nates are situated toward the pelvis of the mother. Dr. Collins assures us that he has not unfrequently diagnosed the presenting of the breech or inferior extremity, before there was any appearance of labor, by attend-

ing to this sign alone; and he observes, with his usual judiciousness, that a knowledge of it may assist us where we are doubtful as to the presenting part; but until the os uteri is considerably dilated, little practical benefit, further than putting us on our guard, can be derived from it (1). "In cases of breech presentation," Dr. Kennedy remarks, "the fetal heart's action is observed higher up, and according to the state of advancement of labor at the time of applying the stethoscope, above or below the umbilicus" (2). Let it be remembered, however, that when the back of the fetus is turned forward (as it most frequently is after labor begins), and comes in contact with the abdominal parietes, then, according to the observation of the author last quoted, the fetal pulsation is sometimes heard extending from two or three inches above the umbilicus, over the whole of the anterior part of the abdomen, inclining to one or the other side, according to the position of the back of the fetus. This extension of the sound results from the heart being brought nearer the surface, and the proximity of the back to a good conductor. When thus diffused, it is not equally distinct over the whole space, but will be most plainly heard near the maternal umbilicus; whereas the point of its greatest intensity, in vertex presentations, is in one of the iliac regions.

3. *The form of the membranous cyst and of the*

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(1) Practical Treatise on Midwifery, Boston edition, 1841, p. 30.

(2) Observations on Obstetric Auscultation, New York edition, 1843, with notes by Dr. J. E. Taylor, p. 268.

*orifice of the uterus.*—It is an old observation, that when the breech presents, the membranes protrude at the os uteri in an oval form, and when the feet present, depend in an elongated form, resembling a purse. The observation is not without some foundation, but the form as well as the extent of the cyst is much more influenced by other circumstances, such as the shape of the orifice, the density of the membranes, the quantity of liquor amnii, etc.

The oval form of the uterine orifice, after the membranes rupture, appears, however, to be entitled to more notice. This is caused by the oval figure of the breech, which, being propelled into the cervix by the contractions of the body of the uterus, makes it conform to its figure, and consequently the long diameter of the orificial oval corresponds to the hips of the child.

4. *The elevation of the presenting part, making it difficult to be reached while the membranes are whole, and the unusual flow of the waters after the rupture of the membranes.*—The breech, with its appendages, constituting nates presentation, offers a volume so considerable that it does not easily engage in the superior strait. It remains, therefore, so high in the pelvis, although labor may have lasted a considerable time, as to be beyond the reach of the finger, or only accessible toward the pubes. Meanwhile, the formation of the membraneous pouch, and the gathering of the waters beneath the nates, increases the difficulty of satisfactorily determining the nature of the presentation, even after the os uteri is amply dilated. If the presenting part still remain high for a time, notwithstanding the rupture of the membranes, and more especially if there be a great

gush of liquor amnii, which continues to flow during the pains, even after the orifice is occupied, the probability is strong that it is a nates presentation. The reason of the continued escape of the liquor amnii was correctly assigned by Mauriceau, who was also well aware of the disadvantages of the entire depletion of the uterus, resulting from it (1). The liquor amnii runs off through channels left by the inequalities of the presenting parts; if the feet or knees present, they are too small to obstruct the orifice; if the breech offer, the water flows between the thighs; whereas when the head presents, its volume and regular roundness fit it to act as a complete stopper.

Although these signs usually accompany nates presentation, we shall be liable to err in our diagnosis, if we rely too implicitly upon them. Most, if not all, of them may be present, and yet the vertex may prove to be the presenting part. Of this I had a very interesting illustration, quite recently, in the case of an Irish woman, who had been in labor all night previous to my seeing her, early in the morning. The membranes were entire, and formed a large projection into the vagina, but the margins of the os uteri could nowhere be felt, it was so completely dilated and withal attenuated. During the pains, it was impossible to feel anything but the tense globe of waters: in the intervals, I could, by pushing the finger very high, barely touch something solid just behind the top of the symphysis pubis. I apprehended a nates presentation; but to clear away all

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(1) *Traité des Maladies des Femmes Grosses*, Livre II, Chapter 13.

obscurity, as well as to fulfill a practical precept heretofore inculcated, I ruptured the membranes by pressing the point of the finger firmly against them during a pain. This was followed by such a rush of waters as I have rarely witnessed, and the flow continued very free, during subsequent pains, until the patient was completely drenched. The presenting part meanwhile slowly descended, and proved to be the vertex. The child, a female, was born, in two or three hours, completely asphyxiated, but was recovered by the usual means.

5. *Discharge of the meconium.*—This affords a sign which must be considered as pretty conclusive, provided we do not allow ourselves to be deceived by its counterfeit,—I refer to the discharge of meconium, which is liable to occur in head presentations, when the fetus is dead, or in a suffering condition. In that case, the meconium is diluted by mixture with the uterine and vaginal discharges, and is altogether different from the thick, viscous, and tarry excrements, issuing directly from its repository. All the signs common to nates presentation, which have now been enumerated, are more or less fallacious, and our diagnosis can seldom be entirely satisfactory until it is enlightened by the touch, and we can never otherwise determine the position of the presenting part. With regard to the marks discoverable by the touch, the several modifications of nates presentations differ so much that it is necessary to consider them separately.

The *breech*, when engaged in the pelvis and sufficiently accessible to the finger, is distinguished from every other part of the child, by marks so characteristic that it is not easily mistaken. These are, its fleshy

feel, and its two gluteal prominences, with an intervening depression in which may be felt the *point of the os coccygis*,—surmounted by the unequal posterior surface of the sacrum,—the *anus*,—differing from any other orifice in its thin, puckered, circular margin, and small size, requiring, indeed, to be forced before it will allow the finger to penetrate it,—and lastly, *the genital organs*. It must be remembered that in by far the most usual positions of the breech, with the sacrum to one side or the other of the pelvis of the mother, the finger first encounters the hip that is anterior, which might be mistaken for the head, if the examination is not prosecuted, for this hip offers a roundish surface of considerable extent, and anteriorly the trochanter major feels hard and resisting. But on passing the finger as deeply as possible, and curving it forward, as in searching for the sagittal commissure in a vertex case, the cleft of the breech may be reached, and what is felt there, as already described, will clearly reveal the nature of the presentation. The direction of this cleft and the situation of the coccyx point out the position of the breech. Thus, it runs transversely in the first and second positions, the coccyx being toward the left side of the pelvis in the first, and toward the right in the second: it runs antero-posteriorly in the third and fourth positions, the coccyx being forward, in the third,—where it and a good part of the sacrum can be easily felt,—and backward in the fourth.

Let none imagine, however, that it is always an easy matter to ascertain how the breech is situated, or even to recognize itself when it is presenting. Previous to the rupture of the membranes, it may be placed too

high, or be too obscurely felt; and, after the escape of the waters, it may be so disfigured by tumefaction, from long detention in the pelvis, that its natural features are obliterated. In this latter condition, Baudelocque informs us, the best-instructed practitioners have mistaken it, for one part and another, even for the head of the child, the integuments of which were supposed to be engorged and swollen. A very celebrated accoucheur, he states, having mistaken the breech under such circumstances for locked head, applied the forceps successfully, and considered the mistake fortunate, as it taught him a new resource in difficult breech presentations (1).

But, it may be said, how much soever the breech may be deformed by swelling, the anus is so characteristic it ought to be sufficient to prevent such mistakes. Aye, so it ought, if it were always found a closed and puckered orifice; but if the child be dead, and a curious examiner have been poking at it before we are called, it may be gaping and tumid, and feel like the mouth, while the buttocks, to the touch alone, are not unlike the cheeks. No wonder then if it should be mistaken for a face presentation, one instance of which is within the compass of my own knowledge,—in sooth, *magna pars fui*.

Madame Lachapelle relates that such a mistake was committed by a veteran professor of *l'Ecole de Medecine*, under circumstances that rendered it as ludicrous as notorious. He assured the pupils, who were present during an accouchment whose progress he was watching, that he recognized the face, and had even put his finger

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(1) Par. 1262.

in the child's mouth, notwithstanding that this same finger, covered with meconium, and extended toward the pupils in gesticulating, flatly contradicted what he was announcing.

When the *feet* present and can be fairly examined, they ought to be distinguished from the hands by attending to the following marks; the toes are short, of nearly equal length, and but slightly movable; the fingers are long, flexed upon the palm, may often be felt to contract, and the thumb is more separated from the rest; the internal margin of the foot is thicker than the external; the two margins of the hand are of nearly equal thickness; the foot forms a right angle with the leg, the hand a continuous line with the arm. While the feet are high in the pelvis, and before the membranes rupture, they may be mistaken for some other part, or we may experience momentary uncertainty. The feet are naturally flexed upon the leg, and it may be that only the heel is accessible, which may then be taken for the elbow, which it very much resembles in form, as Madame Lachapelle observes, the heel being like the olecranon, and the malleoli like the condyles of the humerus. Under this delusion, it is easy for any one, as she justly remarks, and I myself have experienced, to imagine that the breech which is felt just above the foot is the thorax, and conclude in favor of a shoulder presentation. Such an error cannot, however, be of long duration, and if not corrected before the membranes rupture, must be discovered shortly after that event.

It is not always easy to form a correct diagnosis as to the position of the child in nates presentations, when this must be determined by examining the feet alone,

the breech being too high to admit of satisfactory exploration. If both feet are down in the vagina, the diagnosis is, of course, perfectly plain, for the heels correspond to the back of the child, as constantly as does the sacrum, when the breech is lowermost. The heels being toward the left side of the pelvis, then, indicate the left dorso-iliac position, toward the right, the right dorso-iliac position, etc. If the feet are yet contained in the uterus, or even in the membranous sack, and both can be felt parallel with each other, the heels still point directly toward the back of the child and indicate its position. But if they are crossed upon the breech and the toes turned inwardly, so that the toes of each are near the heel of the other,—a disposition by no means infrequent, Madame Lachapelle says once in three cases,—we may be confounded at first in our attempts to make out the position, but with care we shall succeed. We have only to take either foot, and ascertain to which side of the fetus it belongs, which may be done by attending, as M. Cazeaux directs, to the relation existing between its internal margin and heel, and different points of the pelvis of the mother. Let us suppose, with him, that the heel is turned toward the symphysis pubis, and the internal margin toward the right side of the mother, it is evident that it is the right foot; if, on the contrary, the heel be toward the sacro-vertebral angles and the internal margin toward the right, it is the left foot, etc. Another means of determining whether it be the right or left foot we are examining, I will venture to suggest; it is the same recommended for finding which hand has prolapsed in shoulder presentations, though no writer, as far as I know, has directed it for the foot: apply the

palm of your hand to the sole of the foot, the fingers extending toward the heel; if it be your right hand and the great toe corresponds to the thumb, it is the right foot; if the little toe corresponds to the thumb, it is the left foot. The literal application of the palm to the sole is not necessary; if the extremities of the fingers are directed toward the heel, it is altogether sufficient.

Having distinguished which foot it is we are examining, we have only to notice toward what part of the pelvis the toes point, in order to determine the position of the fetus. If, for example, it be the right foot (still borrowing an illustration from Cazeaux), and the toes are turned toward the anterior half of the pelvis, the back of the fetus is directed toward the left side: if it be the left foot, with the toes similarly turned, that is, anteriorly, the back of the fetus is toward the right side, and *vice versa*.

The *knees* so seldom present, and differ so much from the elbow, the only part for which they might be mistaken, that it is not necessary to dwell on their diagnosis. They are distinguished by their size, roundness, and the magnitude of the members proceeding from them; to which it may be added, that they are less movable, and the hams offer concavities instead of convexities, as in the bend of the elbows. If any uncertainty is experienced, it may be removed by bringing down the leg, from which no harm would arise should it turn out that we had mistaken an arm for the leg, as prolapsion of the arm not unfrequently occurs in shoulder presentations, without embarrassing any operative procedure that may be called for. It may be observed further, that if both knees present, we may be sure that they are not elbows,

for the child's trunk is never so situated in the uterus as to allow both arms to offer at the superior strait. The same remark is applicable to the feet; when both can be felt, we need not fear that they may prove to be the hands, for both hands cannot offer at the same time.

### *Prognosis.*

Parturition is ordinarily more tedious and difficult in nates than in vertex presentations: the os uteri is more slowly dilated, and the process of expulsion is not so simple or so vigorously executed. It might, indeed, be supposed that the fetus would be expelled more readily in nates than in vertex presentations, when the feet are foremost, as its small extremity then engages in the passages, which are gradually dilated as the base of the cone represented by the child's body approaches them. What I have put as supposition has been advocated as the truth by some writers, who seem to have based this opinion upon fallacious analogies, rather than on observation or a careful study of the economy of the parturient function.

It is evident that when the small extremity of the fetus presents, the most difficult part of the process of expulsion is reserved for its closing stage, when the shoulders and head have to be transmitted. This would offer no difficulty, if the parturient power were more energetically exerted then, when there is the most need for it. But the fact is otherwise. The uterine fibers, like those of all other muscular structures, lose contractile force in proportion as they are shortened by the reduction of the size of the organ, and consequently, when the bulky parts of the child remain to be expelled,

they are incapable of contracting as powerfully as while the inferior extremities are passing. The most voluminous part of the child, and that of which a compliance with the mechanical laws of labor is most rigidly exacted—the head—is to be expelled when the uterine power is at its minimum, and is, moreover, baffled by the head being partly in the vagina. It is true that, in this emergency, the aid of the abdominal muscles is invoked, and not more true than fortunate, for otherwise the completion of labor would be oftener deferred beyond the bounds of safety.

But even at the commencement of the expulsive process, the uterus does not commonly contract so efficiently in nates as in head presentations, because, as has been already stated, it is drained of its waters soon after the rupture of the membranes, on account of its orifice not being so well stoppered. In vertex presentations, a portion of liquor amnii is nearly always retained until after the expulsion of the child; and whether this subserves any useful purpose, as has been supposed, by moistening the parts, a little of it escaping from time to time, it is certain that it sustains the force of the parturient contractions, by keeping up that moderate degree of distention of the organ which is most favorable.

From these considerations, it appears that the advantages of vertex presentation consist chiefly in the surmounting of the greatest difficulties in the early stage of labor, when the greatest power is possessed and exercised by the uterus; viz., procuring the full dilatation of the os uteri, and causing the head and shoulders to execute, with comparative facility, the movements required of them during their passage, and when these

have escaped, the tapering remainder of the child follows without difficulty. In this respect, breech presentations resemble vertex much more than do the feet, for the breech, with the thighs folded upon the pelvis, is even more voluminous than the head; and therefore, although the labor may, upon the whole, be more tedious than in feet cases, expulsion is performed with more rapidity and facility, because, when the parts are sufficiently dilated to allow the breech to pass, they can offer no obstacle to the shoulders and head.

Neither the less energetic manner in which labor is executed in nates presentation, compared with vertex, nor the circumstances accompanying it, necessarily involves any increased hazard to the mother. It was formerly believed, indeed, that when the breech presents, and the child is necessarily born doubled upon itself, that the neck of the womb must be more or less torn; or if this accident did not occur, that the woman is very liable to have prolapsus uteri. Another difficulty was ascribed to such a presentation, viz., that the legs may continue crossed upon the breech, instead of being carried up and extended upon the abdomen. But there does not appear to be any foundation for the apprehension of serious lesions in these cases, and the legs rarely fail to be elevated except where there is room in the pelvis to allow them to pass along with the breech.

The prognosis is much more unfavorable as far as the child is concerned, and the risk it runs of being lost in the birth, by the circumstances of a nates presentation, is so great as to justify us in preparing the father at least to expect such a disappointment to his hopes. All experience testifies to the truth of this statement;

but it may not be amiss to consult the records of the Paris Maternity, as collated by Madame Lachapelle, for information as to the amount of risks incurred by the child. From these it appears that eight hundred and four nates presentations yielded one hundred and two *feeble* children, sixteen premature or deformed, one hundred and fifteen dead, and five hundred and eighty-one alive and vigorous. The proportion of deaths to the total is one-seventh, while in twenty thousand six hundred and ninety-eight vertex positions, only six hundred and sixty-eight were dead born, which is not quite one-thirty-first. It appears, moreover, that the several modifications of nates presentation differ in point of fatality, the proportion of deaths being about one in eight and a half for the breech, one in six and a half for the feet, and one in four and a half for the knees.

The death of the fetus is caused by the compression of the umbilical cord, which, after the breech is expelled, is necessarily placed between the trunk first, and subsequently the head, of the child and the pelvis of the mother; and if this compression be so great or long continued as to intercept the circulation of its blood to and from the placenta, it dies asphyxiated, just as a breathing animal does from the interruption of its pulmonary circulation. The less complete dilatation of the os uteri, and the consequent more tardy transit of the child, accounts for the greater fatality of presentations of the nates where the feet are foremost.

## CHAPTER XVIII.

## TREATMENT OF NATES PRESENTATION.

THERE is something in a name, and that of "preternatural" having been affixed to nates presentations, has influenced, in no small degree, the conduct of practitioners in their management of such cases. The father of medicine considered nates presentation so unnatural that he inculcated, from theoretical considerations, it may be presumed, the practice of turning the child in order that its head may be made to present—an operation which it is easier to describe than perform: *Sunt enim facta verbis difficiliora.*

Practical men, finding it difficult, often impossible, to execute the orders of the venerable father, fain took these presentations as they found them, but convinced of their malignity, lent a helping hand to rid their patients of them as speedily as possible. It is not long since it was the established practice to bring down the feet as soon as they could be seized, and extract the child by drawing upon its legs. Thus, Mauriceau directs that where one or both feet present, no other cause for interference existing, the accoucheur should introduce his hand into the entrance of the uterus, get hold of the feet, and bring them out. This is to be done as soon as the os uteri is sufficiently dilated, or not being dilated, as soon as it can be with the fingers;

and then he goes on to give directions for the proper performance of the operation of *extracting the child* (1). In a subsequent chapter (XXIII), treating, among others, of breech presentation, he says that when this is foremost, if it be small or the pelvis of the mother large, it may come forth in this situation, *with a little assistance*; for though the child has its body doubled, the thighs, being flexed upon the belly which is soft, find room by its yielding. He hastens to enjoin, notwithstanding, that as soon as it is discovered that the breech is presenting, the accoucheur must not allow it to advance or become engaged in the passage; but he must push it up, if this can be done without any violence, and passing his hand along the thighs to the legs and feet of the child, conduct them one after the other without the uterus, in a careful manner, to avoid seriously twisting or dislocating them,—after which the extraction is to be finished as though the feet had come foremost.

An English writer of note, who flourished after Mauriceau, Dr. Burton, of York, the cotemporary and rival of Smellie, admitted the possibility of the child being born with nates presentation, but regarding this as “very accidental,” he recommends that no reliance be placed upon it, but that “as soon as the operator perceives, by the softness and fleshiness of the parts, what part presents, he must immediately thrust up against the buttocks with all his strength, but without committing violence to the child’s os coccygis, or its parts of generation, which are often in this case swelled;

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(1) Des Maladies des Femmes Grosses, Livre II, Chapter 13.

and as he thrusts up, he must endeavor to turn the child with its belly toward the os uteri, and then search for the feet (1).

How this *thrusting up with all the operator's strength* is compatible with a due regard for the child's os coccygis or parts of generation, or, what is of vastly more consequence, the mother's parts, we are not told; but it requires no great ken to divine that such barbarous practice must be productive of the most direful consequences. Mauriceau is much more guarded in his instructions; the breech is to be pushed up, if it can be done, he says, *without any violence*; but he owns that it is sometimes so advanced in the passages, that to attempt its repulsion would endanger the life of mother and child. In such cases, he advises allowing it to progress, with such assistance as can be rendered, and even makes the following further observation, that "there is often less danger in permitting the child to advance in this posture than in hastening its extraction before the passage is sufficiently prepared and dilated; for the way not being open, and the head of the child remaining on this account longer in the passage, after the body has been with difficulty delivered, there is greater risk of suffocation, than where the parts are dilated by the breech which has come foremost."

The practice, indicated by Mauriceau as *often* advisable, is that which is now justly deemed *universally* appropriate, except it be necessary to interfere on account of exhaustion, flooding, convulsions, etc. All are now agreed that in nates presentations, whether the breech

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(1) New and Complete System of Midwifery, sect. 88, 1752.

or feet be foremost, the labor should be confided to nature until the hips are expelled, or the child is born as far as to the umbilicus. Concerning the further management, however, there is not the same accord. "When the umbilicus is expelled, I say, Nature! you have done your work; I must now begin mine—so I grasp the breech with a napkin, and proceed to extract carefully, but as fast as I can, working from hip to hip. As soon as the body is born, bring down the arms; pass up your finger from the shoulder to the elbow, and pressing it toward the chest, bring down the forearm, making it sweep over the face; lift up the body of the child, and extract the other arm in the same manner; the arms being brought down, pass up one or two fingers on the breast of the child, and introduce them into its mouth; press the chin down to the breast; with the other hand raise the child toward the pubes of the mother, extracting, at the same time, in the direction downward and forward; the delivery will thus be readily accomplished" (1).

Such is the instruction of the late Dr. Gooch, delivered in his usual quaint style. He had just before directed that, when the feet are protruded, if the toes are turned toward the pubes of the mother, a napkin must be wrapped around them and as much of the child as may be, to enable the accoucheur to lay firm hold of them for the purpose of turning the toes to the nearest sacro-iliac juncture. This is done to insure the turning of the face into the hollow of the sa-

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(1) Practical Compendium of Midwifery, edited by George Skinner, Philadelphia, 1832, p. 209.

crum, when the head engages in the pelvis. A more recent English writer, Dr. Lee, recommends the same practice: "Except supporting the perineum," says he, "nothing is required in a great proportion of these cases, before the nates and lower extremities have been expelled, when it becomes necessary to ascertain precisely the relative position of the child to the pelvis; to rectify this if it is unfavorable, and artificially extract the superior extremities and head, to prevent the fatal compression of the umbilical cord." It is needless to multiply quotations on this point; suffice it to say, such is the general current of British practice, since the time of Smellie. It rests, it will be perceived, upon the supposition that the natural resources are only adequate to the accomplishment, in a safe manner, of less than half of the process of childbirth when the nates present. Such a supposition is not supported by observation, which teaches indubitably that not only may the child be expelled by the unaided contractions of the uterus, but that where this takes place, the chances of it being born alive are greater, and the risk to the mother is less, than where art interposes and pragmatically turns nature out of doors. *Natural delivery, in all cases, is preferable to artificial,* but in none more than in nates presentation. Its advantages have been clearly set forth by M. Nægelé, in the essay to which reference has been so frequently made. They consist, first, in the chin constantly remaining pressed on the breast during the passage of the head through the pelvis,—which is greatly facilitated thereby; secondly, in the arms continuing pressed upon the breast, and being born with it; thirdly, in the soft passages being dilated so slowly, by the grad-

ual advance of the child, as to oppose less resistance to the head as it follows ; fourthly and lastly, in the contractile power of the uterus being better sustained, when the organ is emptied by its own exertions, its walls being kept in contact with the child's body. From these considerations, it is evident that the manual extraction of the child, in nates cases, is much more an artificial procedure than delivery by the forceps in vertex presentations ; and the conclusion is irresistible, that before it is undertaken, we ought to be well persuaded of its necessity. Now, the ground of our interference is the safety of the child, and if it be not periled, there is no need of our efficient and officious aid. We can, at all times, keep ourselves informed as to the state of the child, by attending to the pulsation of the cord ; if this be strong and regular, it is in no danger, however long its expulsion may be delayed ; if, on the contrary, this be feeble and nearly extinct, it is in imminent danger, and its release ought to be procured, with as much haste as is consistent with a proper regard for the safety of the mother.

Nor is there any necessity for grasping the child's inferior extremities or hips, when its abdomen is turned toward the anterior parts of the mother, and forcibly turning it round to give it a posterior look : such a maneuver is not free from danger, as the head may not follow the revolution of the body, which then causes fatal torsion of the neck ; nor is it at all necessary, because it generally executes such a turn spontaneously, or, if necessary, this may be insured by the slightest imaginable assistance, simply by drawing gently on the leg or hip that is anterior, in concert with the pains.

Notwithstanding I have deprecated the rendering of aid in nates cases, merely on account of the presentation, I am thoroughly satisfied that assistance is more frequently requisite in these than in vertex cases. What we might have expected, reasoning a priori, experience has confirmed: the parturient powers not being so efficiently exerted, the labor is generally more protracted, in all its parts, and may be so long delayed as to require the interposition of art, upon the general principles that should govern our management of all labors. Thus, it is more frequently necessary to promote the dilatation of the os uteri, in such manner as the circumstances of the case may demand; the breech much oftener needs to be helped along than the head; and after its extrication, the *superior* parts of the body oftener require to be assisted in their passage than do the *inferior* parts, after the head is extricated in vertex cases: and all this may be demanded, not less for the mother's than the child's safety. This accords with the experience of Madame Lachapelle, who states that to give aid, in coincidence with the natural efforts, is almost a general indication to be fulfilled in these cases. Let it be observed, too, that the aid we are contemplating must be strictly in subordination to the natural efforts; we must be content to follow, without aspiring to lead, nature.

Should it become necessary to *promote* delivery, then, nothing having occurred to justify us in *forcing* it or making it essentially artificial, it can never be proper to bring down the feet where the breech is the presenting part; but we must limit ourselves to the use of such extractive force in aid of the pains, and always

in concert with them, as can be safely employed. Two fingers, passed over the groin of the child, can make as powerful traction as is commonly necessary, and this method of assisting is preferable to the blunt hook, which is apt to inflict serious injury upon the child, and may fracture the thigh. The mechanism of labor points out the proper mode of operating with the fingers; it consists in closely following the steps of nature. If the breech has not entirely traversed the superior strait, so as to occupy the pelvic cavity completely, the fingers should act upon the groin that is anterior, or alternately upon it and that which is posterior, but chiefly upon the former, because in so doing, traction is made in the direction of the axis of the superior strait. But when the inferior strait only remains to be cleared, traction must be made upon the groin that is posterior, in order that the force which is exerted may be in the direction of the axis of the inferior strait. After the hips are born, they should be embraced by the hands in such a manner that the thumbs may rest upon the lower part of the spine, and be alternately raised and depressed, as the tractive efforts are continued, which is expressed by the phrase, *working from hip to hip*. When the umbilicus is liberated, a loop of the cord must be brought down to free it from injurious extension, and, if the arms are carried up alongside the head, they must be brought down separately, commencing with that which is situated posteriorly, by passing two fingers along the humerus, as near to the elbow as possible, and depressing them over the face and breast of the child; and, finally, when the head is brought into the excavation, the right hand is to be introduced along the

sacrum, and two fingers passed into the mouth, to flex the head by depressing the lower jaw, while the left hand makes tractions upon the shoulders of the child. The body of the child, resting upon the right arm of the accoucheur, is to be considerably elevated toward the mother's abdomen, while the head is being extracted by the hands, placed as already indicated.

It has been already stated that it is not unfrequently necessary to assist, in the manner thus briefly described, in cases of nates presentation; and that our assistance should coöperate with the laborpains. If we are careful to abstain from making tractions in the intervals of the pains, the delivery, though assisted, may be perfectly *natural*, that is, the arms may remain crossed on the breast, and the fundus of the uterus pursuing the child, may keep its head well flexed, so that but little force need be exerted by us; and when the child is born, the womb may be firmly contracted, and the woman in no more danger of accidents of any kind than after the most ordinary delivery. It is very different when nature is unceremoniously set aside, as recommended by Gooch and others; then the delivery is necessarily *unnatural*:—tractions made in the absence of pain, draw down the body, while the arms maintain their position, and come to be placed alongside the head, or the body being twisted around to throw the face toward the sacrum, the arms are placed behind the occiput; and when the head is pulled into the pelvis, it becomes extended, and must be reflexed before it can pass through: but above all, there may be an increasing vacuity of the uterus, as the withdrawal of the child is

going on, and the organ may be left in a flaccid condition after delivery.

But although I have condemned artificial delivery, in anticipation of danger to the child, I have admitted that it is proper when danger actually threatens it, as we are warned by the languishing state of the umbilical circulation. It must be allowed, moreover, that there is not any valid objection to hastening the exit of the head in all cases, if it be much delayed, because it is but partially contained in the uterus, and if the labor have been natural thus far, there is but small risk of any evil consequences to the mother. The extrication of the head may be greatly aided by the voluntary efforts of the patient, even more than by the uterine contractions; she should, therefore, be reminded to bear down or strain, and such an effort is often alone sufficient, if the disposition of the head is favorable to its egress. If, in spite of the united efforts of the patient and practitioner, the child be endangered by the long retention of the head, it may be succored for a considerable time, by raising its body, and passing the hand along the sacrum above the mouth, and pressing back the perineum so as to enable it to breathe. M. Gardien avers that he has often witnessed the success of this precaution, in establishing respiration and saving the child, notwithstanding such compression of the cord as would otherwise have been fatal to it (1). Other authors, among them Dr. Meigs (2), testify to the same

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(1) *Traité Complet d'Accouchemens*, Tom. II, p. 328.

(2) *Philadelphia Practice of Midwifery*.

effect: I cannot, therefore, think it judicious or proper to adopt the counsel of the last-named gentleman, to send for our forceps whenever we discover that the nates are presenting, that we may be prepared to extract the head instrumentally as promptly as he recommends; for, although it may not be difficult to use the forceps in such a case, instruments ought not to be resorted to under any circumstances where the hand may supersede them, as I believe it always may, in the case under consideration, provided it be properly employed, that is, provided the entire hand, and not merely two fingers, as commonly directed, be introduced over the chin.

If the child may be withdrawn with greater precipitancy than is altogether consistent with what is safest for the mother, when its life is in peril, much more may we extract it by such means as are not safest for it, when this is demanded by the condition of the mother. If the labor be, therefore, so protracted as to end in exhaustion, or if convulsions or any other threatening accidents supervene, in nates cases, we shall be justifiable in resorting to instruments, provided manual assistance be not sufficient. For the purpose of extracting the breech, the blunt hook is commonly preferred, but I am not sure that it is safer for the child than the forceps. Against the latter it is objected that the extremities of the blades may rest on the abdomen and contuse its viscera. But such a consequence is not necessary or inevitable, and we know that the blunt hook has terribly contused the groin and fractured the thigh bone, according to the candid admission of its advocates. The most

that can be said in favor of the blunt hook is, perhaps, that it is safer for the mother; and if a practitioner is persuaded that he can use it with the least risk to her, it is his duty, when he is acting for her benefit, to prefer it.

## CHAPTER XIX.

## FACE PRESENTATION—ITS MECHANISM, DIAGNOSIS, AND PROGNOSIS.

BEFORE describing their mechanism, it is necessary to observe that face presentations may be *primitive* or *secondary*—that is, the head may be completely retroverted, causing the face to offer fully at the superior strait, when labor begins; or it may be only partially retroverted, in which case, the anterior fontanel is found presenting at first, but in the progress of labor, this is replaced by the face. Secondary face presentations are considered by authors as deviations from those of the vertex, produced by obliquity of the uterus; but different explanations have been given of the *modus operandi* of this alleged cause. Baudelocque maintained that it is the manner in which the uterine force acts upon the head, where obliquity exists, that causes it to be extended rather than flexed, and thus gradually brings the face into the pelvis in place of the vertex. The obliquity, he affirms, is almost always toward the side where the occiput is placed, and the force of the uterine contractions traverses the head obliquely from its base to the vertex and from the occiput to the forehead, a little anterior to its center of motion, and terminates upon the forehead, which it tends to depress; but to

depress the forehead is necessarily to raise the occiput, or, in other words, to extend the head.

Dugès accounts, more satisfactorily, I think, for the transformation of vertex into face presentations, by attributing it to the impulsion of the occiput against the side of the superior strait, where it is of course arrested, and the face is made to descend by the head representing a lever of the third kind, the prop being at the occiput, the resistance at the forehead, and the power at the occipito-atlantoid articulation.

Secondary face positions, being nothing more than transmutations of vertex presentations, are apt to retain a part of the character of their original, viz., they are usually diagonal instead of direct, the chin being directed toward one of the sacro-iliac symphyses, and because the first vertex position is most common, the first facial position is so likewise, seeing that a considerable number of face presentations are secondary.

It will be remembered that we admit but two positions of the face, namely, the *left fronto-iliac*, and the *right fronto-iliac*. In the first, the forehead corresponds to the left iliac fossa, and the chin to the right, the fronto-mental diameter is parallel with the transverse diameter of the pelvis, and the bimalar diameter is parallel with the sacro-pubic; the back of the child looks toward the left side of the mother, and its breast toward the right; its right side is forward, and its left backward. In the second, the relations of the fetus to the mother are the reverse of the first, but the same diameters of the head correspond to the same diameters of the pelvis.

It is hardly necessary to describe the mechanism of

expulsion in the two positions of the face separately, so nearly do they resemble each other. They will, therefore, be considered in connection, and what is peculiar to each pointed out in its proper place.

THE MECHANISM OF FACE PRESENTATIONS comprises the following movements:

*First step—descent of the face.*—If the head be so completely extended as to offer the face fully to the superior strait, as it is in the primitive cases, no resistance is made to its engaging in it, for its small diameters, the gutturo-bregmatic and bimalar, apply for admittance. In such instances, descent of the face to the bottom of the pelvis is the whole of the first step. But in secondary positions, gradual extension of the head, by which the forehead is depressed and moved from one side of the pelvis to the other, takes place preparatory to the engagement of the face, which then descends as in primitive positions. In secondary cases, it is the occipito-frontal diameter of the head which is first parallel with the transverse or oblique diameter of the superior strait; in the progress of their transformation, this cephalic diameter is replaced by the occipito-mental, which is eventually succeeded by the fronto-mental. In both primitive and secondary positions, it is the gutturo-bregmatic diameter which traverses the pelvis transversely or diagonally.

*Second step—rotation.*—The face now rotates, and the chin revolves forward, from the right in the first position, from the left, in the second position, and is lodged under the symphysis pubis; while the vertex is thrown into the hollow of the sacrum, and the forehead

rests on the floor of the pelvis posteriorly. This rotation is to the extent of one-fourth of a circle in primitive, three-eighths of a circle in secondary, positions, and when it is achieved, the gutturo-bregmatic diameter is parallel with the coccy-pubic.

*Third step—flexion.*—The head next begins to be flexed, which causes the chin to emerge first from under the symphysis pubis and rise toward the mons veneris, until its further movement is checked by the anterior part of the neck being pressed against the posterior surface of the symphysis. The action of the expulsive force upon the chin being destroyed by this resistance, but continuing to bear upon the other extremity of the occipito-mental diameter, the occiput is made to descend until the head is completely disengaged under this flexion movement. While it is being executed, the head, as M. Cazeaux observes, represents a lever of the third kind, whose prop is at the guttural fossa, resting on the under edge of the symphysis pubis, the power being at the occipital foramen, and the resistance at the occiput: and the gutturo-frontal and other coincident diameters measure the antero-posterior diameter of the inferior strait, as the forehead, bregma, and occiput successively emerge before the anterior border of the perineum.

*Fourth step.*—The face turns toward the side to which the chin corresponded at the beginning of labor; the shoulders and rest of the trunk engage and are delivered as in vertex presentations.

*Remarks.*

The mechanism of face positions is liable to several anomalies, two of which deserve especial notice.

First, *Rotation may take place before the face has completely descended in the pelvis.* To understand the reason of this, it is necessary to observe, that the length of the child's neck is not sufficient to allow the face, in any case, to reach the inferior strait in a transverse position, so as to have the chin upon a level with one ischiatic tuber and the forehead upon a level with the other, for the depth of the lateral walls of the pelvis exceed the length of the neck. In order, therefore, that the face may complete its descent *regularly*, flexion must take place in a slight degree, that is, the chin remaining as low as the neck will permit, the forehead must be pushed down to the floor of the pelvis. This internal flexion, which accompanies descent, was not noticed in describing the mechanism, for fear of confusing by complicating its study. Now, instead of thus flexing to reach the inferior strait, the head may rotate the chin forward, behind the symphysis pubis, and then the anterior part of the neck being opposite the short or pubic wall of the pelvis, there is no obstacle to the speedy completion of its descent. When the face traverses the pelvis in this manner, there is first descent, as far as the neck will allow, then rotation, and finally descent resumed and completed. These anomalous movements, as I regard them, are described by M. Cazeaux as the regular march of nature, in face presentation, although he admits that in a large number of cases, what I have described as the ordinary mechanism, does really occur, that is, partial

flexion and complete descent of the face, prior to rotation.

Second, *The head may rotate so as to throw the chin into the hollow of the sacrum, or the chin, being directed toward one of the sacro-iliac symphyses from the beginning, may retain its posterior look from default of rotation.*

If there have been no interference with the regular progress of the labor, it is exceedingly rare that rotation fails to carry the chin forward and place it under the symphysis pubis. This occurs in the diagonal position of the face, where the chin is opposite one of the sacro-iliac symphyses, with even greater uniformity, than does the revolving of the occiput forward in posterior positions of the vertex. The testimony of M. Nægelé to this effect, is very decided: "In a midwifery practice of twenty years," says he, "I have never had a case come before me, where, in presentation of the face as the labor advanced (if no mechanical assistance had been given by art, as for instance, changing the direction of the head, bringing it down further, etc.), the forehead had turned itself forward or upward, and brought the face at the inferior aperture of the pelvis, into a direction contrary to the usual one. I have been assured of this by several accoucheurs, who were men of observation, some of whom had been much longer in practice than myself." (1).

Madame Lachapelle, speaking of the second step of the mechanism of face position (rotation), declares that *it is constant and constantly the same.* She says, indeed,

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(1) Mechanism of Parturition, p. 81.

that she has, two or three times, seen the face escape at the vulva transversely, or nearly so; but these she reckons rare exceptions, and thinks it may be laid down as a general principle, that, in all manner of face presentations, rotation is effected in the excavation, so as to bring the chin under the pubes, while the vertex is lodged in the hollow of the sacrum (1).

It cannot be doubted, nevertheless, that the chin does occasionally remain opposite the sacro-iliac symphysis, or turn into the hollow of the sacrum, an instance of each of which is related by Dr. Smellie, whose accuracy may not be questioned (2). In such instances, in order that the face might escape through the inferior aperture of the pelvis, it would seem that additional and extreme extension of the head must take place; and so it must, could the head be expelled by a mechanism analogous to that of occipito-posterior positions of the vertex. This is, however, physically impossible, where the child is fully developed, as Madame Lachapelle has irrefutably demonstrated. It is impossible, because either the sternum and clavicles must abide at the sacro-vertebral angle until the chin passes out before the perineum, which would require the neck to be so enormously stretched as to measure the whole length of the sacrum, coccyx and perineum (at least eight inches),— or the thorax must be drawn into the excavation between the head and sacrum, and be so flattened as to occupy not more than two inches of the antero-posterior diameter of the excavation, leaving three inches for the cervico-

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(1) *Pratique des Accouchemens, Troisième Memoire.*

(2) *Collection XXX, Cases IV and V.*

bregmatic diameter of the head. The head cannot, therefore, be expelled by the natural efforts, or extracted by art, in such cases, unless the position be first changed to one more favorable, or transmuted into a vertex position. When transmutation is effected, it is produced either by the gradual depression of the occiput, the chin being stayed against the pelvic wall, and becoming the center about which the occipito-mental diameter describes a considerable arc of a circle, or by the chin mounting upward, as the occiput is forced downward. In either way the occiput subsides behind the pubes, and, appearing at the superior part of the vulva, emerges first: the rest of the head is expelled as in vertex positions. Professor Meigs gives a different account of the head's passage through the inferior strait: after having described the mechanism of the mento-anterior position of the face, he says, "A very contrary state of things from the foregoing obtains, where the chin, instead of revolving toward the front, turns toward the back part of the pelvis. Here the *forehead* must be born first; then the nose; the mouth; the chin escapes from the edge of the perineum, and then retreats toward the point of the coccyx, allowing the crown of the head to pass out under the arch; and, lastly, the vertex emerges, which concludes the delivery of the head" (1). Professor Meigs does not inform us whether the picture he has drawn is taken from nature, and none of the cases he relates is the counterpart of it. These mento-posterior positions, moreover, are, as has been already stated, very rare, and still rarer is spontaneous delivery in

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(1) Philadelphia Practice of Midwifery, first edition, p. 203.

them; it may, therefore, be presumed that he has copied from some other artist, but I know not from whom. Smellie, the only author to whose *cases* Professor Meigs refers, states expressly that, in the case (No. 5) where he found it necessary to deliver with the forceps without changing the position, "the parts between the coccyx and os externum were gradually extended by the face and forehead of the child, and at last yielded, *so as to allow the vertex to come out from below the pubis*; then turning the handles of the forceps toward that bone, I delivered the woman safely of a dead child, which was, in all probability, lost by the long compression of its head in the pelvis." Any one who has ever delivered with the instrument, will readily allow that this description is much more suitable to forceps delivery in vertex than in ordinary face cases.

#### *Diagnosis.*

It is not difficult to recognize the face under circumstances favorable to an examination, viz., when the part is sufficiently within reach of the finger, the os uteri dilated, the membranes flaccid, in the intervals of the pains, or, better still, ruptured, provided too long a time has not elapsed since their rupture. We can then distinguish, on one side of the pelvis, the forehead, by its round, smooth, and solid surface, marked by the commissure which divides it; extending our researches toward the other side of the pelvis, we feel the triangular projection made by the nose, and may even feel both nostrils by pressing the finger against them — then the transverse fissure of the mouth, with the lips and gums, and finally the chin. On either side of the nose and

mouth, the cheeks may be distinguished, feeling like soft tumors, surrounded with a bony circle; the cheek that is anterior (the right in the first position, left in the second position) may be most easily reached.

But under less favorable circumstances, especially when a long time has elapsed since the escape of the waters, and the face is greatly swollen from infiltration of its loose, cellular tissue, it may not be easy to penetrate its disguise. The tumid cheeks, pressed together, convert the median line of the face into a deep furrow, in which the distinctive characters of the face lie buried; and this furrow may be mistaken for the cleft of the nates, for which the distended cheeks palm themselves. When to this it is added that the lips are swollen, inverted, and puckered, so as to offer a round orifice instead of a transverse slit, which might pass for the anus, it ought not to be matter of surprise if a jury of matrons, sitting *check by jowl*, should mistake the face for the breech. More astute judges have acknowledged that they have been thus deceived, and he who laughs at them, shows that either he has had but little experience, and is therefore impregnable in his practical ignorance, or he is uncandid and uncharitable.

The remarks, which have now been made, relate to primitive, or at least to full, presentations of the face; the secondary positions are to be distinguished by the anterior fontanel, the superior portion of the orbits of the eyes, and the root of the nose. As the labor progresses, the fontanel recedes, the eyes, nose, and mouth approach, and finally the chin can be felt.

The presentation being ascertained, there is no difficulty in making out the position—the chin is toward

the right ilium in the first, toward the left ilium in the second position.

*Prognosis.*

Although presentations of the face were, for a long time, regarded as essentially preternatural, it may be easily demonstrated that they do not necessarily offer any obstacle to parturition, which the natural resources cannot surmount, nay, that, so far as *the passage of the head merely* is concerned, there is no material difference between them and vertex presentations. The diameters which the face applies to the superior aperture of the pelvis, viz., the fronto-mental and bimalar, do not exceed those which the vertex applies, viz., the occipito-frontal and biparietal, while the face is traversing the excavation, it offers the guttero-bregmatic and bimalar diameters, which again are not greater than those with which the vertex progresses, viz., the cervico-bregmatic and biparietal; and, lastly, when the face is about to clear the inferior strait, it is still the guttero-bregmatic diameter which it offers to the coccy-pubic diameter, and this is as good a passport as the cervico-bregmatic, offered by the vertex. In short, in face presentations as well as in vertex, the axis of the head is nearly parallel with the axis of the strait it is traversing, and hence the essential condition, explained in treating of vertex positions, is fulfilled in both cases,—the principal difference between them being that, in face cases, the mental extremity of this axis is downward, while in vertex positions, the occipital extremity is downward.

What has been advanced in the preceding paragraph is true only of primitive positions of the face, for it is

evident that in secondary positions, the head is not so favorably situated in relation to the pelvis: the forehead being at the center of the superior strait, its axis, so far from corresponding with the axis of the strait, is placed parallel with the transverse or oblique diameter of the strait; and as its axis is the greatest dimension of the head, it is not possible for it to engage in the pelvis without additional extension, which is, as has been shown, a part of the first step of the mechanism in such cases. Under such circumstances, what has been erroneously affirmed of all facial presentations may be truly said,—parturition cannot be accomplished unless the head be small, or the pelvis large, until the face fully present. The disadvantages of secondary positions, in this respect, are so great that it is matter of astonishment that so able and accomplished a writer as M. Gardien should not only deny the fact, but assert the contrary to be true; for he says, “We are surprised that some authors have thought that labors in which the child presents the forehead are more unfavorable than where the face is the presenting part. It is evident that the difficulties in the way of delivery are greater when the face presents, since the diameter which must traverse the superior strait is longer than where the superior part of the forehead presents” (1). In either case, however, in M. Gardien’s opinion, there is so great a want of conformity between the dimensions of the head and those of the pelvis, that its rotation and disengagement are prohibited, unless the head be very small *and* the pelvis very spacious (*à moins que le bassin ne*

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(1) *Traité complet d’Accouchemens*, Tom. II, p. 309.

soit très specieux et la tête très-petites), thus estimating, at a very high rate, the difficulties attendant upon any kind of face presentation.

Madame Lachapelle labored to show, by reasoning and observation, the falsity of such an exaggerated estimate of these presentations, and contributed, more than any other writer, to place them in their true light before the profession. Adopting Levret's comparison of the head to a cone, of which the occiput is the apex and the face the base, she declares that as the head lies in the excavation after being extended or flexed, according as the face or the vertex presents, the only difference is that in the one case, the base of the cone is above, and in the other it is below; and then she inquires, what matters it, whether the base or the apex is in advance, inasmuch as in both cases alike the cone moves in the direction of its axis or greatest length? Must not the diameters and circumferences be always the same?

In her zeal to overthrow established opinions and prejudices, as it appears to me, Madame Lachapelle goes too far when she declares that face presentations are more favorable to delivery than vertex; this opinion rests, in good part, on the assertion that, as there is more free space between the chin and the spine than between the occiput and spine, the chin may more completely emerge from under the pubis than the occiput may, and consequently less of the base of the cone has to pass out at once. She allows, nevertheless, that the *real* advantage thus gained is diminished by the breadth of the jaw, which hinders it from occupying the arch so fully as does the occiput.

Now, although I have stated that, so far as the pas-

sage of the head is concerned, there is no *material* difference between face and vertex presentations; yet it must, I think, in candor be admitted, that there is *some* difference. The face may unquestionably engage in the pelvis as readily as the vertex, nor is there any reason to believe that it may not descend as readily until its free progress is arrested by the shortness of the neck; afterward, as it can continue to advance only by becoming flexed, unless it rotate, the head's axis is made to decline from the axis of the pelvis, as the chin moves toward, and is pressed against, the pelvic parietes, and consequently greater diameters of the head are brought into the pelvis, which must impede the completion of its descent, if it be large, or the pelvis contracted, or the soft parts resistive.

But even though there were absolutely no difference between face and vertex presentations, in regard to the magnitude of the diameters they offer, the former labor under a disability from which the latter are exempt viz., the circuitous manner in which the force of the uterine contractions is transmitted to the head, and the consequent loss of power. This will be readily comprehended, when it is remembered that the face can only be made to present by the yielding of the ligaments and fibro-cartilages of all the cervical vertebræ, in consequence of which the neck is bent backward like a bow, and that the head is moved by the uterine force, transmitted through the spine. The force, therefore, instead of operating in a direct line, reaches the head nearly at right angles, after traversing the bend of the neck, and loses considerably on account of the indirect manner in which it is exerted. This disability is felt in

every step of the mechanism, but especially in the third (flexion), when, as we have seen, the head represents, in both face and vertex cases, a lever of the third kind, which necessarily involves a loss of power, or in other words, the working of which requires the employment of much power. If, on this account, the extension of the head in vertex cases may fail to take place for want of adequate uterine force, we should, *a fortiori*, expect that in face cases, its correspondent movement, flexion, may fail, and require extraordinary aid for its achievement. M. Cazeaux reports a case of face presentation, in which an attempt was unsuccessfully made to deliver with the forceps, but the child was expelled naturally, ten hours after the rupture of the membranes; in carefully examining it, he could feel, in the vicinity of the posterior fontanel, something like little splinters of bone, which crepitated under the finger, and a marked depression was observable upon the dorsal region,—from which he infers, I think justly, that the thorax was flexed upon itself, and strongly pushed against the superior part of the occiput, to aid in urging it forward (1).

From the foregoing remarks, it may be concluded, that labors, in which the face presents, are not necessarily much more difficult than vertex presentations, but at the same time they are liable to be more protracted, and to involve more suffering, if not more hazard, as far as the mother is concerned. With regard to the child, the prognosis is different; it is more apt to be

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(1) *Traité Theorique et Pratique de l'Art des Accouchemens*, p. 342, note.

stillborn, and runs decidedly more risk of being lost in the birth. These effects result from the compression unavoidably experienced by the extended neck, which, arresting the return of blood from the head, produces cerebral congestion and a disposition to convulsions. The stasis of blood adds to the swelling of the face, which takes place independently of it, from the sero-sanguineous infiltration which any part that presents is liable to, for the reason assigned when treating of vertex positions; and hence the visage, from its tumefaction, turgescence, and lividity, may be frightful to behold, even where the child is born alive or is easily resuscitated. But under the use of the usual discutient applications, this hideous mask, as Madame Lachapelle calls it, is thrown off in a few days, and the countenance regains its healthy tint and expression.

## CHAPTER XX.

## TREATMENT OF FACE PRESENTATION.

WHILE face presentations were regarded as essentially bad or preternatural, they were supposed to require the effective interference of art, for the safety of both mother and child. Thus Baudelocque, who entertained such an estimate of their character, enjoins, as a general indication, the redressing of the head, by pushing up the face or pulling down the occiput, to cause the vertex to present; or, when we cannot thus happily second the efforts of nature, either because we are called too late, or there is pressing occasion to deliver immediately, the turning of the child, and bringing it by the feet, or extracting it with instruments, when it is deeply and closely engaged in the pelvis (1). Baudelocque was, however, fully aware that the head may be spontaneously transmitted in face positions, and he describes, accurately, their mechanism; but it must be considered a striking proof of the baneful influence of prejudice, that notwithstanding this knowledge, and the further observation made by him, that the labor in these cases is sometimes finished with "astonishing facility," he continued to adhere to

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(1) Par. 1347.

the general indication above enunciated. Why was M. Baudelocque astonished at the occasional facility of parturition in face presentations,—but because he had prejudicated that they must be difficult?

Some animadversions upon the several items, embraced in this general indication, may assist us in settling our duty in the management of the cases under consideration.

And first, (*a*) *The redressing of the head when the face is fully presenting.*—With regard to the method of fulfilling this indication, it may be observed, that most authors, before the time of Baudelocque, directed several fingers to be applied to the chin, root of the nose, or cheeks of the child, for the purpose of simply pushing up the face, in order that the occiput may descend. But Baudelocque preferred acting upon the occiput, and bringing it to the center of the pelvis, by curving the fingers and advancing them over the surface of this part of the head, even as far as to the nape of the neck. The lever is, also, recommended for the same purpose. Baudelocque's experience authorized him to declare, that this maneuver may be executed without much difficulty, *when the head is still free at the entrance of the pelvis, or susceptible of being easily returned thither*; and other experience, that might be cited, corroborates his. But when these favoring conditions exist, we should not now feel at liberty to *redress* the head, as we do not believe that it is laboring under any grievous wrong. Face presentations are brought, by the unaided efforts of nature, to a satisfactory issue, so constantly, as regards the mother, and in so large a proportion of cases, as regards the child, that we should not,

in anticipation of difficulty, be justifiable in causing the mother to experience the suffering and incur the risk of the operation, however slight that may be considered.

When the face has become fully engaged in the pelvis and is so closely confined there, either by its own magnitude or the strength of the tonic contraction of the uterus, that it cannot be easily pushed up above the brim of the pelvis, the redressing of the head ought, in my judgment, be considered as out of the question. Baudelocque admits that it is always difficult, often impracticable. Why, then, attempt the operation under such circumstances, with the prospect of failure and the serious risk of injury to the mother? If the face be without the os uteri, or even if it be within it, but firmly grasped by the cervix, this *pushing up* is fraught with danger, for it may lacerate the cervix, or rend its connections with the vagina. Yet, it is evident, the head must be lifted out of the pelvis, preparatory to its rectification, because it will be impossible to seesaw the axis of the head in the pelvic excavation,—its dimension, to say nothing of the thickness of the fingers interposed between it and the pelvis, being too great to allow such a movement. Should labor, therefore, be arrested in this stage of its progress, or any symptoms be developed, making it necessary to deliver, some other method must be had recourse to.

(b) *When the face only partially presents.*—This will be readily recognized as our secondary face position, that is, vertex presentation in process of conversion into a facial. If its conversion is arrested or retarded by any cause whatever, whether on account of rigidity of

the neck, or inefficacious contraction of the uterus, it may prove a serious or insurmountable obstacle to delivery, for the longest diameter or axis of the head tends to engage in the pelvis. In this case, Baudelocque advises us to sustain the forehead, with several fingers pressed against it, during every pain, in order that the natural efforts may act on the occiput and cause it to descend, cautioning us to beware of pressing on the anterior fontanel and vicinity, for fear of inflicting fatal injury on the child, by depressing the bones, which are here very thin and flexible. By this simple procedure, he represents it as an easy task to prevent the head from assuming such a vicious position as it engages in the pelvis. Should the head have taken up this vicious position, it is still by the same method, that he proceeds to redress it and restore it to its natural march; and if this alone prove ineffectual, he introduces the index and middle fingers of his other hand above the occipital protuberance, to cause it to descend, by drawing toward himself as though he were using a crotchet.

Dr. Dewees treats of this case, in a very instructive manner, under the style of the "chin departing too early from the breast." He considers it as it is observed at two different periods of labor, "first, where the head has not descended entirely into the lower strait; and second, where it occupies the lower strait." In the first situation, he recommends acting upon the forehead with the fingers, after the manner of Baudelocque; but in the second, more especially if the head have escaped through the orifice of the uterus, he thinks it essential to success to employ the hand to raise the whole head, "that we may be certain of keeping the forehead sufficiently high

to permit the vertex to descend ;” and then the fingers are to be applied to the forehead, as in the first situation. A case related by him shows, in a very striking light, the value of a correct knowledge of the mechanism of this case, and of sound principles in obstetric practice. I beg leave to commend the case to the reader’s careful perusal, but at the same time to question the necessity or safety, in less dextrous hands at least, of the particular manipulation practiced by Dr. Dewees. As to the safety, I have already expressed my aversion to raising a head escaped from the uterus; and the necessity of it, in this particular instance, is not very apparent, for the forehead can be raised or the occiput drawn toward the aperture of the pelvis, if it may not be brought any lower, and the malposition be thus rectified without preliminary elevation of the head. If the face, presenting fully, have become closely engaged in the pelvis, and it were deemed proper to redress it, it must, we have seen, be raised above its brim as a necessary preparation, because the axis of the head cannot be seesawed in the excavation; but not so, in the partial facial presentation,—because although the head engages with its axis lying across and above the pelvic entrance, the axis itself, or the longest diameter of the head, does not become actually engaged; or if it does, there is no reason why it may not retreat as well as advance.

Madame Lachapelle declares, as the result of her experience, that the forehead cannot be hindered from descending, or be restored after it has lapsed, by the mere pressure of the fingers against it,—such puny opposition being altogether insufficient to resist the com-

bined effort of the uterus and abdominal muscles. She advises us, therefore, to promote rather the descent of the face, as it is easier to reach and act upon the chin than the occiput, and in so doing, she thinks, we only promote the natural proclivity of the head (1).

This counsel deserves to be remembered, and ought to be acted upon whenever pressure against the forehead is abortive and there is difficulty in reaching the occiput: to slight it would be inconsistent with our improved knowledge, and proportionate diminished dread, of complete face presentations.

Secondly; *Version, or turning the child.*— Among the conditions requisite for the safe performance of this operation, in any case, there is one of paramount importance, viz., the presenting part must not have passed the uterine orifice, or have long occupied fully the pelvic excavation. In the first instance, the cervix uteri is contracted above the part which has escaped, and in attempting to return it, there is danger of rupturing the womb; in the second, the uterus is contracted so closely about the child, if the membranes have been ruptured and the liquor amnii discharged, as is commonly the fact, that there is still danger of rupture or other serious injury, in pushing the presenting part above the brim— an indispensable preliminary to the introduction of the hand. Looking to the interests of the mother, we ought not, therefore, to resort to version at an advanced period of labor in face presentations; and we should as little think of it, at an early period, viz., as soon as the os uteri is dilated, and shortly or immediately after the

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(1) Pratique, etc., Memoire cit.

rupture of the membranes, when it may be most safely performed, because, as already stated, this would be groundless anticipation of difficulty. Turning, then, can seldom, if ever, be necessary or proper in these cases, for the safety or advantage of the mother; accordingly, Madame Lachapelle, who seems to have had a *penchant* for the operation, pleads the danger to which the child is exposed, in justification of her frequent resort to it. "In my table, will be found," says she, "forty-one spontaneous deliveries in seventy-two face positions; the remainder were terminated by art; it is to be observed, though, that this great proportion of artificial deliveries was not owing to any difficulty of labor or danger of the mother, but of the child." Her rule was, to deliver when the child is brought into a suffering or critical condition, which she judged to exist by the cessation of the movements of its tongue and jaw, and the increase of congestion. The child is not, however, often in jeopardy, until the expulsion has advanced so far as to make it more or less perilous for the mother to deliver by turning; and under these circumstances, the prospect of rewarding her for the risk, by presenting her with a living child, as the fruit of the operation, is too slender to reconcile us to it. I know, indeed, that in the table referred to, Madame Lachapelle gives seventeen living and three dead children, as the result of version in twenty cases; but in less-skillful hands, and among general practitioners, the chances of success are not near so great; and it is doubtful whether one half would be brought into the world living, or long survive the injuries received by the way. We are not told how many of the mothers lived to enjoy the triumph of obstetrical

art (a capital defect in the table), but it appears to be pretty well established that more women die from parturition and its consequences, in French, than in British or American practice; and, with our views of the comparative value of the lives of mothers and unborn children, we should say, that if one of these twenty women died, in consequence of the mode of delivery, the redemption of the seventeen children, or rather, as many of them as would have been lost by other management, was too dearly purchased.

From what has just been said, it may be inferred that version is not a favorite resort with me, in face presentations, under any circumstances; and I will take the present opportunity to declare, as my own opinion, that it is seldom defensible, for any reasons whatever, where the vertex presents. In such cases, it is the most artificial of all the modes of delivery, with the single exception, perhaps, of the Cæsarian section: it subverts the purpose of nature, in the first place, by repelling the part which she so much prefers advancing, and then substitutes, to a greater or less extent, mechanical tractions for the vital agencies which she has appointed to preside over childbirth. When art has tasked her utmost ingenuity, the product is but a poor imitation of nature, in one of her most important vital functions—that which is designed for the propagation of life itself; the child may, indeed, be torn from its repository, but if the regular series of vital actions, which should have changed its habitation, be rudely interrupted, there is no estimating the pernicious consequences, immediate and remote, which may result to the mother.

Thirdly; *The forceps or crotchet*.—When the face

has advanced so far in the pelvis, and the uterus is so closely contracted about the child, as to preclude turning or render it unsafe, the forceps affords the proper means of delivery, if the child be alive, or the crotchet, if it be dead. It is hardly necessary to observe that the forceps is not called for, *because* it is a face presentation; though this may, for the reasons already given, more frequently require it than the vertex, but because the labor can no longer be intrusted to nature, safely for the mother and child. It is to be resorted to, therefore, upon the general principles that govern us in vertex cases, which it would be out of place to discuss here. But with regard to the manner in which the head is to be extracted, it may not be amiss to advert to a singular and gross mistake committed by Dr. Dewees. This appears to be the more necessary, because his writings are in the hands of all practitioners in this country, and are the guide of not a few.

Dr. Dewees directs, very properly, that the blades of the forceps be applied over the ears, and then erroneously observes that "they must be so applied that the concave edges must look toward the hind head, which must be brought under the arch of the pubes, and not the chin, as directed by Smellie" (1). If he had not been so careful to forbid what is right, we should have supposed that his inculcation of what is wrong was a lapsus pennæ, or a typographical error.

Now, in no case is the precept, to deliver in accordance with the mechanism, more obligatory on the practitioner than in face presentations. How strong the

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(1) Midwifery, fifth edition, p. 313.

tendency of the chin toward the pubes is, we have seen, and, also, how essential its revolution thither, rather than into the hollow of the sacrum, which raises almost an insurmountable barrier to the head's expulsion, and forbids the hope of extracting the child alive by the forceps. Smellie understood these cases much better than Dr. Dewees. In one of his cases (*No. IV, Collect. XXX*), where he found, when called by a midwife, the anterior fontanel at the pubes and the mouth and chin toward the sacrum, and where the womb was so strongly contracted as to defeat an effort to turn, he applied the forceps and endeavored to bring the head lower down; he then tried to turn the chin, first to one side and then to the other,—which he finally succeeded in accomplishing by first raising the head in the pelvis,—and eventually brought it out under the pubes, safely for the child as well as the mother. In his next case (*No. V, Collect. eadem*), he extracted the head with the forceps, truly, as he found it, viz., with the chin to the lower part of the sacrum, though a little to the left side; but the woman had been long in labor, the face was so low down as to protrude the external parts in form of a tumor, and she was delivered of a *dead* child.

From this discussion, it may be concluded that, in full face presentations, we are neither to redress the head, nor turn, nor use the forceps, merely because the face presents: it may, then, be inquired, is any special treatment demanded in such cases?

It has been supposed that great vigilance is necessary, on the part of the accoucheur, to prevent the chin from rotating toward the hollow of the sacrum, and to

insure its turning under the pubic arch. "To give all possible aid and assistance to nature, in her attempts to turn the chin toward the front of the pelvis," is inculcated by Professor Meigs as the prime duty of the medical attendant, in these cases. Again he says, "the great doctrine," in all face positions, is to bring the chin to the pubic arch: "there are," he continues, "two positions, in which the chin naturally tends to the arch, if the position be just and good; or it may tend to fall into the sacral curve, if it be not just and good" (1).

Such solicitude about the destination of the chin appears to me altogether unnecessary; the pubic arch is prescribed for it by nature, and, as a rule that has very few exceptions, thither it tends and will be ultimately landed. It is fortunate for the parturient woman that there is this strong natural proclivity; for it is exceedingly doubtful whether it is at all in our power to control the movement of the chin, by any force that can be exerted by the hand, and we should be loath to use instruments for such a purpose. With due deference for the opinions of Professor Meigs, I would, therefore, say, that to have all reasonable confidence in the ability of nature to accomplish what she purposes, is our first duty in these cases. The labor should be allowed to take its course, just as in vertex cases, unless palpable necessity of assistance should be developed during its progress, and the more efficient aid than can be given by the fingers, attempting to direct the course of the chin, will be required;—the head must be extracted by the forceps.

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(1) Philadelphia Pract. Midwifery. Chapter on Face Presentation.

The precaution that is to be observed in supporting the perineum, when the face is about emerging, is another item of special treatment, which Madame Lachapelle thought of sufficient importance to be attended to. "In sustaining the perineum," she remarks, "it must be remembered, that the chin is engaged in the arch, that the anterior part of the neck is pressed against the posterior face of the pubes, and that the throat rests upon the border of the arch, as its prop. We must be careful, therefore, not to push strongly upward and forward, whereby the danger to which the child is exposed would be greatly enhanced: the head must be simply *sustained*, and not pushed" (1). The injury which Madame Lachapelle apprehends might be inflicted on the child, is, of course, contusion of the superior part of the neck, where it is pressed against the inferior border of the pubic bones, which appears to me imaginary. The face can only be released by undergoing flexion; and of this movement, the guttural region of the neck being the pivot, considerable compression, and some contusion of it, are unavoidable. It is doubtful whether well-regulated pressure upon the perineum will materially augment the contusion; and, at all events, we should be quite unwilling to be deprived of the privilege of giving such valuable assistance, as is often in our power, by this means, as well in face as in vertex presentations. By well-regulated pressure, I mean pressure made with the hand, or both hands, according to circumstances, bearing with greatest force upon the perineum posteriorly, and directed from the os coccygis to the pubes: having for its

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(1) Troisième Memoire.

object, the promoting of the particular movement which the head has to execute in escaping at the vulva; )*extension* in vertex, *flexion* in face, positions.) Of the efficiency of such pressure, in vertex cases, I have already expressed my strong conviction; and it may be confidently stated, that, if the assistance of art is sometimes needed in vertex presentation, it is still more likely to be needed in face cases; because, flexion, for reasons already given, is more difficult than extension.

## CHAPTER XXI.

SHOULDER PRESENTATIONS—THEIR MECHANISM,  
DIAGNOSIS, AND PROGNOSIS.

IN the notice that has been taken of them, in a previous chapter, presentations of the shoulders were considered in connection with each other, nor is there now any necessity of separating them. When either shoulder presents, the body of the fetus is placed more or less transversely in the uterus; and it is physically impossible that it can be born, by the unaided efforts of nature, unless its position be changed, or it be amassed in an unusual manner. Such a presentation may, therefore, with strict propriety, be regarded as preternatural. It does, nevertheless, occasionally happen, that the natural resources are, by an extraordinary exertion, sufficient for the exigency; and the mechanism by which this is accomplished deserves to be studied, not only as curious, but as affording useful hints to us in practice.

Dr. Denman, who first directed the attention of the profession to the subject, denominated the movement, by which nature contrives to expel the fetus in these cases, *spontaneous evolution*—a vague appellation, expressive of the result, rather than the expedient adopted for its attainment. *Spontaneous version* would have

been a more proper phrase, considering the views which he entertained in regard to nature's procedure; for he says, "As to the manner in which this evolution takes place, I presume that after the long-continued action of the uterus, the body of the child is brought into such a compacted state, as to receive the full force of every returning action. The body in its doubled state, being too large to pass through the pelvis, and the uterus, pressing upon its inferior extremities, which are the only parts capable of being moved, they are forced gradually lower, making room, as they are pressed down, for the reception of some other part into the cavity of the uterus which they have evacuated, until the body turning as it were upon its own axis, the breech of the child is expelled, as in an original presentation of that part" (1).

Dr. Denman's explanation was generally received as a satisfactory solution of the phenomenon, until it was objected to by Dr. Douglass, of Dublin, in a pamphlet entitled, "Explanation of the real process of the spontaneous evolution of the fetus," which I have never seen, but the substance of which may be gathered from the references to it by subsequent systematic writers. Contrary to the declaration of Denman, Dr. Douglass maintained that the fetus actually does pass the pelvis in a doubled state; first, the shoulder and chest are propelled low in the pelvis, when the whole of the arm is made to protrude externally; the acromion then appears under the symphysis pubis, and as the loins and breech

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(1) Introduction to the Practice of Midwifery, chapter 14, section 8.

descend into the pelvis at one side, the apex of the shoulder rises toward the mons veneris, making room for the complete reception of the breech into the cavity of the sacrum; and this part is eventually expelled, greatly distending the perineum, to be followed by the other shoulder and arm, and lastly the head" (1).

Considered as a description of what occurs, in the great majority of instances of natural expulsion, in shoulder presentations, Dr. Douglass's narration must be reckoned to be, in the main, faithful; but his reasoning against Dr. Denman's hypothesis is not entitled to much weight, when he observes, "that it is incompatible with the received ideas of uterine action to suppose that the uterus, when contracting so powerfully as to force down that part of the child which was at its fundus, could at the same moment form a vacuum, into which another portion, already low down in the pelvis, should recede." There is nothing more impossible, as Dr. Burns truly remarks (2), so far as uterine contraction is concerned, in the child revolving during the action of the uterus, by the efforts of the womb on the upper end of the ellipse (the nates), than that we should, during the uterine contraction, find the shoulders with facility go up, merely by drawing gently at the feet; and, we may add, in a certain number of cases (the proportion being probably small), nature does proceed after this manner, performing a genuine version of the child. Still, it undoubtedly is according to the other manner, described by Dr. Douglass, that nature

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(1) Ramsbotham's Process of Parturition.

(2) Principles of Midwifery.

usually operates; and this I propose to call the *duplication*, instead of the *spontaneous evolution*, of the fetus.

The expulsion of the child, by the process of duplication, is pretty well described by Dr. Douglass; but it may not be amiss to study its mechanism somewhat more particularly, availing ourselves of the valuable assistance of M. Cazeaux, to whom we are already so largely indebted. For this purpose we may take the first or *scapulo-pubic* position of either shoulder, for, in this respect, there is no essential difference between them; but we select, with M. Cazeaux, the first position of the right shoulder, in which, it will be remembered, the head of the child is placed in the left iliac fossa, the breech in the right iliac fossa, its back looking forward, and its breast backward. Its great axis corresponds nearly with the transverse diameter of the pelvis.

After the rupture of the membranes and the immediate escape of nearly all the liquor amnii, the uterus is brought into close embrace of the fetus, and causes the presenting part to engage in the excavation: and now commences what may be called the first step, viz., *flexion* and *descent*, which I unite, although M. Cazeaux makes of them two distinct steps. This first step is performed in the following manner:—the great axis of the fetus is strongly flexed upon the side opposite that which presents, the head is thrown upon the left side, and the breech upon the flank of the same side. While this flexion is going on, the shoulder descends lower and lower in the pelvis, until its progress is arrested by the neck, whose shortness will not permit the shoulder, any more than the face, in face positions, to reach the bottom

of the pelvis, and for the same reason; that is, its length is not equal to that of the lateral wall of the excavation.

A rotatory movement now occurs, as the *second step*, by which the axis of the trunk is placed nearly antero-posteriorly, instead of transversely as it was; the head is brought over the horizontal branch of the pubis, and the breech before the sacro-iliac symphysis; and now the *descent* can be completed, — since the side of the neck is behind the symphysis pubis, the depth of which is not greater than its length. The arm now escapes or protrudes at the vulva, and the shoulder comes under the symphysis pubis.

The shoulder not being able to advance further, on account of the hinderance of the neck, and the expulsive force continuing to act on the nates, the doubled body of the child is pushed into the excavation, and sweeps over the concavity of the sacrum and along the perineum, which is greatly distended. The third and final step is now taken, viz., *disengagement*, or, as it is very properly called by M. Cazeaux, *deflexion*, which is executed by the shoulder remaining stationary, under the pubes, while the side of the chest, the side of the loins, the hip, and lastly, the thighs and the whole of the inferior extremities successively, emerge before the anterior commissure of the perineum. The head and the left arm only remain, and these are easily expelled.

The mechanism is not materially different in the second or *scapulo-sacral* position of either shoulder; but M. P. Dubois, as we learn from M. Cazeaux, has observed in two cases of this kind, that at the moment when the nates were being disengaged before the anterior commissure of the perineum, the entire trunk was

twisted so as to bring the back of the child forward, toward the pubes, which would otherwise have been directed toward the anus: so that even here the general law continues to reign, by which it is provided that, *no matter what may be the primitive relation of the posterior plane of the fetus, it is ultimately turned toward the anterior part of the pelvis*; — a law as salutary as it is wonderful.

#### *Diagnosis.*

Previous to the rupture of the membranes, it is not possible to ascertain, certainly, the presence of the shoulder at the superior strait. From the form of the uterus, viz., its unusual width, in connection with the elevation of the presenting part, which cannot be reached by the finger, and more especially if a small, floating member of the fetus can be felt, we may suspect that we have to do with a shoulder presentation, but cannot attain to certainty, until the membranes have ruptured and the shoulder is somewhat engaged in the pelvis. Then it may be either the shoulder proper, or the elbow and side of the child, which offers at the center of the superior strait, — the *acromial* and *cubital* varieties of Madame Lachapelle, — and the marks, which will be recognized by the touch, will be different, as one or the other of these varieties may chance to be present.

The shoulder is distinguished by the round tumor it forms, not so large or so resisting as the head, for which it can scarcely be mistaken, neither is it so large as the breech, but its consistency is about the same, and hence it has been mistaken for it. But, by carrying the finger sufficiently high, we may be able to feel the acromion

process and spine of the scapula, the clavicle, the armpit with its margins, and, if the child be not very fat, the ribs and the intercostal spaces,—all, or even several, of which will serve to distinguish the shoulder from any other part. Our next aim is to determine which shoulder presents and what is its position, and this can be learned by attending to the relations of the *back* and *armpit* of the child to the pelvis of the mother. In the first position of both shoulders, the back of the child and arm proper (humerus) are forward, while the forearm and hand flexed upon the sternum are toward the sacrum of the mother. The scapula will indicate the location of the back; and supposing this first position to exist, if the armpit is directed toward the right ilium of the mother, it is the right shoulder, if toward the left ilium, it is the left shoulder. In the second position of both shoulders, the back of the fetus and arm are placed posteriorly, the flexed forearm and hand anteriorly, and if now the armpit is toward the right ilium, it is the left shoulder, if toward the left ilium, it is the right shoulder.

The elbow is distinguished by its three bony processes, the olecranon and the condyles of the humerus, by the prominence of the tendon in its bend, and the vicinity of the chest, with its ribs and intercostal spaces. If our examination be limited to the elbow, it might be mistaken for the heel of the foot; but the elbow is smaller and more pointed, and the condyles are not so remote from it as are the malleoli from the heel. Should any uncertainty be felt, it may be removed by tracing the forearm to the hand, which may be readily distinguished from the foot, by the marks formerly given.

The elbow once clearly recognized, we are enabled, by it alone, to ascertain the shoulder that presents and its position. If the forearm is backward, it is the first position; and if the elbow is toward the right, it is the right shoulder; if toward the left, it is the left shoulder. The forearm being forward, denotes the second position; and then the elbow being toward the right, it is the left shoulder; and being toward the left, it is the right shoulder.

In shoulder presentations, the arm is not unfrequently extended, and is found hanging in the vagina, or protruding through the vulva. This does not obscure, but rather facilitate, the diagnosis, provided we be careful to ascertain that it is a precursor of the shoulder, and not of the head, for proci-dence of an arm sometimes complicates head presentations. An arm having prolapsed, we may easily ascertain whether it be the right or left, by applying the palm of our hand to its palm; if its thumb corresponds to our thumb, it is the right hand; but if its little finger correspond to our thumb, it is the left hand, and its thumb will correspond to the thumb of our left. Having learned, in this way, which shoulder presents, we can ascertain its position by passing a finger or two along the arm to the armpit (which should be done, at any rate, to make sure that the shoulder is above it); if it is the right arm, the armpit is toward the right side in the first position, and toward the left in the second; if it is the left arm, the armpit is toward the left side in the first position, and toward the right in the second. Both the presentation and the position are so clearly indicated by the prolapsed arm, that it will be proper, in all cases of

doubt and perplexity (and who has not met with such?), to bring down an arm to enlighten the diagnosis, especially as such a procedure will not at all embarrass the treatment of the case.

### *Prognosis.*

These presentations have, in all ages and countries, been regarded as sinister, and as requiring the interposition of art, to surmount the difficulties which they oppose to childbirth. Such an opinion could hardly have gained currency and maintained its ground, were there any sufficient foundation for the more favorable estimate of the powers of nature, which Dr. Denman was pleased to entertain. In his opinion, "a woman in a state of nature, *with her child presenting in any manner*, would not die undelivered, if no assistance were afforded to her;" but, in a country "somewhat civilized," much would be thought requisite to be done for an equally healthful woman, and she might fall a sacrifice to "the ungainly and rude exercise of art,"—the attempts of art defeating the natural efforts. In the instances of women dying undelivered, their children presenting with the arm, because it was not possible to pass the hand into the uterus, to turn the child and deliver by the feet, communicated to Dr. Denman, by his medical friends, he more than hints, that spontaneous evolution was hindered by the efforts that were made to turn. It may be true, that natural expulsion would have taken place, in many more instances than have been witnessed, if practitioners had never interfered; and yet, there is reason to believe, that many more women must have

died, either undelivered, or in consequence of the severity of the labor, under this expectant treatment, while it is well ascertained that but few of the children could have survived. The records of these cases show clearly, what their very nature might have authorized us to predict, that the labors were terminated after severe and long conflicts, compromising the mothers, who were not always so fortunate as to escape death, and destroying the greater part of the children,—one hundred and twenty-five of the one hundred and thirty-seven, whose fate has been communicated by M. Velpeau.

With such evidence as this before us, we should not, *willingly*, confide shoulder presentations to unaided nature, however much we may admire the fertility of her resources, and however gratefully we may acknowledge the overwhelming power which she occasionally brings to the rescue, when the help of man is vain. On the contrary, it is our duty to lighten her burden, and consult the safety of both mother and child, by turning, and thus adjusting the axis of the child's body to the axis of the parturient passages, whenever this can be done with any degree of facility, and with a due regard to the safety of the mother. There are, nevertheless, cases in which we shall be justifiable in deferring to act, in hope that the child may be expelled by the process of duplication; as for example, in premature labor, where the small size of the child warrants the expectation that it may easily pass, doubled upon itself; or where, in labor at the full period of pregnancy, the pains are unusually powerful and frequent, and the child

is already forced so low down in the pelvis as to distend the external parts. A remarkable instance of the latter kind, which came under my own observation, I may be permitted to relate. February 27, 1846, I was requested by Dr. Donne, now one of the professors in the Memphis Medical College, to accompany him to the house of Mrs. B., on Market street, who was in labor with her second child, under the disadvantages of a shoulder presentation. I found Dr. Lewis Rogers at the house, who had made an effort to turn, but was defeated by the strength of the uterine contractions. It was plain, from the patient's behavior, that the pains were still exerted with unusual vehemence as well as frequency, and I proceeded, as soon as possible, to make an examination; when it was discovered that the left shoulder presented in the second (*scapulo-sacral*) position, with the arm extended and the hand protruding through the vulva. Before the examination was completed, however, the perineum began to be distended, and I remarked to the medical gentlemen, that the child would probably be expelled by duplication, which did accordingly occur in a few moments afterward, in the manner already described. The child, which appeared to be fully developed and of average size, was born dead; its left arm being considerably swollen, and the left side of the neck, with the corresponding cheek, retaining marks of the contusion they had suffered. The labor was not unusually protracted, and the mother recovered without any unfavorable consequences. It should, perhaps, be observed, that the time when this case happened seemed to be propitious

for *independent* childbearing; as no fewer than four women, to whom I was called, were delivered by dame Nature, before I could reach their domicils, albeit I made as much haste as is consistent with obstetric dignity.

## CHAPTER XXII.

## TREATMENT OF SHOULDER PRESENTATIONS.

*Treatment.*—The great desideratum, in shoulder presentations, is, to restore the fetus to a situation in the cavity of the uterus, that will enable it to pass out of the pelvis, under the influence of the parturient forces, with the assistance of art. This, it is evident, will be fulfilled by pushing aside the shoulder and bringing either the head or the nates into the pelvis, thus causing the child to turn upon its axis, and offer one of its extremities to the passage. The manual operation, by which this is effected, is denominated *turning* or *version* of the child: and according as the head or the nates is brought down, it is *cephalic* or *pelvic* version. Cephalic version has but few advocates at the present day, and is confessedly applicable to such a limited number of cases, that it is scarcely worthy of our formal consideration. For this reason, and also because I have no experience of it, I shall confine my observations to pelvic version, or the operation of bringing the feet through the vulva, in order that the child may be born without such mechanical disadvantages as belong to shoulder presentation.

Before describing the manner of turning, in the different positions of the shoulders, it will be useful to offer some general observations on this mode of delivery.

These general observations will relate to the conditions that must exist to justify the operation, the position of the patient, the choice of a hand, and the principles that should govern the several parts into which the operation may be divided.

*Conditions.*—The operation ought not to be undertaken, and there is seldom, if ever, necessity of undertaking it, until the os uteri is sufficiently dilated to allow the hand to enter the cavity of the womb, without the employment of any considerable force. It is not necessary that the orifice should be so patulous as to admit the hand without the least resistance, for thus it may not be, and yet be so far dilated and dilatable withal, that the hand may enter it, without such force as would prove, in the least degree, injurious. But violence is always to be avoided, as never justifiable and often destructive. If the operator has the selection of his time, the most favorable moment is, unquestionably, just when the os uteri is sufficiently dilated for his purpose and before the membranes have ruptured, for he may then rupture them and immediately push his hand into the uterine cavity, before the waters have escaped. He will thus have the signal advantages of ample room for the movements of his hand, free access to the feet of the child, and great facility in turning. But, unfortunately, this favorable conjuncture is not often enjoyed, at least in the practice of this country, where the physician may not be called until it is irrecoverably lost, and his services are requested only on account of the subsequent discovery that the shoulder is presenting. The operation is then to be performed, with the hinderance resulting from more or less close contraction of the ute-

rus about the child's body, according as the liquor amnii is more or less completely discharged, and little or none will be retained, after the lapse of a few hours, for the shoulder is a worse stopper of the orifice than even the breech.

If a considerable time have elapsed since the rupture of the membranes and escape of the waters, the uterus may be so strongly contracted as to defeat any attempt to introduce the hand into its cavity, and compel us to devise some other expedient to deliver the woman. What is to be done, in this case, will be presently pointed out and explained: but let not the practitioner too hastily conclude that delivery by turning is impracticable, for I have often found that, notwithstanding I have been frustrated in a first or second trial, by persevering and varying the maneuver somewhat, success has ultimately crowned my efforts. The operation may sometimes be facilitated by bloodletting and tartarized antimony, administered in broken dozes, at short intervals, until nausea or even slight vomiting is induced, and one or both of these, according to circumstances, ought to be tried before it is finally relinquished.

*Position of the patient.*—The patient must be placed across the bed, upon her back, and with the hips so near the side of the bed that the perineum projects a little over the mattress on which she lies. Her feet may rest on chairs, or in the laps of two assistants, who are charged with keeping her knees far enough apart to make room for the operator to stand or sit between them. A sheet or blanket, according to the season, must be thrown over her to screen the patient from exposure, which is as indelicate as it is unnecessary; for the operation,

from first to last, is to be performed under the guidance of the touch alone. The necessity of having the perineum free of the bed arises from the course of the hand, in its complete introduction, which is that of the axis of the superior strait; and this cannot be followed without depressing the elbow to the level of the bed. So great must this depression be, when the feet of the child lie in the anterior part of the uterine cavity, that it is sometimes less irksome to the physician to have the patient turned upon her side.

*Choice of a hand.*—Not a little discrepancy will be found among practical writers, in the directions they give as to the hand that should be employed, in the different shoulder positions. Without discussing the merits of their conflicting advice, I shall be content to state my own rule, which is, that the right hand must be used for the right shoulder, and the left hand for the left shoulder. Where there is obscurity or uncertainty as to the presentation, the right should be preferred, because it is that which most persons are accustomed to employ, and can, therefore, use with the greatest facility. The choice of a hand for the operation implies a perfect knowledge of the presentation, which ought, in fact, always to be attained, whenever it is practicable, before commencing the operation. This is the more necessary where the uterus is in a contracted state, as, by guiding the hand in the right direction, namely, toward the feet, we shall be saved a deal of toil, and the patient of pain, which must result from passing the hand in a wrong direction, and then having to withdraw it in order to get into the proper track.

With a view to the more methodical description and

study of the operation of turning, it may be divided into three parts, viz., 1, Introduction of the hand into the uterine cavity; 2, Seizing and bringing down the feet; 3, Extraction of the child. The principles that should govern us, in the performance of these several parts, are next to engage our attention.

1. *Introduction of the hand.*—The hand selected for the operation, and likewise the forearm, must be well lubricated with lard, with the exception of the palm, which ought not to be greased, that it may take a firmer hold of the legs. The operator is, of course, to divest himself of his coat, and roll up the shirt sleeve of the arm which is to be used. Some practitioners are fastidious on this point, fearing that such preparation will give them too much of a butcher-like aspect; but this is certainly neater and less frightful than to have the shirt sleeve dangling about the arm, soaked with blood and other fluids, as I have sometimes seen it in the lying-in chamber. The hand, thus prepared, is to be formed into a cone, by pressing the fingers together and flexing the thumb on the palm, and must be presented to the external organ, with its breadth corresponding to the genital fissure. By pressing on the perineum, the external orifice can be gradually dilated, so as to receive the entire hand, which is now lodged in the vagina. In effecting this part of its intromission, the hand must move in the direction of the vagina, which is that of the axis of the inferior strait, that is, upward and backward; and it will be best to act only *during the pains*, as the severer suffering of the throes of labor will render the patient unconscious of the pain inflicted by the hand. The uterine cavity is now to be entered, and to accomplish this,

the hand must preserve its conical form, and the resistance of the os uteri, if any exist, must be overcome by gradual dilatation. These dilating efforts must be made only *in the intervals of the pains*; and when the hand is fairly introduced, it must be pushed forward as rapidly as may be toward the feet. Let it never be forgotten, however, that, especially when the uterus is closely contracted, the hand, in its farther progress, must rest during the pains, and lie flat upon the surface of the child's body, ready to resume its march the instant the pains cease, that the most may be made of every interval of the muscular contractions. The movement of this hand will be facilitated, by applying the other to the abdomen of the mother, for the purpose of steadying the uterus and preventing its ascension, which might not only hinder this part of the operation, but occasion rupture of its vaginal connections.

2. *Seizing and bringing down the feet.*—The hand having arrived at the feet, takes a secure hold of them, by inserting the index between the internal malleoli, while the thumb is applied to the outer part of the ankle of one leg and the other fingers to the outer part of the other ankle. Embracing the opportunity offered by an interval of the pains, the operator is to bring the feet down over the child's abdomen, as much as possible in the direction of the natural flexure of the body; and this evolution may be assisted by the hand that is applied externally, which must push the head upward toward the fundus of the uterus. When the womb is strongly contracted, it is not always easy to seize both feet; the practitioner ought then to be satisfied with one, and proceed to make the evolution by drawing it

down. I have several times adopted this course, and considered myself fortunate in getting hold of one foot. Again: it may happen, under the same circumstances, that the feet cannot be reached at all; in that case, the turning may be effected by acting upon the knees, or upon one knee, by means of two fingers applied to the ham, and then one or both legs can be extended and brought out of the vulva.

3. *Extraction of the child.*—When the child's feet are brought through the vulva, it would, undoubtedly, be proper to confide the completion of labor to nature, if sufficient power be retained by the uterus, and be so vigorously exerted as to give promise of a satisfactory issue. But this rarely, if ever, happens, in the cases we are considering; for the labor has generally been tedious, and the uterine force, more or less, completely expended, before we are called on to deliver, and it is then our indispensable duty to extract the child. This part of the operation must, however, be executed, in as close conformity as possible to the natural procedure. If there be pains, no matter how feeble, our extractive force should act only in concert with them; and, if there be no pains, we should extract, not continuously, but with intervals of rest, in imitation of nature. Each application of artificial force ought, moreover, to be made with gradually augmenting strength, and be as gradually relaxed, for this, too, is nature's method. As to the movements that the body of the fetus is to be caused to execute, they are precisely such as belong to the mechanism of labor, in nates presentations; and the manner of proceeding, in order to secure these, having

been already explained in the chapter on that subject, we need not repeat what is there said.

In the extraction of the child, after turning, there is, however, one thing to be attended to, which hardly merits attention in the management of nates presentations, because the vigilance of nature exonerates us from solicitude concerning it,—I mean the care which the operator is to take to turn the anterior parts of its body toward the loins of the mother, while he is engaged in extracting it. The sufficiency of nature, in original nates cases, arises from the uterus possessing and exerting its forces, in a good degree, needing only, at most, the assistance of the accoucheur; and the tendency of these forces being to cause so desirable a revolution of the child's body, even where its abdomen is toward the pubes, primitively. But in shoulder presentations, the delivery is more artificial: and should the toes point forward, when the feet are brought out, the head may come into the pelvic excavation, with the face toward the pubes, and its extrication be thus rendered much more difficult. To prevent, if possible, such a catastrophe, the operator ought to make traction upon the leg that is toward the pubes, which tends, in the gentlest and most gradual way, to turn the anterior parts of the child's body posteriorly; so that when the head is brought into the pelvis, the face may be in the hollow of the sacrum. To effect a so desirable object, most writers direct more vigorous exertions—even the grasping of the child's body, and forcibly turning it round; but such a maneuver is not free from serious objections, in all cases where the uterus is firmly contracted. In the first place, the head may not follow the

rotation of the body, being hindered by the firm embrace of the fundus of the uterus; and thus the neck may experience a fatal twist, for its articulation with the head will not permit rotation equal to half a circle. In the second place, supposing the *head* to obey the impulse communicated to the body, the *arms* may not; and one of them may be made to decussate the back of the neck, when the head gets into the pelvis, and offer a serious barrier to its egress. Two kinds of decussation are distinguished by M. Dugès, according as the accident occurs at a more or less advanced stage of the extraction. If, when the body is turned round, the arm is pendent by the side, it first crosses the back, and then moves upwardly as the body is extracted, until finally, it is lodged upon the back of the neck. If, on the contrary, the arm be raised alongside the head, when the body is made to revolve, the arms and the head only remaining in the uterus, the arm is depressed and sinks beneath the occiput. The first kind of decussation is, according to Dugès, recognized by the inferior angle of the scapula being made to approach very near the spine, and the forearm is sometimes found hanging down the opposite side; in the second kind, the inferior angle of the scapula is removed to a greater distance from the spine, and the forearm is never pendent, but raised along the opposite side of the head.

To discriminate between the two kinds of decussation is material in practice, because their treatment is very different,—the first or *ascending* decussation, as it may be called, requiring the arm to be brought down over the back, and the second or *descending* requiring the arm to be pushed up over the head and brought

down over the breast,—but to avoid the maneuver, likely to produce such an embarrassing accident, is still more important. If, therefore, the uterus be strongly contracted, and simple traction upon the member that is forward should not cause the child's anterior parts to turn toward the mother's back, it will be better to allow the head to come into the pelvis, with the face toward the pubes, and trust to our ability to rotate the face into the hollow of the sacrum, should it prove impossible to extract it, in its untoward position. Such is the practice recommended by Madame Lachapelle, and Dugès avers that it is not difficult to turn the face into the hollow of the sacrum, by the manipulation of that distinguished midwife. The manipulation referred to, consists in introducing the hand behind the occiput and passing it over the opposite cheek until the fingers reach the mouth, into which one finger may be inserted; the face, being thus seized, is to be drawn into the sacral concavity, at the same time that it is brought lower in the pelvic excavation, being made to move in a spiral line. For this manipulation the right or the left hand is to be used according as the face may be toward the right or left side of the pubes: should it look directly toward the pubes, either hand may be used indifferently.

These general observations being premised, we are prepared to consider the operation of turning in the several positions of shoulder presentation, commencing with the second position of both shoulders, because in these the operation, though it may not be more easily executed, is more regular, that is, more in conformity

with our general rules, than it may be practicable to make it in the first position.

1. *Turning in the second or scapulo-sacral position of the right shoulder.*—Let the student recall to mind the relations of the child's body, in this position: its back is toward the loins of the mother, its head is in the right iliac fossa, and its lower extremities, folded upon the abdomen, are contained in the left anterior part of the womb. The operator introduces his right hand in the state of supination, seizes and pushes the right shoulder toward the right iliac fossa of the mother, and then glides the hand over the posterior parts of the child's body until it reaches the breech. The hand is then brought forward, becoming prone as it rounds the breech, to get hold of the feet, which are drawn toward the child's abdomen, in bringing them down into the vagina, and thus this position is converted into first position of the nates. The extraction is then to be made in compliance with the rules already laid down; and no difficulty can be experienced in gradually rotating the anterior parts of the child backwardly, so as to bring the occiput behind the pubes.

2. *Turning in the second or scapulo-sacral position of the left shoulder.*—In this position, the back of the fetus is directed posteriorly, its head is in the left iliac fossa, and its legs are in the right anterior part of the uterus. The left hand is introduced supine, pushes the shoulder toward the left iliac fossa, traverses the back of the child, becoming prone as it passes over the breech, grasps the feet, and brings them down into the vagina, converting the case into a second nates presentation.

Extraction is as favorable as in the corresponding position of the other shoulder.

3. *Turning in the first or scapulo-pubic position of the right shoulder.*—The back of the fetus is forward, its head is over the left iliac fossa, its legs are in the right posterior part of the uterus. To turn *secundum artem*, it is obvious that the feet should be drawn over into the left side of the womb, while the head is moved toward the right, for it is only by such a maneuver that the evolution can be made according to the natural flexure of the body; and could such a movement be made, this position would, like the second of the same shoulder, be converted into a first nates position. This is, in fact, the method of operating, recommended by M. Moreau (1); while M. Velpeau (2) proposes to accomplish the same object by converting the first into a second position of the right shoulder, preparatory for turning,—the conversion to be effected by seizing the shoulder and rotating the body upon its axis, causing the head to swing round, from left to right, anteriorly or posteriorly, according as it may be nearest the pubes or sacrum, and depositing it in the right iliac fossa. There can be no doubt but Moreau's method would be found exceedingly difficult, in a contracted uterus, and Velpeau's utterly impracticable, to say nothing of the great risk of rupturing the uterus by such feats of obstetric dexterity. The safer and, doubtless, the preferable method is that recommended by M. Cazeaux (3), which

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(1) *Traité Pratique des Accouchemens*, Tom. II, p. 222.

(2) *Midwifery*, section on Turning.

(3) *Traité Theorique et Pratique de l'Art des Accouchemens*, p. 717.

consists in introducing the right hand supine, and, after raising and pushing aside the shoulder, passing it toward the right sacro-iliac symphysis, above which the feet are situated; the feet being seized are brought directly down into the excavation, making a *lateral* evolution, that is, the feet are drawn toward the right hip, instead of the abdomen, of the child. This method is much easier of execution than any other, and no objection lies against it, except that the child's anterior parts may be directed toward the front of the pelvis; but this may be obviated, if not by turning the body around, by rotating the head in the pelvis, according to the advice of Madame Lachapelle.

4. *Turning in the first or scapulo-pubic position of the left shoulder.* — The back of the child is toward the pubes, its head is over the right iliac fossa, its feet are in the left posterior part of the womb. The left hand is introduced supine, raises and pushes the shoulder toward the right iliac fossa, and then passes up over the left sacro-iliac symphysis, where the feet are found, which are to be brought straightway into the vagina, by a left *lateral* evolution. The extraction is to be managed in the same way as in the corresponding position of the other shoulder.

It has been already declared, that cases will now and then be met with in practice, in which, on account of the excessively contracted condition of the uterus, it will be found wholly impossible to deliver by turning. I have had three or four cases of this kind, and what is to be done for the relief of the woman, under such circumstances, will now claim our attention—I say for the relief of the *woman*, because the *child*, being dead, as it

always is, when the mother is brought into such fearful peril, has no claim to our regard; and even though it were alive, the paramount claims of the mother forbid the doing anything which might increase the hazard of her life. It is manifest that all attempts to *forcibly* pass the hand between a powerfully contracted uterus and the fetus, must be extremely painful, and may cause fatal rupture of the organ; no such attempts can, therefore, ever be justifiable. The only resort is mutilation of the child, either by eviscerating its trunk, to enable the operator to extract it doubled upon itself, in imitation of the natural process of duplication, or by decapitating it, in order that the body and head may be separately extracted. The former operation, being the only one of which I have any experience, I will briefly describe, referring the reader to other treatises, particularly to the elder Ramsbotham's "Practical Observations," for an account of the latter.

When this operation has become necessary, the shoulder is forced low in the pelvis, and the arm is usually protruded. A large incision is to be made in the most dependant part of the thorax, between two of the ribs, by means of Smellie's scissors, conducted to the part by two fingers of the left hand. This incision is to be crossed by another, which divides one or both ribs, so as to make a large perforation, through which the hand may be introduced, to remove the contents of the chest. The diaphragm is next to be perforated, and the abdominal viscera removed. The evisceration being completed, a crotchet is to be passed through the opening made in the chest, to get hold of the inferior part of the child's spine, or, better still, the interior of

its pelvis; and with this instrument, traction is made to bring the nates into the excavation, and eventually through the vulva; the remainder of the delivery is to be conducted as in cases of ordinary turning.

The inexperienced practitioner should bear in mind, that this operation may be sooner described than performed; for his encouragement, he may, however, be assured that it can be safely done by patience and perseverance, aided by a correct knowledge of the process adopted by nature, in those rare instances in which her unaided efforts are successful. In no cases is it more necessary to imitate nature than in these; for I have distinctly observed in practice that the child is always *extracted*, as it is sometimes *expelled*, doubled.

## CHAPTER XXIII.

PHENOMENA AND MANAGEMENT OF THE THIRD  
STAGE OF LABOR.

THE third stage of labor comprises the separation and expulsion of the secundines; and while this is in progress, the child, that had been ushered into the world at the close of the second stage, is assuming the functions of extra-uterine life, and divides with the mother the attention of the accoucheur. The most important phenomena of the third stage, in a practical point of view, relate to the manner in which the placenta and membranes are detached and expelled. In considering them we may speak, 1. Of the instrumentality employed in effecting the separation: and, 2. Of the mode in which they separate and escape from the organs of the patient.

1. *The instrumentality employed in separating the placenta and membranes from the uterus.*—In many cases of labor, there can be no doubt that the pain, which expels the child, detaches the placenta at the same time; for it can be felt by the finger over the uterine orificé, immediately after the birth of the child. Where, however, this does not take place, and the separation is a distinct and special part of labor, it will be found, I apprehend, that *tonic contraction* of the uterus is the

means employed by nature to accomplish it. This is not the account usually given by writers, who speak of the return of pain (muscular contraction), after a longer or shorter interval, to separate as well as expel the placenta and membranes. Dr. Dewees had juster views of the subject, and declares that "the tonic contraction *almost* exclusively detaches the placenta from the uterine surface, in order that it may be expelled." From many observations, carefully made, I deem myself justified in concluding that when the placenta is not detached by the last labor throes, preceding the expulsion of the child, it is by the agency of the tonic contraction alone that the uterus dissolves the connection between itself and the placenta. I have, many times, introduced my fingers up to the os uteri, passing them along the cord as a conductor, immediately after the birth of the child, without being able to reach the placenta; and I have repeated the examination, several times, at short intervals, until the placenta could be reached in this way, and satisfactorily ascertained it to be lying loose and unattached, notwithstanding *pain* had not been complained of by the patient, although frequently asked if she felt pain. From observations like these, it may be safely concluded that the placenta is detached without pain, viz., without muscular contraction of the uterus, and the only other agency that can be operative is tonic contraction.

That the placenta is not detached by muscular contraction might have been inferred from the nature and design of this mode of uterine action, independently of observation. It is expulsive in its tendency and aim, and its occurrence implies, therefore, the presence of

something in the uterus to be expelled. But the placenta and membranes, so long as they are attached to the inner surface of the organ, are in bonds of vital union with it, and cannot, in any sense, be reckoned as extraneous matters. This consideration explains, if I mistake not, a fact as notorious as remarkable, constantly occurring in cases of abortion. I allude to the prolonged retention of the placenta and membranes, where the ovum is ruptured and the fetus escapes. At the period of pregnancy, when these accidents usually happen, the connection of the fetal envelopes with the uterus is stronger than at the conclusion of gestation, and the womb is less powerfully contractile. Hence, these envelopes are not so easily separated; and until they are, nature will make no effort to expel them. Meanwhile, as the separation slowly progresses, the woman is exposed to repeated attacks of hemorrhage, until it is completed, and expulsive contractions are aroused by the irritation of the detached placenta and membranes, then acting as a foreign body in the uterine cavity.

But although muscular contraction is not the agency provided by nature to detach the placenta and membranes, it must not be supposed that this mode of uterine action is incapable of such an effect, should it be excited by any cause whatever. For, it is manifest that muscular contraction diminishes the cavity of the uterus, as well as tonic contraction; and this diminution of its cavity, no matter how produced—nothing being contained in it beside the placenta and membranes—must cause their separation. We have an illustration of the truth of this remark, in cases of retention of the placenta from uterine inertion, that is, on account of de-

fective tonic contraction, in which the administration of ergot, or the introduction of the hand into the cavity of the womb, excites pains that both separate and expel the placenta.

2. *Of the manner in which the placenta and membranes are separated and expelled.*—The separation begins with the placenta, and commences usually about its center, extending gradually toward its margin. While this is going on, more or less blood escapes from the denuded mouths of the uterine vessels, and, by its pressure, forms the detached portion of the placenta into a cup-like cavity for its reception. When the attachment of the margin of the placenta is broken up, the entire mass falls by its gravity, or is pushed by uterine contractions, to the external orifice of the womb,—its smooth, fetal surface being foremost. The placenta, fallen or driven to the inferior part of the uterus, necessarily draws the membranes along with it, which are inverted as they are torn loose. As the placenta is expelled through the vagina and vulva, it becomes more cupped, and the membranes, as they are peeled off the inner surface of the uterus, continue to be inverted, so that when the whole is expelled, they are completely turned inside out and thrown over the lobulated uterine surface of the placenta, concealing the blood that had been effused into the placental cup, which is now seen to be coagulated, upon lifting its membranous covering.

The separation of the placenta sometimes takes place differently. Its margin may be detached first; and if it should happen that the separation begins with that part of its margin which is below and near the os uteri, the placenta is rolled into a cylinder in the direc-

tion of the axis of the uterus, and its lobulated surface is presented to the examining finger. In this case, as Baudelocque remarks, its expulsion is preceded by the discharge of a little, or it may be a considerable quantity, of fluid blood. No more blood may be effused than is perfectly normal; and yet, because it flows away, instead of being retained, for want of a placental cup, it might alarm the medical attendant, unless he satisfies himself of the cylindrical disposition of the placenta.

After the expulsion of the secundines, no mechanical obstacle is opposed to the full exercise of the tonic contraction of the uterus; and if this be healthily exerted, the womb sinks into the hypogastric region of the abdomen, where it can be felt by the practitioner as a hard globe, of considerable magnitude. The tonic contraction diminishes the caliber of the utero-placental vessels sufficiently to prevent the flow of much blood from their orifices, though it is usual for some to escape during the first twenty-four hours, and the lochial secretion may be tinged with blood for several days.

In the management of this stage of labor (I speak now only of its ordinary management), the attention of the practitioner is, as already intimated, divided between the mother and new-born child; and in considering his duties it will, therefore, be best to enumerate them, as nearly as possible, in the order in which they are commonly performed.

1. Immediately after the child is born, it is to be taken hold of by the practitioner and removed as far from the genitals of the mother, as the length of the cord will allow. This removal should be slowly and deliberately accomplished, that the cord be not jerked

or put on the stretch, and the child must be brought from under the cover and placed on its back or side, that air may have free access to it, when, if not before, it begins to breathe and cry.

2. Having provided for the child, the accoucheur should next spread both his hands over the hypogastrium of the mother, either in contact with its integuments or with very thin covering intervening, to ascertain whether the uterus be properly contracted or not. If it be contracted, he will be able easily to feel its hard globe, which he may search for in vain, if it be in a state of relaxation. In the first case, its contraction should be increased, or at least maintained, by pretty firm pressure with the hands; in the second, its contraction should be excited by friction over the whole abdomen, with both hands, alternated with strong pressure. Abdominal friction and pressure will, according to my experience, seldom, if ever fail, to arouse the uterus from its lethargy; and the success of these valuable expedients will be announced by the gradual gathering of the expanded organ into a ball under the hands, which is wound tighter and tighter, as the tonic contraction increases in power, until the globe is established.

3. The accoucheur then turns to the child again, to inquire whether it can be safely severed from the mother, by cutting the cord, which had hitherto connected it with her. To decide this question, he must examine the state of the circulation in the umbilical vessels, which is done by taking the cord between his thumb and finger, and noting the degree of pulsation that exists in its arteries. If the pulsation be strong, *the whole length of the cord*, or as far toward its placental end as

it can be examined, he may conclude that the new mode of life, which is now just beginning, is not perfectly established; for when the lungs are fully inflated, and the new channels of circulation are freely opened, the blood forsakes its fetal routes, and the umbilical pulsation becomes feeble or extinct, or if it can be felt near the child's abdomen, it ceases at no great distance from it. *The cord must not be divided until the new or extra-uterine life is satisfactorily established.* It is not, however, necessary to defer this operation until there is a total cessation of the umbilical pulse, under the puerile apprehension that the child may be feeble and sickly all its life, in consequence of the loss merely of the little blood that may be faintly circulating in the umbilical vessels, when the section of the cord is made.

The division of the cord is a very simple affair; it is done with a pair of scissors (which should be sharp), after having tied a ligature very tightly around it, at the distance of about two fingers' breadth from the umbilicus. The cord should be cut half an inch beyond the ligature, or far enough to prevent the ligature slipping off, after the section is made. It was formerly the practice to apply two ligatures, and divide the cord between them, for what reason, I am unable to conjecture, unless to guard against hemorrhage from the placental end of the cord, which might have been dreaded when this branch of the fetal circulation was imperfectly understood. It is now well known that whatever bleeding of this kind may occur, proceeds from the fetal vessels in the placenta, and cannot, of course, affect the mother, while, by depleting the placenta, it only makes its expulsion easier. The child being severed from

the mother, is delivered to the nurse or female friend, who receives it in a warm blanket.

4. The accoucheur next makes an examination, to learn whether the placenta be detached or not; which is done by taking hold of the cord with the left hand, and pulling it cautiously until it is straightened (not stretched), and the indexfinger of the right hand is then slid along the cord, as a conductor into the patulous genitals of the patient. If the placenta be detached, it is lying loose about the external orifice of the uterus, or partly in the upper portion of the widely dilated vagina, and the finger is readily conducted to its smooth surface, where, also, the root of the cord is felt, if the placenta have been separated in the most usual way. If it have been rolled into a cylinder in separating, the finger may not reach the root of the cord, and will not feel the smooth, but the lobulated, surface of the placenta; still it may identify it as the placenta. If the placenta cannot be reached in such an examination, it may be inferred that it is still attached to the uterus.

The conduct of the practitioner must be determined by the result of this exploration. If the placenta is *not* detached, the abdominal frictions and pressure should be renewed and diligently kept up, repeating the vaginal examination, from time to time, to ascertain whether or not the placenta can be reached by the finger. Should these efforts to bring the placenta within reach, by exciting uterine contractions, be unsuccessful, there will be ground to conclude that some unusual obstacle exists, requiring for its removal more than the ordinary

treatment, which it is the object of this chapter to expound.

If, on the other hand, the placenta is detached, are we to wait for its natural expulsion? or, if we are not to commit the case unreservedly to the resources of nature, how long shall we wait before we proceed to extract the placenta? Different rules of practice have been inculcated by eminent teachers, in relation to this part of the duties of the accoucheur; without discussing their merits, I shall simply state my own views and the practice which I have ever pursued.

It has always appeared to me that when the placenta is detached and lying loose in the genital organs, there is no necessity of waiting for its expulsion by the contractions of the uterus. Writers, who attach importance to the recurrence of the uterine contractions for this purpose, do not discriminate, as they ought, between the tonic and muscular contractions of the parturient organ, and assign to each its appropriate office. Their anxiety for the return of pains is evidently predicated upon the supposition that the patient is in an insecure and perilous state without them; for their absence, it is imagined, is indicative of a relaxed condition of the womb, which might, at any moment, give rise to hemorrhage. With such views, it is no wonder that the artificial removal of the secundines, in the absence of uterine contraction, is condemned by them as rash and hazardous. But it has been shown that muscular contraction of the uterus has nothing to do, either with the separation of the placenta or the prevention of hemorrhage; these are the work of the tonic contractions, and the muscular is alone concerned with the work

of expulsion. The tonic contraction may exist in a high degree, as we can easily satisfy ourselves by the tests that have been explained, and yet, in this third stage of labor the uterus may be disposed to rest from its more active expulsive efforts, and tolerate, for a long time, the presence of the secundines in its cavity. It is wearied by the exertions it made, in the previous stages of labor, and withal it possesses less muscular force, as we have seen in a former chapter.

In this jaded and crippled condition of the uterus, if the placenta be allowed to remain in its cavity, there may be no return of expulsive efforts for hours or days; and meanwhile the secundines begin to decompose and emit an offensive odor; the genital surfaces become sore and heated, and the uterine orifice is contracted; so that when driven at last to extract the placenta, the practitioner encounters no little difficulty, and the patient suffers greatly on account of the procrastination.

If, then, the only good that can result from the return of laborpains is the expulsion of the placenta, lying loose and waiting to be expelled, and nothing but evil is to be expected should it be retained long, I cannot but regard it as culpable timidity or negligence in the practitioner, to call upon Hercules when he might help himself; for it is within his power easily and safely to extract the placenta, whether there be pains or not. For my own part, I am ready to avow that I seldom wait for pains, or inquire of the patient whether she feels them or not,—my only solicitude being to have the womb well contracted, and the placenta naturally separated. These conditions existing, I proceed, without delay, to extract the placenta, like a good *miller*

(pardon the pun), when its turn to be served comes, that is, after the matters, already specified as entitled to precedence, have been dispatched.

The extraction of the placenta and membranes is, usually, a simple affair. In its performance it is, however, proper to observe certain precautions which I proceed to suggest. The extraction is effected by tractions upon the cord, made by taking hold of it, near its cut extremity, with one hand, entwining it about the fingers to make the hold more secure, and seizing it between the thumb and fingers of the other hand, except the index, near the vulva,—the index being at liberty that it may be introduced into the vagina, to note the progress of extraction. Traction is to be made, in the first place, downward and backward, until the placenta is drawn into the vagina, and this direction may be given to the force by the hand next the vulva. Should there be any difficulty in causing the placenta to move in that direction, it may be overcome by pressing upon it near the root of the cord, with the points of two fingers, or by introducing two fingers deeply into the vagina, to press the cord toward the hollow of the sacrum, as far as possible, and holding them there as a pulley to give the desired direction to the force exerted by the other hand. When the placenta is brought fully into the vagina, traction is to be made upward and forward, in the direction of the axis of the vulvar space, when the placenta is readily brought through the external organ, at which time some pain is commonly complained of, and the diaphragm and abdominal muscles are excited to expulsive efforts.

When the placenta is extracted in this manner, it is doubled upon itself, and the membranes are inverted and turned over toward its uterine surface, as in cases of natural expulsion. The membranes are, however, liable to be broken off, and one or more fragments of them may be left in the uterus. No serious consequences need be apprehended from this accident; but the retained membranes may become the nucleus, around which blood coagulates, to form a mass of considerable size and firmness; and this being expelled, in the course of a few days, may be mistaken for a part of the placenta, and reflect discredit upon the practitioner. Or, this coagulum of blood may be supposed to be the uterus itself, prolapsed or inverted, or a polypus or other tumor, and give rise to great and unnecessary alarm. Instances of these mistakes and groundless alarms, have fallen under my observation. I remember one case, in which the medical gentleman who had delivered the patient, came for me in person, to go with him to her house, two days afterward; telling me that the patient had discovered something unusual about her, and that he found, on examination, a tumor of some kind, in the vagina, which he feared was the womb, displaced. Before coming for me, he had pushed up the supposed tumor, and inserted a tampon to hold it up. On removing the tampon, it was soon discovered that the tumor had no connection, whatever, with the parts; and upon extracting it, its true nature was disclosed by pulling it to pieces, and bringing to light its membranous substratum.

To prevent the laceration of the membranes, and the leaving any portion of them behind, it is a good rule of

practice to draw the placenta very slowly through the vulva; as it comes forth, take hold of it with the hand and twist it several times, in order that the membranes, by being twisted together, may be made stronger and less liable to break. The placenta ought, moreover, to be slowly *withdrawn* from the vulva, after it is disengaged, and the finger of the other hand should be passed into the vagina, to help along the tail of membranes, and to remove any fragments that might otherwise remain. He only can, to use a popular and expressive word, be said to have *cleared* his patient, who is careful to attend to all of these minutiae, which may appear finical to some.

5. The patient having been cleared, the next duty of the accoucheur is, to apply the binder for the purpose of giving support to the relaxed muscles and integuments of the abdomen, and, by its pressure upon the uterus, keeping up a due degree of tonic contraction, on which her safety so materially depends. A towel, long enough to go around the hips and wide enough to cover the abdomen, from the pubes to the cartilages of the ribs, or a piece of cloth of equal dimensions, makes a good binder, which has the advantage of being always at hand. It should be applied next the skin, which can be done under the bedclothes, by pushing one end of it, rolled like a bandage, under the back and hips, and unrolling it as it is brought forward over the abdomen, to be pinned opposite the side. It should be drawn quite tight over the hypogastrium, and slacker over the upper region of the abdomen; and if it be desirable to make greater pressure upon the hypogastrium, another towel folded can be placed under it as a compress. The only

objection to this extemporaneous bandage is, its liability to slip above the hips, which may be obviated by a strip of cloth passing between the thighs, and pinned to it before and behind, in the manner of the T bandage.

The proper application of the binder I consider a point of sufficient importance to demand my personal attention, in every case. I always apply it myself, unless the patient have a nurse, in whose intelligence and carefulness I have confidence. To justify this solicitude concerning a matter regarded as trivial by some, it may not be amiss to mention another accident, quite as alarming though not so dangerous as uterine hemorrhage, which the binder is calculated to prevent. I allude to faintness accompanied by sinking, bordering on collapse, which occasionally supervenes, shortly after the parturition. There may be other causes for this state, but I am persuaded that in many instances, it is owing to the sudden removal of the stimulus of distention, by the emptying of the gravid uterus, which acts in the same manner as drawing off the fluid of ascites, but more deleteriously, on account of the shock inflicted upon the nervous system, by the sufferings and efforts inseparable from childbirth. This persuasion rests upon observation in the lying-in chamber; for I have seen patients, prostrate and unable to speak above a whisper, with feeble, faltering pulse, cold extremities, and other marks of great depression, speedily aroused to greater animation by the careful application of a tight abdominal bandage, aided by a hypogastric compress.

6. Inasmuch as nothing is so essential to a woman, recently delivered, as rest and freedom from annoyance of every kind, at least until her exhausted powers are

recruited, it is a good general rule to direct an anodyne, before leaving her. The anodyne must necessarily be some of the preparations of opium; two teaspoonsful of paregoric, thirty or forty drops of laudanum, or half a grain of morphia, may be given, according to circumstances. I am aware that this practice has been condemned, on account of the supposed danger of its interfering with the proper contraction of the uterus; but this objection is, I apprehend, altogether theoretical, for I have never seen anything to countenance it.

## CHAPTER XXIV.

## ASPHYXIA NEONATORUM.—MORBID RETENTION OF THE PLACENTA.—UTERINE HEMORRHAGE, BEFORE AND AFTER THE REMOVAL OF THE SECUNDINES.

It has been already stated, that the duties and responsibilities of the obstetrician thicken in the third act of the drama of labor, and it may be added, not unfrequently great vigilance, on his part, is required to avert a tragical termination, either in regard to the mother or child. Pursuing the method already indicated, namely, enumerating and explaining his duties, in the order in which they most usually arise, we may consider the asphyxia of new-born infants among the first of the accidents demanding his attention.

The condition of an infant born asphyxiated, is analagous to that of adults after strangulation, or the respiration of gases unfriendly to life. It is, in fact, brought into this condition by the operation of the various causes that may arrest its umbilical circulation, or hinder the oxygenation of its blood, in the placenta.

The circulation of blood through the umbilical vessels is liable to be arrested by compression of the cord, where it prolapses before the presenting part of the child, especially the head; and, also while the head is detained in the pelvis, in nates presentations. The

oxygenation of the fetal blood, though it may flow into the placenta, is prevented by an inadequate supply of the mother's blood, in the maternal portion of the placenta, resulting from the long continuance of strong contractions of the uterus, after the escape of a portion, much more, of the whole, of the liquor amnii, and especially from the almost uninterrupted, as well as powerful, contractions induced by the administration of ergot. *The bowstring is not more murderous than ergotic contractions of the womb.*

Whether the fetal or maternal blood be prevented from circulating through the placenta, the effects upon the child are the same; its blood not being vitalized in the placenta, soon ceases to flow in that direction, and is sent, in unusual quantity, to its internal organs, particularly the brain; because such large currents as had been hitherto sent to the placenta, being suddenly stopped, the descending aorta cannot receive and distribute as much blood as before, and consequently more blood is thrown into the carotid and subclavian arteries. While this derangement of the balance of the fetal circulation is going on, the action of the heart grows feebler, for the want of duly oxygenated blood, until it altogether ceases,—never to be aroused again, unless the child be born in time to be recuscitated.

It is not difficult to recognize the existence of asphyxia in the new-born child. Its insensibility, immobility, absence of respiration, and of any effort to establish it, together with the cessation, usually, of pulsation in the cord, and the heart having ceased to beat,—in short, all the tokens of apparent death,—too plainly indicate it to allow mistake. To the signs just enumera-

ted, should be added, lividity and tumefaction of the surface of the body, especially of the face.

Asphyxia, produced by the causes that have been mentioned, and accompanied by the signs that have been described, may be called *simple*, to distinguish it from another form of the malady, not unfrequently met with in practice, which I propose to term *apoplectic asphyxia*, in which there is a deeper congestion of the brain, or, it may be, a still more serious lesion of this organ. This is treated of, by most writers, as apoplexy of new-born children ; but as it is generally associated with asphyxia, and differs from it only in degree, there is no necessity of separating them. Apoplectic asphyxia, although it may result from the same causes as the simple, is, I apprehend, most usually induced by severe and long-continued compression of the head, from difficult and instrumental deliveries,—whereby the blood is forced from the surface of the head to the brain, by pressure of the jugular veins, in face presentations, or by compression of the inferior parts of the body, in nates presentations, particularly where the feet are foremost, in consequence of which the blood is determined to the brain, because it is excluded from the lower parts.

Apoplectic asphyxia is accompanied with the same insensibility, immobility, and absence of respiration that attend simple asphyxia ; but the heart may continue to beat, and the umbilical arteries to pulsate, and there is greater lividity and swelling of the face, the eyes being prominent and injected with blood, and the pupils dilated. In both forms of the disease, when the means of resuscitation have been ineffectually applied, the heart and large vessels will be found gorged with black blood,

and cerebral congestion will be discovered: but in the apoplectic variety, there may be effusion of reddish serum upon the surface and within the ventricles of the brain, or extravasation of blood, coagulating into a layer, of considerable thickness, upon the surface of the cerebral hemispheres.

The *treatment* of asphyxia neonatorum may be divided into, 1. That which is proper in the simple variety of the malady: and 2. That which is recognized in the apoplectic form. Simple asphyxia is to be remedied by the employment of all the means calculated to put the respiratory apparatus in motion. Among these, one of the most powerful is, *sprinkling the surface, particularly the face and chest, with cold water*. For this purpose, the fingers should be repeatedly dipped in cold water, and shower the fluid, with considerable force, upon the parts indicated. The practitioner ought to be careful not to have the fingers too wet, so as to drench and chill the child, and after each application, or, at all events, now and then, the surface should be wiped dry and well rubbed. The skin is thus rendered more sensitive, and the probability is greater that the respiratory nerves will be excited through its medium. Desormeaux and P. Dubois recommend, as an excitant of respiration, which has more frequently succeeded in their hands than all others, a sort of douche upon the parietes of the thorax, made by filling the mouth with *eau-de-vie* (brandy), and spurting it forcibly upon the breast. It is, they say, rarely necessary to repeat this many times: it soon causes a convulsive contraction of the inspiratory muscles, blood and air penetrate the lungs, respiration is established, in an irregular manner at first, being

feeble and convulsive, but it speedily becomes stronger and more regular (1). I have no experience of this, but it evidently acts on the same principle, and its effects are the same, as sprinkling with cold water.

With the same view, frictions should be made on various parts of the body,—upon the extremities, accompanied by smart slapping of the palms of the hands and soles of the feet, along the spine, upon the temples, etc. Smellie seems to have had great faith in flagellation, as a means of resuscitating still-born children. In his “Treatise on the Theory and Practice of Midwifery,” he observes, “Whatever augments the circulating force, promotes respiration; and as this increases, the circulation grows stronger, so that they mutually assist each other. In order to promote the one and the other, the child is kept warm, moved, shaken, *whipped*; the head, temples, and breast rubbed with spirits; garlic, onion, or mustard applied to the mouth and nose,” etc. Speaking, in his “Collection of Cases,” of the different means had recourse to, to resuscitate a still-born child, after delivery by turning, in a difficult case of shoulder presentation, he says, “That which had the greatest effect, was whipping his little breech, from time to time, for which I ask pardon of my old friend and preceptor, *Dr. Nicholls*.” The mucous membranes may also be irritated, as, for example, by holding camphorated spirits, hartshorn, etc., to the nose, and a little camphorated or simple spirits may be put in the mouth. Of blowing the fumes of burnt paper into the anus, recommended by Baude-locque and others, I have no experience.

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(1) Dictionnaire de Medecine, article Nouveau-né.

The warm bath is advised by almost all writers, but I have seldom used it; and the little I have seen of it, has not impressed me very favorably. Should the means already recommended fail to arouse the child, the next recourse is, artificial inflation of the lungs; and if this does not succeed, nothing more can be done. To inflate the lungs, I have been in the habit of applying my mouth to the child's, after having made a deep inspiration, and expiring the air, pretty forcibly, taking the precaution to close its nostrils with the fingers of one hand, while those of the other press moderately upon the trachea, to close the esophagus, to insure its passage into the lungs. Successful inflation is indicated by the rising of its chest, when the blowing is to be intermitted and the air forced out, by pressure with the hand upon the chest and abdomen; the blowing is then to be repeated, alternated with pressure, until respiration is established, or we are convinced of the hopelessness of our efforts. These efforts must not, however, be relinquished until they have been fully and fairly tried, —for I have known them succeed, after the lapse of half an hour of disappointment.

In the apoplectic form of asphyxia, the great remedy is *bloodletting*, which must be promptly practiced by cutting the umbilical cord, when, if its circulation be active, blood immediately spouts from its arteries. We have been directed to receive the blood in a vessel or upon a diaper, that we may estimate the quantity subtracted. But I take no such precautions; and instead of looking nervously at the blood, look at the child's countenance, watching the chasing away of its purple hue by the rosy tints of health; and when its complexion is

good, I arrest the bleeding. While the blood is flowing, the child usually begins to breathe, at first with a sort of convulsive struggle, but presently it breathes deeply, and announces, by its cries, that it has escaped the danger that menaced it at the portal of life. If the umbilical pulsation be faint or extinct, blood cannot be procured so freely from the cord; when the bleeding should be promoted by stroking it and immersing the child, to its naval, in warm water, made more stimulating by the addition of salt or mustard. If blood cannot be obtained in this way, a leech should be applied behind one or both ears. If bloodletting fail to resuscitate, the other means, already recommended in simple asphyxia, should be tried.

I have said nothing of bloodletting, in the treatment of simple asphyxia; cases of this kind do, nevertheless, occur, in which it is not only proper but highly beneficial. Whenever the child is decidedly plethoric and congested, although the congestion may not reach the height of apoplexy, it is useful and salutary to detract blood from the cord. Nay, ample experience justifies me in saying, that, when even simple asphyxia does not exist, if the child be plethoric and discolored, showing that it has suffered from the manner in which it has been ushered into the world, it will be benefited by losing a little blood, and secured, as I have reason to believe, from the convulsive affections, inflammations, and hemorrhages, to which it would be otherwise obnoxious.

*Morbid retention of the placenta.*

In the preceding chapter, the means of promoting uterine contraction, to insure a prompt *separation* of the placenta, were pointed out. These means are so efficacious, and, indeed, the tendency of unaided uterine action to detach the placenta is so strong, that where it is not speedily detached, there is reason to fear the existence of some unusual obstacle. The practitioner ought, nevertheless, to persevere in the assiduous use of his abdominal frictions and pressure, for at least an hour, before he despairs of their success. If, at the expiration of this time, he is still unable to feel the placenta or any part of it, in an ordinary vaginal examination, he may conclude that *morbid retention* exists, and proceed to inquire into its nature. In such a case, it will be found that the placenta is retained by one or the other of the following causes, viz., *atony of the uterus*, *morbid adhesion of the placenta*, or *irregular contraction of the uterus*, which, as they require a difference of treatment, must be separately considered.

*Atony of the uterus as a cause of retention.*—This may be ascertained to exist by the large size, and flabby, amorphous feel, of the uterus, examined through the parietes of the abdomen. There is, likewise, an entire absence of pains, and the placenta cannot be reached by the finger, passed along the cord made moderately tense. If the placenta be partially detached, there is, necessarily or, at least, commonly, uterine hemorrhage; but if it retain its connection with the uterus, no blood is effused, and the woman is in no immediate danger.

Undue protraction of the previous stages of labor,

is, according to my observation, the most common cause of uterine atony, in the third stage, the parturient power being so exhausted as to be inadequate to further vigorous exertion. But it may happen that too prompt expulsion of the child will leave the uterus in this atonic condition, because the organ is, then, as Baudelocque expresses it (1), taken by surprise and is so stupefied as to have its contractile faculties suspended. On the same principle, the extraction of the child, by manual or instrumental force, in the absence of pains, may be followed by atony of the uterus.

When uterine hemorrhage attends retention, from this cause, all are agreed as to the imperative necessity of extracting the placenta, with suitable precautions to insure a due degree of tonic contraction of the uterus. But if there be no hemorrhage, there is not the same accord, but discord rather, among writers and practitioners as to the proper course of procedure. Some maintain that after a limited and specific time, the accoucheur ought to interpose and terminate the suspense of the patient, while others deprecate interference merely on account of the lapse of any time. To the latter class belonged our celebrated countryman, Dr. Dewees, who, for so long a period, ruled our obstetrical realm with an absolute sway. "I have always objected to making 'time' the criterion for action in midwifery," says Dr. Dewees, in discussing the subject now under consideration; and on the next page he declares, "When this state of things presents itself," (*viz.*, retention from want of tonic power) "all attempts to deliver the placenta must be forborne, until we have, by properly in-

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(1) Par. 232.

stituted frictions over the region of the uterus, obliged it to contract and harden itself under the hand" (1). But what if the uterus wont be "obliged" to harden, and obstinately remains flaccid? We have been rubbing it for an hour, according to our directions, and still it is as incoherent as dough; how much longer shall we rub? *Quousque tandem abutere, pontifex obstetricie, patientia nostra?* So unfruitful have occasionally been all my efforts of this kind. There is a more direct and powerful means of exciting the uterus to contraction; why not resort to it now, without relying any longer upon that which has baffled us for the space of an hour?

The more powerful uterine excitant, to which reference is made in the preceding paragraph, is, the introduction of the hand into the flaccid cavity, to arouse its torpid parietes, to action, and to withdraw the placenta. My own "fixed" rule of practice, in this case as well as in retention from the other causes mentioned, is, to have recourse to this manipulation, in an hour after the birth of the child, it being understood, of course, that all other means have been diligently but vainly tried within the hour. The passage of the hand, well lubricated with oil or lard, along a track so recently traversed by the child and yet patulous, from atony, is neither a painful nor difficult operation. In performing it, the patient must be placed on her side, or, if she lie on her back (which I commonly prefer), her pelvis must be near the edge of the bed, with the perineum slightly projecting, her feet being supported on chairs, or the laps of assis-

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(1) Midwifery, Chapter 32, of the Assisted Delivery of the Placenta.

tants, because the head having to follow the axis of the excavation, the arm must necessarily be greatly depressed. The practitioner should pull off his coat and roll up the shirtsleeve of the arm, usually the right one, which is to be used in operating: the latter part of the preparation ought not to be made in view of the patient, or, indeed, of the bystanders. It can be done, as well, under the covering which protects the patient against unnecessary exposure and him from prying observation.

The preliminaries being settled, the accoucheur takes the cord in his left hand, twisting it about the fingers to get a secure hold of it, and draws upon it until it is straightened or rendered a little tense. The cord is to be thus held, as a guide to conduct to the placenta the other hand, which, formed into a cone, by pressing the fingers closely together and flexing the thumb upon the palm, is now introduced in the direction of the axis of the inferior strait, viz., upward and *backward*, until it is fairly lodged in the vagina. It next enters the uterus; and, in this part of its introduction, it moves upward and forward, in the direction of the axis of the superior strait, while an assistant presses on the abdomen to steady the uterus. Conducted by the cord, the hand arrives at the placenta, upon which pressure is to be made with the knuckles, while counter pressure is kept up by the other hand (now no longer needed to hold the cord), through the walls of the abdomen. The hand is, also, moved about in the uterine cavity, and brought in contact with other points of its parietes, to stimulate them to contraction. It happens sometimes that when contractions cannot be provoked by these assaults of the hand, they are evoked by feigning a re-

treat in partially withdrawing the hand. Cases occasionally occur, in which neither of these maneuvers is successful, and then I have not scrupled to make a cautious separation of the placenta, by a finger insinuated between it and the uterus, which will hardly fail to excite contraction. When contraction takes place, it may separate the placenta, or complete the separation the practitioner had commenced, and the hand may now be withdrawn, bringing the placenta along with it. If the placenta be separated, partially or wholly, the hand must never be withdrawn until the uterus is felt to be in a state of vigorous contraction, for the patient would be exposed to the risk of hemorrhage from the exposed orifices of the utero-placental vessels.

I know that the manual extraction of the placenta, under the circumstances described, in an hour after the termination of the second stage, has the appearance of a cruel operation, uncalled for by the actual condition of the patient. She is suffering no pain, is in no immediate danger, and if let alone, *might* do well, uterine contraction, after the lapse of a longer time, coming on and finishing its work, with less pain than is inflicted by artificial delivery. The arguments for delay are specious, and apt to captivate the timid or too sensitive practitioner. The reasons which justify the more decisive course I have recommended ought, therefore, to be set forth so strongly, if possible, as to induce its general adoption. Let it be remembered, then, that the placenta cannot be allowed to remain in the uterus, without the imminent risk of alarming hemorrhage, which may occur at any moment, and destroy the patient before the practitioner can come to her rescue. Her condition is,

therefore, in this respect, so perilous, that the medical attendant would hardly be excusable in leaving the house, unless, indeed, his residence be very near, and even then he may be out of the way when an urgent message is sent to recall him. The practitioner is consequently fettered, and the patient is anxious about her situation. Supposing that she escapes hemorrhage, she is liable to offensive discharges from the genitals, produced by putrefaction of the placenta—discharges so offensive as to infect the chamber, though spacious, with their odor, and taint even the adjoining apartments,—and then constitutional symptoms, of the most alarming kind, may supervene: “purgings, vomitings, sweatings, a pulse of one hundred and forty, a cheek of typhoid tint, and a brown tongue.”

The latter part of this sketch is taken from an author, partly in his own words, who is by no means as decided in his determination to remove the placenta as some others; and who speaks of leaving this mass in the uterus with more complacency than is, I think, allowable, because he had “*noted more than one case, in which the placenta had remained a long time in the uterus, without a single conspicuous symptom of irritation becoming manifest.*” Dr. Blundell, the author referred to (1), seems to have experimented a good deal in this way, and that apparently from the strong repugnance he manifests, everywhere and in every variety of expression, in his lectures, against the introduction of the hand into the uterus, which he never recommends, but

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(1) Lectures on the Principles and Practice of Midwifery, edited by Charles Severns, M. D., Lecture XXX.

in connection with the risk incurred by it, when there is any difficulty in the operation, of *bruising*, and *tearing* the parts, and the consolatory prospect of *inflammation*, *sloughing*, and *death*, as its result. To this sketch of the consequences, likely to arise from leaving the placenta in the uterus, already sufficiently gloomy, I will only add that, should it become necessary to remove the placenta, at a period somewhat remote from the birth of the child, the difficulty of the operation is greatly enhanced, and there may, then, be real danger, while the patient must necessarily suffer great pain, on account of the soreness and swelling of the parts.

These considerations gave fixity to the rule which I early adopted for the government of my practice, in these cases, namely, the rule to deliver the placenta manually at the expiration of an hour from the close of the second stage. I have had no reason to repent my adherence to the rule; no uteruses have been torn or bruised, or destroyed by inflammation and sloughing and never having, in a single instance, allowed the placenta to abide in the uterus, I have never, in my own cases, snuffed the intolerable stench of its putrescence. Is it necessary to fortify myself with authority? Hear what Burns says: "We ought never to leave the bedroom, until the placenta be expelled; if it be not excluded in an hour after delivery, we ought to extract it (1).

I have said nothing concerning *ergot*, which is recommended by some, or the various other *deobstruents*,

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(1) Principles of Midwifery, Philadelphia edition, 1823, vol. I, p. 375.

as they are called by Dr. Blundell, who discourses at some length in their favor as remedies for retained placenta. Among these are, injections of senna and salts into the rectum, coughing, sneezing, blowing on the back of the hand (why deviate from a more ancient direction, to blow into a bottle?), but above all, *retchings*, provoked by tickling the throat with a feather. I have no experience with any of these things, because I regard them as trifling and uncertain, and know that my hand will not forget her cunning. I beg that the reader will not infer, from my commendation of the hand, that its introduction into the uterus is an every day feat with me. Far from it. According to my experience, there will seldom be occasion for it, on account of atony, if the previous parts of labor have been properly managed.

*Retention from morbid adhesion.*

This obstacle to the natural exclusion of the placenta, is occasionally met with in practice, and is more alarming than simple atony, because, according to my observation, it is more apt to be accompanied by hemorrhage, owing, as we may suppose, to all parts of the mass not being equally firmly adherent, and the separation of the less adherent portion, exposing the mouths of bleeding vessels. The existence of morbid adhesion of the placenta may be *suspected* when the uterus feels firmly contracted, and the placenta is, notwithstanding, so high as to be beyond the reach of the finger: but it can only be certainly detected by the hand, carried into the cavity of the womb.

When morbid adhesion of the placenta is suspected, the means already directed to excite the uterus to more

powerful contraction, should be diligently employed for an hour (unless hemorrhage appear, and then no delay is proper); and if these do not answer, we must proceed to its manual extraction. Baudelocque (1), and after him, our celebrated countryman, Dr. Dewees (2), inculcated the practice of applying force to the placenta, by means of the cord, for the purpose of disrupting its attachments and bringing it away. In order to the success of this method, they tell us, that the force must be directed in such a manner as to act perpendicularly to the surface of the placenta; in order to which, again, it must be ascertained to what part of the uterus the placenta is adherent, and then, by arranging a couple of fingers in the vagina, as a pulley for the cord to be drawn over, the required direction can be given to the force. I have no experience of this maneuver, having always regarded tractions upon the cord, in cases of retained placenta, no matter from what causes, as unsafe, on account of the danger of inverting the uterus. It was not, therefore, without surprise, that I discovered, that a late and generally judicious writer, Dr. Robert Lee (3), recommends these tractions, as a part of the ordinary management of the placenta. Discoursing of the treatment of natural labor, he says, "When a pain is felt, slight traction, in the direction of the axis of the brim of the pelvis downward and backward, should be

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(1) *L'Art des Accouchemens*, chapter 5, section 5. Des obstacles qui proviennent des adhérences contre nature du placenta, et de ce qu'il convient de faire en pareil cas.

(2) *Midwifery*, chapter 32.

(3) *Lectures on the Theory and Practice of Midwifery*, Philadelphia edition, 1844, page 222.

made upon the cord," and with what object? why, "to promote the separation of the placenta from the uterus." "By compressing and squeezing the fundus uteri," he continues, "and gently pulling from time to time, on the cord, the placenta usually descends, and passes through the os uteri into the vagina, in the course of a quarter of an hour, or twenty minutes, or half an hour after the birth of the child." "More anxiety," he adds, "is often felt by us during this period, than during the whole of the previous stages of the labor, and not without good reason." Not without good reason, I would say, certainly; for, were I to imitate Dr. Lee's practice, in this particular, I should, undoubtedly, feel anxious, instead of being composed, as I usually am, by the confident expectation that the uterus can be excited to detach the placenta, and bring it within easy reach. Even in view of the possibility of being disappointed in this expectation, I am not dismayed, for I remember my *hand*.

To return from this digression. The safest and most reliable treatment of morbid adhesion of the placenta, consists in the introduction of the hand, in the manner and with the precautions already described; and when it reaches the placenta, endeavoring to excite the uterus to throw it off, by pressing on its surface, or, as Burns directs, by gently rubbing, or as it were, pinching it up between the fingers and thumb. Should these efforts fail, and this has happened in my hands, we may be under the necessity, contrary to the prohibition of this high authority, of breaking up the adhesion with the finger, insinuated between the placenta and uterus. The operation is to be executed as rapidly as is consistent with its proper performance, for, as the placenta is

being detached, the mouths of the uterine vessels, running to it, are unstopped, and blood is felt trickling, or, it may be, streaming down the arm. When the placenta is separated, it is to be abstracted with the coöperation of uterine contraction.

*Retention from irregular contraction of the uterus.*

Irregular contraction of the womb is most apt to ensue after unusual prolongation of the previous stages of labor, more especially where the membranes are ruptured prematurely, and the liquor amnii flows away entirely, before the child engages in the os uteri. The tendency to unequal and irregular contraction, under such circumstances, has been noticed in the former part of this treatise, and the chosen seat of it has, also, been pointed out. That seat, it will be remembered, is the upper part of the neck, the cervico-uterine orifice. Whether contraction exists, at this part, prior to the expulsion of the child, hindering its escape, or takes place immediately after its birth, the uterus, it is evident, will be divided into two cavities, — a superior cavity, that of the body, and an inferior cavity, that of the neck, — and the entire organ will resemble an hour-glass, only its superior compartment is much the largest. From this similitude, the contraction itself is called the *hour-glass* contraction of the womb.

The above is substantially the description given of this morbid state of the uterus, by Baudelocque, in section seven, of the chapter cited a little while ago, and most subsequent writers have confirmed its accuracy. It accords certainly with my own observation; but recently it has been confidently asserted that this kind of irre-

gular contraction is exceedingly rare, compared with others, and it has even been denied that it ever occurs in practice. The first affirmation is made by Dr. Francis Ramsbotham(1), who says, "We hear much of hour-glass contraction of the uterus, but my belief is, that there is (are) no rarer cases in midwifery than the real and true hour-glass contraction, such as I have described it." A little further on, he observes that he does not recollect to have met with more than three or four cases that perfectly agreed with his idea of the true hour-glass contraction. And what is his idea of the contraction in question? That is sufficiently explained in the text and illustrated by a figure, No. 137. It is contraction of the *central fibers of the body*, dividing the uterus into equal compartments. Dr. Ramsbotham may be esteemed fortunate (if it be good fortune to meet with varieties), in meeting with three or four such cases, for I avow that I have not encountered a single instance of it, although my practice has furnished me with not a few cases of the genuine hour-glass contraction, such as I have described it. After quoting the statement of Professor Burns, that "in almost every instance, this contraction takes place, that he scarcely ever introduced his hand into the uterus, in a case of flooding, without meeting with it, whether the placenta had or had not been expelled," Dr. Ramsbotham intimates that he had mistaken the whole cavity of the uterus for an upper chamber, the os uteri for the constriction of the central fibers of the body, and the dilated vagina,—having in it a coagulum of blood,—for the lower chamber! It is much more probable that Dr. Ramsbotham may have overlooked the os uteri, which is commonly lax and

gaping for several hours after labor, and mistaken the cervico-uterine orifice for it, in what he calls *globular* contraction of the uterus, than that the Scotch professor was so egregiously deceived, in the great number of cases attended by him.

I am led, by the remark in the concluding part of the preceding paragraph, to examine into the reality of the other kinds of irregular contraction, which, according to Dr. Ramsbotham, are so much more common than the hour-glass contraction. It will be fair to allow him to describe them: "Sometimes the uterus contracts globularly on the placenta, sometimes longitudinally, assuming somewhat the shape of a sugarloaf; at others, it contracts with a corner, so that in one part or other there is a sack, in which the principal bulk of the placenta is retained; the other portions of the organ being in a relaxed state. Sometimes it contracts with a sharp ridge anteriorly, something like a hog's back; but this is rare." Of these multifarious and grotesque contractions I have only to say that they are not contractions at all, in the sense in which we are now considering irregular uterine contraction, that is, as offering an impediment to the escape of the placenta; but, it appears to me, they are the unequal contraction of the uterine fibers, resulting from preternatural adhesion of the placenta. Dr. Ramsbotham allows that morbid adhesion of the placenta is a frequent concomitant of his irregular contraction; to me it is manifest that they are the necessary *effects* of such adhesions, and are not chargeable with the retention of the placenta. Whenever morbid adhesion exists, if the uterus retain its ordinary power of tonic contraction, every part of its parietes will con-

tract in a greater degree than the part to which the placenta is connected, and thus alter the shape of the cavity variously, according as the placenta is attached to one or another of its parietes. This will explain all of Dr. Ramsbotham's contractions, except his *globular*, which, it has been already insinuated, may have been hour-glass contraction (Baudelocque's hour-glass contraction, not Dr. Ramsbotham's), in the cases wherein he thought he discovered it. If this were not its character, I am, I confess, in the dark concerning it. My experience has, indeed, supplied me with cases of the placenta, shut up in the cavity of the uterus, by closure of the os uteri, the uterus being sufficiently firmly contracted, and quite as globular as could be desired. But, in every such case, the labor had been badly managed, pains did not come on to expel the placenta; it was suffered to remain in the cavity, though separated, and sufficient time, twenty-four hours or upward, had elapsed to allow the os uteri to contract. Here, contraction of the os uteri was not the cause of the retention of the placenta, however much it may be in the way of its extrication, but the want of expulsive contraction and the inefficiency of the practitioner, in permitting the placenta to remain until the os naturally closed upon it.

The treatment of hour-glass contraction, which is the only irregular contraction that can operate as an impediment to the delivery of the placenta, is simple, though it may be difficult and painful in the execution. It consists in the introduction of the hand and the insinuation of the fingers, one after another, within the stric-tured portion of the uterus, for the purpose of dilating it and giving access to the upper chamber, where the

placenta is incarcerated. This stricture is usually so great as to leave an aperture no larger than the cord, around which it is formed, and so firm that very persevering efforts are required to overcome it. To be safe or successful, our efforts must not be violent but steady, and we must be content to gain our end by slow degrees. It may take an hour or more to overcome the resistance of the constriction, and get the hand fully in the upper chamber, when the placenta is to be grasped, after separating it, if it be found adherent, and slowly withdrawn; observing whether the fundus contracts after the hand, and if it do not, pressing against it, making, at the same time, counter pressure externally with the other hand, until it is excited to contraction.

The manual removal of the placenta, in cases of hour-glass contraction, is, as already intimated, a painful operation,—few operations are, indeed, more painful,—it will, therefore, be proper to do all we can to diminish the sufferings of the patient. A large dose of laudanum, eighty to a hundred drops, may be administered; and the extraction of the placenta should be deferred until the system is under its narcotic influence. I have not had an opportunity to try chloroform in a case of this kind; but from what I have seen of its effects, in obstetrical and surgical practice, I am convinced that it will be found more efficacious than opium. In a case of instrumental delivery that occurred in my practice, twelve months ago, it was found necessary to introduce the hand into the uterus to extract the placenta, retained by atony, and this was done without the slightest manifestation of suffering, the patient being under the influence of chloroform.

*Uterine hemorrhage.*

The last topic which will engage our attention is *uterine hemorrhage*, occurring in the third stage, either before or after the removal of the placenta. Uterine hemorrhage, during any of the stages of labor, or the latter months of pregnancy, before labor comes on, is not like the hemorrhages to which other organs are obnoxious from morbid states, but resembles more hemorrhage from injuries, which come within the province of the surgeon. It is, in fact, essentially of the same nature. Wounded arteries and veins bleed, because they are cut,—the effusion of blood being purely *passive*, in the sense, at least, that preternatural momentum of the circulation has nothing to do with causing it. As long as the circulation goes on, no matter at how feeble a rate, blood will continue to flow from the divided vessels, until they are secured by ligature, or stopped by coagula. Just so with regard to uterine hemorrhage, toward the close of pregnancy or at the time of parturition. Blood flows from the denuded orifices of the utero-placental arteries and veins, whenever the placenta is separated, and will continue to flow until it is arrested by coagula, or nature's ligatures. These ligatures consist in the muscular fibers of the uterus, that encircle the blood-vessels, and they are *tied* by the tonic contraction of the uterus. If the uterus be well-contracted, the ligatures are tightly drawn; if it be relaxed, they are loose about the vessels: hence the satisfaction of the intelligent obstetrician, if he find the uterus firmly contracted, after the expulsion of the child, and his anxiety (which he

must, however, keep to himself), if he find it flabby, or fail to find it at all.

These hemorrhages have, on account of their profuseness, been very appropriately denominated "floodings:" blood suddenly rushes from the uterus in a stream, deluging the bed and dripping through it, and unless speedily arrested, the patient is blanched by the draining of her vessels. The blood, thus pouring out, is chiefly venous, for the veins are much larger than the arteries, and they have not the power to close themselves which the arteries possess, by the contractility of their coats, but are dependent on the surrounding muscular fibers.

Uterine hemorrhage occasionally occurs in the first and second stages of labor; but this happens so seldom, according to my experience, compared with its frequency in the third stage, that we have scarcely any reason to expect it in the former, but every reason to dread it in the latter, without great vigilance on our part, and sometimes in spite of all the vigilance we can bestow. We do not do our duty, unless we remember that it is a covert, as well as an open, enemy of parturient females, and may intrench itself in the womb, after having barricaded the external orifice with coagula. In this concealed situation, it may sap the foundation of life, and the practitioner not be aware of danger until he sees the edifice tottering to its fall. Dr. Gooch very properly remarks, that the constitution suffers from this *internal hemorrhage* as if an equal quantity of blood were discharged externally,—the blood in either case being out of the circulation,—and consequently the danger is equally great. "I have," says he, "seen many cases of

internal hemorrhage. Not long since I was requested to attend at the examination of the body of a female who had died soon after delivery ; the labor appeared to have terminated favorably, and the accoucheur had left her : soon afterward she became pale and fainted : he was immediately sent for ; but just as he arrived she expired. There was no external discharge of blood ; he knew not to what so fatal a change could be imputed. As soon as we entered the bedroom to examine the body, we perceived that the abdomen was much above the level of the body, and appeared as prominent as that of a woman seven months gone with child. The uterus, on its exposure, was seen to be enormously distended ; and although there was no external evidence of hemorrhage, on cutting into it we found a mass (amounting to a gallon) of coagulated blood" (1). We now and then hear of sudden deaths among parturient females, in all parts of the country, astounding the friends on account of their unexpectedness, nothing having occurred in the previous stages of the labor to prepare them for such a catastrophe. In many of these melancholy cases, concealed uterine hemorrhage was the fatal foe, — so much the more fatal because unsuspected. It should, therefore, be engraven on the memory of every practitioner of midwifery, in capital letters, that UTERINE HEMORRHAGE IN THE THIRD STAGE IS THE GREAT DESTROYER OF PARTURIENT WOMEN.

These observations upon the nature and tendency of uterine hemorrhage, in this stage of labor, being premised, we may proceed to consider the most effectual

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(1) Practical Compendium of Midwifery.

weapons with which we can arm ourselves when called to combat it. First, *hemorrhage before the extraction of the placenta*. The treatment in this condition ought to be modified by the previous circumstances of the case. If a discharge of blood should take place immediately after the birth of the child, we may try *frictions* and *pressure* over the uterus, with the hope of exciting sufficient contraction to arrest it. These means not proving efficacious as promptly as we desire, we may resort to *cold*, either by repeatedly wetting our hands in cold water, while pressure and frictions are making with them on the naked abdomen, or by applying cloths from which cold water or a mixture of vinegar and water is wrung out. But if the discharge appear later, notwithstanding frictions and pressure had been used as preventives, or in the event of the failure of these means quickly to control it, where it commences immediately after the birth of the child, it must be met by the introduction of the hand into the cavity of the womb, for the double purpose of compelling it to contract and of removing the placenta. In cases of internal hemorrhage, no time should be lost in trying the milder remedies, because by the time it is discovered, by the pallor of the patient's countenance, the feebleness of the pulse, faintness, sickness at the stomach, large size of the abdomen, etc., she has already lost so much blood, and the uterus is so little disposed to contract, that we must use the club of Hercules to kill the lion of Nemæa, or it will kill our patients,—and this club is neither more nor less than the HAND, carried into the uterus to press upon its internal surface, aided by counter pressure

from without, and to withdraw the placenta, as soon as it is perceived that the uterus is contracting.

I have said that one of the objects of the hand's intromission is to excite uterine contraction, and I have been careful to give precedence to this indication, because it is paramount. What would it avail to evacuate the uterus, by bringing away the placenta, and leave its walls as relaxed as an empty sack? And yet this is the practice inculcated by M. Velpeau, which can hardly be contemplated without a shudder; and it is surprising that neither his American translator nor the editor of the third edition of his midwifery, published in this country, protested against it. Speaking of hemorrhage before the delivery of the placenta, M. Velpeau says, "Whether it depends upon inertia, spasm, plethora, or irritation of the womb, it is always a dangerous phenomenon, which we ought to make haste to combat; if the presence of the placenta is not the only cause, it at least serves to keep it up and aggravate it; we should, therefore, be diligent in extracting it, even although there should be inertia!" (1) M. Velpeau professes to be in doubt as to the cause of the hemorrhage, but he does not hesitate to say that it is "improperly attributed to the noncontraction of the womb, in consequence of which the blood must flow in torrents from *supposed* orifices that remain gaping upon the internal surface of the organ," and then straightway he envelops himself and his reader in a fog of puerile conjectures. Now, if

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(1) An Elementary Treatise on Midwifery; or Principles of Tokology and Embryology, translated from the French, by Charles D. Meigs, M. D., with notes and additions by William Harris, M. D., Philadelphia, 1845, p. 544.

there be any one principle in practical obstetrics firmly established, it is precisely this: that a relaxed uterus will bleed profusely, soon after the birth of the child, if the placenta be detached, while a contracted uterus cannot bleed; and to call in question the existence of large vascular orifices, especially venous, where the placenta had been attached, is preposterous, because any one may see them, and thrust the end of his little finger into some of them. It is fortunate for M. Velpeau that the uterus is prone to contract, on the introduction of the hand, and particularly when it is being withdrawn, else it cannot be doubted that his practice, in these cases, would prove disastrous in the extreme. This contraction may, however, fail to take place, if no precautions be adopted to insure it: it cannot, therefore, be believed, by any one holding correct doctrine on this vital and deeply interesting subject, that the practice of M. Velpeau is as successful as that which sound principles prescribe.

In the treatment of hemorrhage, while the placenta is retained, I have said nothing of injecting the umbilical vein with cold vinegar and water, or brandy and water, of administering styptics, or even ergot, because none of these things can be relied on: the HAND, the HAND is the main chance.

*Secondly; Hemorrhage after the extraction of the placenta.*—The same indication is presented here as in the first case, namely, to excite uterine contraction; but it may be fulfilled by other means, though the hand is to be held as *une chose de réserve*, in the event of their failure. These means are, 1. Firm pressure upon the naked abdomen, by both hands, with a movement of the

fingers as if we aimed to grasp the uterus and amass its flabby, floating parieties. When this manipulation is commenced, the uterus is nowhere to be felt; but if it be successful, we presently feel it gathering itself up and becoming hard to the touch. In proportion as the uterine globe is formed, from the preëxisting chaos, the hemorrhage subsides, and when it feels uniformly hard, we know that our patient is placed on *terra firma*.

2. The application of cold, in the manner already directed, viz., by cloths wrung out of cold water, or by cold water, poured in a small stream from a pitcher or teapot on the abdomen. Cold cloths may likewise be applied to the vulva, and ice may be deposited in the vagina. Cold, freely and boldly used, is a powerful agent; and I have met with very few cases of hemorrhage, of this kind, that did not yield to it, in conjunction with grasping pressure. When such cases do occur, we must, as already intimated, introduce the hand into the uterus to arouse it from its stupor. It seems to have been a favorite practice of Dr. Gooch, to press with the hand against the bleeding surface, and with the open hand on the outside of the abdomen, make counter-resistance to the first on the inside; and in this way, he says, he has known the most profuse hemorrhage suppressed (1). My own experience does not enable me to decide on the merits of this particular manual operation, because, as already stated, I have seldom had occasion to insert my hand, in these cases; it may, however, be doubted whether any special efficacy can be claimed for

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(1) Op. Cit., p. 154.

it, unless, indeed, pressure be made strong enough to contuse and staunch the bleeding vessels, independently of uterine contractions—a procedure not required by the nature of the case,—to say nothing of the risk of dangerous consequences. Contraction is emphatically the one thing needful.

Some practitioners are in the habit of administering ergot, in the hemorrhage under consideration. There is no harm in giving the article, provided we put no trust in it. I mean to say that ergot might possibly do good; but that its operation is too precarious to justify any one in relying on it, to the neglect of the more certain resources which have been pointed out. There is another expedient, adopted by some, and sanctioned by high authorities, which is not so harmless,—I allude to the *tampon*. To attempt to control hemorrhage from an empty and flaccid uterus, by plugging the vagina, is highly hazardous. We may, it is true, prevent the issue of blood by this expedient, but we can have no assurance that it will not continue to pour from the vessels and collect in the uterine cavity, until life is exhausted. It is better to contend with an open than a lurking enemy; for though we were fully able to cope with him, we might be circumvented by his wiles. Let the blood, then, have an unobstructed channel; we can, the more clearly, discern our patient's danger—which it is folly to hide from our eyes,—and shall be incited to more earnest efforts to save her from impending death.

## ERRATA

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The Author, having been so circumstanced as to exercise but a partial supervision of the press, begs the reader to excuse and correct the following errors:

Page	vii.	—	Preface—	line	37,	for first	<i>this</i>	read	<i>his</i> .	
"	9,	—	Text—	line	3,	for points	read	<i>point</i> .		
"	15,	"	"	"	14,	"	ascribed	read	<i>described</i> .	
"	52,	"	"	"	23,	"	indicate,	read	<i>indicated</i> .	
"	74,	"	lines	10	and	20,	for	Gardier,	read	<i>Gardien</i> .
"	129,	"	line	14,	for	a,	read	<i>the</i> .		
"	209,	"	"	"	14,	"	vagina,	read	<i>vagina</i> .	
"	241,	"	"	"	24,	"	hand,	read	<i>head</i> .	
"	242,	"	"	"	13,	"	capet,	read	<i>caput</i> .	
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"	302,	"	"	"	24,	"	affected,	read	<i>effected</i> .	
"	357,	"	"	"	29,	"	position,	read	<i>presentations</i> .	
"	362,	"	lines	15	and	19,	for	guttero,	read	<i>gutturo</i> ,
"	364,	"	line	1,	for	specieux,	read	<i>spacieux</i> .		
"	378,	"	"	"	27,	"	the,	read	<i>then</i> .	
"	396,	"	"	"	6,	"	to,	read	<i>below</i> .	
"	406,	"	"	"	22,	"	dependant,	read	<i>dependent</i> .	
"	420,	"	"	"	3,	"	twist,	read	<i>twirl</i> .	
"	426,	"	"	"	9,	"	recognized,	read	<i>required</i> .	
"	432,	"	"	"	7,	"	tandum	read	<i>tandem</i> ,	



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