





AMUSSAT'S LECTURES

ON

RETENTION OF URINE,

CAUSED BY

STRICTURES OF THE URETHRA,

AND ON THE

DISEASES OF THE PROSTATE.



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WITH THREE PLATES.



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## P R E F A C E.

IN the work now published, under the title of "Dr. AMUSSAT'S *Lectures on Retention of Urine caused by Strictures of the Canal of the Urethra, and on the Diseases of the Prostate,*" I have not aimed at reproducing, in the words of the author, the lectures which this surgeon has given for several years, and still continues to give upon the subject in the amphitheatre of the faculty. I have only endeavoured to collect in one, perhaps too limited a view, and to explain, as clearly as possible, the ideas which I have heard him advance and enforce not only in his public lectures, but also in his communications with physicians of every country, upon a point of pathology which he has illustrated by numerous and important researches.

A daily witness of M. Amussat's practice, I have been enabled to repeat faithfully the precepts which experience has enabled him to establish respecting the treatment of Strictures of the Urethra: and it was only after having submitted my manuscript to him that I decided upon giving it publicity.

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## TRANSLATOR'S PREFACE.

"IN medicine the aim should be *utility.*" Under this conviction, I have been induced to offer to the medical public the following translation of M. Amussat's Lectures on Strictures of the Urethra, a work of much practical importance. I have myself followed the course of practice here laid down, and have seen it employed by others, in the treatment of these very distressing, and sometimes dangerous affections, and am consequently entitled to add my mite of testimony as to its decided advantages. The treatment by scarification, combined with cauterization and dilatation, as pursued

by M. Amussat, will be found to fail very rarely, if ever; and, preceded and accompanied by the use of forced injections, will overcome the most obstinate case of Urethral Strictures. The employment of forced injections is not, however, (we candidly admit it,) suitable to every case, especially at the commencement of the treatment; for there are individuals possessing so much irritability, as to be unable to support the distension of the urethra, caused by the presence of the injection. In such individuals, however, our point may almost always be gained, by at first introducing less fluid and retaining it a shorter time; then gradually increasing the quantity and the time of its retention.

It has only been within, comparatively, a short time, that the attention of the profession has been directed to the study of the pathology of diseases; and a still shorter time since the diseases of the urinary organs have received that careful investigation, which their importance so richly deserves. The subject has, however, been taken up with zeal, and prosecuted with talent and industry, and the rapid advances which have been already made, speak well for the future eminence which this branch of medicine will attain.

On the subject of the Notes which I have attached to the translation, I would merely observe, that I have drawn freely from all the sources of information within my reach.

J. P. J.

# DR. AMUSSAT'S LECTURES.

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## ON RETENTION OF URINE IN GENERAL.

WHEN any obstacle, situated upon some part of the urethral canal, or at the neck of the bladder, prevents the excretion of the urine; or when the bladder itself is unable to discharge the fluid contained in its cavity, which occurs when this viscus is paralyzed, or when it is not assisted in its functions by the action of the abdominal muscles and diaphragm, there is said to be a retention of urine.

Three degrees of retention are generally admitted; 1st, dysury, in which the urine flows in jets, but with pain; 2d, strangury, in which it escapes by drops, and after great efforts on the part of the patient; 3d, ischury, micturition\* in which is altogether impossible.

The causes of retention of urine, in man, are numerous, and may be divided into two classes: In the first must be placed, in the order of their frequency, 1st, strictures of the urethra; 2d, inflammation of the neck of the bladder; 3d, the different diseases of the prostate gland, and particularly its chronic engorgement, and the tumours, more or less considerable, which are developed upon its transverse portion; 4th, extraneous bodies arrested at the neck of the bladder, or at some point of the canal; 5th, a varicose state of the neck of the bladder; 6th, different bodies, or tumours, which, compressing the urethra from without, internally, diminish the area of this canal.

In the second class, will be very naturally ranked, 1st, paralysis; 2d, fungi and cancer of the bladder; 3d, want of action of the abdominal muscles and diaphragm, as in tympanitis, for instance.

Retention of urine is complete or incomplete. It is complete when the patient, notwithstanding all his efforts, cannot pass a single drop of urine. It is incomplete, when the bladder, having reached its greatest degree of distension, and the fibres of its neck, or the stricture, which, in this case, occupies the place of the neck, yield and allow the emission of urine, drop by drop; this is generally called *urinating by overflowing* (*uriner par regorgement*), and

\* We adopt this word, still but little used, to express the action of urinating—M. Rostan first introduced it into science.

which may also be considered as a species of incontinence.\* There is another incomplete retention, which should not be confounded with this last, and to which individuals, who have been for some time affected with an engorgement of the prostate, with a stricture, or with a calculus in the bladder, are subject: under these circumstances the patient empties the bladder but incompletely, and makes an almost continuous effort to urinate.

Whatever, indeed, may be the cause of the disease under consideration, the distension of the bladder is its immediate result. The urine, which descends constantly from the kidneys, separates the walls of the bladder, which at first occupies the whole of the lower pelvis: in a short time, if the evil be prolonged, it rises above the pubis, where it forms a tumour, which may extend even to the umbilicus and beyond, by pushing towards the upper part and sides of the abdomen, the large and small intestines. When the retention has reached this point, it is easy to prove the presence of the bladder in the abdomen, and to examine, in a very exact manner, by the aid of M. Piorry's plessimeter, or of any other means of percussion, the place which it occupies in this cavity. Before the summit of the bladder advances above the symphysis pubis, if the finger be introduced into the rectum, a tumour formed by the fundus of the bladder is easily felt, and which, resembling in figure the head of a child, is in contact with the anterior wall of the intestine. This tumour may be considered as the most certain sign of the repletion of the bladder; for a mistake might occur, were we to confine ourselves to the inspection of the abdomen, especially when there exists an effusion, and the patient has not urinated for a long time.†

If the retention of urine be not quickly remedied, the bladder may acquire a considerable size; its form, and the relations of some of its parts, become then entirely changed, while its fundus always remains in contact with the rectum, a position in which it is retained, partly

\* If the quantity of urine, becoming too great for the distended bladder, as not unfrequently happens, passes out through the neck of this viscus, by overflowing, the individuals thus affected may bear with the tumour formed by the accumulation of the urine for months, without requiring the assistance of art. In such a case, the urine flows by a continuous jet; and the patient passes it voluntarily, while in other cases he emits it drop by drop, and involuntarily. This circumstance has sometimes deceived surgeons so far as to cause them to mistake the disease, and to conceive the tumour formed by the bladder to be an abscess. Colot declares that this has frequently happened in his time, and that these pretended abscesses would have been opened, had he not warned the patients of the mistake to which they were about to be victims. *See Sabatier de la Médecine Opératoire.—Trans.*

† The accident which occurred, some years since, at the Hospital of La Pitie, is well known: the attendant having observed that a patient had not urinated for a long time, introduced a catheter. Astonished at not seeing the urine flow out, he thought it had not entered the bladder; and in the efforts which he made, he traversed the walls of this organ with the sound, which penetrated into the cavity of the pelvis; a liquid which was recognised as an effused serosity, escaped then abundantly by the instrument. The patient died.

by the peritoneum, and partly by the very dense cellular tissue which unites it to this intestine. After having occupied the whole of the cavity of the lower pelvis, the bladder rises, as we have just said, above the pubis; it then becomes, in some sort, strangulated, by the superior straight; its summit, in the form of a cone, leaves the posterior surface of the symphysis, and raises up the peritoneum, so that the anterior face of the organ, comes in contact throughout the greater portion of its extent with the abdominal wall. The triangular space between the peritoneum and pubis is then increased according as the retention has continued, for a longer or shorter time, and as, consequently, the summit of the bladder is more or less elevated towards the umbilicus. This effect, however, is not as marked as might be supposed.

It would be very difficult to determine the point to which the bladder might be distended; but there is in all individuals a point of extensibility of the fibres of this organ, beyond which it ruptures, a frightful accident, but fortunately, very rare, as it must always be fatal. After what has been said, it is easy to conceive, that the quantity of urine discharged from the bladders of individuals affected with a complete retention, must vary considerably; it may be twelve pints, and even more.

If the retention be caused by one of the diseases ranked in the first class, it may supervene instantaneously. In this case it is most often after an abundant meal, during which the individual has drunk alcoholic liquors, after venereal excesses, or some fatigue.

Sometimes, also, it is announced by a few precursory symptoms. Several days before the occurrence of the accident, the patient experiences chills, and a sensation of heaviness in the loins; some pains are felt, at first slight, but which very soon increase, in the urethra, and in the region of the bladder; the jet of urine diminishes by degrees, and the micturition, becoming more and more difficult, warns him of the danger with which he is threatened.

When, on the contrary, the disease depends upon a want of contractility in some of the organs which assist in the excretion of the urine, or upon a cancer of the bladder, it always progresses slowly, unless the patient becomes suddenly paralyzed, after a fall, or any other accident.

The symptoms of retention are common or particular; thus, the distension of the bladder, weight, pain in the anus, spontaneous weariness in the loins and pelvic extremities, efforts to urinate, heat of the skin, fever, thirst abundant perspirations, hiccough, and the urinary odour, are the symptoms common to all cases of retention of urine; but there are others, which are peculiar, and which are only manifested in particular cases, according to the cause which produces the evil. We will not detail these symptoms here, since we only intend in this work to treat of the retention of urine, produced by strictures of the urethral canal, in the male.

## CHAPTER I.

## OF STRICTURES OF THE URETHRA IN THE MALE SUBJECT.

OF all the diseases of the urinary apparatus, that which is about to occupy our attention is certainly the most frequent; and which may be followed by the most prompt and fatal accidents, when those who are attacked seek too late the assistance of art, or trust themselves to imprudent hands, and to physicians little skilled in the treatment of this affection.

Much more rare formerly than at present, strictures have attracted, in a very particular manner, the attention of many surgeons of latter years; but if the numerous monographs which have lately been published on this important subject, have enriched science with curious observations, and with the details of many methods of cure, more or less ingenious, more or less certain, it must be admitted, that very few are there found, upon the pathological anatomy of strictures, a point, nevertheless of great interest, and the knowledge of which may conduct to many important therapeutical indications.

Devoted for a long time to an especial study of the urinary organs, in a healthy and diseased state, assisted by an extensive practice, M. AMUSSAT has had frequent opportunities of carefully examining and studying urethræ affected with strictures, and he has been enabled to verify the different degrees of alteration which the urethral mucous membrane and the subjacent tissues exhibit, according to the chronicity of the disease. We shall carefully exhibit the result of these researches, in which we have often assisted; but, in the first place, we will point out the causes of strictures which are generally divided into *organic*, *spasmodic*, and *inflammatory*.

*Of Organic Strictures.*—The name of organic strictures is given to points of engorgement which are formed upon the mucous membrane of the urethra or in the tissues which surround it, and which oppose the passage of the urine by diminishing the diameter of this canal.

Organic strictures are the most frequent; they are generally the effects of a chronic inflammation of the mucous membrane of the urethra, and sometimes of the subjacent tissues, most often produced by one or several attacks of blennorrhagia, by the use of astringent injections in the treatment of this latter disease,\* by contusions, and ruptures of the canal from external causes: they are sometimes, but

\* Doubtless, the use of astringent injections has sometimes occasioned strictures; but we think this practice has been more reprehended than it deserves. It is the abuse, not the use, of this means of cure, which is to be deprecated. We believe, from the opportunities which we have enjoyed for forming an opinion, that strictures of the urethra are much more commonly occasioned by a long standing gonorrhœa, or gleet, than from a judicious employment of astringent injections.—*Trans.*

rarely, produced by masturbation, herpetic, and rheumatismal affections, &c., or by excessive exercise on horseback.

*Of Spasmodic Strictures.*—Much more rare than they are generally admitted to be, spasmodic strictures (if we preserve the name which has been given them by authors) can only be considered as a spasmodic contraction of the muscular fibres\* which surround the portion of the urethra situated between the bulb and the prostate gland; † they are observed particularly in nervous subjects, during the course of an acute blennorrhagia, or after venereal excesses. ‡

*Of Inflammatory Strictures.*—The inflammatory strictures, admitted by some surgeons, are only the result of a very great afflux of blood into the spongy tissue, or into the mucous membrane of the urethra; this state of turgescence, which is only temporary, no more constitutes, rigorously speaking, a true stricture of the canal, than the spasmodic contraction of which we have spoken above. Organic strictures are those which must especially engage our attention. §

#### PATHOLOGICAL ANATOMY.

After numerous observations and researches in pathological anatomy, M. Amussat admits four species of organic strictures;

1. Fræni.
2. Valvular strictures.
3. Strictures produced by a chronic swelling of the mucous membrane.
4. Callous strictures, which comprise the indurations and nodes formed in the subjacent and spongy tissues.

*Of Fræni.*—When an acute inflammation of the mucous membrane of the urethra, whatever may be its cause, passes into the chronic state, one or several points of this membrane may become

\* M. Amussat was the first who clearly demonstrated the existence of these fibres (which he proposes to call *muscular*) round the membranous portion. See his "*Memoire sur l'Urethre*," *Archives Gen. de Med.*, April, 1824.

† Some authors have supposed that the urethra is surrounded by fleshy fibres, throughout its whole extent; anatomical examination proves this idea to be completely erroneous.

‡ Sæmmering, in admitting this species of stricture, says that it rarely exists in old persons, without the thickening of a point of the internal membrane.—*Holland's Trans.*, p. 169.

§ We conceive spasmodic and inflammatory strictures to be nearly identical, differing perhaps in degree; in both, the difficulty of micturition comes on suddenly, and, in both, subsides suddenly: and they are both most probably caused by some temporary change in the condition of the urethra. Thus, the urine may be unnaturally stimulating, from the presence of an excess of lithic acid. This is proved by the spasmodic action occurring after a free indulgence in spirituous or fermented liquors, especially such as contain a combination of alcohol with acid. The absorption from a blister acts probably in a similar manner; that is, by increasing the stimulating properties of the urine. Gravel, or stone in the bladder, will produce the same effects. Diseases of the kidney and of the rectum, as hemorrhoids or carcinoma, act sympathetically on the urethra, and not unfrequently give rise to spasmodic stricture. See *Brodie on Diseases of the Urinary Organs.*—*Trans.*

the seat of a very circumscribed engorgement, which, if it be not always followed by a well marked induration, deprives the mucous tissue of its natural extensibility.

In this first stage, it would be difficult, even for the patient, to suspect the existence of an incipient stricture; but by degrees, the stream of urine coming from the bladder, and finding a point of the canal which resists its passage, pushes it before it, raises the mucous membrane at the affected spot, and thus forms a slight elevation, projecting more backwards than forwards, and which, at a later period, becomes a genuine obstacle to the emission of the urine.

If, at this stage, the patient having died of some other disease, the canal of the urethra be carefully examined, there will be found, particularly upon the inferior portion, small, whitish, filiform lines, situated transversely, slightly, or not at all projecting to the eye, but which become so upon passing the nail or a sound along the urethra, from behind forwards, and which are easily caught by the explorer, which we will soon describe.

As for the longitudinal fræni, spoken of by M. Lisfranc\* we have never met with them, and Charles Bell,† who has carefully studied these pathological alterations, only represents them in a transverse direction.

There may be several of these fræni in the same individual; they are evidently the result of a pathological state, which in the spot corresponding to them has caused the mucous membrane to lose its natural extensibility.

There exists another species of fræni, much more projecting than those which we have mentioned: they are thicker than these last, and are the result of a very decided induration of the mucous membrane. These fræni appear sometimes to be formed by the cicatrice of an ulceration; they are met with especially in the fossa navicularis; in the corresponding point, the mucous membrane instead of being white is injected red, and the subjacent cellular tissue itself is sometimes diseased. These fræni often exhibit the appearance of a scar produced by a burn. We have seen two excellent examples; the first in an old man afflicted with calculus, who died of pneumonia. M. Amussat, before performing the operation of lithotrity, had divided one of these fræni situated near the meatus, to enable him to introduce sounds of a large size; the second in an adult, who died of an acute affection in the hospital of La Charité.‡

The fræni are not formed by false membranes, as Ducamp§ and

\* *These sur les retrecissemens de l'uretre*, in 8vo., p. 40. Mr. Hollard, in quoting this thesis, says that "the anatomical portion is especially remarkable for the rich practical details." Let M. Amussat's memoir, cited above, be read, and it will be seen that M. Lisfranc has largely profited by this work, which was communicated to him at the time he was a candidate for the situation of 'agrege.'

† Letters on the diseases of the urethra.

‡ This last specimen was shown to us by M. Rufz, "interne" of the Hospital.

§ *Traite des retentions d'urine*, p. 14.

Laennec\* suppose ; at least, we have never been able to verify this assertion upon the dead body.†

*Of Valvular Strictures.*—These strictures are nothing more than fræni, which occupy the whole circumference of the urethra. But, in the last case, as the area of the canal has lost much of its capacity, the urine, finding a greater resistance, pushes this frænum forcibly forwards, and forms thus a genuine valve, a diaphragm traversed by the urethral orifice. Upon an anatomical examination, the mucous membrane, in the spot where the stricture existed, appears, as it were, gathered by a thread passed into its thickness, and afterwards fastened by uniting its two extremities.

In order to see this valvular ring, care must be taken not to open the urethra in its whole extent through its superior wall, as is ordinarily done, because so soon as this valve is divided in one of its points and the urethra extended for examination, if the stricture be of recent formation, it disappears almost completely, and only a whitish line upon the mucous membrane, situated like the fræni transversely, together with a slight degree of redness, remains of the stricture which was felt during life and verified even after death, before the division of the parts. It is necessary, then, in this case, as in all those in which a stricture is to be examined, which occupies the entire circumference of the urethra, or the greater part of this circumference, to open this canal, only before and behind, up to the point affected.

Valvular strictures are perhaps the most common ; the older they are the smaller is the orifice which they offer for the passage of the urine ; like the fræni, they are rarely thicker than one line, or one line and a half.‡

*Of Strictures produced by the chronic swelling of the urethral mucous membrane.*—These strictures are met with more frequently among old persons than young. They are particularly observed in those, who, after one or several attacks of blennorrhagia, have used for some time, in order to relieve themselves of a habitual oozing, bougies more or less irritating. Such is the case with two old persons who were under the care of M. Amussat.

One had used for a long time Daran's bougies to facilitate the emission of urine, which had become difficult after several attacks of blennorrhagia. The other, in order to relieve himself of a

\* Leçons aurales.

† Spontaneous adhesions of the mucous membranes of opposite surfaces are very rare, and great difficulty is often experienced in producing them with therapeutical views. It is therefore conceived that the gonorrhœa may terminate by the production of a false membrane, which, becoming organized, and adhering to the mucous membrane, forms in the urethra a frænum, a circular or semicircular partition, separating the canal into two parts, which communicate by means of an orifice more or less extensive, central or lateral. This partition, which is of a whitish colour, ordinarily possesses a fibrous texture ; and generally offers less resistance than the walls of the canal.—*Trans.*

‡ M. Amussat possesses drawings and several specimens, in which very well marked valvular strictures are seen.

gonorrhœa, introduced into the canal every night small bougies, dipped in the extract of lead.

In the autopsy of the first, who died of a long standing catarrh of the bladder, we found the canal contracted to an extent of twelve or fifteen lines in length. At this part, the mucous membrane was very red, and exhibited a most remarkable state of turgescence; the portion of the urethra, situated behind, was very much dilated, as well as all of the mucous lacunæ. After the canal had been opened, if the finger were passed lightly over the interior wall, no very evident projection was felt; if, on the contrary, a silver sound were drawn over this same part, so as to compress it, the beak of the instrument was arrested at the spot where the disease existed. This pathological specimen carefully delineated, only exhibited a slight contraction of the canal in the middle and anterior part of the urethra, although during life a small sized sound was introduced with difficulty. In the second, who was operated upon by scarification, and who was perfectly cured, we think that a similar swelling of the urethral mucous membrane existed throughout almost the whole extent of the anterior part of the canal, and formed a stricture several inches in length.

The attentive perusal of what J. J. Rousseau has written on the disease of the urethra, which tormented him all his life, induces M. Amussat to think that he was affected with a stricture, produced by a swelling of the mucous membrane. This stricture has been said to be spasmodic, because no obstacle was found in the urethra after death. But the difficulty of sounding him experienced by skilful surgeons, proves that he was affected with an organic stricture. And what must strengthen this opinion, is that he used Daran's bougies. He was then affected in the same manner as the two patients above mentioned.

Sometimes, in this species of stricture, the submucous tissue is affected, which renders the disease more serious and more difficult to cure.

*Of Callous Strictures.*—If the acute inflammation of the mucous membrane of the urethra extend to the subjacent tissues, and there pass also into the chronic state, indurations, callosities and nodes may be there found in the point primarily affected. These strictures, which rarely occur in persons who have never been subjected to cauterization, are much more frequent in those upon whom the caustic has been often and too deeply applied. In this case, it is easy to conceive that, on account of the often repeated application of the nitrate of silver, causing the chronic inflammation, which existed in the mucous membrane, to pass into the acute state, the surrounding parts become engorged in a greater or less extent; and at a later period this engorgement produces indurations and nodes, which are felt by the finger through the canal. These strictures are often formed by cicatrices either in consequence of wounds, or fistulæ of the urethra.\*

\* The existence of these callous strictures, or carnosities, as they have been called, is denied by some authors, as Chopart, Bell, Desault, Hunter, &c.;

Upon examining the dead body, the canal, when opened throughout its whole extent, appears contracted only in the diseased point; but it exhibits no projection, no appreciable elevation; as, in strictures produced by swelling, the diseased spot can only be felt by passing a sound along the urethra. In the majority of cases the mucous membrane appears to be healthy, and the induration is seated in the submucous cellular and fibrous tissues. The spongy tissue is often diseased; in which case, the cellules which compose it have disappeared, and it is transformed into a white tissue, which sometimes forms with the neighbouring tissues a substance which may acquire the hardness and consistence of cartilage.

I have examined, with M. Amussat, the urethra of a German, who died of a very severe colitis, and who had had for a long time a callous stricture in the region of the bulb, into which it was impossible to introduce the smallest bougie. During life a very evident uneven induration was felt through the walls of the urethra. When the canal was opened we found it contracted to such a degree that we could scarcely pass a small stylet. The mucous membrane was healthy; but all the other tissues were transformed into one of very great firmness.

In a young boat-builder of Nantes, whose case I will quote hereafter, we observed a callous stricture, which formed a genuine ring around the urethra, and which was very sensitive to the touch; he had been cauterized twenty-seven times in this spot.

Such are, according to M. Amussat, the four forms under which strictures are most frequently met with. As for vegetations and fleshy excrescences, the existence of which has perhaps been denied in too absolute a manner by some authors, he has never seen them but once.\*

He is of opinion that if, in the autopsy of individuals treated during their lifetime for strictures, the seat and nature of which had been well determined by skilful surgeons, no trace of them has been found, it arises, as we have said above, from the imperfect manner in which the anatomical examination of the urethra is generally made. In the hospitals the urethra is more often sliced than examined, and if nothing be found, it is then said that there was only a spasmodic stricture; after the example of some physicians who declare all diseases (the causes of which they cannot discover after death) to be nervous affections. We have several times, in the cabinet of M. Amussat, had opportunities of examining very

they are found, however, although rarely; they have been observed by Galen, Van Swieten, Daran, Morgagni, and others. Daran admits two species, one with, and the other without, ulceration. They are callous, says Ambrose Paré, when there exudes no superfluous humidity.

They may be produced by a too luxuriant development of granulations in cases of ulceration. They arise, according to Daran, from the *corpus spongiosum*; and, according to Sæmmering, in the mucous membrane.—*Trans.*

\* During the month of June, 1831, there was a woman in one of the venereal wards who had a vegetation of several lines in the interior of the urethra.

singular specimens of the pathological state of the urethra which had been brought there by intelligent students, and in which those, whose duty it was to dissect them, had found nothing remarkable.

However slightly any individual may have studied, upon the dead body, the pathological anatomy of strictures of the urethra, if he glance upon the plates, designed to represent these diseases, he is tempted to believe that almost all these delineations are only the fruit of the imagination of their authors, or that they have been traced only after those impressions, often imperfect, furnished by the bougies used for examination. For instance, he will never find in the urethra, whatever may be the cause of its contraction, those projections represented in the plates published by Hunter, Ducamp, Teytaud and by M. Civiale, who, according to his practice, appears only to endeavour to copy his predecessors.

It is not by these delineations, which are mere inventions in the eyes of those who have some knowledge of the diseases which they represent, that positive ideas upon the nature, seat, and form of strictures of the urethra, can be given to others. The study of the pathological anatomy of the part can alone conduct to this end; everything else is but hypothesis; but it must be confessed, that the majority of the treatises upon strictures, which have appeared within several years past, are designed rather for the use of unprofessional men than for physicians.

*Of the Seat.*—The four species of strictures of which we have just spoken *never exist beyond the bulb*,\* for they must not be confounded with a few varicose vessels, which sometimes diminish the diameter of the membranous portion, or with the swelling of the veru-montanum. It has been pretended by some, that they have met with genuine strictures, fræni, in the portion of the canal corresponding with the prostate: but we do not know that they have produced any anatomical specimen demonstrating this fact.

Even if daily observation did not prove that the spongy portion is the only part of the whole canal which is the seat of organic strictures, an attentive examination of the phenomena which occur in this part during life, and its anatomical structure, would convince us of it. Indeed, the mucous membrane which lines it, being much less extensible than the spongy tissue which surrounds it, and constantly fatigued and expanded by the lengthening of the penis in its frequent erections, has a greater tendency than in any other part, to become debilitated and inflamed. On the other hand, the spongy tissue is far from strengthening the mucous membrane at this point, as it is elsewhere by the muscular fibres of the membranous portion, and by the firm tissue of the prostate. It often happens, indeed, as in gonorrhœa accompanied by chordee, that if this tissue

\* Brodie declares that the ordinary situation of a permanent stricture is at the anterior extremity of the membranous part of the urethra, just behind the bulb of the corpus spongiosum. If the disease be recent, it occupies but a small portion of the canal. In some very old cases we find a permanent stricture behind the bulb, and another anterior to it.—*Trans.*

be inflamed the disease is communicated to the mucous membrane; besides, strictures are very rarely met with in the female, whose urethra possesses the same organization as the membranous portion in the male. It must also be considered that blennorrhagia, so common a cause of strictures, seldom passes the bulb, and that the astringent injections which produce them perhaps still more rarely penetrate beyond.\*

Although strictures may be seated upon any point of the spongy portion, there is one spot which they particularly affect: it is the point of union between the bulbous and the muscular portion. They are very frequently met with, also, at the commencement of the fossa navicularis, near the *meatus urinarius*.

The frequency of the disease in these two points will be very easily conceived, if it be considered, 1st, that the former is, in the normal state, the narrowest portion of the whole canal; 2d, that during an erection, being at the apex of the angle formed by the penis, it is, of all parts, the most irritated, and consequently the most disposed to inflame, and to become the seat of a chronic engorgement, after a blennorrhagia, or the use of astringent injections; and that the latter, viz., the fossa navicularis, is the ordinary seat of blennorrhagia. Proof of this opinion upon the seat of strictures is found in an attentive examination of the plates which have been published upon this disease. Indeed, in none is a stricture seen beyond the bulb; and if some surgeons have admitted them, it has not been done from pathological specimens, but from an inaccurate and imperfect examination, made while the penis was very much lengthened.†

Wherever a stricture may be seated, the portion of the urethra which is in front is almost always in the normal state, whilst that which is behind, is more or less enlarged, according to the degree to which the obstacle has arrived, and the efforts, more or less violent, which the patient is obliged to make in order to urinate. In this dilated portion, which offers the appearance of a cone, the summit of which is directed forwards, the mucous membrane, red and irritated, is the seat of slight secretion, which is often regarded as the effect of a blennorrhagia, and the mucous lacunæ are very much dilated.‡

\* Many surgeons, and M. Lisfranc among others, believe that astringent injections do not produce strictures. Why then do we see so many individuals attacked with this disease after the use of these medicines, while it is more rare among those who have abstained from them, although they have had several attacks of blennorrhagia? In sixty-five patients, affected with stricture, whose cases I noted in 1827, sixty-two were treated for blennorrhagia by astringents; one was addicted to masturbation and had never had a discharge; a second had taken long rides on horseback, while suffering under blennorrhagia; and a third had a herpetic affection.

† We have seen unskilful surgeons penetrate as far as the neck of the bladder, without meeting any obstacle, and mistake the sphincter for a stricture which they supposed was situated at the bulb. This error arose from their giving to the penis, when drawing it on the sound, greater length than it naturally has.

‡ The urethra behind the stricture, sometimes exhibits, as an effect of its morbid

When there is but one stricture it is often at the bulb; if there exist several, one is almost always met with at this point.

Whatever may be the seat, nature, form, and duration of a stricture, the canal of the urethra is never entirely obliterated, and there always exist a point of communication between the parts anterior and posterior to the obstacle: if this communication be sometimes interrupted, it is only temporarily, and by a foreign body, as we will presently prove.

*Diagnosis.*—Strictures generally form so slowly that it is difficult, in their incipient stage, to suspect their existence; and the patients are often only informed of it by a retention of urine, which supervenes suddenly after a copious repast, fatigue, or excessive venereal indulgence.

There is, however, a circumstance which should attract the attention of patients and of surgeons, for it almost invariably indicates an incipient stricture. When after one or several attacks of blennorrhagia, especially when astringent injections have been employed, a small whitish, but not abundant discharge, is observed to remain, which agglutinates the lips of the *meatus* every morning;\* when the circumference of this orifice is red and slightly

condition, small irregular prominences or tubercles, probably originating in minute depositions of coagulated lymph, which subsequently become organized. The orifices of the mucous glands and those of the prostatic duct, are often preternaturally dilated; indeed the whole canal behind the stricture is widened. The dilatation is most evident when the stricture is in the anterior part of the canal.—*Trans.*

\* This discharge is not contagious; it however produces upon the glans and prepuce of some individuals vesicles which disappear under the influence of simple lotions. If it be owing to the presence of a stricture in the canal, it often ceases after the removal of the latter: but sometimes it persists, and then it is independent of this cause. I have said that this discharge was not contagious; if, however, an individual affected by it commit excesses with a female, even one in good health, this discharge increases, and may very soon, in some cases, constitute a genuine blennorrhagia, which may be communicated.

These chronic discharges, which, consisting only of a few drops of mucus, harass the unfortunate patients for months, and even years, to such a degree, as to cause a disregard for everything else, and to induce the most melancholy ideas, deserve the undivided attention of practitioners.

I have often meditated upon the true cause of these chronic discharges, and I believe that in the majority of cases they result from the improper manner in which blennorrhagia is treated. A urethral discharge among the unprofessional is too commonly regarded as a slight affection, and they scarcely give it a thought, unless the inflammatory symptoms, being somewhat severe, rendering it difficult and painful to walk, force them to keep to their chambers. A little greater simplicity in diet is all they impose upon themselves. Some, impatient to be relieved from a discharge which annoys them, resort to remedies, more or less energetic, which, if they do not suddenly arrest the disease, only abate its progress: others, more indifferent, allow the mucous membrane to become habituated to an abnormal secretion, by opposing no treatment to the evil.

Patients, but especially physicians, are not sufficiently convinced that blennorrhagia, like many other diseases, has its periods well marked, and that it is improper, and often dangerous, to oppose it in its progress. There is an observation, which many others besides myself have doubtless made, viz., that blennorrhagia has a much shorter duration, and that the chronic discharges particu-

tumefied; when small mucous filaments are seen floating in the urine, an incipient stricture may be suspected. The whitish discharge which exists is not secreted from the whole mucous membrane, but only from the part of this membrane which is situated behind the stricture.

At this first period there has been produced hardly any change in the emission of the urine: the stream is almost as large as before, and has not appreciably diminished in volume. The patients, however, sometimes experience a slight embarrassment in the urethra; but they attribute it to any other cause: the discharge alone attracts their attention.

If the canal be explored with a sound or an ordinary bougie, even with Ducamp's exploring sound, we can in many cases penetrate as far as the bladder without meeting any obstacle, and without obtaining the print of a stricture, which however exists upon some point of the urethra.

*Exploring Sound.*—M. Amussat, having observed that this kind of examination almost always fails when the sounds are directed from before backwards, had an instrument constructed a few years since, according to his ideas upon the formation of strictures, to which he has given the name of exploring sound (*sonde exploratrice*), or explorer of the urethra; this instrument allows him to examine from behind forwards, a direction in which the strictures are always more appreciable.\*

The exploring sound is composed of a silver canula and a rod.

The canula, about eight or nine inches long, and of a variable diameter, exhibits upon its length the division and subdivisions of the foot. At one of its extremities are soldered four small rings, designed solely to render the instrument more firm between the fingers of the operator.

The cavity of the canula is not made through the centre of its thickness, but towards one of its sides. It is filled by the rod, which is fixed into a point of the circumference of a small silver lens with

larly under consideration here, are much more rare in patients treated in the hospitals, and in those belonging to the lower classes, than in individuals of good society. This arises from the circumstance that the former are subjected to a diet and treatment proper for producing a resolution of the disease; that there exists among the people this old belief, that a discharge should not be arrested, until after it has flowed for several weeks; they, therefore, often seek the assistance of a physician only for the purpose of obtaining some astringents, which then succeed, because the proper time for their administration has arrived.

Individuals in the higher ranks of society, on the contrary, impatient to return to their pleasures or their business, importune, before the proper time, too obliging physicians, who administer to them, too early, medicines, which at a later stage would have produced a good effect, but which, at a period when the disease is not sufficiently advanced, derange its progress and induce it to pass into a chronic state, which is very difficult to arrest, even when the patients consent to submit entirely to the advice of a prudent and enlightened physician.

\* Ducamp himself perceived the necessity of exploring the urethra from behind forwards; but the instrument which he constructed for this purpose is too complicated, and cannot be successfully used.

blunt edges; the diameter of this lens is not greater than that of the extremity of the canula which is to be introduced into the urethra, and is exactly fitted to it when the instrument is shut. The rod is moved by means of a fluted handle, fitted to its other extremity, and which is turned between the fingers; the rod can only be moved in a rotatory manner, for it does not exceed the canula in length. A screw is fitted into the handle which corresponds to the rod's insertion into the lens. From the construction of this instrument it is easily conceived that, by giving to this rod a rotatory motion, the lens at its extremity is displaced, and this latter, turning upon an axis which is not in its centre, is no longer in perfect apposition with the canula, and forms a projection upon one of its sides.

When the existence of an incipient stricture is suspected, and we wish to be assured of it by means of the explorator, this instrument, after having been previously warmed and oiled, must be introduced closed as far as the prostatic region. The surgeon then causes the lens to project towards the wall of the canal to be explored; below, if the stricture be suspected to exist upon the inferior wall, above in the opposite case. The screw placed in the handle of the rod always indicates in a positive manner the direction of the projection formed by the lens. The instrument, being thus opened, is passed slowly along the whole extent of the canal in the act of withdrawing it, and if there exist the slightest frænum, it is caught by the lens, from behind forwards. It might be feared that the folds accidentally formed by the instrument upon the mucous membrane, would lead into error. But in the numerous experiments performed by M. Amussat during several years, as well on the living as on the dead subject, he has observed that the instrument is not arrested when the canal is healthy.

In the absence of this explorator, which furnishes the most certain means of arriving at positive data concerning the existence of a stricture, wax bougies rendered softer by the addition of tallow, may be advantageously employed, care being always taken that they be of such a diameter as to pass freely through the *meatus*.\*

When these bougies have remained in the canal for one or two hours, and been then withdrawn, they almost always exhibit a depression in the point corresponding to the obstacle.

When by the aid of these bougies, and better still by that of the exploring sound, an incipient stricture is proved to exist, the subject of it should be advised to submit to treatment immediately; if he do not consent, the progress of the evil is recognised by the following symptoms.

Every time that the patient goes to urinate, the jet of urine is still delayed after the resistance of the neck of the bladder has been overcome: smaller than in the natural state, it flows out, flattened

\* These bougies invented by M. Amussat, are like the bougies "a ventre."

and twisted a few lines from the *meatus*; it very soon becomes bifurcated, filiform, and can only be expelled to a short distance. The urine received in a vessel exhibits mucous filaments, whitish flocculi, which united, form a plug, that always precedes the first jet of urine. The presence of these bodies in the urine may be regarded as the pathognomonic sign of a stricture, when the individual who passes them experiences some difficulty in urinating.

At this second period, the patients experience a kind of tickling upon urinating, which induces them instinctively to carry the hand to the perineum, opposite the bulb, the most common seat of stricture. If a sound or bougie be introduced, it is then arrested by the obstacle, and causes some pain in the effort to insert them further.

The emission of urine becomes more painful, and often requires great efforts on the part of the patient, on account of the tendency of the diameter of the urethra to contract more at the point primarily affected. This liquid only flows by drops, or in a small and often interrupted stream, which brings along with it much mucus; the bladder, which is only incompletely emptied, often becomes the seat of a catarrh, that obliges the patient to urinate at every instant.

The tickling which is felt at the perineum in the second period of the disease, is converted into a severe pain extending up to the end of the glans, and an unpleasant weight is felt at the anus and in the groins. In some patients, the efforts to urinate have produced hernia.

If we succeed in introducing a small bougie, it is felt to be forcibly compressed in the obstacle. In order to facilitate the flow of urine, the patients often dilate the stricture, by forcing the urine from before backwards, which they have retained in the anterior part of the canal, by compressing the *meatus*, which is equivalent to a forced injection.

*Complete Retention.*—When a patient exhibits the last symptoms which we have indicated, he is daily exposed to an attack of complete retention. This accident especially occurs after excesses in venereal pleasures, or in those of the table; after any occupation rather more fatiguing than usual, or much exercise, either on foot or on horseback. In all of these cases, the circulation being quickened, the mucous membrane of the urethra, which is always diseased behind the obstacle, secretes this whitish mucus of which we have spoken in greater quantity; if this mucus collect together, behind the stricture, which is swollen by the afflux of fluids, it closes up the opening entirely, and presents a complete obstacle to the passage of the urine. Such is the most common cause of retention in the case under consideration; for, as it is easy to prove, as M. Amussat has frequently demonstrated in his lectures, that the canal is never wholly obliterated; but its diameter may be reduced to such a degree as to prevent the introduction of the smallest bougie. It is evident then that the interposition of a foreign body, whatever may be its tenuity, may be the determining cause of the retention.

When a complete retention, on account of a stricture, occurs in a young person, or in an elderly individual, who still preserves his vigour, there is nothing more painful to observe than the symptoms which accompany it. Seizing upon anything near him for a support, the patient puts himself into every position which can favour the contraction of the muscles that assist in the excretion of urine. His countenance is animated, his eyes are sparkling, his pulse beats fast and strong, all of his muscles are contracted, the penis is erected, the glans, which is dry, assumes a violet colour, and a severe and lancinating pain, which extends to the *meatus*, is felt in the region of the bladder, and in the whole extent of the urethra. Sometimes a tumour, formed by the dilatation of the canal, behind the obstacle, projects into the perineum. If, notwithstanding all his efforts, he cannot pass a few drops of urine, he gnashes his teeth, stamps upon the ground, involuntary tears roll down his cheeks, and, in his despair, he cries out for assistance from those around him; at last overcome with fatigue, and covered with perspiration, he throws himself upon his bed, where he vainly courts repose. Tormented by a burning thirst, he does not satisfy it, for fear of increasing the repletion of the bladder. Excited by the pain, he soon rises again, and again fatigues himself with useless efforts, until some surgeon relieves him from this deplorable and dreadful situation, and preserves him from the frightful accidents which are its consequence. In their moments of anguish the patients often resort to suicide; and some demand their abdomen to be opened.

If there be diseases the remembrance of which is soon forgotten, there is no man affected by stricture who does not throughout the whole of his life recollect a complete retention of urine, and who does not preserve for him who has relieved him some sentiment of gratitude.

The pressing indication for the surgeon to fulfil who is called to a patient labouring under a complete retention produced by stricture, is to endeavour to evacuate the bladder by affording to the urine a passage through its natural channel, or, if that cannot be done, by some other route; several means are offered in order to obtain this end:

- 1st. Ordinary catheterism with solid catheters;
- 2d. The introduction of a bougie through the obstacle;
- 3d. Forced injections;
- 4th. Forced catheterism;
- 5th. Puncture of the bladder;
- 6th. Incision of the urethra;

Before passing in review these different operations, let us speak more particularly of catheterism in general, and in the case in which the urethra is free. We will afterwards lay down the rules to be followed when this canal offers any obstacles to be overcome.

## CHAPTER II.

## OF CATHETERISM.

CATHETERISM is an operation which consists in introducing into the bladder through the canal of the urethra, an instrument designed to explore this organ, to afford a passage to the urine which it contains, to discover the foreign bodies which may be present in it, and to inject this viscus.

Of all surgical operations, catheterism is one of the most delicate, and it is, of all of them, that which sometimes offers the greatest difficulties. The perfect knowledge, therefore, of the parts which constitute the urethra, is indispensable to every operator. Without this knowledge all the rules laid down by authors become useless, and even in the most simple cases cannot serve as guides for the certain introduction of a sound into the bladder. Catheterism is more or less easily performed, according as the canal is free, or as it offers one or more obstacles in its extent. Before indicating the method to be pursued under either of these two circumstances, we will say a few words on the subject of sounds in general.

The names of sounds and catheters have been given to instruments used for performing catheterism.

Sounds were known from the most remote antiquity. At first brass sounds were employed, afterwards they were made of silver or platina, and in later years of different metals.\*

Sounds (or catheters) are curved or straight. Female catheters have always been designated under the name of straight, although they are slightly curved at their extremity; it is from this improper denomination that the error of so many modern writers has arisen, who have quoted after each other numerous authors, who, according to them, have spoken of straight sounds (or catheters) long before 1821, although there is reference made really only to the female sound, an instrument which, on account of its slight curvature, cannot offer for the performance of lithotrity the advantages of the straight sound, proposed by M. Amussat in 1822.

Curved sounds† are generally only curved in a third of their extent and straight in the remainder. The curvature may vary infinitely, as each practitioner adopts a particular one. When the curved sound is used, however, it is observed that the catheterism is generally more easy, if the curvature of the instrument be well marked.

The extremity of the instrument which is introduced into the bladder has received the name of beak; it is terminated by a blunt point in which two small orifices are made, designed to afford a pas-

\* We will only speak here of metallic sounds; hereafter we will speak of flexible sounds.

† Sound, in this translation, is used as synonymous with catheter.—*Editor Sel. Med. Lib.*

sage of urine, and to which the name of eyes has been given. These eyes vary in form and position; they are generally round or oblong, made at two or three lines from the beak in such a manner as not to correspond to each other. They ought not to be too large or too small; in the first case, the mucous membrane of the bladder, when this organ contracts upon itself, may be caught in them; in the second, they would with difficulty afford a passage to the urine if it were charged with thick mucus. The circumference of the eyes should be well polished, for if it offer any projection or inequality, the introduction of the instrument would be painful.

The other extremity of the catheter is called the handle; two small rings are attached to it, one on each side, which receive the threads employed in fixing the instrument when it is to be left in the urethra. In the cavity of the instrument is placed a rod, designed to open the eyes when they are obstructed; but the ordinary rods rarely fulfil this intention, which is better done by employing an injection of tepid water. Besides, when the rod is used it may protrude through one of the eyes and wound the patient.

M. Amussat has made some modifications of this extremity of the curved sound: instead of one ring upon each side, he fits two as in the straight sound. These four rings by their union offer somewhat of a flat surface, which renders the instrument firmer, and prevents it from turning between the fingers of the operator, when he employs it. He has also caused a cock to be fitted which hermetically closes the sound, so that during the catheterism the urine does not pass from the bladder, and the patients are not constantly wet as generally happens when they are obliged to retain the sound.

The generally received idea that the male urethra presents two great curves thus S, induced the belief up to late years that no other than curved instruments could be introduced into the bladder. The celebrated Petit entertaining this opinion even caused a catheter with a double curvature to be constructed, thinking that the form of this instrument being better adapted to the pretended disposition of the urethra, it would fatigue patients less: but this sound, the invention of which, as usual, was afterwards contested with its author, has altogether fallen into disuse.

Many authors, it is true, have spoken of catheterism with the straight sound; but by the straight, they meant the female sound, as is easily proved by reading their works. Gruithuisen is perhaps the only one who conceived and put forth the idea in 1813\* of introducing perfectly straight instruments into the bladder. But his works were so little known that, in 1822, when M. Amussat announced the possibility of sounding the male urethra with instruments perfectly straight, and consequently of breaking up the calculi in the bladder, by mechanical means, this idea appeared new, not only in Germany, † the country of Gruithuisen, but also in

\* Gazette de Salzbourg.

† Nouveau Journal de Médecine, April, 1832.

‡ In the "*parellele de la chirurgie allemande et de la chirurgie française, apres un voyage fait en France*" in 1821 and 1822, a work published by Dr. Frederick

France, where the majority of the practitioners, at the head of the hospitals, regarded it as absurd and inapplicable.\*

Auguste Ammon, pp. 337 and 338, we find the following sentence, which shows that catheterism with a straight sound appeared to be something wholly new, when M. Amussat spoke of it in his lectures; "at this time," says the author, "a young French surgeon (Amussat) recommends catheterism with a straight sound, &c."

\* Some disappointed individuals, desirous of depriving a contemporary of the honour of an useful discovery, after he has answered all the objections which they had made to him as the author of the straight sound, have ransacked authors to find in them the idea of this instrument. Albucasis, Rameau, Lieutaud, Montagut, have been quoted in turn. I will only give here the passages of these authors in their own words, to prove how exact, or rather sincere, those individuals are who quote them:

"(Albucasis, Chap. 58, p. 227.) *Ex argento conficitur (catheter) sit vero tenue glabrum, concavatum, uti pennæ avis canula, radii gracilitate, longum quasi spithuma et dimidia, in cujus capite est infundibulum parvum.*"

After having given this description of the catheter, Albucasis thus expresses himself on the manner of using it.

"Tunc catheterem oleo, vel flore lactis et ovi albumine illines et agrum sedens fac sedere, et vesicam ejus et penis foramen oleis humidis imbrocas, vel oleo et aqua tepida. Tunc catheterem in urethram leniter immittas donec ad urethræ radicem perveneris. Tunc caput virgæ sursum versus umbilicum flecte, tunc catheterem trudas introrsam, donec intraverit et prope sedem pervenerit. Et tunc inferne virgam vertas et catheterem: in illa tunc trudas illum, sentiersque infirmus illum jam in locum vacuum pervenisse. Hoc modo equidem fiat operatio quoniam meatus per quem mittitur urina infectitur."

It is very evident that catheterism with a straight sound could not be performed as Albucasis here indicates.

They have gone so far as to say that Albucasis had given the figure of the straight sound. It is true that below the text which we have just cited a design is found representing a small canula about three inches long; it is terminated at one of its extremities by an olive-shaped expansion, and at the other by two branches, which form, upon being separated, a very extensive angle. Below this figure are written the following words of the translator:

*Hæc hujus loci non esse videntur.*

*Extract from Rameau.*—"With respect to the choice of catheters for sounding patients, M. Morand employs an ordinary one; but I prefer the *female catheter* which serves also as a sound for the thorax. Although the canal of the urethra may not be rough, full of fræni and callosities, nor its spongy tissue swollen and varicose, nor the prostate tumefied, nor the veru-montanum œdematous and elevated, nor the neck of the bladder swollen, cases in which the principal advantages of this catheter consist, I prefer it, I say, on account of the facility with which it may be introduced without pain, without folding the spongy tissue of the urethra, or tearing it, as happens with the ordinary sound, which is always curved, from the belief of the impossibility of introducing it otherwise into the bladder—an erroneous idea which has always been general, from the want of proper anatomical reflection, and founded upon the figure of the penis compared to that of the Roman S, which it only has in the state of immobility and when it is depressed towards the groin, but which is easily changed by holding the penis in a different manner, which very much facilitates the operation of catheterism; as follows:

"The penis must be held straight, and the female sound introduced perpendicularly, the beak turned towards the abdomen, as far as the arch of the pubis, slowly inclining it towards the anus; it enters of itself, though it be pressed ever so slightly; and the precaution should be taken to hold it firmly so that the beak may not be turned downwards, which might form an obstacle to the introduction, because it would be arrested at the inferior portion of the canal of the urethra and of the veru-montanum, or at the base of the neck of the bladder, and this fre-

The straight sound proposed by M. Amussat, is composed of a hollow silver cylinder, of variable size, from nine to ten inches long,

quently happens on account of the turn which is given to the ordinary sound, in order to introduce it into the bladder under the arch of the pubis, where the beak of this instrument is very often arrested."

After having said that patients can sound themselves more easily with this sound, and that it affords a better passage to the urine when it is in the bladder, he adds ;

"I have lessened the small curvature of this sound. I have had it made *almost straight* and the sound longer than usual in order to enter the bladder."

He concludes thus : "No rational surgeon will deny a fact so clear and so evident ; everything here speaks for itself and is seen ; but it must not be believed that certain individuals receive it. Possessed of a natural presumption, they are already seen to be so obstinate as to decry this method as unworthy of them, and proscribed by their laws as obsolete [*Reflexions anatomiques en forme de lettres ou Analyse de la dissertation de Morand sur la taille au haut appareil*, p. 6 and 7, Amsterdam, 1729.

After what Rameau has said here, we must necessarily conclude, that he never employed the sound, *perfectly straight*, and that the precepts, otherwise good, which he gives upon the manner of introducing the instrument, are less founded upon the attentive examination of the structure than upon the observation of a constant practice. It belonged to M. Amussat to demonstrate by his researches in surgical anatomy a fact until then unknown.

Lieutaud has said in a vague manner, in his "*Traité de Médecine pratique*," vol. 1, p. 581, that a straight sound can always be introduced into the bladder. Who could presume to say that Lieutaud did not mean here the female sound ? It is not said every day that the sound used by M. Larrey is straight, although it is more curved than the female sounds ?

*Extracts from Montagut.*—"M. Magendie, assistant anatomist to the Faculty, having introduced an ordinary female sound into the canal of the urethra of a male dead body, was very much astonished at seeing it penetrate into the bladder without his feeling the slightest resistance. The flow of the urine through the canal of the sound allowed no suspicion of a false passage. Having purposely repeated, upon the same and many other bodies, this attempt, the result of which was constant, M. Magendie mentioned it to me as well as to several of the students, I then caused a greater length to be given to the female sound, and hundreds of times have I introduced this instrument into the bladder of a very great number of bodies of the male sex, with a facility really extraordinary when the canal was free."

"M. Magendie and myself have observed that if there be obstacles which the straight sound cannot overcome, a curved sound of the same diameter does not surmount them, while those which have resisted the curved sound, are sometimes passed by a straight sound."

"I have several times opened the abdomen and drawn the bladder upwards and forwards without rendering the introduction of the sound more difficult, which penetrates very well also into the bladder of dead bodies upon whom the operation of lithotomy has been performed."

"The introduction of straight sounds is so easily performed upon dead bodies that it appears very astonishing that no practitioner has mentioned it. However Chopart and M. Deschamp alone, among the authors whom I have read, who speak of the possibility of this introduction, think that it can only take place under certain circumstances and upon certain individuals. But one of my fellow students assured me that an old village surgeon of his acquaintance never used any other than a straight sound ; and I have met with, a few days since, the surgeon major of a brigade of veterans who told me that he never employed any other sound. *Besides, is not M. Thenon's sound straight in the part which penetrates the bladder ?* Shall I now, drawing the consequences anticipated from what precedes, propose to replace the curved sounds by straight ones ? Shall I say

and perfectly straight, throughout its whole extent. The extremity, called the beak, is blunt, like that of curved sounds, and furnished with two small orifices. To the opposite extremity is fitted a handle, two inches long, by means of the thread of a screw: upon the middle of this handle is fixed a cock, designed to retain liquids when they are injected into the bladder. The rod placed in the cavity of the sound is furnished with a button having the thread of a screw, that can be screwed on the cylinder which constitutes the instrument, when the handle is separated. We will hereafter see the use of this contrivance, which M. Amussat has adapted with equal advantage to the curved sound. He has given to these sounds thus lengthened by the rod, the name of conducting sounds.\*

Whatever may be the form of the sounds employed, their size should always be proportioned to the age of the subject, or rather to the capacity of the urethra into which they are to be introduced.

#### OF CATHETERISM IN CASES IN WHICH THE CANAL IS FREE.

*Of Catheterism with the curved sounds.*—There are two methods of performing catheterism in the male with the curved sound, 1st, over the abdomen; 2d, below the abdomen. The former, being the only one now in general use, will engage our undivided attention. The latter, which has received the name of *master turn*, is only a slight of hand, a genuine trick worthy of the barbarous ages of surgery; it cannot be noticed here.

that these latter deserve the preference; that they have none of the inconveniences of the former; that they surmount all the obstacles which may present themselves? Far be such assurance from me. Facts are wanting for such pompous assertions; and I avow that the sole object of my ambition is to confine myself to the recital, scrupulously true, of what I have observed." (Thesis defended, April 9, 1810.)

It is very evident that M. Montagut means here by straight sounds, only female sounds. Besides the following passage extracted from an author, cited by M. Montagut, supports this idea.

Chopart, "Traité des maladies des voies uninaires," Vol. II., p. 211.

"Sounds are straight or curved. Straight sounds are employed for females; they have only a slight curvature at their beak. Some men also may be sounded with straight sounds like those for females; but longer and slightly curved at their handle in the direction opposite to the beak.

\* \* \* \* \*

"The curvature of the urethra under the pubis requires that the sounds be bent."

It is then evident that M. Civiale in his first letter to the chevalier de Kern, p. 6, commits a grievous error when he pretends that Montagut, in his thesis, has defended the doctrine of Professor Lassus, who, according to some persons, demonstrated, in his lectures, catheterism with straight sounds. Even the assertion of M. Civiale would prove that Lassus never spoke in his lectures of sounds perfectly straight. Besides there exists no written proof of this fact. Even supposing however that the straight sound had been known from the earliest antiquity, it is no less true that M. Amussat has rendered an immense service by first demonstrating all the advantages which can be derived from this instrument.

\*These sounds have been since imitated; for we were not aware that they were known before 1822, the period at which M. Amussat had his constructed.

*Position to be given to the patient.*—To perform catheterism with a curved sound the patient must be placed as near as possible to the left side of the bed, the head and chest slightly elevated by pillows, the thighs separated and flexed upon the pelvis, which must be somewhat raised by the bed-clothes. This position, by relaxing the muscles of the abdomen and consequently the suspensory ligament of the penis, assists the introduction of the sound.

The surgeon, placed upon the left of the patient, after having uncovered the glans, holds the penis in an almost perpendicular direction, keeping it fixed between the thumb and indicator, and middle finger of the left hand, applied to each side of the glans upon the corpora cavernosa, so as not to compress the urethra.

After having warmed\* and oiled the sound through its whole extent, he seizes it by the handle, between the thumb, indicator, and middle finger of the right hand, and introduces it slowly into the urethra, directing it so that its concavity should correspond to the pubis. The left hand must remain perfectly immoveable, instead of its drawing out the penis as the majority of authors recommend. The right hand alone must act in this method of catheterism; it advances the instrument without effort through the canal, taking care to direct its beak along the superior wall. When the surgeon has reached the symphysis pubis, which is easily felt, because the instrument is there arrested, he must endeavour to catch this part gently, in the concavity of the sound. When he has succeeded he lets the penis go, depresses the handle of the instrument between the thighs, which then enters the bladder with the greatest ease, whence the urine immediately flows.

It is very important to direct the beak of the sound, as we have said, along the superior wall of the urethra, which presents no natural obstacle capable of opposing its introduction. It sometimes happens that in endeavouring to pass the symphysis the instrument is arrested in the bulb, if the urethra be not well stretched.

If, on the contrary, the lower wall be followed,† the sound, by resting upon the spongy tissue, which is thicker below than elsewhere, depresses it, and having arrived at the bulb, the beak of the instrument, arrested by the folds of the fibrous membrane which envelopes this body, and not by the perineal ligament, as Bell and some authors after him have supposed, remains below the level of the canal.‡

\* It is better to warm the sound by rubbing it, than by holding it to the fire. Oil should be preferred to other fat bodies.

† M. Blandin in advising, in his thesis, that the inferior wall of the canal should be followed in performing catheterism, appears to us to have committed a serious error.

‡ See the memoir of M. Amussat, entitled, "Observations on the Male and Female Urethra, in which it is proposed to employ straight instruments to sound those canals, and to extract and destroy most of the foreign bodies contained in the bladder." This memoir, read before the academy of surgery, December 2, 1823, was inserted in the "Archives Generales de Medicine," January and April, 1824.

In this case, if, instead of withdrawing the instrument, in order to follow the superior wall, a see-saw motion be given to it, there is danger of making a false passage in the bulb, which unfortunately too often happens.

Independently of this first obstacle, the inferior wall presents a second, which is formed by the portion of the prostate gland situated below the neck of the bladder. It is there that it is most often arrested, when either a curved or straight sound is employed; and if fewer false passages are made in this point than in the bulbous portion, it is because the tissue of the gland offers a greater resistance to the efforts sometimes made by imprudent surgeons. Nevertheless, operators are seen, who, either from temerity, or ignorance of the parts, have bent silver sounds, and made deep false passages in the prostate gland, in endeavouring to overcome the opposition which it offered to the introduction of the instrument.

A tailor, aged 54 years, was attacked with retention of urine, from a paralysis of the bladder. A surgeon who was called to sound him, performed the operation of catheterism with a curved silver sound. This operation was long, and required considerable efforts on the part of the operator. He, however, succeeded in reaching the bladder, which he emptied of the urine that it contained. The patient thought that he felt during the operation a cracking near the neck of the bladder. He died a few years after. At his autopsy\* we found three false passages in the prostate; one on the right from six to seven lines deep, extending under the transverse portion: the other, on the opposite side, was less deep; the third, which was seated immediately below the neck of the bladder, afforded a passage to a gum-elastic sound, which was found in the bladder at the time of death.

In another patient, an officer of the "*gardes du corps*," at Versailles, also attacked with a paralysis of the bladder, so much force was used to overcome the resistance offered by the transverse portion of the prostate, that the instrument traversed the gland at this point and penetrated for several inches between the bladder and the rectum. An affection of the chest occurring to complicate that of the bladder, the patient died eight or ten days after the accident. At the autopsy, a purulent collection, corresponding to the false passage, was found in the lower pelvis.

When the transverse portion of the prostate offers an obstacle, instead of using force, as was done in the cases just mentioned, the sound should be withdrawn a few lines, its handle slightly depressed, and then, by pushing it forwards, it enters the bladder with facility; the sound is rarely arrested by the *veru-montanum*, as some surgeons suppose.

*Of Catheterism with a straight instrument.*—In order to perform this kind of catheterism with facility, the patient must be placed in

\* This autopsy was made in the presence of Dr. Duplau. M. Amussat preserved the pathological specimen for a long time.

such a position that the abdominal muscles be relaxed as much as possible, and the suspensory ligament of the penis, being no longer stretched, the first curvature of the urethra may be easily effaced.

The patient must then be seated upon the edge of the bed, the body bent forwards, the thighs flexed upon the trunk, and the feet supported upon two chairs. The surgeon, seated before him, seizes the penis between the thumb and the indicator and middle finger of the left hand, placed behind the gland, upon the sides of the corpora cavernosa, and holds it in a situation almost perpendicular to the axis of the body. He then introduces the sound directly forwards, which he holds between the thumb and indicator of the right hand, taking care to follow the superior wall of the canal, whilst with the left hand, he draws the penis towards him. He reaches the prostate without obstacle: in order to pass the transverse portion of this gland, which is opposed to the introduction of the sound, he withdraws the latter a few lines, depresses its handle in letting go the penis, until the instrument is almost parallel to the axis of the body. By this manœuvre, the beak of the instrument (catheter or sound) being elevated, the slightest motion from below upwards is then sufficient to introduce it into the bladder, because, by the position given to the penis, the curvature which the urethra forms below and behind the symphysis pubis, is effaced.

When the canal is free, if the rules we have just laid down be followed, false passages are less liable to occur than with the curved sound, 1st, because the obstacle formed by the bulb is always avoided, the point where this accident most frequently happens; 2d, because it is always easier for the operator to direct the beak of a straight sound, than that of a curved one, and to disengage it when arrested in any part of the canal.

However, he who has a perfect knowledge of the anatomy of the urethra, may perform catheterism with equal facility, whether he employ a curved or a straight sound. There are, nevertheless, circumstances under which the curved sound should be preferred; when, for instance, the patient cannot be placed in a situation suitable to the rectilinear catheterism. Thus, in old persons, debilitated by age, in adults worn out by long disease, who are obliged to remain constantly in bed, catheterism with the curved sound is preferable, because it is more easy for the operator, and less painful for the patients.

We may say, in recapitulating, that a curved or straight sound may be introduced into the bladder without much difficulty, whenever the canal is free, provided, 1st, that the patient be placed in a position suitable to the kind of catheterism to be performed; 2d, that, always keeping in remembrance the two obstacles in the inferior wall of the canal, and the eye, as it were, on the end of the sound, the instrument be directed along the superior wall, without any force.

*Of practising upon the dead body.*—The best precepts, however, upon catheterism, either with the curved or with the straight

sound, are completely useless to the surgeon, who, being called upon to perform this operation, has not often exercised in the course of his studies, upon dead subjects, of different ages. It is chiefly during the courses of operations, and when their master guides their hand, as it were, that students are seen introducing a sound into the bladder; and as the majority are but little acquainted with the arrangement of the urethra, when the instrument is arrested, they do not know how far they have penetrated, and often, from some movement of pride, they lacerate the canal to attain their end.

There is, however, a very simple and prompt means of learning to sound, and which we have often heard recommended by M. Amussat.

Upon the dead body of an adult subject expose the canal of the urethra throughout its whole extent, on one side. To make this preparation, the thigh of the same side must necessarily be removed. An endeavour must then be made to introduce the sound, and as the instrument is seen advancing under the eye of the operator, when it is arrested, he can judge at what point it has arrived; it then becomes easier for him to give it the movements necessary to disengage it. Thus, every time that a student exercises himself with a curved sound, after having made the above preparation, he sees that the sound is first arrested by the dilatation of the bulb, and the depression which this body experiences, if he endeavour to force the obstacle, immediately points out to him with what facility false passages may be made at this point; he then withdraws the sound, and avoids this first obstacle by directing it along the superior wall. Arrived at the prostate, if he employ any force, he sees the gland resist; while if, withdrawing the sound again, he endeavour to catch the symphysis pubis with the curvature, he sees it enter the bladder without any difficulty. If he employ a straight sound, and place the subject in the position indicated, he may be assured that the only obstacle to penetrating the bladder which he will meet, is the transverse portion of the prostate.

Catheterism practised thus openly upon the dead body is of the greatest utility, and advances the student rapidly.

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### CHAPTER III.

#### OF THE MEANS PROPER TO RELIEVE RETENTION CAUSED BY STRICTURES OF THE URETHRA.

##### OF CATHETERISM.

CATHETERISM, in the case of complete retention of urine from a stricture of the urethra, is one of the most delicate and often most

difficult operations in surgery. Skillful practitioners are daily seen to fail in the performance of this operation, and cases, in which it has proved fatal when confided to inexperienced hands, are not very rare.

The surgeon who is called to a patient affected by a complete retention from stricture, should have a perfect knowledge of the anatomical disposition of the parts upon which he is about to act, and especially keep constantly in mind that too much precipitation on his part might be fatal to the sufferer.

Before commencing, he must attentively examine the state of the patient, question him and those around him on the circumstances which have preceded or accompanied the accident. Useful information is thus often obtained, and which it is always proper to collect.

It is always necessary to be provided with silver and gum-elastic catheters of different lengths and diameters. After having made choice of the instrument to be employed, and having previously warmed and oiled it, the patient must be placed in the position which the surgeon thinks most suitable, according as he proposes to operate with a straight or a curved instrument.

The catheter is introduced slowly into the urethra, until it has arrived at the obstacle. If the stricture which forms it be recent, if the retention having suddenly supervened after some excess, be owing to an inflammatory swelling of the mucous membrane in the point already affected, it may sometimes be overcome with facility and without much effort, even with sounds of large calibre. The same thing will also occur when a spasmodic constriction of the muscular portion is to be relieved, an affection which the majority of authors have improperly regarded as a genuine stricture.

If, on the contrary, the stricture be of long standing, if the retention have come on slowly, and in a gradual manner, the catheterism is much more difficult.

In this case when the instrument has reached the obstacle, it encounters a considerable resistance, which pushes it backwards, if any attempts are made to advance it. The operator should employ no force to overcome this resistance; he should only move the instrument about, to endeavour to insert the extremity in the orifice of the stricture, never forgetting that he must always try to avoid the inferior wall of the urethra, the point in which it is most easy to make false passages, especially when the stricture is at the bulb, which most ordinarily happens.

If, after several attempts with the first catheter, the obstacle cannot be passed, instead of endeavouring to attain this end by imprudent efforts, for fear that some more experienced or more skillful fellow practitioner might be more fortunate than himself, the surgeon should be patient and try metallic and flexible catheters successively smaller. By acting thus he often succeeds in relieving the patient without resorting to means, which, if they afterwards facilitate the

catheterism, have the inconvenience of prolonging his painful position.\*†

When the operator has been so fortunate as to surmount the obstacle, which is easily perceived by the absence of resistance, the urine immediately commences to flow through the instrument. He must not fall into error from this circumstance and suppose that he has reached the bladder. Indeed, it sometimes happens that the urine which passes off at first, is that which was collected in the portion of the urethra, dilated behind the stricture. He must then advance the instrument until it has entered the bladder. He may assure himself of this by moving the instrument in every direction, which could not be done without causing violent pain, if it were only engaged in the urethra, or in a false passage.‡

After having emptied the bladder of all the liquid which it contains, the sound employed must be left in the canal, and fixed so as not to become deranged.§ If this be a silver sound, however, as the presence of a solid body in the urethra fatigues the patient, a gum-elastic one must if possible be substituted for it; but it is better to allow it to remain for a couple of days, if it be feared that too

\* Baths certainly hold the first rank among all the means praised by authors, as proper for relieving individuals attacked with a retention. I have often, however, observed, with M. Amussat, that the patients upon coming out of the bath suffer more than before going into it. Indeed it is easy to conceive that, the obstacle remaining and the secretion of urine being increased by the absorption of the water of the bath, the bladder becomes more full, and that consequently the pains augment; some patients, therefore, will neither drink nor bathe.

† The remedy, says Brodie, on which most reliance is to be placed where these mechanical means (catheters and bougies) fail, is opium. From half a dram to a dram of landanum may be administered as a clyster in two or three ounces of thin starch. If this do not succeed, opium must be given by the mouth, and the dose must be repeated, if necessary, every hour, until the patient can make water. Brodie, declares that, according to his experience, the cases in which the stricture does not become relaxed under the use of opium, if administered freely, are very rare. The first effect of the opium is to diminish the distress which the patient experiences from the distension of the bladder. Then the desire of urinating becomes less violent, and the exertions to accomplish it less severe. After some time of this, comparative rest, the patient finds the capability of urinating return slowly and in small quantities at first, but increasing afterwards.—*Trans.*

‡ After passing the stricture, however, we may find a second. In this case, Semmering thinks, that the second is more easily overcome than the first. Lisfranc denies the general correctness of this assertion, and lays down the following rule which he says admits of no exception; when the first obstacle is passed, the sound must not be withdrawn above it, in endeavouring to overcome the second, because the irritation produced by the presence of the instrument would tend to diminish the size of the already contracted portion of the canal, which could not, perhaps, be passed a second time.—*Trans.*

§ We shall not describe here the different methods of fixing the catheter, but merely say that the most simple and convenient for the patients consists in passing cotton cords into the rings of the handle, which cords are attached behind the glans, taking care not to draw them too tight, for fear of producing an œdematous swelling of the prepuce.

much difficulty will be experienced in introducing the flexible catheter.\*

#### OF THE EMPLOYMENT OF BOUGIES.

*Choice of Bougies.*—When the obstacle cannot be overcome with a sound, bougies must be resorted to. The choice of these latter is not indifferent; upon it often depends the success of the operation. They should be neither too soft nor too hard. The former, such as the wax bougies, when they are heated by the walls of the canal, lose so much of their consistence, that they bend against the stricture, if the operator attempt to advance them. The same thing occurs when certain gum-elastic bougies are employed, the extremities of which are too flexible. If, on the contrary, the bougie be too solid, particularly at its point, and the operator use some effort to introduce it, he is liable to excoriate the mucous membrane of the urethra, and to facilitate the infiltration of urine, by the formation of a false passage. Care must be taken, then, to choose a bougie of moderate consistence.

*Of the introduction of bougies.*—To facilitate the introduction of a bougie, the patient should be placed in the same position as for catheterism with a straight sound. When the instrument is felt to be arrested by an obstacle, it must be moved in a rotatory manner between the fingers in order to introduce it into the orifice of the stricture. If the operator succeed in this, he is sometimes notified of it by the urine, which flows drop by drop, and the resistance which he experiences when he endeavours to withdraw the bougie. This resistance produced by the contraction of the obstacle upon the bougie, is sometimes so great as to prevent the passage of the urine. In such cases, M. Amussat has advantageously injected water between the bougie and the canal; this indeed was one of the first causes which led him to think of forced injections, of which we will speak presently.

When the extremity of the bougie, instead of entering the urethral orifice, constantly strikes against the obstacle, the instrument is pushed back; and if any effort be used, it bends if it be too soft, and may lacerate the urethra if it be too hard. In this case, some practitioners advise the introduction of the bougie only as far as the obstacle, without endeavouring to pass it; they thus expect to obtain a dilatation of the stricture at the end of a few hours, so as to allow the patient to urinate. This means, almost always illusive, may be applied in a hospital, where the individuals are subjected almost

\* Lisfranc advises that the metallic catheters be not replaced by gum-elastic ones, until the movements of rotation can be given to the former without pain.

The gum-elastic catheter should be changed every two or three days; if delayed longer, there is fear of its breaking in the bladder, or of there being deposited, around its beak, concretions capable of tearing the neck of this viscus and the urethra upon the extraction of the instrument. Again the concretions may remain in the bladder and there form the nucleus of a calculus.—*Trans.*

without restriction to the will of the surgeon; but in private practice it cannot be resorted to, except to teach the sufferer a little patience.

It also frequently happens that catheterism and the introduction of bougies produce a flow of blood from the urethra. If this discharge be inconsiderable, the surgeon should not trouble himself about it. It even becomes favourable by producing a disgorgement in the affected parts. If, on the contrary, the blood flow abundantly, this symptom should attract his attention, especially if the stricture be seated at the bulb, and if he has employed force in his manœuvres. There is then reason to fear that he has deviated from the true direction of the canal, and has made a false passage in front of the obstacle; he should then cease his endeavours, and call in a more experienced fellow surgeon, whose task becomes a very difficult one.\*

Indeed, when a false passage has been made, it appears that the sounds and bougies have a greater tendency to enter there than in the opening of the urethra, because the circumference of the passage is swollen, and because the penis is almost always at the moment of the accident in a semi-erection.

#### OF FORCED INJECTIONS.

Convinced of the difficulties often presented by catheterism and the introduction of bougies in cases of retention of urine from stricture, as well as of the dangers to which the patients are exposed, M. Amussat invented forced injections, a process still too little known, and which was unjustly at the time attributed to a German surgeon.†

\* In common, even a free discharge of blood for some time from the urethra need not always excite alarm or self-reproach on the part of the surgeon. After a time he may, without inconvenience, resume the use of the bougie, or the elastic catheter with the rod, if he prefer it, and introduce it into the bladder.—*Editor Sel. Med. Lib.*

† When M. Amussat presented his memoir upon forced injections to the academy of medicine, many objections were addressed to him. He answered all by experiments upon anatomical preparations, before the assembly. It was afterwards pretended that Trye had employed this means. Now the following is the manner in which Sæmmering explains himself with respect to the injections employed by this surgeon.

“I will mention here a process which I have practised, without knowing that Trye had employed it; when the stricture is so great that the finest bougie cannot pass it, I inject the canal of the urethra with olive oil, or opiated oil, I close the external orifice of the canal, and endeavour, by pressing with the finger, to force the liquid forwards. I repeat this process, until the bougie can be introduced.” *Traité des maladies de le vessie, et de l'uretre, considérées particulièrement chez les vieillards, traduit par Hollard, p. 191.*)

The same Sæmmering adds: Brunninghausen cured three strictures of the urethra “by forcibly compressing the canal, behind the glans, at the moment of urinating.”

It is very evident that Trye only employed oily injections to facilitate the passage of the sound, but not for relieving the retention.

In the process employed by Brunninghausen, the urine acted somewhat like the forced injections.

We will not here discuss the pretensions of M. Fournier of Etampes, who, in

M. Amussat was particularly led to invent this means by the certainty which he had acquired, that the canal of the urethra is never entirely obliterated, and that complete retention in subjects affected by strictures, is almost always occasioned by a plug of mucus, which is interposed in the part of the canal yet free, and which ordinarily accompanies the first jet of urine.

Agreeably to this idea, he thought that, in the cases where the urethra is contracted so much as to prevent the introduction of the smallest bougie, it would be always possible to introduce a liquid, which, by its fluidity, would insinuate itself more easily than a solid body into the orifice of the stricture, and immediately relieve the retention, without any kind of danger, by diluting and forcing back the mucus, which, collected into a plug behind this orifice, intercepted the course of the urine. Such flattering hopes were not disappointed, and numerous successful cases daily prove that forced injections, in every case of complete retention, especially from stricture, constitute a surgical means as simple as it is easy and certain in its mode of application.\*

*Manner of Injecting.*—The patient being seated upon the edge of the bed, his legs are held by two assistants, or supported upon two chairs, and the surgeon, placed in front, introduces into the urethra as far as the stricture, a gum-elastic catheter, very flexible and of small diameter, which, like a canula, is opened at both extremities; he attaches to this instrument a gum-elastic syringe, previously filled with tepid water, and from which the air which might be present is expelled. The pipe of the syringe should have an orifice almost capillary. Everything being ready, the urethra should be squeezed forcibly upon the sound with the indicator and middle finger of the left hand, while with the right hand the syringe is gradually compressed to force out the liquid which it contains. This latter being unable to pass out of the urethra, on account of the pressure exerted upon the canal, very soon penetrates into the orifices of the stricture, which it clears away by forcing back the plug of mucus mentioned above.

If the patient be directed to make the exertions for urinating, as the liquid is injected, it is seldom that immediate relief is not obtained. Indeed, almost as soon as the liquid has passed the obstacle, the urine flows out drop by drop. The sound is then withdrawn, and, however slightly the individual may be enabled to exert himself, the urine soon runs in a small stream.

It may happen, especially in old persons, that a first injection is unsuccessful, a second must then be given, and even several others if it be necessary.

1829, claimed the priority for the forced injections, as he had done with respect to the straight sounds, lithotrixy, &c. The perusal of his work on lithotrixy, straight sounds, and forced injections, will be sufficient to determine that his pretensions are misplaced.

\* I have myself very frequently employed forced injections, and always with complete success.

When at the cessation of the retention, injections are employed as a means of dilatation, they should be used with discretion; they produce, in nervous and irritable subjects, a febrile disposition, which is promptly relieved by a few baths, and the application of leeches to the perineum.

The resistance which the obstacle offers to the passage of the injected liquid, is sometimes so great that the strength of one hand is not sufficient; the surgeon is obliged to place the hand which presses the syringe between his knees, to compress it more forcibly and by sudden contractions. At first M. Amussat exerted pressure upon the syringe by means of a compressor, composed of two plates of copper or iron united by a hinge between which the instrument was placed, and which were brought together by means of a screw, or kind of capstan. He has, for some time, given up this machine, which had no real utility and which very much complicated the apparatus designed for the administration of forced injections.\*

The idea of introducing water into an organ, already distended with urine, might induce some practitioners to fear an increase instead of a relief of the evil, by employing the means above mentioned. But all fear upon this score is idle, for the quantity of the liquid injected is so inconsiderable, that it cannot become injurious, if we consider, that, upon removing the obstacle, it is immediately forced out of the canal by the column of urine for which it has just made a passage.

M. Amussat has very frequently used forced injections since 1824, the period at which he first employed them, and experience has proved that the following propositions may be established:—

1st. When the patient preserves all his strength, the injections are sufficient to allow the entire evacuation of the urine contained in the bladder, without resorting to catheterism and the introduction of bougies.

2d. In old men and feeble subjects they relieve the first symptoms of retention, and render catheterism and the introduction of bougies more easy.

\*3d. In the case in which a false passage has been made, they are always the surest means of reopening its natural channel to the urine.

4th. Whatever may be the cause of the retention, the injections are always useful, since in those cases in which they are not sufficient for the relief of the symptoms, they always facilitate the introduction of instruments, and render it less painful to the patients.

5th. Whenever the patient retains sufficient strength, they do away with the necessity of puncturing the bladder, an operation always very serious, and sometimes mortal.

\* This compressor has been imitated by a surgeon, who, to some of his patients, calls himself the inventor. The injections may also be administered with an ordinary syringe, but with less facility.

6th. Forced injections not only relieve the retention of urine, but they are often sufficient, to prevent it in individuals who have the canal of the urethra too much contracted to admit the introduction of bougies.\*

We cannot do better than cite here a few cases which will prove that forced injections, so little known to the majority of surgeons, constitute, we repeat, one of the most certain and efficacious means for immediately relieving the unfortunate individuals attacked with retention of urine caused by stricture.

CASE I.—M. J\*\*\*, aged 30 years, a musician, experienced, during many years, after several attacks of blennorrhagia, a difficulty in urinating, when, in 1820, after having drunk wine and cordials, he was seized suddenly with a complete retention. He took a tisane of dog's grass and nitre without experiencing any benefit. He passed the night in intolerable pain, tormented by a violent fever, and without urinating a single drop.

The next morning a surgeon succeeded with much difficulty in introducing into the bladder a gum-elastic sound, by means of an iron rod. The efforts which the operator employed, the blood which the patient lost, and the severe pain which he experienced during the catheterism, indicated that the canal had been lacerated. The sound was left in the bladder for a few days, and M. J. could very soon attend to his business; he was however obliged to introduce a small bougie into the canal from time to time.

A few years afterwards, in the month of December† he experienced for the second time all the symptoms of complete retention. Called to him by Dr. Hauregard, M. Amussat found him in the following state: violent fever, hot skin, very severe pain in the region of the bulb, extreme anxiety; the most violent efforts could not expel a single drop of urine; the penis was in a continual semi-erection and the glans of a blueish colour.

M. Amussat at first attempted catheterism, with straight and curved catheters, of different calibres, then the introduction of bougies; but the extremity of these instruments, instead of entering the orifice of the stricture which was at the bulb, appeared to take an opposite direction to that of the canal and enter into a false passage. He then introduced, as far as the obstacle, a catheter cut at both extremities, and administered a forced injection, of tepid water. The patient immediately passed a few drops of thick and fetid

\* Segalas denies the utility of forced injections, having employed them in many cases, without obtaining any other result than that of fatiguing the patients. Once only, he declares, after the persevering use of injections, combined with other means, the course of the urine was partially reëstablished. We cannot, however, withhold our testimony in favour of this remedy, and having witnessed its great efficacy on more than one occasion, we consider it a valuable accessory means in the treatment of retention of urine arising from strictures of the urethra.—*Trans.*

† This case was one of the first collected by M. Amussat, in favour of forced injections; but it was not before 1825 that he published this means in the Journals, and read a memoir on the subject to the academy.

urine, but after a second injection he urinated as well as before the accident. This patient was afterwards cured by scarification and bougies.

CASE II.—M. B\*\*\*, aged about 60 years, suffered for more than 25 years from a difficulty of urinating, caused by two strictures in the canal. He had already been cauterized a great many times, and without success by Ducamp himself. In 1825, the difficulty of urinating increasing daily, M. Ferrus, the patient's physician, caused M. Amussat to be called in.

At this period M. B\*\*\* could only introduce small bougies, which he was obliged to wear almost constantly to avoid a retention, and which distressed him very much. M. Amussat immediately undertook to dilate the canal by forced injections, which the patient often performed himself. He could thus very soon lay aside the use of sounds and bougies, and at the end of two months he urinated with so much facility that he was unwilling to submit to any treatment for the radical cure of his strictures. When the urine after any fatigue flowed less freely than usual, he employed an injection, and was immediately relieved.

CASE III.—M. D\*\*\*, aged 70 years, had several urethral discharges, after which he experienced a difficulty in urinating; for several years, whenever he satisfied this desire, he only passed one or two ounces of urine. On February 1st, 1826, at 8 o'clock in the evening, he wished to urinate but could not succeed. The pains which he experienced were already very severe. He retired to bed and slept a little; but at 2 o'clock the pains increased, and the most violent efforts to expel urine were useless.

On the 2d, at 10 A.M., having been called in by Dr. Grimaud, M. Amussat visited the patient, who was in the greatest agony; the pulse was strong and frequent, the face red, the abdomen tense and globular at its inferior part, where the bladder was easily recognised; the penis was in a semi-erection; not a single drop of urine flowed from the canal.

A sound of small calibre having been introduced, was arrested by an obstacle at the bulb, which it was impossible to pass. M. Amussat then resorted to forced injections. The liquid of the injection had scarcely penetrated beyond the stricture, when the patient, who had not urinated for fourteen hours, exclaimed that he was saved. Indeed, he immediately urinated with as much facility as before the accident, and passed about two pounds of a dark coloured urine, and of an ammoniacal odour.

CASE IV.—M. R\*\*\*, a merchant of a vigorous constitution, aged 40 years, had experienced, for some time, a slight difficulty in urinating, when suddenly after a copious repast he was seized with a complete retention. After useless efforts to obtain relief, he was obliged to go to bed and send for a surgeon, who discovered that there were several strictures, and particularly one at the bulb, which he could not pass. A second surgeon was called. This last, more rash than the other, made very violent efforts to reach the bladder,

and finally succeeded, after having *ploughed up the canal*; this is the expression of the patient.

After this first accident, M. R., instead of submitting to treatment for his stricture, continued to lead a laborious life, and to enjoy the pleasures of the table. This kind of life very soon aggravated his disease, and in 1826 he had a second complete retention, for which he called in M. Amussat. He had been several hours without urinating, and the pains which he experienced were so great as to allow him no repose. The introduction of catheters and bougies was attempted; but having arrived at the bulb, the seat of the principal obstacle, these instruments entered into a false passage, several lines deep, from which it was impossible to turn them, so as to penetrate into the orifice of the stricture. The forced injections were here resorted to, succeeded completely, and immediately procured the emission of urine.

Afterwards, and before the fear of seeing himself exposed to still more serious accidents had determined M. R. to take some repose, and lead a more regular life in order to subject himself to treatment, he was frequently exposed to complete retentions. Often, in the absence of M. Amussat, I have relieved him by a single injection, while it was impossible for me to introduce the smallest bougie. Scarification cured this patient, who would have been exposed in consequence of his situation to an abscess, or a urinary fistula.

CASE V.—M. V\*\*\*, residing in the Rue de Sorbonne, of a very irritable constitution, and eccentric character, had for several years a considerable stricture of the canal, which had many times exposed him to a complete retention of urine. Diluent drinks and repeated baths had always prevented this accident.

Towards the end of the winter of 1829, the emission of urine became, all at once, impossible. He had been already, several hours, suffering the torments of a complete retention, when, yielding to the solicitations of his friends, he called in a well-known surgeon. After several useless trials of catheterism, this latter declared that *the only means of relieving the patient was puncture of the bladder*. M. V. refused, and still waited, always hoping to be relieved without the assistance of art.

At last, yielding to the pain, he desired the aid of M. Amussat. Under these circumstances, the effect of the forced injections was prompt; scarcely had the obstacle been passed by the liquid injected, than the patient could urinate in a jet almost as large as before the accident. The bladder was completely emptied, and from that moment all the symptoms of the retention disappeared.

Although forced catheterism and puncture of the bladder are extreme means, which should only be resorted to after having tried everything for the relief of the patient; although the occasions for performing these two operations should become more rare, according as the use of the injections is extended, we, however, think that we ought briefly to explain the manner of performing them.

## OF FORCED CATHETERISM.

In this kind of catheterism, the aim is to open an artificial passage in the course of the natural channel. To attain this end, a silver curved catheter is employed, with very thick walls, and the beak of which is more or less pointed according to the greater or less degree of resistance with which the operator expects to meet. This has received the name of conical catheter, and has been especially praised by M. Boyer.

*Introduction of the Conical Sound.*—The patient being placed upon the side of his bed, as in ordinary catheterism with the curved sound, the surgeon introduces the instrument slowly, as far as the obstacle; when he has reached it, he must introduce, high up into the rectum, the indicator finger of the left hand, to assist in directing the sound. Everything being thus arranged, he thrusts the sound in the direction of the urethra, without inclining it towards either side, with a force proportioned to the resistance which he experiences. The indicator finger introduced into the rectum is intended to discover to the operator, whether the instrument preserve, in advancing, the direction of the urethra; if it deviate, it must be immediately brought back. The sensation of a resistance overcome, the urine which flows through the catheter, and the ability of moving the instrument up and down, are the signs which announce that it has reached the bladder.

After having evacuated the urine, the sound must be fixed so that its beak may not project too much into the interior of the organ, the walls of which it might rupture. It is always prudent, after forced catheterism, to prevent inflammation by an application of leeches to the perineum, local fomentations and baths.

*Inconveniencies of this mode of Catheterism.*—It must be confessed, that everything tends to render the operation, of which we are speaking, both more difficult and more dangerous. In the first place, it is founded upon no positive rules: for those which we have laid down, after the partisans of the conical sound, are very uncertain and almost always illusive.

Indeed, whatever may be the anatomical knowledge of a surgeon, when a stricture shall have entirely changed the direction of the urethra, can he ever, even with the assistance of the indicator finger introduced into the rectum, be certain that the beak of the instrument is properly in the direction of the canal? Certainly not; and he will be much less able to bring it back to the direction which he would desire to give it, especially if it be engaged in the prostate, because the movements then made with the finger to elevate the beak of the sound, become useless in acting at the same time upon the gland.

On the other hand, if, with ordinary catheters and bougies that are somewhat stiff, false passages are liable to be made, in entering the bladder through a strictured canal, this accident must be still more

frequent, when a conical instrument is used, the disposition of the beak not allowing the operator to appreciate perfectly all the resistance which the obstacle might offer.

When the obstacle, therefore, exists at the bulb, if the operator endeavour to pass it forcibly, the beak of this sound, instead of entering the stricture, penetrates without difficulty into the tissue of the bulb, and enters into the bladder by a false passage after having perforated the canal; if, on the contrary, the obstacle be formed by the swollen prostate, or by a tumour of this gland, the efforts to advance the instrument are sometimes so great, that it bends, or penetrates into the bladder after having lacerated the gland.

M. Amussat has dissected the genital organs of two subjects upon whom forced catheterism had been performed. In one the sound had perforated the fibrous frænum which bounds the cul-de-sac of the bulb behind, and had reappeared in front of the prostate, before penetrating into the bladder through its neck; in the other the instrument had entered between the prostate and the rectum, and opened a passage through the inferior wall of the bladder. In both cases, the urine contained in its reservoir had been evacuated.

The passage of this liquid through the sound ought not to be sufficient to assure the surgeon of the success of his operation; for, always prompt to turn aside in the midst of the obstacles which it has been forced to pass, the instrument may have easily deviated from the direction which it was desired to give it, and have penetrated into the bladder through a circuitous passage.

The inconveniences of the conical sound, and the dangers which accompany forced catheterism, are so well known at the present day, that there are but very few practitioners who have not entirely renounced it. This kind of catheterism is nothing else than a true puncture of the bladder through the urethra, a puncture much more difficult and much more dangerous than that which is performed above or below the pubis.

Indeed, into whatever place the surgeon may choose to plunge his trochar, if he bear in mind the disposition and relation of the parts concerned, he will almost always arrive directly at the organ which he wishes to enter. With the conical sound, on the contrary, he will operate by feeling, and his anatomical knowledge becomes almost entirely useless, in enabling him to introduce, certainly and forcibly into the bladder, a pointed instrument, through a very narrow canal, all the parts of which are so much the more easy to perforate, as they are in a pathological state and very unfavourable to the operation.

#### OF THE PUNCTURE OF THE BLADDER.

The bladder may be punctured from the perineum, from above the pubis, or through the rectum.

*Perineal Puncture.*—Dionis first performed the perineal puncture.

He employed a straight bistoury with a narrow blade, which he plunged on the left side of the raphe, in the place where Frere Jacques cut for the stone. He thrust in the instrument until the flow of the urine showed that it had penetrated into the bladder. He then slipped along the blade of the bistoury a metallic canula, to afford an issue to the urine, and retained it in place by means of bandages.

In 1721, Junkers substituted the trochar for the bistoury of Dionis, which is still used at the present day.

To perform the puncture from the perineum, the patient must be placed as in the low operation for stone. The surgeon being placed before him, plunges the trochar in on the left side of the raphe, between the urethra and tuberosity of the ischium, at about an inch from the anus, while an assistant holds the scrotum in the left hand, and presses with the right upon the hypogastric region, so as to make the bladder descend into the pelvis. The point of the trochar should be directed at first parallel to the axis of the body, and afterwards a little within, in order to reach the inferior part of the wall of the bladder near the neck. So soon as the absence of resistance, and the passage of the urine show that the instrument has penetrated into the cavity of the viscus, the trochar is withdrawn and the canula, which must be properly fixed, is left.

*Puncture above the Pubis.*—It is only since the possibility of extracting calculi from the bladder, through an incision above the pubis, has been known, that puncture of the bladder from the same place has been performed. Mery first put it into practice.

In this operation the patient is placed, as in lithotomy above the pubis. The surgeon, after being well assured of the fluctuation, and after having marked, with the indicator finger of the left hand, the place where he wishes to make the puncture, seizes the trochar with the right hand, and plunges it quickly into the most dependent point of the tumour formed by the bladder, at about one inch above the symphysis, and upon the median line. When it has penetrated into the bladder, he withdraws the trochar, and leaves the canula.

Frere Come, in puncturing above the pubis, substituted for the straight trochar, which is still employed by the majority of surgeons, a curved one. The curvature of this instrument is a portion of a circle, the diameter of which is seven inches; a small channel is made in the convexity of the trochar to facilitate the passage of the urine, so soon as it has penetrated into the bladder; and the handle of the canula is furnished with a flat surface which serves to keep it in place. When this instrument is employed it should always be so directed as to make its concavity correspond to the pubis. The canula should, in every case, be thrust in deeply, to prevent its leaving the bladder.

*Puncture through the rectum* was first performed by Fleurant, a surgeon of Lyons. The following is the method. The patient being placed and held as in perineal lithotomy, the surgeon introduces into

the anus one or two fingers of the left hand as high up as possible; he afterwards slips upon these fingers, which serve as a conductor, a trochar with a suitable curvature, and plunges it into the part of the bladder the farthest removed from its inferior wall. The cutting portion being withdrawn, the canula is fixed in the manner least inconvenient to the patient.

Of these three methods, that which ought always to be preferred, is the *puncture above the pubis*. 1st, through the hypogastrium, the operator is almost always sure of arriving at the bladder without injuring any important organ; 2d, the portion of the bladder which is interested, being the farthest removed from the neck, which in every retention of urine is the seat of a violent irritation, is less liable to consecutive inflammation; 3d, the parts which are traversed by the canula being thin, the presence of this foreign body in them must develop less inflammation; 4th, the urine passes out as easily above as below the symphysis, and infiltrations of urine are more rare, because the canula, after the puncture above the pubis, is less often deranged than after the other methods.

Puncture from the perineum offers serious inconveniences; 1st, it is difficult to arrive at the bladder from this place, without wounding the prostate, the arteries of the perineum, or the ejaculatory vessels; 2d, the considerable quantity of cellular tissue in the perineum, and which the canula must traverse, very much favours the development of inflammation; 3d, if a gangrenous eschar form around the canula, the urine, passing out at the side of the instrument (which sometimes happens, upon the sloughing of this eschar), is easily infiltrated into the laminæ of this cellular tissue, and forms considerable abscesses in it; lastly, in this case, the patient supports, much less easily, the presence of the canula, than in the puncture above the pubis.

Without mentioning the lesion of the vesiculæ seminales, or the *vasa deferentia*, which may be easily wounded in the puncture through the rectum, the recto-vesicular fistulæ, which are almost always a consequence of this operation, should cause it to be invariably rejected.

Whatever may be the method, which the surgeon chooses for performing the puncture, when the first indication is fulfilled, that is to say, when the bladder is empty, he must employ all the general and local means for preventing inflammation. If the patient be plethoric, one or two bleedings must be prescribed; if pains in the hypogastrium be developed, the abdomen must be covered with emollient fomentations; the patient must be put upon the use of diluents and upon diet. When the first symptoms have disappeared, the attention should be directed towards reëstablishing the natural course of the urine, and the canula must not be removed until a catheter has been introduced into the bladder.

## OF THE INCISION.

There is another operation, which may be performed for the relief of retention caused by stricture, when catheterism has become impossible. We mean the incision (*la boutonnière*) which consists in making, in the perineum and parallel to the raphe, a small incision, which, interesting the membranous portion of the urethra, more easily allows the introduction of a canula or flexible sound into the bladder, to be kept there in order to prevent the infiltration of urine, until the excretory duct for this liquid can be reëstablished.

Although the perineum is the place chosen for making the incision, it may be performed in any point of the canal, according to the seat of the obstacle. Perhaps, indeed, it is the greater frequency of the obstacle at the bulb, which has induced surgeons to open the membranous portion in preference, as it is immediately behind this body, which it must be difficult not to include in the operation.

When the obstacle is formed by one of those callous strictures of which we have spoken, and which may be easily felt through the walls of the canal, it would be better to make the incision at the very point which corresponds to it, as is done in England, because the wound resulting from it gives rise to a suppuration sometimes abundant, which may produce a favourable disengagement.

This operation is perhaps improperly neglected, and it is difficult to explain why surgeons prefer forced catheterism, and the puncture of the bladder to it.

The incision, performed in cases of retention from stricture, conducts always, and without danger, to the end proposed—the evacuation of the urine—and sometimes destroys the strictures. Forced catheterism, on the contrary, as we have demonstrated, is always attended with danger, even when it is performed by the most skilful hands; and if with the trochar, which sometimes offers difficulties, after the bladder is reached, the puncture may be followed by infiltration of urine.

The first indication being fulfilled, viz., emptying the bladder of the urine which it contained, the reëstablishment of the natural course of the urine, is much more easily performed by means of catheters and bougies, after the incision, than after the two operations which have been substituted for it, especially if the operator be careful to divide the stricture itself. It is true that the incision may be followed by a urinary fistula. But this accident, and others much more serious, still, such as infiltrations of urine, abscesses, and false passages, are the frequent results of puncture, or of forced catheterism, and become much oftener fatal to the patients.

M. Amussat has never had an opportunity of performing the incision; but if a case presented itself, in which, after having ineffectually tried catheterism and forced injections, he should not succeed in relieving the patient, he would perform it in the follow-

ing manner : 1st, he would make an incision into the canal a little behind the bulb, and introduce through this orifice a sound, in order to empty the bladder ; 2d, the bladder being emptied, he would withdraw this sound, to introduce a second one through the *meatus urinarius* into the urethra, as far as the strictured point ; that being done, he would cut down upon the stricture itself, and pass this sound into the bladder. For every surgeon who perfectly understands the surgical anatomy of the perineum this operation is easy ; but in order to perform it, he must have reflected upon it, and especially have repeated it several times upon the dead body.\*



## CHAPTER IV.

### TREATMENT OF STRICTURES.

WHEN the symptoms of retention of urine have been relieved by the means above indicated, the attention should be directed to the cure of the strictures, the cause of this retention. But patients are often met with, who, forgetting the danger which they have run, fear a long and sometimes difficult course of treatment, and endeavour to avoid it under different pretexts ; thus allowing the disease time to make a progress, which it is afterwards impossible to arrest, and the consequences of which become but too often fatal. We will give an example.

L\*\*\*, endowed with a strong constitution, aged upwards of 60 years, had devoted himself during his whole life to venereal pleasures. Two strictures, one situated at the bulb, the other two inches above, were the result of his excesses, and often exposed him to a complete retention of urine. Dr. Ricque, this patient's physician, had already several times succeeded in relieving this accident by forced injections, and had advised L. to put himself under treatment for his strictures ; but the danger once passed, this good advice was soon forgotten, and he returned to his ordinary excesses.

Another retention very soon supervened, but the physician was

\* This operation is very generally reprehended by surgeons, and has consequently almost passed into disuse. We have, however, witnessed its performance upon one occasion, the results of which were perfectly satisfactory. It was a case in which, from obstructions existing in the canal, it was impossible to pass an instrument into the bladder. In order then to relieve the patient, who was suffering from painful micturition by overflowing, the urine passing out *guttatim*, the urethra was opened near the affected spot, which enabled the operator to divide the stricture, and pass a sound through, which was retained to the end of the treatment. The cases, however, are very rare, in which, by perseverance and patience, and dexterous, and above all, gentle management, an instrument may not, at last, be introduced into the bladder.—*Trans.*

not near to relieve it. L. made the most violent efforts to pass the urine contained in the bladder; but in vain. Worn out with fatigue, and a prey to a burning fever, he was fain to wait for the assistance of him whose advice he had neglected. The physician arrived, but he was too late: the portion of the canal, situated behind the stricture, ruptured, and an extensive effusion of urine occupied the whole scrotum, and a part of the perineum. M. Amussat being called in consultation, introduced with much difficulty a small sound into the bladder; but this instrument was useless. The effusion progressed very rapidly and extended into the cellular tissue of the nates and of the superior part of the thighs. The scrotum having been deeply incised to afford a passage to the effused urine, soon became gangrenous, and upon the sloughing of the eschars, the two testicles remained denuded; the patient died a few days after in the most miserable manner, exhaling from his whole body an intolerable urinary odour.

At the autopsy which we carefully made, urinary abscesses were found in the perineum, the nates, and upper part of the thighs. The urethra being opened with care, exhibited the two strictures above mentioned. Behind that which was seated at the bulb, the canal presented a considerable dilatation, and a rupture, or rather a laceration of the mucous membrane, whence the effusion was made into the adjacent parts. All the organs of the three cavities exhaled a strong odour of urine.

Two methods of treatment have been employed up to the present time, for the cure of strictures. The first, which can only be considered as palliative, consists in the dilatation of the canal by mechanical means. The other, curative, aims at destroying the strictures, which oppose the emission of the urine.

Bougies of every kind, gum-elastic catheters and forced injections, proposed and applied with much success, by M. Amussat, are the means of dilatation most generally applied.

Cauterization, performed in different ways, was for a long time the only surgical process known for the cure of strictures of the urethra. For several years past, M. Amussat has derived great advantages from scarification, employed alone or combined with cauterization.

#### OF DILATATION.

*Of the different kinds of Bougies.*—The treatment by dilatation is very ancient; it has been practised from the sixteenth century. Bougies of lead, whalebone, catgut, and wax, have been successively employed. The last mentioned were only wicks of cotton covered with this matter, and carefully rolled, so as to be well united. According as the art progressed, the inconveniences and slight advantages of these instruments were seen, and composition bougies, and those of gum-elastic were invented. The former were for a long time used, to introduce caustic or cathartic medicaments into the

urethra, for the purpose of producing a suppuration in the excrescences of the canal, which were regarded as the most ordinary cause of strictures.

But since the progress of pathological anatomy has proved that these excrescences are extremely rare, medicated bougies have fallen into discredit, and gum-elastic bougies and those of wax are almost alone employed at the present day. The latter are composed of slips of old linen of a fine and close texture, covered upon both sides, with a layer of very pure yellow wax rolled carefully between the fingers according to their length, and afterwards upon a polished marble plate with a very smooth wooden spatula.

Wax bougies are never hollow internally; those of gum-elastic on the contrary are either filled up or hollow. The latter are introduced by means of a rod.

Of these two kinds of bougies, the wax are preferable in the treatment of strictures, because, being softer than the gum-elastic, they fatigue the patient much less, when he is obliged to wear them, and because the urethra is less liable to injury from their introduction; their extremity being softer. There is, however, an inconvenience offered by these bougies when they are fine, and which should be pointed out; it is, that if they be not immediately introduced into the orifice of the stricture, they fold upon themselves with the greatest facility, even without being forcibly pushed. To remedy this, M. Amussat has a small leaden thread put into the centre of these bougies, which, without giving them a greater degree of stiffness, serves as a rod to introduce them. He also has their walls covered with a thicker coat of wax, to which is added a small quantity of tallow to make them softer.\*

The name of conical bougies is given to those having the extremity which is introduced into the urethra much finer than the other.

Those, which at some distance from this extremity exhibit an increased size, have the name of bougies '*à ventre*.'

*Of Flexible Catheters.*—Flexible catheters of gum-elastic are those which are most generally employed to dilate the strictured urethra, because they fatigue the patients much less than solid sounds of silver or any other inflexible substance. The gum-elastic catheters were invented by Bernard, a Parisian goldsmith. These instruments composed of a texture of silk covered with a particular plaster, into which little or no caoutchouc enters, although their name appears to indicate that they are entirely formed of it, have but slowly acquired the degree of perfection at which they have arrived at present, and that suppleness which allows them to accom-

\* The wax bougies are certainly the softest and the least fatiguing to the patient, which can be employed in the dilatation of the urethra, but another and serious inconvenience is, that they deteriorate very rapidly, and can only be used for a few hours. They are not consequently adapted to permanent dilatation; but are excellent for the dilatation which succeeds cauterization, for here they are only wanted to act temporarily.—*Trans.*

moderate themselves to the different curvatures of the canal, when the penis is in a state of relaxation.\*

*Of the choice of Catheters.*—The choice of catheters is a circumstance of sufficient importance to demand some attention. Those should be used which have very thin walls, and a perfect polish over their whole surface. The eyes, placed at one or two lines from each other, should present no roughness upon their borders.

In order to be assured that a catheter will not scale off when introduced into the urethra, it should, before being employed, be taken by the two extremities and gently drawn out. If the texture of which it is formed be bad, and if the composition which covers it do not adhere well to this texture, it will scale off in the defective points. If these sounds be curved so as to make the two extremities meet, they scale off in like manner.

There are sounds also, which, a short time after being placed in the canal, bend at the point which corresponds to the curvature of the urethra, and then the urine can no longer flow. The sounds which presents this inconvenience are such as have the texture too loose, and which are covered with too thick a coat. Their texture is ordinarily made by a machine.

It is very easy to recognise them; they are remarkable on account of their flexibility, and upon drawing them out as we said above, they may be lengthened several lines, which does not happen when the texture is very compact.

*Of forced Injections.*—Although the advantages of the forced injections of which we have spoken are especially manifest in complete retention, they are also very useful in the treatment of strictures, as a means of dilatation. Indeed we know several patients who, after having been ineffectually subjected to dilatation by sounds and bougies, and afterwards to cauterization, have improved so much from the employment of injections alone, that they have since resorted to no other means, and have been relieved from the frequent retentions of urine to which they were before exposed.

Nevertheless, we must observe that patients should be gradually accustomed to this kind of dilatation, for it sometimes happens, especially in nervous subjects, that an injection introduced with too much force, or retained too long, produces fever.

#### MANNER OF USING BOUGIES IN THE TREATMENT OF STRICTURES.

Before introducing a bougie, it should be oiled throughout its whole extent. If any resistance be experienced, force must not be employed, because then, as we have already said, the point of the instrument, striking against the stricture instead of following the area of the canal, may tear the mucous membrane if the point present any solidity, or bend upon itself if it be too soft. If, on the

\* Brodie observes, that if the bougie, to be introduced, be very small, it may be used straight; otherwise, it should always be curved like a catheter, but in a less degree.—*Trans.*

contrary, the instrument be left to itself, it tends to pass out of the canal, as if it were pushed back by the obstacle which it had met.

Immediately when the operator feels the bougie stopped, he should withdraw it a few lines, and then endeavour to introduce it into the orifice of the stricture, by giving it a rotatory motion. M. Amussat often attains this end, by giving a slight curvature to the bougie, before introducing it; but he then uses it as a curved catheter.\*

When the stricture has increased so much as to be able to produce a complete retention, there are two signs by which it may be easily known that the instrument has penetrated into the obstacle; 1st, when left to itself it no longer tends to pass out of the canal; 2d, if endeavours be made for its withdrawal, it is felt to be forcibly embraced by the stricture.

If, on the contrary, the stricture be only incipient, the operator knows that he has passed it, by the pain, more or less severe, which the patient experiences, when the instrument comes into contact with the affected part.

If there be several strictures, the first must sometimes be dilated, before passing the others with the same bougie. If the stricture be situated at the bulb, the bougie should either be introduced as far as the bladder, or its point should only be arrested at several lines behind the obstacle; for, if it were to bruise the orifice of the ejaculatory canals, which are in the prostatic portion, a swelling of the testicles might supervene. It also happens, not unfrequently, that engorgements of the prostate, and tumours of this gland, are, especially in old men, the consequence of an improper use of catheters or bougies.

This arises from the circumstance that the majority of patients who use these instruments for a long time, after having easily passed the true stricture, irritate with the beak of the catheters or bougie the transverse portion of the prostate, or the neck, which they still take for an obstacle to the course of the urine, and which they call the last stricture.

It often happens that during several days, the surgeon, however skilful he may be, cannot introduce the finest bougie into the obstacle; it is then that the forced injections are of great assistance. We have already described the manner of performing them, which we will not repeat here. Their action is so evident and so prompt, that a single experiment can convince any one. It is sufficient to cause the patient to urinate in a glass before the injection, and to mark the time he takes to fill it. It will be seen that after the injection the jet of liquid is stronger and larger, and that the patient takes less time in passing the same quantity.

A fact which speaks in favour of the dilating action of injections,

\* Different kinds of conductors have been invented to facilitate the introduction of a bougie; these instruments, the inventors of which have made a great noise, but rarely attain the end proposed, and are completely useless, when the operator has a little experience in the treatment of diseases of the urinary organs.

is what some patients attacked with stricture do instinctively. When they urinate, they are frequently seen to squeeze the end of the urethra, to prevent the urine from passing out, and when it is collected between the point corresponding to their fingers and the obstacle, they compress the canal with the other hand, from before backwards, as if to return this liquid into the bladder. After having performed this process two or three times, the emission of urine is easier, a result evidently owing to the dilatation of the stricture by the returned liquid, which has also cleansed and removed the mucus obstructing the canal.

OF THE INTRODUCTION AND USE OF FLEXIBLE SOUNDS IN THE TREATMENT OF STRICTURES.

When bougies of a moderate size have been introduced, the advice given, is to substitute gum elastic catheters for them; perhaps it would be better to continue the use of the bougies, because they fatigue the patient less. There are, however, circumstances in which a resort must necessarily be had to catheters; for instance, when there exists a false passage more or less deep, in which it would be dangerous for the urine to remain, or when the patient has already experienced lacerations behind the obstacle; when the stricture contracts so much upon the bougie which traverses it, that the urine cannot any longer flow between the instrument and the walls of the canal, then results a genuine complete retention.

We have seen a very remarkable example of this last accident. A patient desiring to be promptly cured experienced a complete retention of urine, which lasted thirteen hours, for having obstinately refused to withdraw a small bougie which M. Amussat had placed in his urethra: the instrument being at last removed, a large quantity of urine was expelled from the bladder, and all the symptoms of retention disappeared.

*Observations on the Rods.*—To facilitate the introduction of the gum-elastic catheters, a simple rod is ordinarily used, which is nothing else than an iron wire more or less curved. In every case in which it is necessary to introduce a gum-elastic sound into the urethra, and especially when this canal offers one or several obstacles to the emission of the urine, this rod often becomes completely useless, and sometimes even exposes the operator to commit a serious injury.

As it offers nothing at the extremity representing the handle which can fix it firmly between fingers, and at the same time indicate the position which the beak of the instrument occupies when it is introduced into the urethra, it often happens, when the operator wishes to pass the symphysis, that the sound turns between his fingers, and he then has great difficulty in deciding in what part of the canal it is engaged.

To obviate this inconvenience, M. Amussat advises the use of steel rods, which resemble, except in size and in the groove, ordi-

nary catheters; like these last, they are furnished with a plate, the flat part of which corresponds to the curvature of the instrument. By means of this plate, which serves as a handle, the operator may act with as much, and even more certainty, than with the ordinary metallic catheters.

In the case of a false passage, flexible catheters must be introduced by means of a straight rod, with which the beak of the sound can be better directed than with the curved rod. For instance, if the stricture be at the bulb, and a false passage exist in front of it, when a curved rod is used, at the moment in which the operator wishes to pass the obstacle, by giving the sound a slight see-saw movement, to introduce it under the symphysis, its beak, arrested by the stricture, depresses the spongy tissue of the bulb, and enters into the false passage. With the straight rod, on the contrary, if any difficulty be experienced in passing the obstacle, the operator runs less risk of entering the false passage, because the beak of the straight instrument will be so much farther removed from this passage, as the see-saw motion necessary to make it pass the symphysis is greater. It must be well understood that the patient must always be placed in a proper position.

In the case of false passage, forced injections have an incontestable advantage over all other dilating means; for they conduct to the same end, viz., to the enlargement of the obstacle, without inducing the fear of new accidents from the false passage; and when ineffectual endeavours have been made to introduce a sound or any other body, they refresh the canal, and remove the clots of blood which are formed there.

It would be difficult to say how long a time daily the bougies and sounds should be left in the canal, that being altogether dependent upon the greater or less degree of irritability of the patient; it is however prudent to direct them to be retained at first only one or two hours, and to augment the time gradually. In individuals who cannot keep their room, the sounds may be retained during the night.

*Manner of substituting one sound for another by means of the conducting sound ('sonde à conducteur').*—When a patient cannot urinate with a bougie, or when catheterism is rendered difficult from any cause whatever, and the surgeon fears that he cannot substitute another sound (catheter) for that which is introduced, the conducting sound of which we spoke in the article on Catheterism may be used. This sound being introduced, the operator lengthens it by its rod, and having made use of it to slip a canulated gum-elastic sound into the bladder, the silver sound is then withdrawn. When he wishes to replace the canulated sound, he introduces into its cavity the conducting sound, and withdraws it when the latter, which must serve as conductor to a new canula, has entered the bladder: but to an expert operator, this conducting sound is almost always useless.

The treatment by dilatation is often accompanied by local symptoms and sometimes by general morbid phenomena. If the reten-

tion of the bougies and sounds irritate the canal, leeches, and cataplasms containing laudanum, to the perineum, hip baths and slightly narcotic enemata are advantageously employed to combat this irritation.

If the irritation of the canal appear to extend to the other mucous membranes, if fever be produced, the evil must be combated by general antiphlogistic means, after the bougie or sound shall have been previously withdrawn. Bloodletting from the arm, demulcent drinks, baths, and diet, will promptly restore the equilibrium.

During the whole treatment, the patients must lead a temperate life, drink but little wine, abstain from all alcoholic liquors, and as much as possible from coition.

When they have a catheter or bougie in the canal they must not take exercise, otherwise they will be exposed to a swelling of the testicles, a very frequent accident among those who neglect this precept.\*

However well directed, however well followed may be the treatment by dilatation, it requires many months, even years, and the patients can scarcely ever regard themselves as completely cured. The contracted urethra may indeed, by means of dilating instruments be brought back to its natural diameter, but so soon as these means are left off, it tends, like all excretory canals, to return to its primitive pathological state. Besides, although the sounds and bougies can for a time flatten the fræni and callosities of the urethral mucous membrane, they never cause them to disappear entirely, because they only act most commonly by compression. A curious phenomenon, and one which surprises the patients, is that the stream of urine continues to be very small, although catheters of several lines diameter are introduced into their canal. In this case, the stricture is formed by a frænum which is easily depressed by the sound from before backwards, whilst the urine, which comes from the bladder, elevates it from behind, and the area of the canal is contracted. M. Amussat has often convinced himself, in our

\* Segalas observes that in the cases in which he treats a stricture by dilatation alone, he directs the bougie to be retained, having carefully chosen one, the diameter of which, being such as to enable it to remain free in the canal, allows the urine to pass around it. Many practitioners, however, direct the instrument to be retained, but one or two hours every day, while Brodie insists that it should only be allowed to remain a few minutes, and should not be re-introduced sooner than two or three days after. This intermittent dilatation, of several hours a day, is we think to be preferred; for besides allowing the patients to attend to their ordinary concerns, its effects are slower and more permanent. The frequency of relapses is in the direct ratio with the promptness with which the urethra has been dilated. Under the most favourable circumstances, however, the canal does not acquire its normal size earlier than after a month or six weeks of permanent dilatation, and two or three months of intermittent dilatation; and in many cases this result requires much more time. Besides, under this mode of treatment, many different inflammatory symptoms may arise; such as violent inflammation of the urethra, of the bladder, and chronic engorgements of the prostate, testicles, &c.—*Trans.*

presence, of the truth of this fact, with the exploring sound. If in the case under consideration, this instrument be introduced, it passes without being stopped, but upon withdrawing it, it catches the stricture from behind.

It was for a long time believed improperly, that the bougies and sounds caused the stricture to suppurate. The discharge which exists during the continuance of these instruments in the canal, is only the produce of the secretion from the urethral mucous membrane, augmented, like those of all the mucous membranes, by the contact of a foreign body. This discharge, however, is observed to produce a local disorgement from the stricture, which is sometimes very favourable.

#### OF CAUTERIZATION.

The length, and often the inefficacy of the treatment by dilatation, had, for a long time, induced many surgeons to introduce into the urethra, by means of certain instruments, medicines intended to destroy the obstacles in this canal. Without mentioning the different bougies which were charged with caustic substances in the point supposed to correspond to the stricture, many other means were invented to apply with more certainty to the obstacle—caustic powders and nitrate of silver.

*Ambrose Paré's Instruments.*—Ambrose Paré, who was among the first writers upon the diseases of the urethra, being persuaded, like all the surgeons of his time, that the obstacles in the urethra were always formed by carnosities, advises, in his work, to cut them off, to separate them into small pieces by means of stylets in the form of rasps, which he has had represented, and afterwards to burn them with caustics.\*

The apparatus which he employed for this last purpose was composed of a straight silver canula, open at its two extremities, and containing in its cavity a stylet of the same metal, furnished at its point with a small linen tampon. The canula was to be so introduced as to bring its orifice immediately into contact with the carnosity to be acted upon. This was then cauterized, by placing upon it the caustic powders, with which the tampon of the stylet was covered.

It was with an instrument very similar to this that Loizeau successfully treated King Henry IV. whom he says he cured in five weeks of a carnosity of the canal.†

*Hunter's Instrument and Process.*—Hunter, and before him, Wiseman, in England, proposed to employ nitrate of silver in solution, which they applied to the strictures by means of a canula like Paré: but in place of the stylet invented by this surgeon, Hunter substituted a pencil case which held the caustic.

\* Livre xix., chap. 27.

† Observations médicales et chirurgicales, par M. G. Loizeau. Bordeaux, 1617.

Hunter gave up this apparatus, and afterwards only employed composition bougies, to the extremity of which he affixed a piece of lunar caustic, in such a manner that the anterior portion of the caustic only was exposed, its sides being covered with the composition. These bougies thus prepared, are called Hunter's armed bougies.

When a stricture is to be cauterized by means of this instrument, no conductor is used to introduce it into the canal. When it is thought to be arrested by the obstacle to be destroyed, it is kept applied there for one or two minutes, in order to give the caustic time to act.

This process of Hunter, however defective it may be, nevertheless found a zealous partisan in Sir Everard Home, through whom it has been more extensively employed than all the others by English surgeons.

Who, however, at the first examination does not see the dangers that may accompany the use of the armed bougie? In the first place, it is much more easy to make a false passage with it than with any other instrument, because, acting directly by its point, if this were to deviate, the healthy parts might be easily burned. Again, the medicament, being retained only by a soft substance, may become detached, fall into the urethra, and produce accidents, the consequence of which it would be difficult to calculate.

Such was very nearly the state of the science when Ducamp, more recently, used all his endeavours to correct the faults so properly found with Hunter's process, and adopted a more certain treatment for cauterizing strictures of the urethra.\*

*Ducamp's Instruments and Process.*—Ducamp convinced of the danger attendant upon treating a stricture from before backwards, endeavoured to act from the centre of the obstacle towards its circumference. For this purpose, he thought it necessary to determine in an almost mathematical manner, at what distance in the canal the stricture is, its length, and especially the position of its orifice, either above or below, or at the sides. To attain his end, this surgeon invented a great number of instruments, which, however ingenious, are perhaps far from offering all the advantages evident to their author.

These instruments are :

1st, A hollow gum-elastic bougie, No. 6, upon which are marked the divisions of the foot ;

2d, The exploring sound, formed of a gum-elastic canula of variable size, armed at its extremity with a cylinder of moulding wax. The wax is fixed to the canula upon a roll of silk, so as to prevent its becoming detached ;

3d, The impression bougie, (*bougie porte-empreinte*,) which is

\* It is however just to say that M. Petit had, before Ducamp, made some excellent modifications in cauterization. He even published an important memoir upon the subject under the title of "*Memoire sur les retentions d'urine*," 1818, in 8vo.

only a gum-elastic bougie covered with silk threads, dipped in moulding wax ;\*

4th, The conductor formed by a gum-elastic sound opened at both extremities ;

5th, The caustic case. This last instrument is composed of a very flexible gum-elastic canula, No. 7 or 8, eight inches long, furnished at its extremity with a platina socket, six lines long ; this socket encloses a cylinder of the same metal, five lines long and one line thick, hollowed into a deep groove, destined to contain the caustic ; at a half line behind is a small pin projecting to the right and left, which enters into two grooves made in the interior of the socket. The cylinder which contains the caustic is fixed to the extremity of a very flexible bougie, placed in the interior of the canula, which serves to project it and direct the caustic towards the point to be acted upon. With the exception of the impression bougie, all these instruments exhibit upon their length the divisions of the foot.

When a stricture is to be destroyed according to Ducamp's process, the graduated bougie is introduced into the urethra. If when it is arrested, the *meatus urinarius* correspond to No. 5 marked upon the bougie, the operator concludes that a stricture exists at five inches.

The depth of the stricture being known, the operator endeavours to take its impression. For this purpose he introduces the exploring sound as far as the obstacle, and keeps the extremity of the instrument applied against it for some time, to allow the wax time to soften. He then pushes the sound forward, and the wax being pressed against the stricture, is moulded upon it and penetrates into the orifice. When he withdraws the sound, it is always observed that the impression thus made exhibits a more or less evident projection, of a greater or less diameter, which projection has penetrated into the orifice of the stricture, and the operator concludes that the stricture is circular or lateral, above or below, according as this projection is in the centre or on one of the sides of the impression.

When the operator is assured of the depth and form of the stricture, and of the position of its orifice, it only remains to discover its extent. He introduces then an impression bougie into the canal, and when it is withdrawn, a groove is observed in the point corresponding to the stricture, the extent of which is marked by this groove.

Ducamp, perceiving the difficulty often experienced of intro-

\* The composition used by Segalas consists of a mixture formed of equal parts of wax and pitch, coloured with ivory black. This preparation appears to be preferable to that proposed by Ducamp, into which there enters, besides the ingredients above mentioned, an equal quantity of diachylum and resin. Of whatever the wax may be composed, it is indispensably necessary that great care be used in attaching it firmly to the bougie, to prevent any portion of it being left in the urethra.—*Trans.*

ducing a bougie into the urethra when it is strictured, invented his conductor, to facilitate the introduction. This instrument is only a gum-elastic canula with which he penetrates as far as the obstacle. If the impression had indicated that the orifice of the stricture was in the centre, he thought that it would be easy to pass it with a bougie introduced through the conductor, the orifice of which must necessarily correspond to the orifice of the canal. If, on the contrary, the impression had indicated that the stricture projected downwards, he employed a canula which exhibited upon one of its sides an evident projection, and he directed it, so that this projection came into contact with that formed by the obstacle; hence the opening of the canula must then correspond to the opening of the stricture, which it became easy to pass with the bougie.

When, after having acquired all these data concerning the depth, form, position and extent of the stricture, the operator desires to destroy it by this method, he introduces the closed caustic case into the urethra as far as the point primarily indicated by the graduated bougie. He then describes the fourth of a circle with the rod which supports the cylinder, pushes it forwards in order to advance the cylinder, endeavouring to introduce it into the orifice of the stricture. If it be circular, he turns the cylinder slowly upon its axis, so that the caustic which it contains may act upon the whole circumference. If, on the contrary, it occupy only one of the points of the circumference of the canal, the cylinder is so directed that the diseased part may alone be acted upon. After having cauterized for a minute, the cylinder is returned into the socket and the instrument then withdrawn, without any fear of injuring the sound parts which are in front of the obstacle. An eschar always forms after the cauterization, the sloughing of which must be waited for in order to cauterize again, until the stricture is destroyed throughout its whole length, of which the operator must endeavour to assure himself, by taking a new impression after each cauterization. If, for instance, at the commencement of the treatment, the graduated bougie indicated that the obstacle was at five inches depth, and after several applications of nitrate of silver the same bougie penetrates to five inches and two lines, the advocates of this method conclude that the stricture has been destroyed in the extent of two lines. If the exploring sound indicated an opening of one line in the centre of the stricture, and after several days treatment this opening appear to be enlarged by one line, they conclude that they have enlarged the canal so much.

When several strictures exist, Ducamp's caustic case is constructed so that they must necessarily be acted upon in succession.

However ingenious Ducamp's method may be, however certain it may appear at the first glance, yet to him who studies it carefully, it is founded upon false principles, and may offer many dangers. In order to prove this, it is sufficient to demonstrate the errors into which the use of the instruments invented by this author may lead.

With a graduated bougie can the operator always know, in a

positive manner, at what distance the stricture is, as Ducamp desires? certainly not, for this distance will be greater or less, according to the traction which the surgeon exerts upon the penis, or as the penis at the moment of the introduction of the bougie is in a state of complete flaccidity or in a very slight erection. Hence, the numerous errors of certain practitioners, who pretend to have destroyed strictures at seven inches and sometimes deeper, without thinking that at this distance, they would have acted, either upon the *veru-montanum*, or even upon the neck of the bladder in certain cases; for in almost all adult subjects, the urethra is rarely, when the penis is not in a state of erection, more than seven or eight inches long. This can easily be proved by the following experiment.

Introduce a flexible sound with a single eye into the bladder, then withdraw this instrument gradually until the eye, having passed the neck, no longer allows a passage to the urine: then mark the point of the sound corresponding to the *meatus urinarius*, after having let the penis go. The sound being withdrawn from the canal, measure the distance which separates the eye from the mark that was made, and it will be found that rarely more than seven inches is the true length of the urethra.

Although the exploring sound is even yet highly praised, this instrument is often useless as a guide for the surgeon in the treatment of a stricture. Let the numerous impressions which have been made\* be attentively examined, it will be seen that in the majority of cases, the projection which marks the position of the orifice of the obstacle is rarely in the centre of the impression, but almost always on one of its sides, particularly on that which corresponds to the superior part of the canal. Circular strictures are however numerous: how does it happen then that, according to the impressions, it would appear that those which are situated only on one of the sides of the canal are the most frequent? This arises altogether from the disposition of the parts in which they are seated, and to their depth in the urethra.

In the whole of the straight portion of the canal it is more easy to obtain faithful impressions. If, however, upon pushing the exploring sound against the obstacle, the operator press more upon the inferior than the superior wall, the spongy tissue, which, in this point, is thicker than that above, allows itself to be depressed; then the projection formed by the stricture will appear more evident, and its orifice nearer the superior wall, and almost the same impression, will be obtained, either when the stricture is circular, or when it has its seat on the inferior wall. If, on the contrary, it exists only on the superior wall, which is more rare, the exploring sound, penetrating more easily below, will again exhibit an unfaithful impression, which will induce the belief that the projection of the stricture is less than it really is, and its orifice more considerable, because the wax, on moulding itself upon this opening, dilates it so much more

\* See Ducamp, Segalas.

easily, as the spongy tissue which is below allows itself to be more easily depressed. There is one circumstance in which the exploring sound is truly useful; it is when the operator wishes to assure himself of the existence of a false passage. In this last case, the impression always exhibits a bifurcation, one of the branches of which corresponds to the opening of the urethra, and the other to that of the false passage.

If, as we have just demonstrated, an exact impression be obtained with difficulty in the straight portion of the canal, the operator will scarcely ever succeed when the obstacle is seated at the bulb under the symphysis pubis, the case most commonly seen. Ducamp then employed a curved exploring sound, or he slightly curved the ordinary exploring sound, before introducing it into the canal; all these precautions are useless. The bulbous portion of the urethra is so arranged, that an impression can always be taken with the exploring sound, when the canal is healthy or diseased, or when the experiment is made upon the living or the dead subject. When the extremity of the instrument has arrived at the bulb it is arrested by the open sac formed by the fibrous membrane which envelops this body. However slightly the exploring sound be then pushed forwards, the spongy tissue, which is thicker at the bulb than anywhere else, allows itself also to be more easily depressed, and then forms a kind of hollow in which is moulded the inferior part of the end of the wax with which the bougie is armed, whilst above the wax enters into the area of the canal. Thus, whenever an impression is taken at the bulb, if the operator be guided by this impression, he will believe that the stricture is more projecting below than above, and consequently will be induced to cauterize, especially in the former direction.

To how many false passages has not this error given place! It is so true that the open sac of the bulb can impose upon the operator, that the majority of these accidents occur at this point.

If the means of investigation invented by Ducamp are capable of deceiving the surgeon as to the depth and disposition of the opening of the stricture, the conductor which serves to direct the impression bougie is useless, and cauterization cannot be performed with certainty by means of his caustic case; for at one time the operator will cauterize where there is no obstacle, at another he will cauterize too much where there is one. We can conceive, however, that Ducamp could have obtained considerable success, his skill and great experience compensating for the imperfection of his instruments.

The bougies 'à ventre,' recommended by Ducamp, for obtaining, after cauterization of the strictures, a dilatation of from four lines to four lines and a half in the contracted point, are exceedingly painful for the patient to bear, and become useless, because they can only be retained in place a short time. This kind of dilatation is therefore abandoned by almost all surgeons; there are also the intestines of fowls which are introduced into the urethra by means of

a sound, and afterwards inflated. Bougies and catheters answer the end much better.

The process of Ducamp has found numerous partisans, and since his death, the instruments which he invented have been infinitely modified. It would be too long and at the same time useless to mention all these instruments, which, reposing absolutely upon the same principles, present the same inconveniences, without offering greater advantages. Indeed it may be said that of all the flexible caustic cases which exist at the present day, Ducamp's is still one of the best.

*M. Amussat's first Caustic case.*—M. Amussat invented in 1824 a caustic case, which, without having the inconveniences of those known up to that time, appears to us to present all their advantages. Although the author has abandoned it, we think that we ought to describe it: it will be a means of exhibiting to the reader the progressive march which he has followed in arriving at the perfection of the instruments which he employs at the present day.

This caustic case is composed of a straight silver canula, eight or nine inches long and of the diameter of one line and a half; four small rings, situated upon the sides of one of the extremities of the canula, serve as a handle, and at the same time indicate by their position, that of the caustic, placed in the side of a platina cylinder which is situated at the other extremity. The interior of the canula is filled by a silver stylet, garnished with a button, designed to serve as a conductor.

To employ this instrument, it is introduced into the urethra, covered with a gum-elastic sound opened at both extremities. When it has arrived at the contracted point, which is easily felt by the resistance experienced, the operator endeavours to introduce the stylet which is furnished with a button into the opening of the stricture, and if he succeed he slides the canula which contains the caustic upon it. By this movement, the gum-elastic sound, which is thicker than the silver canula, is arrested by the obstacle, and the caustic remains uncovered in the orifice of the stricture, upon which it may be made to act as desired, without any danger of its cauterizing farther than is necessary, because the caustic case is retained by the button of the conducting stylet, which only passes the stricture one or two lines.

With this instrument, the operator is never, as with Ducamp's, exposed to act upon the sound parts situated in front of the stricture, since the caustic is only uncovered after the conductor has passed the obstacle to be cauterized. In Ducamp's, on the contrary, and in all the others, the caustic being placed in the stylet with which the opening of the obstacle is searched, it is almost impossible, in the endeavours made to attain this end, to prevent a part of the caustic from not dissolving in front and acting upon the sound parts.

*Caustic case of M. Lallemand of Montpellier.*—This surgeon has also abandoned the flexible caustic case for a solid one, but abso-

lutely founded upon the same principle, *i. e.*, that the caustic is also fixed in the stylet. This instrument consists of a straight or curved platina canula from eight to ten inches long. Upon the body of this canula is placed a slide destined to mark to what depth the canula should be introduced to reach the stricture. The cavity of the canula is filled by a rod having a button, which closes its anterior extremity, and which contains a small hollow for lodging the caustic. A nut is screwed upon the other extremity of this rod, which prevents its coming out of the canula, and which is withdrawn or advanced during the operation, according as the surgeon desires to cauterize more or less deeply. When the curved canula is used, the rod which fills it contains the caustic in its concavity or its convexity; on which account it is necessary to have different rods, according as the obstacle to be acted upon is upon the superior or inferior wall of the urethra.

When the stricture is in the straight part of the canal, it can be more easily attacked with M. Lallemand's instrument than if it be at the bulb. The operator acts always at this latter point with less certainty, even when he employs the curved caustic case of the same author, because there is no conductor for applying the caustic. There is a fault common to both Ducamp's and M. Lallemand's caustic case; it is, that when the operator has cauterized or dilated the stricture sufficiently to enable the part of the instrument which contains the caustic to pass the opening without difficulty, he then acts in the dark, for as the instrument is not stopped, he no longer knows if he be at the obstacle. If, on the contrary, this opening be just sufficiently large to receive the caustic, this latter, in acting, develops an irritation in the parts, which may produce a retention of urine.

Indeed, whatever may be the instrument employed for cauterization, the operator must always be very careful that the nitrate of silver should not become detached from the groove destined to receive it; this accident would be very serious. The best manner of fixing the nitrate of silver is to pulverize it, fill the groove with it, and melt it in the flame of a candle.

In cauterizing a stricture care must be taken not to keep the caustic applied too long against the contracted point, for too deep an eschar would be formed, and which might involve the sound parts. We will cite a very remarkable example of this accident.

M. L. R\*\*\*, attacked with a stricture of the canal, after a blennorrhagia treated by astringents, sought the assistance of Ducamp, who, after having discovered an obstacle at the bulb, applied the caustic to it several times, but without any kind of success. The patient departed for Italy, whence he returned a few years after. The difficulty of urinating had increased, and there existed moreover a consecutive catarrh of the bladder. Ducamp being dead, the patient applied to an advocate of his method who introduced the nitrate of silver into the canal. From the patient's account, who was of extreme irritability, the application of the caustic continued

from two to three minutes. The pain which resulted from it was so great, that he fainted and did not recover until some time after. He was very soon attacked with a violent fever accompanied by delirium. The difficulty of urinating increased to retention, and he was only relieved on the third day, by the sloughing of the eschar, which he passed in urinating. This eschar, which we have seen, is about five lines long and of a cylindrical form; it represents a tube formed by a cauterized portion of the urethral mucous membrane. Since this period, the canal had become so very sensitive in the affected point, that the simple introduction of a bougie drew tears from the patient. The stricture and the catarrh remained.

Accidents of this kind, hemorrhagies, retentions of urine, urinary abscesses, are not rare after cauterization, when it is improperly performed; and it is astonishing that they are not more frequent when it is considered how much the use of caustic is daily misapplied.

In certain cases, as when the obstacle is recent, and situated in the straight portion of the canal, cauterization promptly cures: if, on the contrary, it is old and callous, if it exist at the bulb, it becomes much more difficult to cure.

When the caustic has been applied several times to a contracted portion of the canal, without obtaining any amelioration, it is imprudent to persist longer in cauterizing it, for experience proves that, in this case, the evil, far from being diminished, is aggravated. It appears, indeed, that the often reiterated application of caustic to a contracted point of the canal, renders it callous, and favours in this place nodes very difficult to destroy. There is not a practitioner who has not experienced much greater difficulty in curing a stricture which has been often cauterized than one which has never been.

Ducamp, in pointing out, in his work, the inconveniences attached to the employment of Hunter's armed bougie, remarks that many patients have been subjected a great number of times to the application of this bougie, without being improved, whence he concludes that the caustic acted in a false direction. We might cite a goodly number of patients who have been cauterised as much as forty or fifty times and more, by his own process, and whose state has continued the same or worse. The two following cases prove it.

M. R\*\*\*, aged 26 years, dwelling ordinarily at Nantes, had had several attacks of blennorrhagia, when, after the last, which was accompanied by chordée, he experienced some difficulty in urinating. The physician whom he consulted discovered an obstacle in the canal and advised the use of sounds. The patient followed this treatment for some time; but, perceiving that immediately on his suspending the employment of these instruments, his urination was impeded, he resorted to cauterization, hoping that this means would certainly cure him. In a short period he was cauterized twenty-four times: but, far from improving, he very soon found that the

evil had progressed. Indeed, not only had the emission of urine become more difficult, but when he withdrew the sound for a few hours, it was often impossible for him to reintroduce it: he, moreover, felt an induration, formed in the spot where he had been cauterized, and this induration was sensible even externally.

It was now ten months since he had been cauterized, and he found his situation becoming daily worse, notwithstanding the use of sounds and bougies, when he arrived in Paris, to obtain M. Amussat's assistance, in January 1829.

At this time there existed a frænum in the *fossa navicularis*, which was promptly destroyed by scarification; but at four inches from the meatus, there was a circular stricture, sensible externally and as hard as cartilage. It could be gradually dilated with sounds as far as No. 9; but so soon as the patient ceased the use of this sound, even for a few moments, he was obliged to recommence the dilatation by the smallest numbers. As we said above, this stricture became hard only after the cauterization.

During the months of January, February, March, April, and May, scarification performed with the ordinary instruments produced no effect. On the 1st of June, the patient having decided to attempt everything to be relieved from his infirmity, M. Amussat made four deep incisions into the obstacle, by means of the sounds for extracting calculi, upon the exterior of the branches of which he had had four small blades constructed. This operation gave but little pain.

He repeated it upon the sixth, but the blades having penetrated farther, there was slight hemorrhage and some inflammation, which yielded promptly. Sounds were again resorted to; an abundant suppuration was established and it was very soon perceived that the ring which formed the obstacle was disappearing. M. B. was enabled to depart in the early part of September, with the certainty of a complete cure, for since that time he urinates with facility.

M. M\*\*\*, a lawyer, aged 27 years, contracted in 1820, in one of the southern cities a very mild gonorrhœa. The physician whom he consulted, advised an injection of Goulard's water. This injection produced a severe pain, and two hours afterwards, the patient, who is very irritable, was seized with a complete retention of urine, which required the use of the sound. From this period the emission of urine becoming more and more difficult, M. M. sought the assistance of a surgeon, who discovered several strictures in the external part of the canal which he treated with cauterization; but he could never penetrate more than four inches.

In 1829, business having called M. M. to Paris, he profited by this circumstance to subject himself to treatment. He placed himself under the care of a practitioner, who had a reputation for treating affections of the urinary organs. In the space of eight months, more than sixty cauterizations had been performed, after Ducamp's process, without the operator being enabled to pass an obstacle which existed at the bulb. The surgeon then declared to his patient that he could do nothing more for him, since his stricture was so narrow,

that the caustic case could not penetrate it, an indispensable condition for its destruction by cauterization.

Under these circumstances M. M. applied to M. Amussat. It was easy to discover several inequalities in the anterior part of the canal. But he was arrested at the bulb by an obstacle which it was impossible to pass. By means of Ducamp's exploring sound, M. Amussat discovered a false passage of a few lines in the bulb. He then abandoned the introduction of sounds and bougies. He contented himself during the first days with the use of injections, which procured a dilatation sufficiently great for him to be enabled on the fourth day to introduce a small straight silver sound into the bladder.

After a treatment of three months by scarification and sounds, M. M. was perfectly cured of his stricture and false passage.

Relapses, as may be easily conceived, are not unfrequent after cauterization.\* In the first place, a strictured canal always tends to become more contracted; and again, with the instruments most ordinarily employed, it must be extremely difficult to destroy an obstacle entirely. Indeed, as we have said above, when the caustic case has enlarged the orifice of the stricture sufficiently to enable it to pass without difficulty, it is believed to be entirely destroyed, and the exploring sound exhibiting no impression, the operator thinks that he has certainly attained his end. But if the stricture has been produced by a frænum, as soon as the patient ceases for some time from the use of bougies or sounds, this frænum, being raised from behind and pushed forwards by the urine passing from the bladder, becomes a new cause of dysury. The patient is then sounded, and if a large catheter, or a large bougie be employed, it enters without any obstacle, and the cause of the difficulty of urinating is not easily explained. In this case, it is much better to employ a small bougie, which will better come into contact with the frænum, because it will not stretch the walls of the urethra like a large sound; but M. Amussat's exploring sound is still better.

The application of caustic in the urethra often produces no painful sensation in the patient. Sometimes the sensation is only felt at the *fossa navicularis*. Under other circumstances it is extremely painful, and produces serious inflammatory symptoms.

\* Segalas declares that he has never observed the spontaneous reproduction of strictures which have been treated by cauterization. He has sometimes seen new strictures in patients whom he had cauterized, but the seat of the strictures was changed; or if they appeared in the same spots, they were caused by new attacks of blennorrhagia. Incomplete cauterization is, of course, not unfrequently followed by a return of the disease; for a partial cure by caustic is scarcely more permanent than that obtained by dilatation.

In order to effect a permanent cure by this means, it is necessary that the dilatation which succeeds the employment of the caustic, be regularly made. It is, doubtless, not only accessory, but very useful, and indeed indispensable; for the sloughing of the eschars must leave the parts which suppurate naked. Now, if the cicatrization be not directed by a methodical dilatation, it may produce fræni, which will themselves become obstacles to the course of the urine.—*Trans.*

When an irritable patient is cauterized, the operation should not be long kept up, and should only be repeated at distant intervals. In no case should the same stricture be cauterized every day; the surgeon ought, if possible, to wait until the eschar produced by the preceding application has sloughed.

After all that we have said, cauterization may then be considered as a method very often uncertain, when it is performed with the instruments most commonly in use up to the present time, and as being liable to produce the following accidents:

- 1st, Retention of urine;
- 2d, The destruction of a sound portion of the canal;
- 3d, Hemorrhages;
- 4th, False passages, and, consequently, urinary fistulæ;\*

We will hereafter inquire if the caustic case which M. Amussat uses at present, and the principles upon which it is based, be not adapted to an avoidance of these accidents,† but wishing to pursue the course which this surgeon has himself followed in his labours on the treatment of strictures, we will first speak of his process by *scarification*.

#### OF SCARIFICATION.

The uncertainty and danger which, in the treatment of strictures of the urethra, sometimes accompany the use of nitrate of silver,

\* There are only two inconveniences, according to Segalas, attendant upon the treatment by cauterization, and these may occur even when the treatment is most skilful; 1st, upon the separation of the eschar, blood may flow from the urethra, either alone or mingled with the urine; 2dly, and sometimes before its complete separation, the eschar forms a valve in the canal, obstructs the passage, and causes temporarily a difficulty or even an impossibility of urinating.

The first accident is rare, and most commonly requires no assistance from art. I have only once, says Segalas, been obliged to prescribe an injection of cold water for this flow of blood, which was immediately arrested.

The second accident is more frequent; it however most commonly yields of its own accord; if it continue, a small bougie must be introduced against the obstacle, at the moment when the patient makes an effort to urinate; the urine flows instantly. This inconvenience is no longer to be feared, after the separation of the eschar is complete.—*Trans.*

† M. Amussat advantageously applies the process of cauterization to strictures of the rectum, even when they are situated at a considerable distance. In a patient who had one of these strictures three inches from the anus, and the orifice of which scarcely allowed the introduction of the little finger, he succeeded by this means in giving the intestine a diameter sufficiently large, for the stools to be very easy.

In another patient, whose situation appeared desperate, and who had, at six or seven inches within the rectum, a stricture which not only prevented the passage of the fæces, but which was so contracted, that injections introduced with the greatest force could not pass it, M. Amussat by catheterism, has already enlarged the orifice of this obstacle sufficiently for the patient to receive injections and have almost natural stools.

In the first case, he applied the nitrate of silver by means of a wooden caustic case, which he introduced covered with parchment, which he withdrew when he wished to place the caustic in contact with the affected part.

In the second case, he employed caustic cases, to which he had taken care to give the exact curvature of the rectum, after having well studied this curvature upon several dead bodies.

applied with the customary instruments, and the often proved inefficacy of cauterization, in cases in which it had been performed by skillful hands, led M. Amussat, several years since, to invent a new process, by means of which either when employed alone, or conjointly with cauterization, he might more easily destroy strictures of the urethra. Having laid down the principle, that in the majority of cases the strictures are formed by a valvular ring, which in some manner choked the canal in the corresponding point, he thought it would be possible to divide this species of strangulation, by means of a cutting instrument carefully introduced into the urethra.\*

This idea is not new; many surgeons entertained it before him, and abandoned it, on account of the difficulty of introducing with certainty into a canal, such as the urethra, any cutting instruments whatever. It was reserved for M. Amussat to resolve this problem.

Even before having read in Sæmmering, that Doner the surgeon had proposed to divide strictures with a lancet enclosed in a sound, he endeavoured for a long time to make an application of this means, without success; finally, after a great number of attempts, he invented, in 1824, an instrument, which he presented to the Academy, and which was described in several journals under the name of *urétrotôme*: that of scarificator suits it better.†

1st *Scarificator*.—This instrument is composed of a silver canula of variable length and diameter, terminated at its anterior extremity by a conical steel cylinder, six or seven lines long, and which presents upon its circumference eight small cutting projections, of a quarter of a line each. This cylinder may either be fixed upon the canula, or else only screwed to it so that it may be replaced by a larger or smaller one according to circumstances. At the other extremity is placed a moveable ring, which is advanced or withdrawn at pleasure, and is destined to receive the thumb of the operator.

This scarificator is introduced into the urethra by means of a rod formed of two pieces; the first, seven or eight inches long, is always furnished at its anterior extremity with a small silver button, and on the other, is made the thread of a screw, upon which the second piece is fitted, which may be of silver or steel.

When the stricture has been sufficiently dilated to allow the introduction of a small sound, the scarification is performed in the

\* A short time after M. Amussat had read his memoir upon this subject to the Academy, M. Despinos explained to the society a process which consists in cutting the strictures with a narrow bistoury, when they are near the *meatus urinarius*.

† Dr. Physick, so far back as the year 1795, used, and continued afterwards to use, a lancet concealed in a canula, for a description of which the reader is referred to Dr. Dorsey's Surgery. Dr. Gibson, in his Institutes and Practice of Surgery, states that he has succeeded, with this instrument, in a great many instances, in effecting a complete cure, after bougies, caustic, and other means had entirely failed.—*Editor Select Med. Lib.*

following manner: the patient being in the position proper for catheterism with the straight sound, the surgeon, placed in front of him, introduces the first piece of rod as far as the obstacle, which he endeavours to pass for the distance of a few lines. When he has succeeded, he lengthens this rod by adding the second piece: by this means, a long rod is obtained, which, received into the cavity of the canula of the scarificator, the blades of the latter having been previously covered with tallow, serves it as a conductor, and upon which it is made to slide. When the cutting extremity of the scarificator has arrived at the *meatus urinarius*, the surgeon gives it the motion of an auger, so as not to injure the sound portion of the canal, and introduces it thus into the canal until it is arrested by the obstacle upon which he wishes to act, and into the orifice of which the rod has entered. He then hands the extremity of the conductor to an aid, who keeps it immoveable, or seizing it himself with the left hand, he passes the thumb of the right hand into the ring of the canula, while he seizes the patient's penis between the middle and index fingers of the same hand, and then pushes the instrument directly forwards, so as to force it to pass the stricture. The resistance being overcome, the scarificator is withdrawn as it was introduced, viz: by turning it; and the rod, before being withdrawn, serves again as a conductor to a flexible sound, open at its two extremities. When the sound is fixed, an injection of warm water is made, which is given to the patient, by closing the sound so that the injected liquid, passing between the walls of this instrument and those of the urethra, removes the blood which results from the operation. This sound remains two days in the urethra, before being changed for a larger one.

When there are several strictures, they can all be scarified at once, provided that their orifices be sufficiently large to permit the introduction of the rod.

Performed with this scarificator, the operation cannot be attended with any danger: for, guided by the conducting rod, the instrument can never deviate, unless the rod itself has made a deep false passage. Warned of this accident by the pain experienced by the patient, and by the quantity of blood which flows from the urethra, it would then be highly imprudent to use the scarificator.

When M. Amussat exhibited this instrument, several faults were found with it; among others, the possibility of cutting some other part than the stricture, when this latter is not circular. But this fear is chimerical, and numerous facts prove that this accident is not to be dreaded.

If M. Amussat has almost wholly abandoned this instrument now, with which he has, however, obtained great success, it is because he has discovered, 1st, that scarification can be executed still more easily and more certainly; 2d, that, in many cases, this first scarificator did not act sufficiently upon the stricture.

Thus when a frænum is to be treated, it is often too loose to resist the instrument sufficiently for its division: the scarificator

often passes it even without the operator being sensible of it. When the stricture is mucous the same thing occurs. It is particularly against hard strictures, and those which offer great resistance, that the scarificator of which we have spoken can be advantageously employed.

More and more convinced of the facility with which the majority of strictures are passed from before backwards by instruments some what large, when they are formed by recent fræni, or when, dilated and already acted upon by cauterization or scarification, they present a larger orifice, M. Amussat thought, after having invented his exploring sound, that a scarificator constructed upon the same principle would act in a more certain manner upon the diseased point, and would be more easy to manage.

2d *Scarificator*.—He then had a new scarificator constructed altogether similar to the exploring sound, except that at the extremity of the canula which forms this sound, and which corresponds to the lens of the rod, a portion of a steel cylinder is fixed, the end of which is sharp in a circular form. He has described this instrument in his lectures under the name of frænum-cutter (*coupebrides*).

To make use of this instrument, it is necessary for the canal to be sufficiently dilated to allow its introduction easily beyond the obstacle; when it has arrived at this point, the operator acts at first as with the exploring sound; viz., he projects the lens and withdraws the instrument until the lens is arrested by the obstacle. He then draws the canula towards himself for several lines, so as to leave, between its cutting extremity and the lens, a space into which the projection formed by the stricture necessarily falls. He then pushes the canula forwards, as if he wished to close its cutting extremity against the lens, and in this movement, whatever is interposed between these two parts of the instrument is cut.

When the obstacle which is to be removed is formed by a frænum, or even by small nodes, the scarification of which we are speaking may be successfully employed; because these strictures, having but little thickness, may be easily cut by the action of this instrument, which acts as a true nipper. But if it be a mucous or callous stricture of any extent, this instrument is insufficient for its destruction.

Before withdrawing the instrument, the operator must be well assured, by slight tractions, of the complete division of the parts acted upon; otherwise, if he remove it suddenly from the canal, the mucous membrane may be torn. In every case, this scarificator should be used with great circumspection, and only when the other processes of scarification or cauterization have failed.

3d *Scarificator*.—After having employed the two instruments above described upon a great number of patients, and being assured, by experience, of the advantages presented by each of them, M. Amussat had a third scarificator constructed, which united all the advantages of the two first without presenting their inconveniences.

This new instrument is composed of a silver canula and a steel rod; this canula is eight inches long and graduated; its diameter should vary from three-quarters of a line (two and a half millimetres) to one line and three-quarters (four millimetres and a half). The anterior extremity of this canula exhibits upon one of its sides a cleft five or six lines long, and upon the other side a small notch, a quarter of a line deep. The opposite extremity offers nothing remarkable. The rod is formed by a small flattened steel shank, which is proportioned to the size of the canula. This shank presents upon one of the sides of its anterior extremity a half-lens, which when the instrument is shut, is lodged in the small notch of the canula of which we have spoken. Upon the other side is placed a cutting blade more or less projecting, but which is more so at the point corresponding to the half-lens. At the other extremity of the rod is a small fluted handle which is fixed by a screw which must always be placed so as to correspond to the cutting portion, to indicate where this portion is during the operation. When the instrument is closed, it presents a blunt extremity, and the blade of the rod being received into the cleft of the canula, does not project beyond.

Each canula may have two rods, one of which is larger than the other; but, for this purpose, it is necessary that the two extremities of the canula be of unequal size; they then both present the same arrangement. Thus, with two canulas, four scarificators may be had, which is entirely sufficient.

When a surgeon wishes to operate with this instrument, he introduces it as deeply as possible into the urethra; he pushes out the rod one or two lines, the half-lens of which, projecting upon leaving the notch formed in the extremity of the canula, is very soon arrested by the obstacle, when the instrument is only withdrawn; the operator then gives the instrument a rotatory motion, so as to make the cutting portion correspond to the projecting point which has arrested the lens. When he has succeeded, of which he can assure himself by the position of the screw, which serves to fix the handle of the rod, he brings the cutting portion of the latter into action, by pushing it without the canula, and by pressing it against the obstacle to be divided. The division being performed, he returns the rod into the canula, and withdraws the whole, without any fear of injuring the sound portions of the canal. This scarificator, which is the one principally employed now by M. Amussat, presents all the conditions necessary for acting certainly, and is not liable to injure the canal; for if the exploring sound, as we have proved, cannot be arrested in the urethra except when there are obstacles, it is certain that this scarificator, constructed upon the same principles, must present the same advantage, and also allow the operator to act with certainty upon the diseased point.

Like cauterization, scarification does not always completely cure strictures of the canal; nevertheless, we must say that up to the present time, relapses have been rather rare. It is true that scari-

fication being in a measure only performed by M. Amussat, and the patients operated upon by this means being less numerous than those which have been cauterized, no conclusion can be formed as to the superiority of the one of these two methods over the other, which time only and experience can determine. But the incontestable advantages offered by scarification over cauterization, are 1st, that it dilates the canal more promptly; 2d, that it can never produce retention of urine; 3d, that false passages can never be made, whatever scarificator be used;\* that it is less painful, and that the patients who have been subjected to the two operations, prefer scarification.

Although M. Amussat has been very successful in the employment of scarification alone, performed, according to circumstances, with one or other of the instruments which we have just described, but particularly with the last, he is far from thinking that this method ought to be employed to the exclusion of dilatation and cauterization: he thinks, on the contrary, that it is advantageous to associate these three methods together, in order to obtain the cure of strictures more promptly.

Before explaining the manner in which M. Amussat combines dilatation, scarification, and cauterization, we think that we should describe the caustic cases which he employs.

*Straight Caustic case.*—This instrument is composed of a silver canula and a rod. The canula has a variable diameter, and is eight or nine inches long; upon its whole extent are marked the divisions of the foot. The anterior extremity is furnished with a small leather box, designed to prevent the caustic, dissolved by the humours of the urethra, from reaching the fingers of the surgeon during the operation. Upon two opposite points of the leather box, are marks, which serve as points of relation between the different parts of the instrument, when it is in action.

The silver rod is terminated by a platina end four or five lines long, hollowed in the direction of its length, into a small receptacle for the caustic, and which extends to within half a line of the extremity of the rod. This end is fixed into one of the sides of the circumference of a blunt lens, the projecting part of which must correspond to the caustic, and is adapted to the thickest side of the canula, so as to form a blunt end to the instrument, when it is shut. To the other extremity of the rod, which extends twelve or eighteen lines beyond the canula, there is a fluted handle attached by means of a screw, which must always be placed so as to corres-

\* I say whatever scarificator is employed, because in a work published in 1828, the author appears to insinuate that a false passage and some serious accidents, such as an abscess and a urinary fistula, had been produced by the employment of the urétrotôme. I have traced the patient, and I affirm that the urétrotôme has never been employed in the case alluded to.

M. Ribes who was called in consultation can testify to the truth of what I advance here. M. Amussat has given some explanations upon this fact to the Academy. (See the Clinique des Hôpitaux, v. 3. No. 21.)

pond to the side of the rod, upon which the caustic is fixed, and consequently to the lens.

When the surgeon wishes to employ this instrument, he introduces it beyond the point which he supposes diseased. He only gives to the rod or to the canula a rotatory motion so as to project the lens, the position of which in the canal can always be known by that of the screw which fixes the head of the rod, or by the points of relation traced upon the leather box. Upon beginning to withdraw the instrument, it is very soon arrested by the stricture, which is caught by the lens. The operator then draws the canula towards himself and thus uncovers the caustic, which being necessarily in contact with the obstacle that has arrested the lens, acts upon it in a very sure manner. The cauterization being finished, the instrument is not completely closed, for fear of pinching the urethral mucous membrane, and movements of rotation are given so as to withdraw it from the canal.

*Curved Caustic case.*—The canula of this instrument, with the exception of the curvature, is entirely constructed upon the same principles as that of the former. The rod presents the receptacle for the caustic, upon its convexity or its concavity, according as it is desired to act upon the inferior or superior wall of the urethra. For the purpose of projecting the lens which terminates it, it is sufficient to push it forwards a half line; and when the obstacle is encountered, it is cauterized by denuding the receptacle for the caustic; it is returned gently in order to withdraw it. This instrument may be especially useful for strictures of the bulb.

We have described with as much exactness as it has been possible for us to do, the different instruments invented by M. Amussat for the treatment of strictures of the urethra, and their manner of action. If we have been so fortunate as to be perspicuous, the reader must see that all these instruments are constructed after a thorough and rational study of the diseases to which they are applicable. The author has only gradually brought them to the degree of perfection to which they have attained; but it is evident that from the commencement, he has always endeavoured to render their mechanism simple, and to introduce into their composition, some piece which might serve him as a guide, and allow him to act with *more security*. Thus, in his first scarificator, it is a conducting rod which guides him in the direction he must follow. In his other scarificators, and his last caustic cases, the lens allows him to know always in a positive manner, the point which projects and upon which he must act.

#### TREATMENT BY THE DIFFERENT METHODS COMBINED.

As we have said above, when a surgeon wishes to cure a stricture of the canal of the urethra, he must not be exclusive in his choice of the kind of treatment. Indeed there exist cases in which one of the three methods employed above may fail, whilst combined together they offer incontestable advantages. It is then often

useful to associate the three methods which we have described above. By acting thus, M. Amussat has frequently cured strictures which had for a long time resisted dilatation or cauterization. The following is the course which he pursues in the treatment.

When a patient attacked with one or more strictures places himself under his care, he sometimes resorts to Ducamp's exploring bougie; but most often, in order to assure himself of the degree of constriction of the canal and of the nature of the obstacle, he commences by making the patient urinate, and, from the size and extent of the stream of urine, he judges if the area of the canal is more or less contracted.

He then introduces a bougie of an ordinary size. If it penetrate without too much difficulty he resorts to his exploring sound, by which he discovers if there be one or several strictures, if they be formed by fræni or by engorgements more or less extensive, and lastly, upon what part of the urethra they are seated.

If the introduction of a bougie of ordinary size, or even of a very fine bougie, be not possible, which not unfrequently happens when the stricture is old, and especially when there exists a false passage, he employs, during several days, forced injections as a dilating means; afterwards when he observes a little greater facility in the emission of urine, before resorting to bougies, he employs a small straight silver sound, of about half a line in diameter, with which he succeeds in passing the obstacles which are met with in the canal, and in avoiding the false passages. He takes care, for this purpose, to make the patient sit upon the edge of his bed or of a table, the body being bent forwards: and when he has arrived at the obstacle and at the false passage, which is commonly in front, he introduces, in order to avoid the latter, the beak of the instrument into the free portion of the canal; taking care, for that purpose, to direct it along the superior wall of the urethra, and he thus attains his end without difficulty. After having performed this operation, three or four times, it is rare that he does not succeed in introducing a bougie or small flexible sound, which passes the obstacle without entering into the false passage.

This manner of proceeding has often completely succeeded with him, but particularly in a patient, who after having been cauterized more than forty times, could not introduce the smallest sound, and urinated as before the treatment. When he requested the assistance of M. Amussat, the impossibility of introducing a very small bougie, and the information which he furnished, induced the surgeon to think that he might have a false passage. He was very soon convinced of it, by taking an impression by which he discovered that there was one in the open sac of the bulb. The injections and the small straight sound were employed, as we indicated above, and in a little time the patient could himself pass the sounds.

When the canal has been sufficiently dilated, if the stricture be recent and has not yet been subjected to any treatment, it may be divided with the scarificator, which is replaced by a catheter or

bougie, which the patient retains for two or three hours every day. The dilatation produced by scarification is extremely prompt, and sensible to the patient, who immediately urinates with more facility than before. When the stricture is formed by a frænum, it is sufficient to scarify it three or four times and to dilate it with sounds in order to obtain the cure. Cauterization may also be advantageously employed in the case under consideration; but if the evil persist, it must be combined with scarification.

If the stricture of the canal be owing to a mucous engorgement, or to those callosities so common when the disease is of long standing, or when it has been treated by the improperly directed application of nitrate of silver, the following is the mode of proceeding:

The obstacle must at first be scarified, to obtain a prompt disengorgement in the diseased spot, and the canal must be dilated with sounds and bougies, until a sufficient dilatation be produced to admit the application of the caustic without producing retention of urine, a not unfrequent accident after cauterization, when it is applied too soon, but which has not yet appeared after scarification.

The surgeon must not wait, however, too long to perform cauterization after having scarified, when cauterization is necessary; for the caustic acts in a manner more efficacious for the dilatation, when it is applied upon the small cuts produced by the scarificator. At least we should think so from the following fact.

It not unfrequently happens that, in persons attacked with stricture, the *meatus urinarius* contracts also. If, in order to dilate it, the surgeon be satisfied with cauterizing it or incising it, this opening again contracts. If, on the contrary, he incise it, and then apply the caustic upon the incision, the desired dilatation is obtained.

A phenomenon which almost constantly accompanies cauterization, is that, during the application, there is developed in the part affected by the caustic, a kind of irritation very sensible even to the operator.

Immediately as the instrument is withdrawn, there occurs a swelling of the walls of the urethra which prevents the patient from urinating as easily as before, and which even sometimes obliges him to introduce a fine bougie immediately, to avoid a retention of urine, but this condition does not continue long. A few days after the sloughing of the eschar, the surgeon may, if he think proper, scarify again before reapplying the caustic. In all cases of old and callous strictures, when the nitrate of silver is prudently employed and when the affected point has been already scarified, a slight suppuration results, which relieves the parts and contributes much to the cure.

There is a very important observation which we have already made in the course of this work but which we think, should be repeated here: when a stricture has been treated by frequent cauterizations, the surgeon must be careful not to employ the caustic again, for it would be the means of aggravating the evil. Indeed it appears that when the cauterization has not been successfully applied at first, far from remedying the evil, it increases it. It is, at the pre-

sent day, well demonstrated that the parts of the canal which have been too often subjected to the action of the nitrate of silver, become the seat of a chronic inflammation, and consequently of an induration very difficult to remove. In these cases, unfortunately too numerous, and a few of which we have related, it is only by scarification, assisted by dilatation by means of sounds and bougies that a cure can be expected.

It is very unfortunate that the idea of introducing a cutting instrument into the urethra, however harmless it may be, has something so frightful to patients, as often to prevent their resorting to scarification. This method is, indeed, but little painful in its manner of application, and we have often seen patients who dreaded it, treated by scarification without suspecting it, and without experiencing the least pain.

Again, it has incontestable advantages over dilatation by sounds and bougies; 1st, because it can radically cure the patients; 2d, because it requires less time for the cure; 3d, because it does not require the constant retention of catheters during the whole treatment.

In the case in which a stricture may be treated indifferently by cauterization or scarification, the latter would be perhaps preferable from the following considerations:—

1st. The incision of a stricture produces a much more prompt dilatation than the application of caustic, and never exposes the patient to a retention of urine;

2d. By this method it is impossible to make false passages, and consequently to give rise to all the accidents which may result from them, accidents too frequent after cauterization applied according to the most generally adopted processes;

3d. The parts of the urethra which have been scarified, are never seen to become the seat of a chronic induration, which forms a new stricture very difficult to cure, as happens after cauterization.

If scarification produce a more speedy and certain cure than simple dilatation, and is attended by less danger than cauterization, perhaps, also, this cure is more lasting. We say perhaps, because a sufficient length of time has not elapsed since it has been practised, for us to be assured that it is followed by fewer relapses than cauterization. Time and experience can alone determine the opinion of practitioners upon this point. In the meantime we can assure them, that up to the present, relapses after scarification have appeared to us extremely rare.

Whatever may be the method followed in the treatment of a stricture, it is impossible to determine the duration of this treatment in a positive manner. Indeed, everything very much depends upon the degree of irritability of the patients, upon their docility, upon the nature and number of the obstacles which oppose the emission of urine, and upon the accidents which may produce some unfortunate complication; such as urinary abscesses, false passages, and urinary fistulæ.

## CHAPTER V.

## OF THE ACCIDENTS WHICH MAY COMPLICATE STRICTURES OF THE URETHRA.

## OF FALSE PASSAGES.

A FALSE passage in surgery is a longer or shorter passage made out of the course of the urethra, by an instrument introduced and improperly directed in this canal.

False passages being most often produced by catheterism, they are necessarily more frequent when the operation has been performed, while the canal is contracted by some obstacle, than when it is free; they may also result from improperly applied cauterization.

If the canal be free, it is always at the bulb and at the prostate that false passages are made in sounding. As we have said in the article on *Catheterism*, why this accident was more frequent in these two points than elsewhere, we will not repeat it here.

When an obstacle exists at some point of the urethra it is always immediately in front of this obstacle that the false passages are made, and as the most difficult strictures to pass are generally situated at the juncture of the membranous with the bulbous portion, it hence results that the accident under consideration happens most frequently in the bulb.

The opinion entertained by surgeons for a long time, that the portion of the urethra, called membranous, was one of the least resisting of the canal, induced the belief that it might, rather than any other, be the seat of false passages. But M. Amussat has demonstrated\* that it is surrounded by a strong muscular coat, which gives it great solidity, and pathological anatomy has not yet proved that it is the seat of strictures. Hence, it is not very probable that false passages are met with there, since it presents no obstacle to the introduction of sounds.

False passages are more or less deep, according as the operator has employed more or less force in introducing the instrument, as the instrument was more or less solid, and as the point at which it has deviated from the direction of the canal, offered more or less resistance. Thus, false passages made with solid sounds, but especially with conical sounds, are deeper than those which are made with bougies or flexible catheters. Those which are in the prostate are ordinarily shorter than those which are situated in the bulb. In this latter case, the false passage may extend several lines, and even several inches, especially when the accident is the result of forced catheterism.

When, in sounding a patient, the operator deviates from the

\* Memoir quoted above.

direction of the canal, and has the misfortune to make a false passage, he is immediately assured of it by a rather abundant hemorrhage, which succeeds to a resistance overcome by the beak of the instrument when it has been arrested at the bulb, and by the sensation of a kind of tearing of which the patients complain when it is the prostate which has been cut. In this last case, commonly but a very small quantity of blood flows.

Catheterism is very difficult, and sometimes impossible with the curved sound, when the false passage exists at the bulb, in front of a stricture; its orifice forms a Y, with the area of the canal; and as this point corresponds to the curvature of the urethra, at the moment when the see-saw motion is given to the sound to introduce it beyond the symphysis pubis, its extremity always enters in the wrong direction. In this case, as we have already said, the operator should use a straight sound in preference, with which he will always succeed in avoiding the false passage, from which the beak of the instrument is easily removed, by directing it along the opposite wall of the canal. In the case in which this mode of catheterism should also fail, the surgeon must then resort to forced injections for some time.

When a false passage is suspected, the surgeon may assure himself of its existence by means of Ducamp's exploring sound, which, under these circumstances, is of great utility. He introduces it into the canal until it is arrested by the obstacle, in front of which the false passage exists; he endeavours to push it forwards, then withdraws it a few minutes after. If there be really a false passage, the sound brings back upon its extremity a bifurcated impression.

False passages which are not deep, are most often cured by the methodical and prolonged use of bougies and catheters; but if they be extensive, they may produce very serious local affections, and consequently general symptoms which endanger the life of the patient.

#### OF URINARY DEPOSITIONS.

The name of urinary depositions is given to the urinary tumours which are formed in the perineum or in other parts, in the neighbourhood of the canal of the urethra.

These kinds of depositions always suppose a rupture, a tearing of the walls of the canal: if this accident may be produced by foreign bodies acting from without internally or from within externally, as the fragments of calculi arrested in the urethra, catheters and bougies unskillfully introduced, it is much more often produced by the fraying, the ulceration of the walls of the canal, in persons attacked with retentions of urine from stricture.

When an individual has had one or more strictures for a long time, it happens that the portion of the urethra, which is behind the last obstacle, being constantly distended by the urine coming from the bladder, is at last weakened. In this state, if the difficulty of

urinating increase, and if the patient, retaining all his strength, redouble his efforts to relieve himself, the fibres of the mucous membrane become gradually frayed or ruptured altogether, and afford a passage to the urine. If the fibrous coat resist, it forms a kind of sac which the urine fills, and which is afterwards lined with a false mucous membrane. This is what is called a deposition by effusion. But if the fibrous coat itself burst, the urine extends into the surrounding cellular tissue, and is said to be a deposition by infiltration.

Depositions by effusion are exhibited under the form of a tumour more or less voluminous, which most commonly occupies the perineum, extending sometimes as far as the scrotum. This tumour is circumscribed, indolent, without change of colour in the skin, shining, increasing in size, and stretching when the patient desires to urinate, which obliges him then to place his hand upon it to facilitate the passage of the urine. This tumour diminishes, and disappears almost completely under pressure.

These kinds of depositions are never accompanied by serious accidents, so long as the obstacle in the urethra is not sufficiently large to prevent the sac from emptying itself easily by compression. But if the urine remain for a long time in this sac, it produces an inflammation there, and, consequently, a suppuration which extends to the neighbouring parts; the tumour then becomes painful, hot and tense, and may open spontaneously. A purulent, fetid matter flows from it, and the opening remains fistulous for a long time.

When a deposition by effusion appears, it must be immediately remedied. The dilatation of the canal is the surest means which can be employed. After the cauterization or scarification of the obstacle which is the cause of the evil, the surgeon should, in order to dilate it, employ catheters in preference to bougies, because, by introducing these instruments into the bladder, he has the double advantage of dilating the urethra, and of preventing the urine from being arrested in the sac where it remained before. The patient should retain a catheter in the bladder until the fraying of the urethral mucous membrane is supposed to be completely cicatrized. If, notwithstanding the employment of dilating means, the tumour increase; if inflammatory symptoms are exhibited, it is better to open it with a bistoury than to wait for it to burst spontaneously. After the disappearance of the tumour, there often remain uneven indurations in the place which it occupied; they are dispersed by the use of catheters, and frictions with the ointment of hydriodate of potash.

We saw in a patient an induration, the diagnosis of which was for a long time difficult. This man was upwards of fifty years of age; he had had several strictures, and afterwards an urinary deposition, which was opened by M. Dupuytren. Five or six years afterwards he again experienced some difficulty of urinating, and sought the assistance of M. Amussat. The strictures, two in number, still existed; moreover, the patient had in the perineum, behind

the scrotum and immediately upon the median line, a tumour, of the size of a large fowl's egg, flattened from one side towards the other. This tumour was indolent, well circumscribed, and so hard, that upon touching or striking it, it felt like a stone. For several days, therefore, M. Amussat thought with a great many of his colleagues, among whom were, Messrs. Broc, Dumoutiers, Troussel, Dufresnois, that this might be a calculus formed in the spot which the deposition had occupied. The patient said that this tumour had formed slowly, and without giving any pain. In order to throw some light upon the diagnosis, M. Amussat thought that the best means was to sound the tumour with an acupuncture needle. The needle only penetrated six lines, and caused the patient some pain when it was desired to push it farther. Then only was it possible to discover that the tumour was not formed by a calculus, which could not have been cut by so feeble an instrument. The patient's strictures were scarified; he was made to wear bougies which produced an abundant suppuration from the canal, and frictions were made twice a day with the hydriodated ointment. Six weeks of this treatment were sufficient to cause the tumour to disappear almost completely from the perineum.

Depositions by infiltration exhibit several degrees; their progress, the phenomena which they present, are proportioned to the greater or less extent of the rupture of the urethra, and to the resistance which the obstacle offers. If the rupture be small, if the obstacle be inconsiderable, the urine is effused slowly into the cellular tissue, and produces in it one or more small indolent tumours, which at last degenerate into abscesses, if the ordinary diameter of the canal be not reproduced by the use of sounds.

When the rupture of the urethra is very extensive, when the retention is complete, the effusion, or rather the infiltration, occurs with astonishing promptitude, and the patient feels relieved, because the bladder is partly emptied. The infiltration, which ordinarily commences by attacking the perineum and scrotum, sometimes advances to the internal part of the thighs, the nates, the walls of the abdomen, and even those of the chest.

Of all the liquids of the economy, the urine is that which is capable of causing the greatest evils, when it becomes infiltrated into the cellular tissue; it must, therefore, so soon as it is perceived be promptly evacuated, otherwise the skin itself becomes the seat of a gangrenous inflammation, which destroys all the parts which it attacks.

The diagnosis of urinary depositions by infiltration, is never very difficult to establish. The retention of urine which has preceded the rapid development of the tumour, which commences by showing itself in the perineum, the kind of crepitation and of trembling which is felt in it upon compressing it, the tension of the swollen and shining skin, the diminution of the symptoms of retention, and sometimes a sensation of tearing complained of by the patient, constitute the symptoms of this disease. If the patient be not

quickly relieved, the urine continues to become infiltrated, the tumour extends above and below, the cellular tissue inflames, the skin takes on a violet-red colour, eschars are very soon formed in it, the sloughing of which is followed by the issue of a fetid sanies which gives off an insupportable urinary odour. This sanies brings along with it shreds of cellular tissue; the ulceration extends and sometimes destroys all the parts into which the urine is infiltrated. The patient suffers little, but he is seized with a fever which may be called urinary, and very soon dies, if the progress of the evil cannot be arrested.

When, by the symptoms which we have pointed out, the surgeon has discovered the existence of a urinary deposition, he should endeavour to open it immediately, without waiting for fluctuation to be felt, for the least delay would give time to the effused urine to form tumours at a distance. The orifice of these abscesses must be made large with the bistoury, which the surgeon is sometimes obliged to introduce very deeply through a thick cellular tissue (which makes a noise under the cutting of the instrument), in order to reach the deposition. A fetid urine then escapes often mingled with pus.

It is generally advised not to involve the urethra. Nevertheless, when there exists an extensive deposition by infiltration, would it not be better to open the canal largely at the very point which is the seat of the stricture? Indeed, by following the processes indicated by authors, when the urinary deposition has been opened, as the urine cannot pass out by a direct orifice, and as the stricture still exists, the infiltration of this liquid is again to be dreaded, and the difficulty of introducing a sound into the bladder always continues the same. If, on the contrary, as M. Amussat proposes, after having opened the deposition, the obstacle be cut, which could be done by introducing into the urethra, as far as the strictured point, a catheter, the beak of which would mark the point of departure of the incision, a sound could be immediately introduced into the bladder, and thus the cicatrization of the wounds would be very much hastened and an obstacle offered to every new infiltration.

However this may be, in the cases of urinary depositions, the incisions must be deeper as the infiltration is more considerable. They rarely arrest the gangrene; but, by affording an issue to the sanies and pus enclosed in the cells of the cellular tissue, they prevent the infiltration from extending farther. If there be several depositions, they must be opened separately.

The incisions which are made in the parts infiltrated with urine, cause very little blood to flow. The cellular tissue appears sometimes filled with air and serum. When all the necessary incisions are made, they are to be filled with lint, and the diseased parts are covered with compresses soaked in Goulard's water, or a strong decoction of bark. A putrid discharge is very soon established. If the integuments be not gangrenous, they inflame, and become tense and painful; recourse must then be had to emollients. If, on the con-

trary, they be gangrenous, they are insensible and flaccid, and large eschars slough off and leave the subjacent parts exposed. The ulcer which succeeds the eschars is hideous; it sometimes attacks the scrotum, leaving the testicles denuded, and extends to the penis, the internal part of the thighs, and the inferior part of the abdomen.

So soon as the disorgement of the parts is effected, either by the incisions or by the suppuration which diminishes after the sloughing of the eschars, a catheter must be introduced into the canal, as the only means of curing the rupture of the urethra, and of hastening the cicatrization of the ulcer. The introduction of the sound is, in this case, somewhat difficult, because the stricture still exists, and besides the beak of the instrument always has a tendency to enter into the accidental opening of the urethra.

When the surgeon has succeeded in introducing sounds, he must continue their use as long as it is necessary to prevent the urine, (the canal being just cicatrized,) from becoming effused upon the ulcer, which cannot close so long as it is wet by this liquid. He must afterwards turn his attention to giving to the canal its ordinary diameter, otherwise the same accident would be easily reproduced if a new retention were to occur.

#### URINARY FISTULÆ.

Whenever, from any cause, a solution of continuity occurs in some point of the canal of the urethra, which affords an exit to the urine, this liquid flows through the tissues in a passage more or less broad, longer or shorter, and to which the name of urinary fistula has been given. These fistulæ are called incomplete when they have only an internal orifice, and terminate in a species of organized sac in the middle of the parts. They are called complete, when they open externally by one or several orifices. The former being no more than a degree of the depositions by effusion of which we have already spoken, we will here consider only complete fistulæ.

These kinds of fistulæ particularly affect individuals in whom one or several strictures exist, and who have for a long time been subject to frequent retentions of urine: they may also result from the improperly directed introduction of sounds or bougies, and from the application of caustic. They are more rarely caused by a calculus engaged or formed in the urethra, or by a foreign body, which, acting from without internally, might have injured the canal.

Sometimes they are formed slowly; this occurs when the canal, presenting but a diminutive orifice, there escapes, only a very small quantity of urine. In this case, the fistula opens externally sometimes without the knowledge of the patient; in other circumstances, he experiences heat and tension in the place corresponding to the fistulous passage, the point of opening of which is not unfrequently indicated by a small pimple.

At other times, on the contrary, they are seen to form almost

suddenly. This happens when the obstacle which is opposed to the emission of urine, being large and the patient vigorous, a rupture of the urethra is produced, and consequently a deposition by infiltration, which, opening spontaneously, leaves one or several fistulous orifices.

It is rare that the internal orifice of a fistula corresponds with its external orifice. The former is always situated behind the contracted point; the latter, on the contrary, although most commonly seated in the perineum or upon the inferior face of the penis, may vary in its position and be met with in the scrotum, in the groin, in the internal part of the thighs, at the root of the penis, in the inferior part of the hypogastrium, and sometimes higher.

It is rare for an urinary fistula to have several internal orifices. It very frequently happens, on the contrary, that it presents several orifices externally, which may be in the neighbourhood of each other, or situated at some distance.

We will relate a remarkable example of an urinary fistula, with several internal orifices; M. J\*\*\*, aged fifty odd years, of a very susceptible constitution, was affected with an urinary fistula after an urinary deposition which had been produced by a stricture situated at the bulb. M. Amussat being called to this patient by Drs. Sorlin and Bousquet, experienced at first some difficulty in introducing sounds, but he very soon succeeded, and the fistula had already completely cicatrized, when the unexpected news of his friend's (Désaugier) death, produced such an impression on the patient, that he was seized upon the same day with a meningitis under which he promptly sunk. At the autopsy of the urethra, a very hard stricture was found at the bulb, already sufficiently dilated, to allow the introduction of a moderately sized catheter, and behind, in a point where the canal was very much enlarged, were three cicatrices which appeared to correspond to three fistulous openings.

When an urinary fistula opens in the perineum, or upon the body of the penis, its diagnosis is not difficult. The urine which at each emission flows drop by drop through the fistulous passage, and wets the patient, gives out a characteristic odour, and prevents any mistake. But if the same fistulous passage have a considerable extent, and if it open externally at a distant point from the urethra; if its orifice, being very narrow, allow but a very small quantity of urine to pass, the diagnosis becomes much more difficult, because then, there flows out of the external orifice only a kind of serum which has little or no urinary odour.

The fistulous passages through which the urine flows to escape externally, are soon lined with a mucous membrane, which becomes gradually organized and takes on the aspect of the excretory canals. When they are of long standing, the parts in the neighbourhood become hardened; callosities are formed there, and upon passing the finger along, a kind of hard cord is felt, which is somewhat cartilaginous, and which extends from the canal as far as the ex-

ternal orifice, which is commonly covered with pale-coloured fungi and forms a kind of '*cul-de-poule*.\*'

If several old fistulous passages exist, it is difficult to feel the cord just mentioned. The cellular tissue situated between the fistulæ is the seat of a general induration, which extends to a greater or less distance, and in which are felt here and there uneven and imperfectly defined scirrhi.

Urinary fistulæ are diseases extremely disagreeable to the patients, who, notwithstanding the greatest precautions, are almost continually wet. The cure is the more difficult according as they have a more direct communication with the urethra, as the internal orifice is more extensive, as the external is in a more dependent point, and as the canal is more contracted in front of the former.

The constant flowing of the urine through the fistulous passage is the principal cause which opposes the cicatrization; the fistulæ, therefore, which open in the perineum, or upon the body of the penis, are cured with more difficulty than those which, opening at a greater distance from the urethra, afford a passage to a smaller quantity of urine.

The only indication to be fulfilled in the treatment of urinary fistulæ, is to prevent the urine from flowing through the fistulous passage. For this purpose, the methodical use of sounds, is the most rational means, and that which is the most constantly followed by success.† But if the introduction of these instruments often presents some difficulty when the canal is contracted, this difficulty becomes greater, when, independently of one or several strictures, there are false passages and ruptures into which the sound may enter. Again, in certain cases, the urinary fistulæ are surrounded by callosities so hard, that the canal, having lost its elasticity in the corresponding point, is only dilated with great difficulty to allow the passage of the instrument which is introduced into it. In these difficult circumstances, M. Amussat acts in the following manner.

If catheterism be impossible, if a small bougie cannot be introduced, he employs, during eight or ten days, sometimes less, forced

\* *Cul de poule* is the name given by farriers to certain ulcers, the borders of which are projecting and everted.—*Trans.*

† Some surgeons, among whom was Ducamp, consider the catheter as superfluous in the treatment of fistulæ, whenever the urethra is free, and in consequence of this opinion they endeavour to place the canal in such a condition by cauterization, and other appropriate means. They adduce certain facts in support of the propriety of their opinion, but which facts, Segalas well remarks, may only be exceptions; and, he adds that, while admitting the necessity of endeavoring to remove all obstructions from the urethra, he regards the catheter as a means often necessary, and always useful, in the cure of urethral fistulæ. Notwithstanding the employment of catheters, and means applicable to freeing the canal, the cure of a urethral fistula, may occupy one or two months and even more; but cauterization very much expedites this cure, when there exists a stricture of the urethra. It would be well, perhaps, to make a slight application of the nitrate of silver to the internal orifice of all urethral fistulæ. This practice, though not in accordance with M. Amussat's views, as will be seen hereafter, is nevertheless sanctioned and employed by such men as Brodie, Segalas, &c.—*Trans.*

injections. The liquid penetrating more easily than a solid body, offers the double advantage of dilating the stricture, and at the same time softening the callosities which increase it. At the moment when the injection is introduced, a part of it flows through the fistulous passage and the other penetrates in the bladder. It is very rare that, after the use of the injections, prolonged during a greater or less length of time, he cannot introduce a small straight sound, or a bougie at first very fine, the size of which he gradually augments. When he has succeeded as far as No. 3 or 4, he substitutes for the use of injections and bougies, that of sounds, which he never introduces at first, except with a straight rod, taking care to give the patient the position suitable to this kind of catheterism. It is much more easy to guide the straight instrument than the curved one, which may sometimes enter into the interior orifice of the fistula, if it be considerable. M. Amussat rarely leaves the silver catheter in the canal, which fatigues the patient a great deal, and often only irritates parts which are already too much so. When he has succeeded in introducing the flexible catheters into the bladder, he continues their use, until the fistulæ are cicatrized, and he afterwards turns his attention to the cure of strictures of the canal, by means of scarification, or of cauterization. This is one of the cases in which scarification appears to have the most advantages.

We have several times seen M. Amussat apply this process to patients affected with very serious fistulæ and always with success. We will cite two cases of it which appear to us interesting.

CASE I.—M. S\*\*\*, a musician in one of the companies of the '*gardes-du-corps*,' experienced, after several attacks of blennorrhagia, some difficulty in urinating. In 1826, this difficulty was so great, that an urinary abscess was developed in the perineum. The patient entered the hospital, where, after the opening of the abscess, which was done by incision, he was cauterized a great many times for a stricture which existed at the bulb. After a residence of fourteen months in this hospital, he left it without being cured and was obliged to return two months afterwards for the same symptoms. He was again cauterized without greater success and again left it.

But at the end of a few months, notwithstanding the severest regimen and the most regular life, he perceived that the difficulty of urinating increased. Very severe pains were felt in the perineum where a tumour was very soon formed. This tumour degenerated into an abscess and the urine flowed through the opening which was formed spontaneously.

Obliged to return to the hospital on the 5th Sept., 1828, he was there cauterized, and the surgeon succeeded in introducing a silver catheter into the bladder, which had not been done before. He retained this instrument for thirteen days. It was withdrawn in order to substitute one of gum-elastic, which was impossible. The cauterizations were then repeated and the patient left without being cured.

On the 5th January, 1829, he was presented to M. Amussat by Dr. Roaldez. At this time there were three urinary fistulæ in the perineum, surrounded by considerable indurations in the cellular tissue, and upon the circumference of which were fleshy fungi of an unhealthy character. When the patient desired to urinate, the urine passed altogether through the fistulæ.

Upon the examination of the canal a frænum was discovered in its anterior part, and at the bulb in front of the fistulæ was a very hard and resisting obstacle, which did not allow the passage of the smallest bougie.

M. Amussat thought that it was a case for the employment of forced injections; he commenced them on the 9th. The urine very soon flowed partly through the fistulæ and through the natural channel; but it was only on the 21st, that he was able to introduce a very fine bougie into the obstacle. This bougie having passed out on the 23d, could not be replaced, and the injections were obliged to be resorted to again.

On the 1st March, the liquid injected, a great part of which ordinarily passed through the fistulæ, passed altogether through the urethra.

M. S., being desirous of attempting the introduction of a bougie himself, was attacked on the 6th with a swelling of the testicles, which required bloodletting from the arm and the cessation of all treatment. The patient was very much affected and had fever for several days. In a short time a sound could be introduced, the size of which was gradually augmented. The injections were but rarely repeated; nevertheless the fistulæ continued for a long time to allow the urine to escape.

On the 14th May, M. Amussat began to scarify the obstacle in the perineum, and the frænum which was in the anterior part of the canal, so as to enable him promptly to increase greatly the size of the sound. He cut away the fungous flesh which surrounded the fistulæ externally, and on the 29th September the patient was completely cured.

Since this period M. S. has been perfectly well and has always urinated with the greatest facility. The treatment was thus long, because it was very often interrupted towards the close, the patient being obliged to perform his duty at Saint Cloud.

CASE II.—M\*\*\*, a mariner, aged 52 years, of a feeble constitution, has had, since the age of 20, several attacks of gonorrhœa, which were treated by different means, among others by astringent injections. In 1817 he experienced, for the first time, a difficulty in urinating, which increased daily, without however a complete retention resulting from it.

In the month of August, 1830, the efforts which the patient made to expel the urine were very great. At this same period, a hard and slightly painful tumour formed in the inferior part of the right groin, extending towards the perineum, where it soon opened upon two points and thus formed a fistula with a double orifice, which

gave a passage to the urine. A few days afterwards, two other small tumours appeared, one at the interior part of the symphysis pubis immediately at the root of the penis, the other upon the same level, but a little to the right. These tumours opened like that of the perineum, and formed each one a fistulous orifice. When the patient urinated, but little urine passed through the *meatus*, the liquid always entering into the fistulæ.

The surgeons who were consulted at Havre, being unable to sound the patient, advised the use of several internal medicines, and hip baths repeated night and morning, without obtaining any success. The evil, on the contrary, increased daily, and the patient decided to go to Paris.

On the 17th November, 1830, M. Amussat saw him for the first time, and found him in the following state: general health very feeble, spirits depressed: the skin of the penis and the scrotum were œdematous; the latter was of a shining red. At the root of the penis the two fistulous openings which we have mentioned above were observed; their edges were fungous and everted; the cellular tissue which surrounded them was hard, studded with nodes in an extent of more than three inches in diameter, particularly at the base of the penis. In the perineum were seen, upon the median line, two fistulous orifices very near each other, larger than the preceding, surrounded like them with indurations and callosities, which extended on the right, towards the inferior part of the groin. The patient was almost continually wet with urine.

Catheterism was impossible; by it were only discovered three strictures, two of but little size, in the anterior part of the canal, and a third situated at the bulb, against which the sound struck as against a solid body, and which could not be passed with very fine sounds. Forced injections were then administered, and on the sixth day, a bougie, No. 1, was introduced into the bladder. In the early part of December, a small straight silver sound could be introduced, but which was not left in the canal. On the 12th, a gum-elastic sound, No. 4, was likewise introduced into the bladder. This sound having been withdrawn too soon, its reintroduction was impossible, and it was only eight days afterwards, that it was possible to replace it by a silver sound, which the patient retained three days. Since this period, he has made use of gum-elastic sounds successively larger, and on the 10th Jan. he introduced one of No. 8. At this time, there was a very remarkable amelioration. His general health was good; of the four fistulous openings, one alone, that which was situated to the right of the root of the penis, still afforded a passage to a few drops of urine; the others were cicatrized. The skin of the penis, and the scrotum had returned to their normal state: the indurations which surrounded the fistulæ had diminished considerably.

On the 12th, 13th, and 14th, M. Amussat scarified the canal in the most contracted point; the instrument, arrested by nodes, appeared to cut into a fatty tissue. On the 15th, the patient introduced into the canal a sound, No. 10, and prepared to depart.

Cauterization of urinary fistulæ should be abandoned ; this means never succeeds, so long as the urine passes through the external orifice. It can only be employed for the purpose of giving a little more vitality to the parts. Compression, which has also been advised, can never be useful when the parts traversed by the fistula have but little thickness, and when the external orifice communicates directly with the internal. If, on the contrary, it be situated far from the canal, if the internal orifice be small, of which the surgeon is assured when no urine passes out, and when the serosity produced by the fistula scarcely has the odour of this liquid, compression and astringent injections into the fistulous passage may be advantageously used : it is however prudent to make the patients wear catheters at the same time.

Should the process which consists in removing with the bistoury the indurated and callous parts which surround the external orifice of the fistula, and afterwards uniting the edges of the wound by sutures, after having previously introduced a sound into the canal, be entirely rejected? Indeed, whatever may be the precaution taken, the surgeon can never prevent the urine from wetting the wound. He runs the risk of enlarging the internal orifice of the fistula, and if he wish to carry the sutures through the urethral mucous membrane, this latter, not offering sufficient resistance, is torn, and he thus aggravates the evil which he wished to cure. It is prudent to make the patients wear catheters for some time after the fistulæ appear cicatrized ; for the external orifice, having been closed but a short time, may suddenly open, and reafford a passage to the urine. This accident occurs when the use of catheters had not been sufficiently prolonged to close the internal orifice, and when its natural diameter has not been given to the canal by suitable means.

Gravelly concretions may be found in the fistulous passages of the urethra, and acquire a size sufficiently great to impede the emission of the urine, and even to produce a complete retention.

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## CHAPTER VI.

### DISEASES OF THE PROSTATE GLAND.

SITUATED at the point of junction of the genital and urinary apparatus, the prostate gland may become the seat of many very serious diseases ; such as *acute inflammation*, *abscesses*, *chronic engorgement*, and *tumours*, which are developed on the portion of the gland situated below the neck of the bladder ; tumours which some pathologists have considered as an abnormal development of the supposed third lobe of Home. If we except acute inflam-

mation and abscesses, the diseases of the prostate are much more frequent in old persons than in adults.

*Of Acute Inflammation.*—The most frequent causes of the acute inflammation of the prostate are, in young persons, blennorrhagia, masturbation and external violence applied to the perineum; and in old subjects, the unskilful introduction of sounds, and the existence of a stricture more or less ancient. It is an inflammation rarely primary in the tissue itself of the gland, in which it is most commonly only developed by continuity, when the part of the urethra called prostatic is itself affected.

The diagnosis of this disease is in general easily established. It is announced by a heaviness and great heat about the part in which it is seated. To these symptoms, which are accompanied by fever, is added, a constant pulsating pain increased by pressure upon the perineum. When the patient goes to stool, he feels a painful heaviness which weighs upon the rectum, and seems to oppose the excretion of the fæces. If he desire to urinate, the urine passes with difficulty; and appears to him to be burning. When the disease has existed only three or four days, by introducing the finger into the rectum the gland is felt to have acquired great development. If the surgeon wish to perform catheterism, the presence of the instrument causes such pain that he is often obliged to abandon it. To all these signs are added all the symptoms of a general reaction, which is the greater as the patient is younger and more vigorous.

The acute inflammation of the prostate ordinarily terminates from the first to the second septenary period by resolution, sometimes by suppuration, but never by gangrene.

The treatment must be altogether antiphlogistic. After having bled the patient, if he be plethoric, the surgeon must especially insist upon the application of leeches to the perineum, and to the inferior face of the gland, by means of the *speculum ani*, invented by M. Amussat, and of which we will speak hereafter. Emollient and narcotic injections, hip baths and diet, always produce good effects.

If the inflammatory swelling of the gland produce a complete retention of urine, and if catheterism become necessary, it must be performed with all possible care, for under these circumstances it is extremely painful.

The disease under consideration is rarely very serious, but it predisposes to chronic engorgements, an affection always very difficult to cure.

*Of Abscesses of the Prostate.*—These abscesses which are formed in the cellular envelope of this gland, for they are rarely observed in the glandular parenchyma, appear when the acute inflammation has almost completely ceased; they are sometimes however already formed while the inflammatory symptoms still exist in all their severity.

The diminution of the inflammation, accompanied by chills, a burning and pulsating heat in the bottom of the gland, the continuation or the augmentation of the difficulty in urinating, are the principal

symptoms which may ordinarily induce suspicion of the existence of a purulent collection in the prostate; for the surgeon cannot be guided in his diagnosis by any external size, such as a tumour which would project into the perineum or into the rectum, and which would exhibit fluctuation.

Indeed it scarcely ever happens that abscesses of the prostate open outside spontaneously, or require the employment of the bistoury. The pus most often penetrates into the urethra, after several efforts made by the patient to urinate, or else the surgeon in performing catheterism pierces the abscess with the beak of the sound.

When this occurs he is immediately informed of it by the relief which the patient experiences, and by the pus which escapes through the instrument.\* We will cite a remarkable case of this affection in an adult.

M. H. Z\*\*\*, aged 43 years, of a strong constitution, having been attacked several years before with strictures of the canal of the urethra, often experienced much difficulty in urinating. In the early part of the spring of 1827, the emission of urine became more difficult, and a severe pain was very soon felt above the anus. When the patient went to stool, this pain was increased; and the rectum was compressed as by a weight. The emission of urine became still more difficult and was made with great pain. Although H\*\*\* was at the same time troubled with considerable fever, he still persevered in fatiguing occupations during two days: but one night, upon returning from a long walk, he was unable to satisfy his desire of urinating, which forced him to seek the assistance of art. M. Amussat was called, and sounded the patient; when the sound had passed two strictures, one of which was in the anterior part of the canal, and the other at the bulb, the beak of the instrument, having arrived in the prostatic region, instead of striking against the transverse portion of this gland, encountered a soft body into which it penetrated in the movement which the operator made to disengage it. A large quantity of pus immediately preceded the passage of

\* Brodie says that the abscess, if left to take its own course, sometimes bursts internally—that is, into the urethra; *more frequently* it makes its way through the fascia, cellular membrane, and muscles of the perineum, and bursts through the external skin. “If there be reason,” continues B., “to believe that an abscess is formed, an endeavour should be made to procure an external discharge for the matter, to prevent it bursting into the urethra. If the symptoms described exist, and continue to increase, and a fulness and tenderness of the perineum be discovered, any more certain indication of the abscess, must not be waited for; but a lancet must be introduced in the direction, indicated by the tenderness and swelling.” Now, the most common, and in most cases we think decidedly the safest plan is to allow the abscess to burst; when it will be found to open either into the urethra, the bladder or rectum, most frequently into the former, and *very rarely* traversing, as Brodie asserts, as being most common, the “fascia, cellular membrane, and muscles of the perineum, to burst through the external skin.” However, would not the serious accidents (asks Sanson) which result from the termination by suppuration, authorize, in cases in which the symptoms of consumption supervene, the division of the sphincter ani and inferior part of the rectum, to arrive at the gland and thus directly afford the assistance of surgery?  
—*Trans.*

the urine through the catheter, which was left in the bladder and replaced the day after and the following days by gum-elastic catheters. The patient used these instruments about two months, and was completely cured.

When the abscess has been opened, it is necessary to make the patient wear a catheter, to prevent, as much as possible, the contact of the urine with the diseased part. Every time that the instrument is changed, it is proper to throw into the canal, in order to cleanse it, some emollient injections. Baths hasten the cure, at the same time that they render the presence of sounds more supportable, by diminishing the irritability of the urethra.

*Of the Chronic Engorgement of the Prostate.*—This disease, very rare among young persons, is particularly incident to old age. Syphilis, the presence of a foreign body in the bladder, the existence of strictures in the urethra, are its most ordinary causes. It is observed particularly in old men who have for a long time used bougies and sounds, introduced by themselves. In this case, the swelling of the prostate is occasioned by the chronic inflammation, from these instruments continually striking against the transverse portion, which the patients take for a stricture, as we have already said, and which they force.\*

The chronic engorgement of the prostate progresses slowly. It often exists for several years without being perceived, and it even happens that the patients, who attribute their pains to every other cause, are not undeceived until the gland has become scirrhus.

The prostate has acquired a considerable size when the following symptoms are developed; heat and heaviness in the anus, tickling in the whole extent of the canal, difficult and painful emission of urine, very frequent desire to urinate; the jet is not formed, the urine passes drop by drop, or as in dribbling. It is rare that a catarrh of the bladder does not complicate this disease.

When it is desired to introduce a sound into the bladder, the instrument is arrested at the neck by a hard and resisting obstacle. The indicator finger introduced into the rectum† detects above this intestine a hard round tumour sometimes painful to the touch. When the evil has progressed, the pains become intolerable; if the patients go to stool they experience a sensation of tearing, of heaviness in the affected parts, and even when they pass no excrement, it appears to them that a considerable mass of matter is about escaping through the anus.

A complete retention of urine may supervene. In this case the introduction of the sound becomes more difficult, and requires a

\* To avoid this inconvenience, M. Amussat always advises patients who sound themselves, to use gum-elastic bougies and catheters, to which a curved form has been given, in making them. With these instruments, which, in order to be introduced, do not require a rod, the patients reach the bladder more easily.

† It very frequently happens that diseases of the prostate are not known, because the surgeons who are consulted, neglect to make this examination by the rectum, which is the surest means of arriving at an exact diagnosis.

great deal of skill and prudence on the part of the operator. A sound very much curved should then be used, because the neck of the bladder, in consequence of the swelling of the gland, is more elevated than in the normal state, and because the cul-de-sac of the prostate is more developed. When the sound, the introduction of which is always usefully preceded by a few injections, has arrived at the prostate, great care must be taken to avoid overcoming the resistance which it opposes, by too sudden a see-saw motion. The surgeon must endeavour, on the contrary, to shun it, by elevating the beak of the instrument towards the symphysis pubis. It is imprudent to make use of a conical sound, especially when the retention is produced by a swelling of the prostate. The beak of the instrument being pointed, the tissues feel the resistance less, and it may traverse them without the surgeon's knowledge. When he has been so fortunate as to reach the bladder, he ought, if possible, to substitute a gum-elastic for the silver catheter, the presence of which in the canal causes, under these circumstances, violent pains to the patients.

In order to facilitate the introduction of flexible catheters, the surgeon can then advantageously use the rods invented some years since by M. Amussat, and which are so constructed as to allow him to increase or diminish the curvature of the catheter gradually, according as he thinks proper, even when it is introduced into the canal.\*

However voluminous the prostate gland may become, *the portion of the canal which is lodged in it is never contracted*, as might be supposed. On the contrary, the urethra acquires at this point a diameter which is so much the greater as the development of the gland is more considerable. M. Amussat possesses and has had delineated several prostates upon which it is easy to prove this fact, since on many of these specimens the middle finger can be introduced without difficulty in the urethra.†

This canal, when the prostate has acquired a considerable development, forms a true gutter flattened from right to left, and its direction may deviate, if one of the lobes be larger than the other,

\* We think that we ought to describe these rods here. They are composed of a very flexible steel shank, eight or ten inches long, mounted upon a flattened handle. To the extremity of this shank, is attached a silver wire, which is lodged in a groove made along the whole extent of the shank, and which on the side of the instrument's handle is attached to a hook, furnished with a small thumb stall, in which a button spring is caught. The rod, being covered with a flexible sound, receives a greater or less curvature, according as the hook is drawn more or less towards the operator, the silver wire which is fixed to it bringing towards his hand the extremity of the shank, which forms the rod. When, after having curved it, the operator wishes to straighten the instrument, he loosens the hook by pressing upon the button of the spring, and the steel shank, by its own elasticity, brings the sound back to a straight direction.

† In many instances, says Brodie, the urethra is rendered narrow in consequence of the increased bulk of the parts, by which it is surrounded; in others, however, it is actually wider, being dilated into a kind of sinus, where it lies in the centre of the prostate.—*Trans.*

a rather unfrequent case, for the gland is commonly enlarged throughout. We shall only speak here of the two lobes which this organ really exhibits, for the part which Home has named the third lobe, and which so frequently produces tumours, is only that portion of the glandular tissue, which we have several times mentioned, that unites the two lobes, and which M. Amussat has called the transverse portion.

After what has just been said, it is evident that the difficulty in urinating experienced by the patients, depends not upon the stricture of the portion of the urethra called prostatic, but rather upon the compression of the neck of the bladder by this gland.

When the engorgement of the prostate has not yet become scirrhous, its resolution may be obtained by various means, according to the causes which have produced it. M. Amussat has often seen incipient engorgements, in patients who introduced sounds and bougies unskilfully, disappear by the disuse of these instruments, or by their more methodical use, especially when the disease is caused by an old stricture.

If the engorgement be produced by a venereal cause, advantage is derived from mercurial frictions upon the perineum. In every case, it is useful to establish an issue in one of the thighs, especially if the disease exist in an individual attacked by a herpetic affection, whether this latter has disappeared, or still exists.\*

When the engorgement continues, the surgeon is to resort to catheters which must be retained. For this purpose, he should choose those which are the most pliant, and the best finished, so as

\* Professor Dickson, of the Medical College of the State of South Carolina, has successfully employed the deut-iodide of mercury and potassium in the treatment of this affection. The patient, æt. 28, had been ill three years and upwards, and from the symptoms exhibited, there was no doubt of the existence of cystitis, enlargement of the prostate gland, and inflammation of the rectum.

Opiates were freely exhibited at night, the muriate of morphia being preferred, as agreeing best with him. Care was taken that he should not suffer from constipation, but when they were required, the mildest laxatives were employed, and he was put upon a course of the deut-iodide of mercury and potassium. He made such complaint of uneasiness at the anus, as to lead to the belief that there was a spasmodic and morbid contraction of the sphincter; this symptom was counteracted by the use of a large wax bougie, introduced a little way, so as to resist the closure of this circular muscle, and diminish its power of action by keeping it distended for some time. This, the patient affirmed, gave him an almost incredible degree of relief.

He continued to take the medicines above mentioned for six or eight weeks, improving very steadily, and towards the latter part of that time rapidly. He soon after returned into the country, where he continues better.

Other means of cure are, emollient and narcotic hip baths, enemata and cataplasms of the same nature, the internal use of iodine, accompanied by opium or any other narcotic in doses sufficiently large to insure repose, and a strict attention to severe diet. An ointment composed of iodine, and the hydriodate of potash with a sufficient quantity of hog's lard, might also be employed. It has been recommended to puncture the bladder above the pubis, and wear a tube there permanently, in order to relieve the urethra from its office of excreting the urine, and thus to prevent all fear of a retention.—*Trans.*

to produce less fatigue. These instruments should always be introduced into the bladder with rods well curved.

As the continued presence of catheters in the bladder always irritates this organ, M. Amussat, in order to avoid this inconvenience as much as possible, uses very flexible ones, furnished at their extremity with an expansion in the shape of an olive, which is only a few lines long and has but one eye. When these have been introduced he withdraws them until the olive is arrested by the neck. In this manner, the instrument projects but little into the bladder, and yet there is no fear of its slipping out.

If the gland be painful to the touch, leeches may be applied to its inferior surface, through the anterior wall of the rectum, which is easily done by means of the *speculum ani* invented by M. Amussat.

This instrument is terminated by a rounded end at that extremity which is to be introduced, and presents at the other a division in the form of a handle. Upon one of its sides and throughout almost its whole extent is an opening from ten to twelve lines broad, which is closed by a moveable plate adjusted by means of a groove. When the leeches are to be applied upon the inferior surface of the prostate, by means of this speculum, the patient is placed in the same position as in the operation for stone, and he is directed to make the same efforts as when at stool.

The surgeon, placed in front of him, then pushes the instrument, previously covered with some fatty body, quickly into the anus, taking care to direct it so as to make the side on which is the moveable plate correspond to the anterior wall of the rectum. The instrument being introduced, upon withdrawing the plate, the part upon which the leeches are to be applied, is uncovered. When the operation is finished, as the mucous membrane has projected into the instrument after the falling off of the leeches, in order to remove the instrument care must be taken to draw it gently with the right hand, while with the indicator of the left the membrane is disengaged. We have seen good effects from these applications of leeches through the anterior wall of the rectum. Hip baths, emollient applications to the perineum, enemata with laudanum, and narcotic injections into the urethral canal, assisted by a mild regimen, may concur efficaciously to the cure of this disease.

But when the prostate is schirrous, the evil being incurable, remedies, purely palliative, must be employed.\*

The prostate may acquire a very considerable size, but in proportion as it enlarges, it loses its form; from being flattened as it ordinarily is, it becomes round, curling itself as it were, by developing itself in every direction. It is then, that it can be well proved, as has

\* In a schirrous state of the prostate, Girtanner advises the employment of burnt sponge and hemlock; and Hunter directs that blisters should be repeatedly applied to the perineum, and a constant discharge kept up from them. Sir Everard Home found suppositories of opium and hemlock, passed up the fundament, not only relieve the irritation, but even lessen the projection of the gland. Sea bathing has also been highly recommended.—*Trans.*

been done by M. Amussat,\* that this gland does not surround the urethra; for, if a tumefied prostate be examined, no glandular part exists above the canal, but only many fleshy fibres which unite its two lobes.

The older the engorgement is, the harder, more compact, and more creaking under the scalpel does the tissue become; it sometimes acquires the hardness of cartilage. When the prostate has passed into the scirrhus state, purulent collections are sometimes found within it. We have seen this alteration in an old man who sank under a scirrhus affection of the prostate and of the posterior part of the bladder. In the centre of the gland was found a cavity lined by a false membrane and containing a very liquid pus of an unhealthy nature.

*Of Tumours of the Prostate.*—It very frequently happens in old persons, but particularly in those who are subject to calculi and have had one or several stones in the bladder for a long time, that tumours more or less voluminous are developed upon the transverse portion of the prostate, below the neck of the bladder. These tumours are what Home regarded as the development of his third lobe.

The existence of these tumours is often very difficult to diagnose, and constitutes one of the most serious diseases which can affect old persons, without even excepting stone, almost all the symptoms of which it exhibits.

The patient experiences a heaviness in the anus and at the perineum; he has the sensation of a foreign body which interrupts the jet of urine. The desire of urinating is felt every moment, because the bladder never completely empties itself and because there always exists a catarrh of this viscus. The urine is charged with mucus, and its expulsion sometimes requires such efforts that it is not rare for hernia† to supervene in persons who are attacked with this disease. A sharp pain is felt in the region of the prostate, every time that the patient urinates or goes to stool. This pain extends to the end of the glans, as in calculous subjects: but there is scarcely ever any blood mixed with the urine, as in these latter, at least unless the disease be complicated by the presence of a stone.

When the surgeon wishes to sound, in the case under consideration, the beak of the instrument is arrested at the neck, without his being able to distinguish if the obstacle which opposes its introduction is the transverse portion or a tumour developed upon one of its points. The catheter has often penetrated into the bladder, without affording a passage to the urine, because the eyes of the instrument being carried upwards by the tumour which elevates them, are above the level of the liquid. When the surgeon thinks, therefore, that he has penetrated into the bladder, he must, by a movement given to the catheter, endeavour to place it upon one of

\* See Memoir quoted above.

† See article on *Hernia* at the end of the volume.

the sides of the tumour, so that its beak may more easily return towards the lower part of the bladder.

When a patient exhibits all the symptoms described above, and when the ordinary catheterism, having become difficult and dangerous, does not allow the surgeon to satisfy himself by the examination of the bladder, concerning the existence of foreign bodies in this organ, M. Amussat advises that the patient be sounded in an inverse position to that commonly given him. After the sound has been introduced, he directs the patient to support himself upon his hands and knees, in such a manner as to elevate the pelvis more than the head. In this position if the calculi be moveable, they are placed upon the anterior wall of the bladder, which thus becomes as it were the bottom, and where they are more easily felt with the sound; while, when the patient is in the position indicated for ordinary catheterism, it is impossible, however small the tumour may be, to examine the fundus.

This affection is much less rare than it is generally believed to be; it may even be said that there are few old persons, who have had a stone in the bladder for a long time, in whom it does not exist in a more or less advanced degree. These tumours are often developed in other subjects, without their having been ever suspected, the symptoms which they furnished, having been attributed to catarrh of the bladder, which was only a concomitant, or to the existence of a calculus.

M. B\*\*\*, a deputy, 69 years of age, experienced, for several years, some symptoms of stone, but only after he had taken a long ride on horseback. In 1826, being in Paris, he was seized with an urinating of blood, which continued three days, and which disappeared under the influence of an antiphlogistic treatment. M. B\*\*\*, who had always very much dreaded catheterism, would not consent for M. Amussat to sound him, in order to satisfy himself of the true cause of this accident. A few days afterwards, M. B\*\*\* left Paris to return to his family; but at fifteen leagues from the city, he was seized with a retention of urine, which obliged him to interrupt his voyage and to seek the assistance of art. The surgeon who was called, after several useless attempts, which caused the patient to lose a great deal of blood, was obliged to abandon the catheterism without having penetrated into the bladder. The evil however increased. M. Amussat was called in. M. B\*\*\* was then suffering the pains and agony of a very severe retention of urine, not having urinated for five days. The bladder being distended, projected high up above the pubis, and an urinary odour was already diffused around the patient. After having thrown several warm injections into the canal, M. Amussat succeeded in introducing into the bladder a silver catheter which afforded a passage to about three pints of thick and bloody urine. This catheter was replaced by a gum-elastic one; but as this last could not be retained on account of the extreme sensitiveness of the canal, the symptoms of the retention again appeared, and obliged M. B\*\*\* to return to

Paris, where he died fifteen days afterwards, in consequence of a hematuria which occurred the day after his arrival.

At the autopsy made in presence of M. Dubois, the prostate was found very voluminous; upon the middle part of its transverse portion, was a tumour of the size of a small egg. To the left of this tumour and in a kind of *cul-de-sac*, were forty seven small calculi, which had been unable to enter into the urethra, because at each emission of urine, the tumour closed up the neck.

Although M. Amussat sounded the patient as often as six times a day, to empty the bladder of the blood which accumulated there, and to throw in acidulated injections, he never felt these foreign bodies which were in a measure hidden by the tumour.

If the diagnosis of tumours of the prostate be difficult, it is because the symptoms to which they give rise are common to other diseases. When, however, the same symptoms are observed as those produced by stone, with the exception of bloody urine, after a ride on horseback or in a vehicle, when the stream of urine is suddenly interrupted to reappear immediately, and when by catheterism, performed as M. Amussat advises, no foreign body is discovered in the bladder, it may be concluded, that a tumour is developed upon the transverse portion of the prostate.

Up to the present time, no means have yet been proposed for the cure of these tumours; as the introduction and retention of catheters can only facilitate the flow of urine, without remedying the evil. Cauterization, advised by M. Nicod, who appears to have confounded these tumours with polypous vegetations, has not yet been sanctioned by experience.

The ligature of these tumours through the canal, or their extirpation through an opening made in the abdomen, as in the hypogastric operation for stone, are two means which might perhaps be attempted.

The former would, without doubt, be difficult to execute.

The latter we have seen attempted with success by M. Amussat, upon an old man of 68 years, upon whom he had operated for stone through the hypogastrium. After the extraction of a very large calculus, having felt at the neck of the bladder a tumour of the kind under consideration, he cut it out with long scissors introduced through the wound. There was no hemorrhage; it is true that the tumour had scarcely the size of a large nut. The patient was cured, and is now 73 years of age.

Pathological anatomy proves that these tumours, most often rounded, are connected with the prostate, to which they are sometimes united only by a pedicle. They are always, or almost always, situated upon the median line. Upon dissecting them with care, it is seen that they cause the small tubercle, situated at the inferior part of the neck of the bladder, to disappear, by raising it up; that they are formed of the same glandular substance as the prostate, and that beneath the mucous membrane that covers them, are blood-vessels, more or less developed, according to the duration of the

disease. There never exists more than one tumour at a time: it is always accompanied by a greater or less swelling of the body of the gland, and may acquire a considerable size; that of a large fowl's egg, for instance. The substance of these tumours is firmer, and more grating under the scalpel, according as their existence is of longer standing.

The engorgement and the tumours of the prostate are affections which contraindicate the employment of lithotrity, when there exists a stone in the bladder at the same time, because, then, the introduction and presence of a straight instrument in the bladder, especially if it be rather large, causes the patient great pain, by the compression which it exercises upon the gland.

There have been recently invented, to facilitate in this case the introduction of straight instruments, and at the same time to diminish the curvature which the prostatic portion then forms, sounds which are introduced curved, and which are afterwards straightened by means of a peculiar construction. But it appears to us that the prostate is too solidly fixed by its ligaments, to allow, when it is swollen, the portion of the canal which corresponds to it to be straightened without great pain.

These sounds may be advantageously employed, in restoring the uterus to its natural position. In two cases of anteversion, we have seen M. Amussat introduce a straight rod, without danger, into the cavity of the uterus, and bring this organ gradually back to its natural position, by using this instrument as a lever; but he acted upon a moveable body, whilst a surgeon who endeavours to straighten the prostatic portion of the urethra when the prostate is swollen, acts upon a part which cannot be displaced.

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## H E R N I A .

HERNIA, whatever may be its cause, is so serious a disease, and the operation which it requires, is so often fatal, that I think it useful to point out the process by which M. Amussat succeeds, in a very great majority of cases, in reducing these tumours, without resorting to the operation. This process having been faithfully explained in a case published in the "*Lancette Française*," Vol. V., No. 91, I will give it in the words of the author.

Madame Malveau, aged 52 years, living in the village of Maison-Alfort, had had for about six months, a crural hernia of the right side, which incommoded her but little, as she attended to active house-keeping, and wore no kind of bandage.

On the 15th November last, after having been very much fatigued the evening before, she was engaged in spreading out linen, when

the intestine suddenly protruded, without its being possible to return it.

On the 16th, colics and nausea, followed by some vomiting, having appeared, Dr. Bleyne was sent for, who, after some useless efforts for the reduction of the hernia, prescribed 20 leeches to the tumour, and an enema, containing Sulp. Magnez., 1 oz. This enema produced alvine evacuations; she had had none since the 14th. The symptoms of strangulation then ceased, and the patient slept a part of the night, which she had not hitherto done.

On the 17th and 18th, no unpleasant symptoms appeared. Madame Malveau had a discharge, and complained of no pain. However, as the tumour remained, Dr. B. again attempted its reduction, but without success. The complete absence of all symptoms of strangulation, and the very satisfactory state of the patient, induced the physician to hope, that she would escape with an adhesion of the intestinal convolution which had passed out with the hernial sac. But at night on the 19th, all the symptoms of strangulation reappeared with greater intensity.

On the 29th at noon, M. Amussat, being called in consultation by Dr. Bleyne, found the patient in the following state: the abdomen tympanitic, and painful upon pressure, constant desire to vomit, impossibility of passing even gas by the anus, frequent hiccup, and extreme anxiety; a hard tumour, of the size of a fowl's egg, and very painful to the touch, occupied the right crural region.

Although the hernia had been strangulated for five days, and was the seat of a very intense inflammation, manifested by the pains which were felt, M. Amussat, before undertaking the operation, thought it proper to attempt the reduction; for that purpose, he placed the patient in the following position.

The patient, lying upon her bed, had her pelvis elevated upon a small bench, covered with cloths, folded several times, so as to give to the whole superior part of the trunk a very sloping direction. The entire body was inclined towards the side opposite to the hernia, and in order to relax the abdominal muscles as much as possible, the thighs were held in an elevated position, Dr. B. undertaking to make, during the whole time of the continuance of the taxis, light pressure upon the abdomen, by endeavouring to draw it along from right to left, and by elevating from time to time the wall of the abdomen, in pinching the skin.

The patient being placed as we have just said, the taxis was commenced; after some considerable efforts, and a long continued perseverance, Messrs. Bleyne, Amussat, and Calmeil, who had joined them, despaired of the reduction. The taxis was nevertheless continued, but a still more sloping position was given to the patient, by placing her pelvis upon the bar of the foot of the bed covered with a pillow and coverlid, and by directing her legs to be supported by an assistant. The hernia was at last reduced, and all the symptoms immediately ceased; during the whole time that the taxis continued there was heard two or three times, under the finger of the operator,

a rumbling at first very obscure, but which became more and more evident until the tumour was completely reduced.

An enema was administered on the next morning which produced an abundant stool of soft, greenish and sanguineous matter. A bandage was applied a few days after, and Madame Malveau returned to her ordinary occupations.

Of eleven cases of hernia, strangulated for a longer or shorter time, and upon which M. Amussat has been called to operate in the space of a few years, the one just related is the tenth in which he succeeded in making the reduction without any unpleasant result. If he has been so fortunate as to save individuals from one of the most dangerous operations of surgery, he owes it solely to the perseverance, with which he continues the taxis, and to the position in which he places his patients, a position too little employed generally. Indeed it is evident, says M. Amussat, that, when the trunk is placed in the position most sloping towards the head and towards the side opposite to the hernia, the reduction is more easy, for the weight itself of the intestines, and the vacuum which exists in the part of the abdomen corresponding to the hernia, are turned to the advantage of the operator, who has only to overcome the narrowness of the ring. M. Amussat has been careful to place his patients as indicated above, especially since witnessing the following fact:

“A waiter of a hotel had an inguinal hernia, which was not unfrequently strangulated in the course of the laborious occupation which he followed. This man had never resorted to a surgeon to reduce his hernia. He always succeeded himself. One day, whilst he was occupied in performing this reduction, M. Amussat was attracted towards him by chance, by the groans which the pain induced; he found him stretched upon the ground, his feet placed upon the back of a chair, and the pelvis considerably elevated; with one hand he pressed the tumour, and with the other drew the skin of the abdomen from the opposite side. M. Amussat offered to assist him, but the man refused, saying that he commonly relieved himself. In a few minutes afterwards he had completely returned the hernia, which was of a very large size, and again went on with his work.”

The same Journal, in the number for the 2d February, 1832, published a new case of strangulated crural hernia, successfully reduced by M. Amussat, in a woman 40 years of age. This tumour had appeared irreducible to Messrs. Dufrenois and Leblond, who then called this surgeon in consultation.

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## EXPLANATION OF THE PLATES.

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### PLATE FIRST.\*

FIGURE 1st. *M. Amussat's urethral explorer represented closed and in the state in which it is introduced into the canal.*

- A. Silver canula of variable calibre and length.
- a a a a. Rings which serve the purpose of a handle.
- B. Point of relation or correspondence.
- C. The lens of the rod, exactly fitted to the extremity of the canal when the instrument is closed:
- D. Fluted handle, employed to move the rod.
- E. Screw, which fixes the handle of the rod.

FIGURE 2d. *Represents the Rod.*

- A. Silver rod, attached to some point in the circumference of the lens B.
- C. Head of the Rod.
- D. This screw should always be placed, so as to correspond to the projecting portion of the lens.

FIGURE 3d. *Explorer open, as it is, when acting in the urethra.*

- A. The lens projecting.
- B. The screw corresponding to the projecting portion of the lens.

FIGURE 4th. *Scarificator represented closed.*

- A. Silver canula of variable size and length.
- B. Slit in which the blade of the scarificator is lodged.
- C. Rod which passes several lines beyond the canula.
- D. Handle of the instrument.
- E. Screw which attaches to it the rod, and which must always be in a position corresponding to the slit B.

\* We have exhibited here only the instruments employed at the present day by M. Amussat.

## FIGURE 5th.

- A. The same canula, seen from another side.
- B. An opening which receives the half of the scarificator.

FIGURE 6th. *Rod seen from the side.*

- A. A rod.
- B. Cutting blade.
- C. Half lens.
- D. Screw, which should always be in a position corresponding with the blade.

FIGURE 7th. *Smaller sized scarificator seen from the side and represented open.*

- A. Extremity of the rod, projecting several lines beyond the canula.
- B. Screw placed in relation with the cutting edge.
- C. Opening which lodges the half lens, when the instrument is closed.

## PLATE SECOND.

FIGURE 1st. *M. Amussat's straight caustic case represented closed:*

- A. Silver canula of variable diameter and length.
- B. Leather box.
- C. Point of relation or correspondence.
- D. Portion of the rod which passes a few lines beyond the canula.
- E. Lens of the rod, adapted to the end of the canula, when the instrument is closed.
- F. Handle used to move the rod.
- G. Screw, which fixes it, and which must always be in relation with the point C.

FIGURE 2d. *The rod uncovered.*

- A. The rod attached to one of the sides of the lens.
- B. The handle.
- C. The screw which must always correspond to the groove.
- D. Groove for lodging the caustic, corresponding to the projecting portion of the lens.

FIGURE 3d. *The caustic case represented with the lens of the rod projecting, in order to explore the canal before cauterizing it.*

- A. The projecting lens.
- B. Leather box.
- C. Portion of the rod, which passes beyond the canula.

FIGURE 4. *The caustic case uncovered for cauterizing.*

- A. Groove for containing the caustic uncovered.
- B. Handle touching the leather box when the instrument is open.

## PLATE THIRD.

FIGURE 1st. *M. Amussat's curved caustic case, represented closed.*

- A. Curved silver canula, of variable length and diameter.
- B. Leather Box.
- C. Portion of the rod which passes beyond the canula.

FIGURE 2d. *The rod having the groove for the caustic on its concavity, represented unclosed.*

- A. Rod.
- B. Groove for the caustic.
- C. Lens projecting on the side containing the groove.
- D. Handle.
- E. Screw which fixes the handle, and corresponds to the groove.

FIGURE 3d. *Curved caustic case, open.*

- A. Body of the caustic case.
- B. The extremity hollowed out by the groove, and which passes several lines beyond the canula.
- C. Screw corresponding to the caustic.

FIGURE 4th. *Curved rod, presenting the caustic in its convexity.*

- A. Rod.
- B. Groove corresponding to the screw B.
- C. Lens.



Fig. 1.

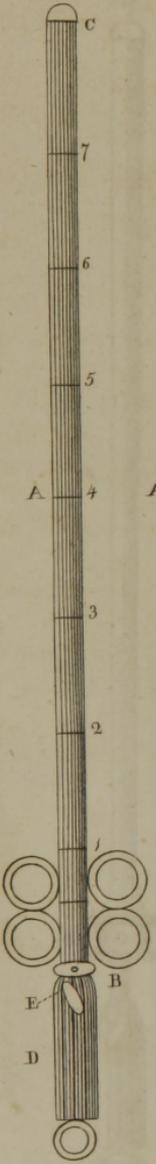


Fig. 2.

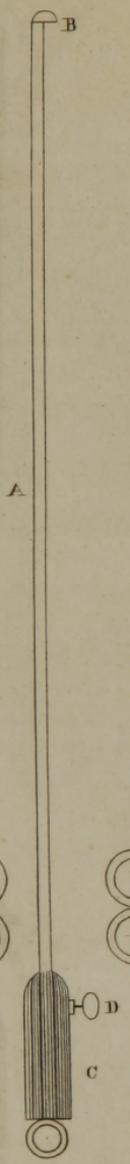


Fig. 3.

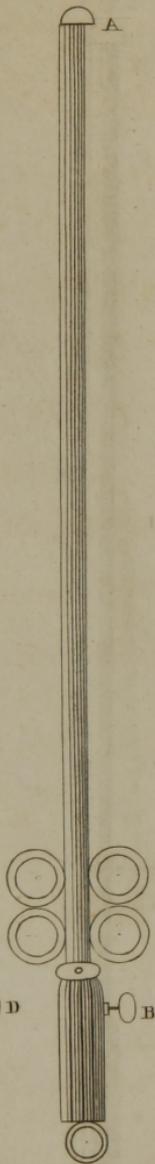


Fig. 4.

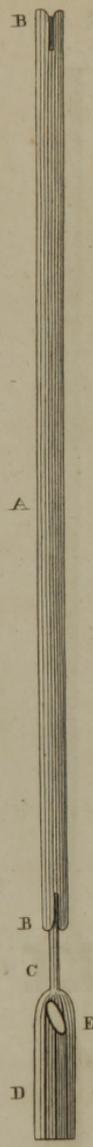


Fig. 5.

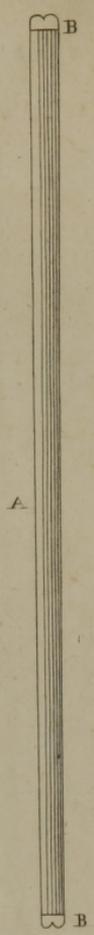


Fig. 6.

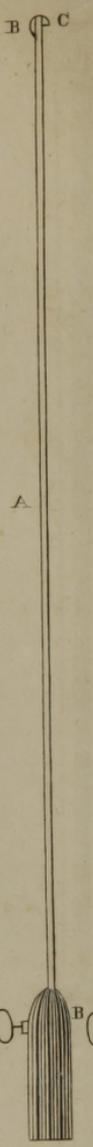


Fig. 7.





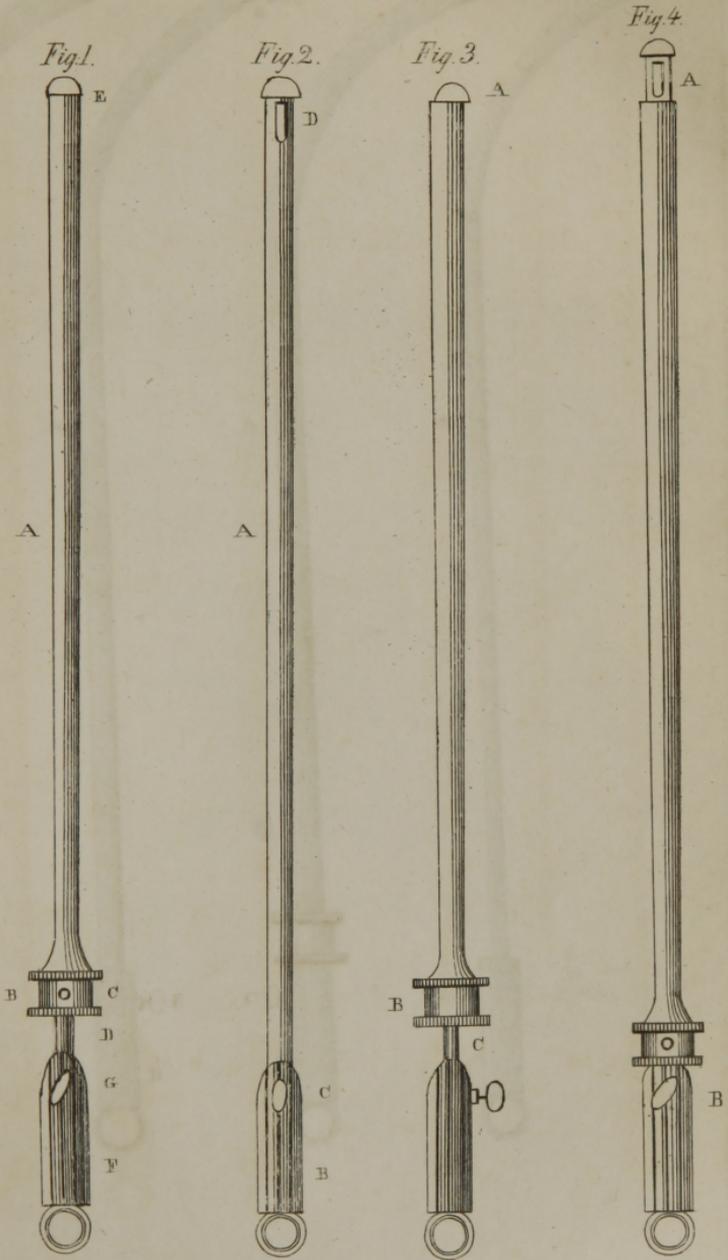


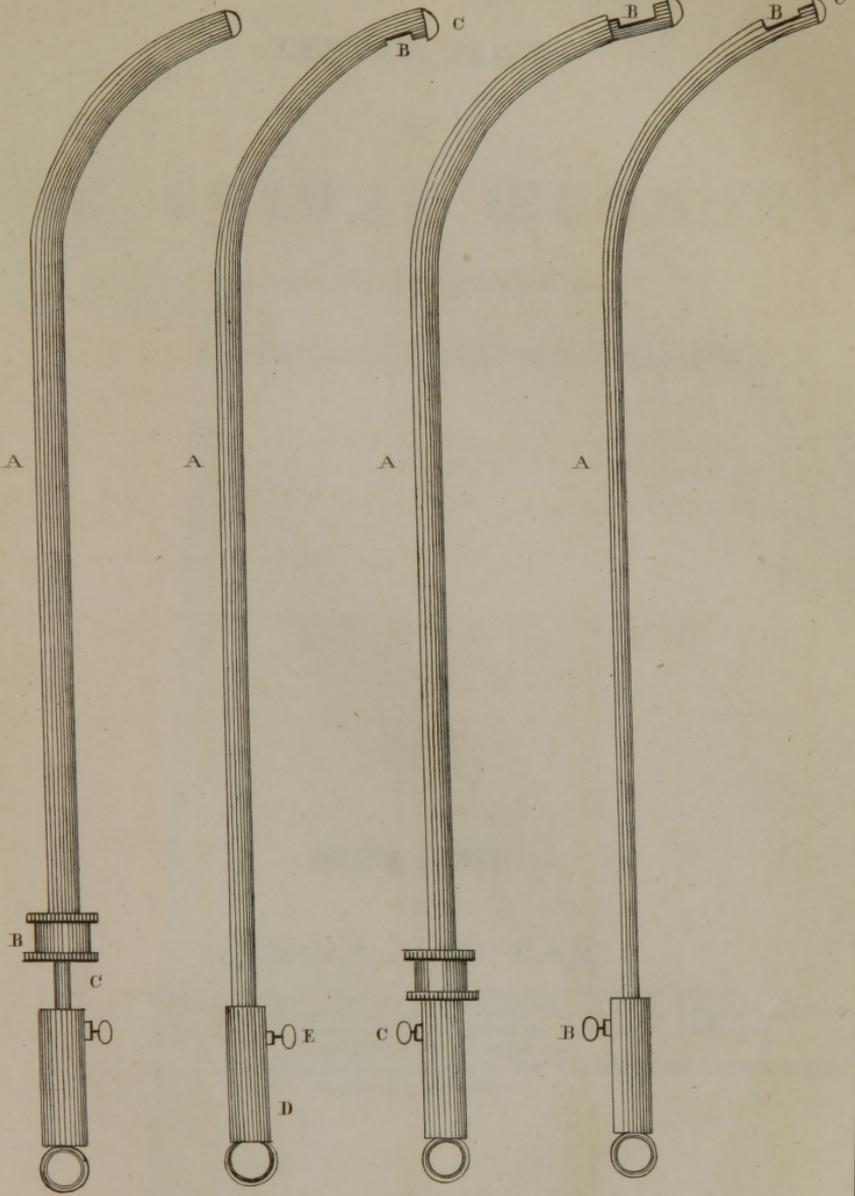


Fig 1.

Fig 2

Fig 3.

Fig 4.







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