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THE PREMATURE INDUCTION OF LABOR IN CONTRACTED
PELVES.*

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Dr. Neale's interesting paper on the indications for Cæsarian section at our last meeting naturally brings forward the subject of the induction of labor in contracted pelvis, and its relation to Cæsarian section.

In the following remarks I do not pretend to anything original, but will attempt to present to the Society the current views of the best obstetric workers on the subject. Whatever our opinions as to the justifiability of the operation may be, I believe that no one present will deny that this country lags far behind Germany and France in attempting to place the operation and its indications upon a rational and scientific basis. This apparent lack of interest is due principally to two causes. In the first place,

we lack the large lying-in institutions in which the continent is so rich, and without which the large fields for clinical study, which is absolutely essential in determining such questions, cannot be obtained. In the next place, the general practitioner and too often the teacher of obstetrics are usually totally ignorant of the art of pelvic measurement, by which alone, one is able to gain a correct idea as to the size of the pelvis, and consequently of the indications for treatment depending upon it.

By the term induction of premature labor, we understand an interruption of the pregnancy at such a period that a viable child may be born; that is any

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period from the 28 to 30th week; to the end of pregnancy.

History.—Unlike the closely related induction of abortion, this operation was unknown to the ancients, and the first mention made of it was in the year 1573, when Eucharius Roesslin in his *Rosengarten* recommended its employment in those cases in which the fœtus habitually died before reaching term.

About 100 years later Justine Siegemundin recommended puncturing of the membranes, which produced premature labor in cases of hemorrhage arising from placenta previa.

Of course the operation could not be recommended in contracted pelvis, until the doctrine of contracted pelvis was well established; as happened in the first half of the 18th century through the labors of Deventer, de la Motte and Smellie. Denman, in his work on obstetrics tells us that in the year 1756, a number of the most eminent physicians of London met to consider the propriety of and the indications for the operation; being led to it by the frightful mortality following Cæsarian section and by the fact that women with contracted pelvis, who miscarried during the last few months of pregnancy, were sometimes delivered of a small child after an easy labor.

The results of this convention were favorable to the operation and we are told that Dr. Macaulay was the first to perform it. The operation took deep root in England and was performed some twenty times by Denman.

It was not until 1804 that Wenzel, of Mainz, introduced the operation into Germany, whence it rapidly spread, and was most widely employed.

Owing to Baudeloque's influence, the operation was not performed in France until 1831 by Stoltz, of Strassburg.

In a few years the operation became very popular in Germany, and soon was resorted to very frequently, and often quite unnecessarily, until 1869. Spiegelberg threw great discredit upon it by publishing the most damaging sort of sta-

tistics. He showed that in over 1200 cases of contracted pelvis at term, the maternal mortality was 6.6 per cent, and the foetal 28.2 per cent., while in 271 cases of premature labor collected from many sources, the maternal mortality was 18.8 per cent and the foetal 66 per cent.

He concluded his article with the statement that with a conjugata vera of 8 cm. or lower, the operation was unjustifiable; and with a conjugata below 8 cm., it should only be resorted to when the course of the previous labors had demonstrated that in all probability a living child could not be born at term. This was a most awful showing, and naturally called a halt to the number of operations.

This was soon followed by an article by Litzmann, who showed that Spiegelberg had painted the picture in colors far too dark. Litzmann's tables were computed from 373 cases of contracted pelvis, in 34 of which premature labor had been induced, and all of which had occurred under his own supervision.

For the purpose of more accurate study he divided his cases into four classes, as follows:

1. Justo-minor pelvis with a conjugata of 10.9 cm., (4-3.5 in.) and flat and generally contracted pelvis of 9.5-8.25 cm. (3.75-3.25 in.).
2. Justo-minor pelvis with the conjugata below 9 cm. (3.6 in.), flat and generally contracted flat pelvis of 8.2-7.4 cm. (3.25-3 in.).
3. Generally contracted flat pelvis with conjugata of 7.3-5.5 cm. (3-2.25 in.).
4. Generally contracted flat pelvis with conjugata below 5.4 cm. (2.25 in.)

In the first class, spontaneous labor at term is to be expected; in the second class, the birth of a full sized child at term, with or without artificial aid, is possible, but scarcely probable, and if it occurs, is very dangerous both for mother and child; in the third class, the pelvis is so contracted that it will only allow the passage of a mutilated child, while

the fourth class represents the absolute indication for Cæsarian section.

Without regard to the amount of contraction, Litzmann's results gave 6.5 per cent. maternal and 18.3 per cent. foetal mortality in spontaneous labor, compared with 14.7 per cent. and 79.5 per cent after premature labor. These figures accord closely with those of Spiegelberg.

On analyzing the cases by classes, however, we find that the great majority of the spontaneous labors occurred in the first class, some 304, and most of the premature labors in the second class.

The main province for induced labor was in the second class, and here his results were totally different from what might have been expected from the general statistics. In this class, Litzman found the mortality in spontaneous labor to be 18.7 per cent. maternal and 75 per cent. foetal, while in induced labor it was only 7.4 per cent. and 48.1 per cent.

This was a great change in favor of the induction of labor; its value was somewhat diminished, however, by the fact that owing to the increased foetal mortality after birth, the number of children ultimately saved was only 25 per cent. or the same as in spontaneous labor.

Accordingly, Litzman concluded that in the second grade of contraction the induction of labor was indicated in the interest of the mother, as shown by the mortality of 7.4 per cent. compared to 18.7 per cent.

These favorable results of Litzmann were more than verified a few years later by Dohrn, who pointed out that the proper method for appreciating what the operation accomplished was not to compare so many cases of spontaneous with so many cases of induced labor; but to compare the results of spontaneous and induced labor in the same woman. In 32 cases of labor induced by him, 18 were in multiparous women, whose previous labors had also been observed by him. These 18 women had 29 labors at term, in which 26 children or 89.6 per cent. were lost; while the induced labors

only showed a loss of eight children, or 44.4 per cent. From these figures he concluded that in moderate degrees of contraction the operation was favorable not only to the mother but also to the children.

Dohrn's statistics were somewhat influenced by the introduction of antiseptics into midwifery, which soon placed the whole affair in a new light, so that even Spiegelberg, in the last edition of his work, 1882, stated that a conjugata vera between 7 and 8 cm., and in just-minor pelvis with a conjugata between 7.5 and 9 cm., the operation was permissible in the interest of the child as well as of the mother. Some of the recent statistics give most favorable results.

Thus Haidlen reports 44 cases from the Stuttgart clinic with no maternal deaths and 72 per cent. of the children saved. While in 67 labors of the same women at term, only 27 per cent of the children were saved.

In 1889 Korn published the results of Leopold's clinic for the last five years, showing the splendid result of 45 cases with only one maternal death and 66 per cent. of the children saved. Calculated by Dohrn's method, 28 of the women had born 38 per cent. of living children at term, and 71 per cent by induced labor. Last July Ahlfeld had induced labor 118 times with the loss of one mother and saved 62 per cent. of the children.

The latest results are those given at the Berlin Congress last summer, when Calderini of Parma stated that the operation had been performed in Italy, in 13 clinics, 305 times, with 4.59 per cent. maternal and 26.88 per cent. foetal mortality. In the discussion which followed, Dohrn stated that as a rule the premature induction of labor is the best method of treating moderate contraction, 7-8cm. and gave the following statistics in support of his statement.

1. Results for the children.—271 induced labors gave 163 or 60.1 per cent. living children.
2. Results for the mothers.—318 induced labors gave 61 or 5 per cent.

deaths; 215 perforation (Berlin, Halle, Leipzig), gave 12 or 5.6 per cent. deaths; 23 Cæsarean sections (Leopold), gave 2 or 8.6 per cent. deaths; 87 per cent. children saved.

And lastly, Fehling stated that he had performed the operation 60 times without a single maternal death, and had saved 80 per cent. of the children.

Indications.—From the above sketch we will readily see that the introduction of antiseptic methods has robbed the operation in properly selected cases of almost all danger for the mother; 401 cases collected by Korn showing a maternal mortality of 2.9 per cent., or just a trifle more than normal labor in a normal pelvis.

But on the other hand, the foetal mortality is almost as great as 20 years ago, ranging from 20-70 per cent., the average being about 33½ per cent.

So in this operation we have a means of saving about two-thirds of the children without any great risk to the mother.

Or reckoning by Dohrn's method, we save at least twice as many children as if we allowed the mother to go on to term and then resorted to some conservative operation; not to speak of the mothers saved.

These are the prospects of the operation in properly selected cases; but unfortunately, the degree of contraction within which the operation is justifiable is very limited, and we can only think of it in cases of moderate contraction.

According to Litzmann, in flattened pelvis with a conjugata vera of 7.5-8.25 cm. (3-3.25 in.), and to Schroeder, 6.5-9.5 cm. (2.5-3.75 in.).

As pelvis with a conjugata vera above 8½ cm., (3 ⅜ in.), offer a reasonable chance to both mother and child at term, and those below 7 cm. (2¾ in.), offer no chance to the child; in 10 cases below 7½ cm., Ahlfeld lost all the children. I think that the operation should be restricted to these limits—that is, between 7-8½ cm., (2¾-3⅜ in.), in flattened pelvis.

In the justo minor pelvis, a conjugata

of 9½ cm., (3¾ in.), or less will usually be an indication for the operation.

In the rare forms of the obliquely narrowed pelvis, whatever its cause, it is very difficult to give any definite measurements, and we must be guided almost entirely by the history of the previous labors.

These figures for the flattened pelvis will appear correct when we consider the transverse diameter of the foetal head, which Schroeder estimated as follows:

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| 36-40th week, | 8.83 cm. |
| 32-36th week, | 8.69 cm. |
| 28-32nd week, | 8.16 cm. |

And remember that the head is far more compressible five to six weeks before, than it is at term.

We thus have the operation restricted to a very small range, 1½ cm. (⅝ in.), which should only be exceeded when the previous history tells us that the previous labors have all ended disastrously.

We should not think of inducing labor in a flattened pelvis with a conjugata below 7 cm. (2¾ in.), for in that case the prospects for the child are almost nil and the dangers to the mother greatly increased. Here we come to the relative indication for Cæsarian section, and in that case, it is best to allow the woman to go on to term, and attempt to save both mother and child by that operation. So we see that the indications for Cæsarian section are hardly invaded at all by this operation, and that they are intended to stand not opposed to each other, but side by side.

Pelvimetry.—With these contracted indications, we readily see that an accurate idea as to the size and form of the pelvis is an absolute prerequisite for the performance of the operation; and the only means by which we can attain this knowledge is by accurately measuring the pelvis.

When we contemplate the operation, we cannot content ourselves with simply measuring the conjugata vera and thinking that we have done all that is neces-

sary. In addition to this, we must measure the distance between the iliac spines and crests and thereby endeavor to determine with what form of pelvis we have to deal. And after doing this, we must carefully examine the interior of the pelvis to determine its height; to see if it is generally contracted, and if contracted, if the contraction increases as we approach the outlet, we must look for exostoses of the pelvic bones, and carefully examine the promontory to see whether it is double or not.

If we think the pelvis at all contracted laterally, we must measure the distance between the tubera ischiorum on each side, as Breisky recommended.

We should also attempt to estimate the transverse diameter of the pelvis, which is most difficult to do. The most that can be expected is to examine alternately with each hand and try to stroke the linea innominata and so relatively to determine the transverse diameter.

This measurement is most important but nearly all methods that have been devised for its determination, are too complicated for general use.

Among the simpler methods we may mention the indirect method of Kuestner, who measures the distance between the ischial spines with Oslander's pelvimeter and to this adds 3.3 cm., ($1\frac{1}{4}$ in.).

Skutsch, of Jena, has invented a most ingenious apparatus for measuring this and other diameters. I will exhibit the instrument, but as yet I have not had opportunity of testing its accuracy.

Time for operation.—Having accurately measured the pelvis and determined that an operation is necessary, the next question to decide is, when shall it be done? Of course the younger the fœtus, the smaller will be its size, and consequently the easier will be its delivery. But unfortunately, the smaller the fœtus, the less chance it will have of living after birth, even if it survive the delivery. Generally speaking, we say that a child is viable after the 28th week; but chances of living are almost nil; indeed children 30 to 32 weeks old have next to no chances.

The later the operation, the more chance has the fœtus of living after it; but unfortunately its size and consequently the difficulty of delivery increase with its age. If possible, the operation should be done about the 34 to 36 week, our object being to operate at the latest possible period consistent with safe delivery.

Estimation of the size of the child's head.—To fulfill this object we must attempt to gain an accurate knowledge as to the size of the child's head. Unfortunately we are unable to determine its size with mathematical precision, or even with the precision of pelvimetry, so we are obliged to take advantage of every possible hint on the subject.

In the first place we must endeavor to obtain as good a history as possible from the mother as to the duration of the pregnancy, etc.

We should also notice the size of the parents, for generally speaking, large and healthy parents have large and healthy children.

If the woman has had other children, we must carefully inquire as to their size, for we know that the children and particularly the heads increase in size and hardness with successive labors.

We must then endeavor to estimate the size of the head by abdominal palpation and by combined abdominal and vaginal examination, which will prove the most reliable means to most of us.

It has been proposed, when the head is above the brim, to measure its diameters by means of a pelvimeter and to deduct the thickness of the abdominal walls from the result. This is very inaccurate, for we cannot estimate the thickness of the abdominal walls with any degree of accuracy; and except in rare cases are not able to be at all sure what diameter of the head we have between the blades of the pelvimeter.

We must also notice the consistency and amount of resistance to compression that the bones of the head offer.

We are indebted to Fehling for demonstrating that the width of the large anterior fontanelle bear quite a constant relation to the circumference of the head.

So that a wider or narrower fontanelle indicates a larger or smaller head, the average width of the fontanelle being about 2 cm. ($\frac{3}{4}$ in.). He also showed that the wider the sutures the larger the head; and that a greater or less distance between the anterior and posterior fontanelles indicated a larger or smaller child. Of course such measurements cannot be made with the child in utero; and can therefore only be approximated and serve to direct our attention one way or other.

Ahlfeld twenty years ago stated that by measuring the child as it lies in utero, from the vertex to breech, and doubling this measurement, we get the length of the fœtus. In some cases it is quite accurate.

To do so, the child is carefully palpated and the highest point of the breech located and marked with chalk. Then with one blade of the pelvimeter in the vagina on the vertex and the other on the chalk mark, the measurement is made. I might also refer to Goenner's measurements of the fœtal feet. He found that they increased in proportion to the size of the fœtus as follows: In large children weighing 3000 grammes, the foot is generally 8 cm. long; in medium sized children, 7.6 cm., and in premature children, 7.3 cm. long; of course this is not accurate and can only be applied when a foot is down.

One of the most important methods of determining the relative proportions of the head to the pelvis, we owe to P. Müller of Berne. He places the woman on her back and presses with the palmar of both hands upon the head, one hand being on the chin and the other on the occiput, and attempts to press it down into the pelvis. At the same time he or an assistant passes a hand into the vagina, by which he perceives readily what progress the head is making. As long as the head can be pressed down into the pelvis, one may feel sure that labor will readily take place. But when only a small segment of the vertex is pressed down, or the head arches out

over the symphysis we know that the time for operation has arrived.

This procedure should be repeated every ten days to two weeks so that favorable moment for operation may not slip away.

Method of operating.—With a case of contracted pelvis before us, whose size and history indicates the necessity for operation, after having determined the proper time for operation, the important question is to decide what method we shall employ.

The fact that very many methods have been advocated, proves that no one method is always successful, so I will mention the most important ones.

As the great danger to the mother is from sepsis, we cannot be too careful in our efforts to guard against it, and so should be most particular in our preparations for the operation.

For several days previous to operating, the woman should have a warm bath daily; and several times a day should be douched with warm water, 95-98° F., containing salt or borax by which the cervix is softened and dilated.

Just before operating, the genitals should be most carefully washed with hot water and soap, followed by a 1-1,000 bichloride solution; the vagina also should be carefully cleansed.

The hands of the operator should be washed for at least ten minutes in hot water, and the nailbrush vigorously used, after which they should be placed for several minutes in a 1-500 bichloride solution.

All instruments to be employed should be sterilized by steam or placed in a five per cent. solution of carbolic acid for at least 30 minutes.

The most generally approved method is that of Krause, or the introduction of a disinfected flexible bougie between the membranes and the uterine wall. If properly conducted it is almost entirely devoid of danger for the mother and will bring about the birth of the child in a period varying from 8-314 hours, averaging about 80 hours or about three days.

To insert the bougie, the woman is placed on her back or side as may be most convenient, and the cervix brought down by a pair of bullet forceps and the cervical canal carefully cleansed with bichloride on a pledget of cotton, the bougie is then carefully inserted, so that its lower end is within the vagina, care being taken not to wound the membranes or the placenta. Then the vagina is packed with iodoform gauze, which serves to hold the bougie in place. If at the end of 24 hours no labor pains have been produced, the bougie should be removed and another introduced at another point under the same precautions as at first.

If this method fail, we may resort to the hot vaginal douche, which was introduced by Kiwisch and recommended by Spiegelberg and Litzmann. Here a current of warm water, 100-110° F. is allowed to flow from an irrigator through the vagina two or three times a day for a period of 5-15 minutes.

The water acts mechanically upon the cervix, and reflexly upon Frankenhauer's centre for uterine contraction. This method is not so reliable as Krause's, and should not be used in preference to it. Or one may resort to the oldest of all methods, that of puncturing the membranes before the os is thoroughly dilated. This is a sure means of inducing pains, but it is usually tedious and, except in vertex presentations, exposes the child to the danger of prolapse of the funis, etc.

These are the three most important methods and may be used independently or to supplement one another.

As accessory to these, one may loosen the membranes about their lower pole,

tampoon the vagina with iodoform gauze, or employ Barne's bags. If the pains are weak, Fehling recommends version by Braxton Hicks' method, and bringing one leg through the cervix, whereby increased contraction is produced, and one is afforded a ready means of ending the labor as soon as one deems it expedient in the interests of the mother or child.

By one or other of these methods one cannot fail in the induction of premature labor; so that I do not think it necessary to go into the numerous other methods that have been devised for the same purpose.

Of course the labor should be conducted as if the woman were at term, remembering that the child is less resistant to injury than if it were at term. Naturally the immature child cannot so well resist the external influences to which it is subjected as one born at term; and consequently one must be most careful in its treatment.

The child should be nursed by the mother or a wet nurse and no attempt should be made to feed it artificially.

The most important point in the care of the child is to keep it warm and protected from changes in temperature. For this purpose it should be carefully enveloped in cotton batting, and if possible placed in some specially devised apparatus.

It is useless to go into the details of the different methods that have been proposed for keeping the child at a constant temperature, and I will only say that Crede's double walled tub is far simpler than the apparatus of Tarnier or Winckel.

