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IS PUBIOTOMY A JUSTIFIABLE OPERATION?*

AN AFFIRMATIVE ANSWER BASED UPON A PERSONAL EXPERIENCE IN THIRTEEN CASES.

BY

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At our last meeting, Fry read a paper entitled "Pubiotomy in America," which was based upon twenty cases, including seven performed by me, and concluded that the operation had only a limited sphere of usefulness and should be employed only when Cesarean section was contraindicated—after failure to deliver with high forceps or in an exhausted or infected patient. Likewise, Berny, after critically studying the twelve cases which had been reported in France up to the end of 1906, held that pubiotomy possessed but few advantages over symphyseotomy, and that time only could show what its future may be. On the other hand, the subject was the main theme considered at the German Gynecological Congress in 1907 and gave rise to a most extended and interesting discussion, the general consensus of opinion being that it was a most valuable operation and one destined to revolutionize the conservative treatment of labor complicated by contracted pelvis.

Since February 13, 1906, thirteen pubiotomies have been performed in my service, and I report my experience in the hope that it may aid some of us in determining whether the procedure is a justifiable one. I shall therefore discuss, in the order given, my own results, the technic of the operation, its various complications and finally its indications.

My Results.—Upon analyzing the cases, nine of which were operated upon by me and four by my assistants, it is found that there were no maternal and three fetal deaths, although, as will be shown later, only one could fairly be attributed to the operation. (For full details the reader is referred to the list of cases at the end of the article.)

* Read before The American Gynecological Society, May, 1908.

The following varieties of deformity were encountered: six generally contracted rhachitic, two flat rhachitic, two generally contracted and three funnel-shaped pelves. In the first ten pelves the conjugata vera varied from somewhat less than 7 to 8.5 cm., while in the three funnel pelves the transverse diameter of the outlet measured 7 cm. It should be noted that in the case histories I have given only the length of the diagonal conjugate, from which the true conjugate may be estimated by deducting 1½ or 2 cm.

With the exception of Cases VII and IX, the operation was not undertaken until after the patient had been in the second stage of labor for from two to ten hours, and then only when advance of the presenting part failed to occur in spite of strong expulsive pains. In every case the vulva was dilated manually before beginning the operation, and the saw placed in position by Doederlein's technic, except in Case I, in which Gigli's open method was employed. As the operation was not undertaken prophylactically, but only after it had become apparent that spontaneous labor could not occur, delivery was effected immediately after severing the pubic bone, forceps being employed in ten, and breech extraction in three instances.

In most cases there was a moderate amount of hemorrhage following section of the bone; but in Case V, which was associated with a deep communicating vaginal tear, it was quite profuse, and vigorous treatment was required to overcome the resulting shock.

Injury to the soft parts occurred less frequently and was less extensive than many of the reports would lead one to expect, notwithstanding the fact that nine of the thirteen patients were primiparæ. Fortunately Case V was the only one in which the vagina was injured, but in this instance a deep tear, extending up the left side from the outlet nearly to the cervix, communicated directly with the pubiotomy wound. This occurred during the extraction, through an 8 cm. generally contracted rhachitic pelvis, of a 4050-gram child, which presented by the breech. In cases XII and XIII slight tears occurred in the vestibule, but did not involve either the vaginal outlet or the urethra.

Considering the fact that nine of the patients were primiparæ, perineal tears occurred but rarely, being noted in only three instances. In Cases III and VIII they were of the first degree, and required respectively but one and two sutures for their repair. In Case V, to which reference has already been made, the deep communicating vaginal tear was associated with a perineal lacera-

tion of the second degree. This, however, could scarcely be attributed to the operation, as it followed the breech extraction of a large child and might readily have occurred with a normal pelvis.

The bladder escaped injury in all cases, and at no time was the urine stained with blood. Catheterization was required for some days in cases V, VIII and XII, while in cases XI and XIII it was necessary upon one or two occasions during the day of delivery.

Following the birth of the placenta, wounds of the vagina or perineum were repaired when present and all healed satisfactorily. After closing the upper pubiotomy incision with interrupted catgut sutures and generally introducing a small drain of iodoform gauze through the labial opening, a broad band of adhesive plaster was passed around the patient's hips and served to immobilize the pelvis to some extent. Upon returning the patient to bed, she was placed upon a Bradford frame in order to facilitate handling, particularly during urination and defecation. The frame was uncovered for twelve or fifteen inches, corresponding to the situation of the buttocks, so that upon elevating its lower end the genitalia became readily accessible for cleansing without seriously disturbing the patient. Except in the first few cases, no attempt was made to immobilize the patient who was encouraged to move upon the frame as soon as she felt so inclined, and accordingly she usually began to lie upon her side within a few days after the operation.

It must be admitted that the course of the puerperium was not as smooth as might be desired, as in only six cases did the temperature remain below 100½, while in the other seven it varied between that point and 102½. None of the patients presented signs of serious infection, although Cases IV and V were quite sick, the former presenting considerable abdominal distention for several days, which disappeared as soon as the bowels moved satisfactorily, while the latter was the patient with the deep communicating vaginal tear.

On the other hand, most of the patients complained comparatively little and were far less troublesome to care for than the reports of several American writers would indicate. Thus my head nurse, who is a very intelligent observer, tells me that the after-care in such cases is somewhat more troublesome than with Cesarean section, but that the patients give rise to far less anxiety.

As soon as the woman has overcome the entirely natural feeling that she may burst open upon the slightest exertion, she will allow herself to be turned upon her side, and within a few days will move freely on the Bradford frame. Thus one patient in the absence of the nurse got out of bed on the fourth day without injury to herself. Ordinarily, somewhere about the tenth or twelfth day the patients ask to be allowed to sit up, and a few days later are ready to leave their bed. With the exception of Case I, who was kept in bed for twenty-nine days as a matter of precaution, the other women were allowed to get up at periods varying between the sixteenth and twenty-third days. They began to walk almost immediately and were discharged in good condition between the twenty-fifth and thirty-seventh days; it being found on an average that they got up on the twentieth and left the hospital on the thirtieth day.

At the time of discharge, locomotion was very satisfactory, although several patients suffered from a slight limp, which soon disappeared. Ten of the women were seen later and reported that they were perfectly well in every respect and were able to work as hard as before the operation.

The findings at the site of the bone wound were most surprising. In somewhat more than one-half of the cases more or less callus was felt upon the anterior surface of the pubic bone, while in the others no trace of it could be found. On the other hand, the posterior surface was invariably smooth and no trace of the section could be discovered upon vaginal examination, except occasionally for a slight notch upon the upper and lower margins of the bone corresponding to the ends of the incision. That healing did not occur by bony union was shown by the fact that in four cases the cut ends of the bone could be felt to move upon one another when passive movements were imparted to the thighs. Except in Case I, no injury was done to the sacro-iliac joints, but in that instance a somewhat prominent and sensitive swelling was felt in front of each joint at the time of discharge, so that the promontory of the sacrum appeared to lie in a depression. This caused the patient no inconvenience and had disappeared when she was examined one month later.

In view of the bearing upon the possibility of the occurrence of spontaneous labors in the future, it was attempted to determine in each case whether any enlargement of the pelvis had followed the operation. Careful pelvimetry at the time of discharge failed to reveal any change except in Case II, in which the

distance between the tubera ischii of a funnel-shaped pelvis had become increased from 7 to 8 cm.

In addition to the elevated temperature and the general discomfort which characterized the first days of the puerperium, several patients suffered from other complications. Thus there was more or less edema of the vulva on the side of the operation in all cases, while in three it was so pronounced as to cause discomfort. In Cases I and IV, a hematoma, the size of a hen's egg developed in labium majus, but did no particular harm, although in one instance it led to an induration which had not disappeared at the time of discharge. In Case VII, three days after getting up, a slight phlebitis developed in the left leg, but did not materially interfere with convalescence, as the patient was discharged on the thirty-seventh day with satisfactory locomotion. In another patient, Case X, the rise of temperature to 101.6 was probably due to a stitch infection at the upper pubiotomy wound, which healed by granulation. As has already been stated, there was no injury to the bladder, and prolonged catheterization was necessary in but three cases.

At a first glance it might seem that the loss of three children (Cases V, IX and X) indicates that the fetal mortality was excessive, but when the histories are considered in detail it appears questionable whether any part of it can be fairly attributed to the operation. Thus, in Case V, a large child, 57 cm. long and weighing 4050 grams, was born asphyxiated after an easy and rapid breech extraction. Dr. Goldsborough, who performed the operation, is inclined to attribute its death partly to the fact that the patient took the anesthesia very badly and partly that stress of circumstances made it necessary to intrust the attempts at resuscitation to a student instead of one of the regular assistants. In Case IX, the child was readily delivered after manual dilatation of the cervix in a prolonged dry labor, interference being indicated by beginning fever on the part of the mother. The head was markedly moulded but presented no signs of injury, and had pubiotomy not been performed, it would have been permissible to attribute the death to prolonged pressure upon the head. Likewise in Case X, the fatal issue was probably due to the prolonged labor , which lasted sixty-one hours with a second stage of ten hours. In this instance delivery was readily effected and the head presented no signs of injury.

Three of the patients have become pregnant since the operation, and one (Case IV) was delivered spontaneously at her own home of a seven-pound child, with a biparietal diameter of 8.5 cm. As the conjugata versa measured 7 cm., it is doubtful whether the favorable outcome was due to a readily malleable head or to some permanent enlargement of the pelvis.

Another patient (Case II) has become pregnant twice. The first pregnancy ended July, 1907, in spontaneous premature labor at the seventh month. The second is still in progress and two months from term; while the third patient (Case VII) is at present three months pregnant.

Technic.—Thus far four methods have been described for performing the operation, namely, the open method of Gigli and Van de Velde, the partly subcutaneous method of Döderlein, the subcutaneous method of Bumm and the subcutaneous symphyseotomy described by Zweifel.

The open method, in which the anterior surface of the bone is exposed by an oblique or vertical incision, appears to present but a single advantage over symphyseotomy, in that by making the bone section somewhat eccentrically, the attachments of the bladder and urethra are less exposed to the possibility of injury. In a series of seventy-seven open pubiotomies collected by Döderlein in 1907, the maternal mortality was 10.4 per cent., which is quite as high as that following symphyseotomy and in marked contrast with the low mortality of subcutaneous pubiotomy. Accordingly, this method of operating has been abandoned in favor of the several subcutaneous varieties, over which itpossesses the single advantage of affording direct access to the bleeding vessels in the rare cases of excessive hemorrhage.

In Döderlein's method, before passing the curved needle beneath the bone and through the labium majus, the soft parts are separated from the posterior surface of the pubic bone by a finger introduced through a small incision parallel to the upper margin of the pubic arch and median to the pubic spine. In this way the bladder is protected from all injury during the application of the saw, while the small upper incision scarcely takes away from its subcutaneous character. I have employed this method in all but my first case, and have been so well pleased with it that I have not felt tempted to experiment with the purely subcutaneous technic.

In the latter operation, which was employed almost simultaneously in the clinics of Bumm and Leopold and described in the

articles of Stoeckel and Kannegiesser, no skin incision is made, but a large sharp-pointed needle is introduced through the outer portion of the labium majus and, under the guidance of a finger in the vagina, is passed along the posterior surface of the pubic bone until its upper margin is reached, when by simply depressing the handle its point is made to emerge just median to the pubic spine. The Gigli saw is placed in position by withdrawing the needle, after which the bone is severed entirely subcutaneously.

It is apparent that this method is extremely simple and reduces the possibility of infection to a minimum. At the same time, it is always associated with some danger of perforating the bladder by the sharp point of the needle, which cannot be entirely avoided by any of the devices which will be considered in the section upon the complications of the operation. For this reason, I have continued to employ Döderlein's technic, and the majority of speakers at the German Gynecological Congress in 1907 also advocated its use upon the same grounds.

Zweifel, in 1907, reported twelve cases in which he performed subcutaneous symphyseotomy by cutting through the cartilage with a Gigli saw, which had been placed in position by means of a Döderlein needle introduced through a small vertical incision in the mid-line of the abdomen just above the symphysis. He obtained excellent results in all of his cases, and contends that the operation is superior to pubiotomy in that it facilitates fibrous union between the cut ends of the cartilage and thereby increases the probability of a permanent enlargement of the pelvis and the occurrence of spontaneous labor in future pregnancies.

This operation is undoubtedly greatly superior to the typical open symphyseotomy, as is readily appreciated upon comparing its results with those described by Thies following fifty-three symphyseotomies performed in the same clinic, with a considerable maternal mortality, prolonged convalescence and frequently impaired locomotion. At the same time it is doubtful whether it presents any advantages over pubiotomy by Döderlein's method, as it would seem more likely to be complicated by injuries to the bladder and urethra. Judgment, however, should be deferred until a greater number of cases become available for comparison.

Whatever the technic employed, most of the German authorities, particularly Zweifel, Döderlein and Bumm, strongly advise against immediate delivery of the child on account of the sup-

posed increase in the danger of deep vaginal and perineal tears. They advocate placing the patient in bed as soon as the bone has been severed, after closing the upper wound with sutures if Döderlein's method has been employed, and allowing the labor to proceed spontaneously, and interfere only upon the appearance of signs of danger to the mother or child.

On the other hand, all of my patients were delivered immediately with very satisfactory results, and I am inclined to attribute the relative infrequency of deep vaginal and perineal tears to the fact that the vaginal outlet was widely dilated manually before beginning the operation, as will be described more fully in the following section. It must be admitted that prompt delivery is the ideal procedure, provided it can be safely effected. In this event the patient can be subjected to the test of labor and pubiotomy performed only when nature has shown herself unable to overcome the resistance after some hours of strong second-stage pains. Moreover, if the operation is undertaken sufficiently early to make it justifiable to wait for spontaneous delivery, it is apparent that one will be in danger of cutting through the pubic bone in cases which would have terminated spontaneously had the operation been deferred until urgently demanded. For this reason I am opposed to the frequent employment of the so-called prophylactic pubiotomy, although I am prepared to admit that it may occasionally be indicated in cases of prolonged dry labor, as in Cases VII and IX, in which complete dilatation of the cervix fails to occur for the reason that it is not exposed to the pressure of the presenting part, which still remains arrested at the superior strait.

One of the great advantages of subcutaneous pubiotomy over the open method of symphyseotomy, lies in the difference in the extent of gaping which occurs between the ends of the bone following its section. In the former the primary separation rarely exceeds 1 or 2 cm., while in the latter the cut ends immediately gape so widely as to expose the sacro-iliac joints to danger of rupture unless the tendency to separation is counteracted by having the legs of the patient properly held by assistants. This is due to the fact that in pubiotomy the ends of the bone are held together by the overlying tissues and by the attachments of the larger muscles of the thigh. Consequently, greater gaping does not occur until the head presses into the pelvis, when the ends of the bone separate from 3 to 5 or 6 cm., corresponding to the degree of disproportion. According to Sellheim, the enlargement

of the pelvis is identical in both operations, but it is necessary to employ three times as much force to bring about the same degree of separation in pubiotomy as in symphyseotomy. For this reason, the extent of gaping is proportionate to the resistance to be overcome, and consequently injuries to the sacro-iliac joints, with subsequent impaired locomotion, occur far less frequently than after symphyseotomy.

The care of the patient during the puerperium, and more particularly the decision as to whether it is necessary to attempt to immobilize the pelvis, will depend almost entirely upon the manner in which the healing of the bone wound is effected. Gigli, in his first communication upon the subject, believed that firm bony union occurred, and one of the arguments which he advanced in favor of pubiotomy was that healing would take place more readily and with less danger of infection in the bone than in a cartilage wound.

More extended experience, however, has shown that his belief is erroneous and that in many cases, at least, true bony union does not occur, the ends of the bone becoming united by dense fibrous tissue, which may be more or less infiltrated by calcareous material. Thus, in a considerable proportion of cases, it is found on examination at the time of discharge that a considerable degree of motility exists at the site of section, as can be demonstrated by passive movement of the thighs or by having the patient take a few steps during vaginal examination. This may be the case in spite of the development of a layer of callus of varying thickness upon the anterior surface of the wound, and occasionally even though *x*-ray photographs appear to indicate that firm bony union had occurred. Moreover, in several instances in which the operation has been performed a second time upon the same patient, the ends of the bone were found to be some distance apart and united by fibrous tissue. Similar conditions were likewise noted by Oberndorfer, Cristofoletti and others at autopsies upon women dying a year or more after the operation. As it has been shown that such a lack of ossification has no effect upon locomotion, it is apparent that the abnormalities in that regard, which sometimes follow symphyseotomy, could not be attributed to defective union, but were probably due to injuries sustained by the sacro-iliac joints.

As soon as it became recognized that lack of bony union did not interfere with locomotion or with the comfort of the patient, fibrous union came to be regarded as advantageous, rather than

otherwise; and accordingly, many patients have been so treated as to encourage its formation in the hope that the fibrous tissue may become so softened and lengthened in subsequent pregnancies as to bring about considerable enlargement of the pelvis and thereby permit spontaneous labor. For this reason, most German authorities do not attempt to immobilize the pelvis, but encourage the patient to move about in bed as soon as she feels so inclined. Consequently, it is not necessary to employ a specially-constructed bed or hammock or to place the patient between sand-bags or to adopt any other expedient tending to hold the ends of the bone in apposition.

Thus far I have employed a twelve-inch adhesive-plaster bandage in all of my cases; but in view of the fact that others obtain equally favorable results without it, I shall discontinue its use in the future. As has already been indicated, we have found that the use of the Bradford frame greatly facilitates caring for the patient. It is not employed with any idea of immobilizing the pelvis, but simply to afford a convenient method of handling her.

From time to time modifications in the operative technic have been suggested in the hope that permanent enlargement of the pelvis might be secured and thus avoid the necessity for repeated pubiotomy in future pregnancies. For example, Crede has proposed an osteoplastic operation and Truzzi the interposition of a piece of calcined or decalcified bone, with the idea that after bony union had occurred the pelvis might remain permanently larger. Schickele, on the other hand, devised a step-like incision of the bone, which he thought would insure the formation of extensive fibrous union. It is as yet too early to judge of the value of such suggestions, but it nevertheless appears safe so predict that no modifications will receive general acceptance which require extensive manipulation and the abandoning of the subcutaneous principle of operating.

Complications Occurring During the Operation or Puerperium. Hemorrhage.—When one considers that the crus of the clitoris is either severed when the pubic bone is divided, or is torn through when the ends of the bone gape during the extraction of the child, a certain amount of hemorrhage must inevitably accompany every pubiotomy. Usually it is slight in amount and ceases spontaneously, as the lacerated vessels tend to bleed but little, while in other cases it promptly yields to compression. Thus, in only one of my series was it suffi-

ciently abundant to cause alarm, and that was in the case associated with a deep communicating vaginal tear. Tandler suggested that the crus clitoridis be isolated and divided between sutures before severing the bone, but experience has shown that it is unnecessary, especially as it necessitates a large open wound; moreover, in the rare instances in which profuse hemorrhage follows this injury, it can readily be controlled by applying a few deep stitches through the tissues adjacent to the pubic arch.

In rare instances, however, profuse and even alarming hemorrhage may occur. In such cases it is usually due to injuries to the vesical plexus or to cutting through an aberrant branch of the internal pudic artery. If due to the former, it can usually be checked by compression applied both externally and through the vagina; but if due to the latter, the entire wound must be laid widely open and the cut ends of the artery seized and ligated. As far as I am aware, Rosthorn has reported the only case of fatal hemorrhage following the operation and which could not be checked by any resource at his command. I am inclined to believe that most of the serious hemorrhages which occur during the operation are due to deep communicating vaginal tears rather than to either of the factors just mentioned, and will therefore occur less and less frequently as we learn to prevent the occurrence of such injuries.

Injuries to the Soft Parts.—The most serious of these are deep vaginal tears which communicate with the pubiotomy wound, thus doing away with every advantage arising from the subcutaneous technic. When the mutual relations between the vaginal walls and the pubic arch are considered, it is apparent that after the latter is severed only a thin layer of tissue separates the vagina from the pubiotomy wound, and if the ends of the bone are widely separated, before the vagina has become sufficiently dilated to accomodate itself to the stretching, deep communicating tears must occur through its wall. For this reason, most authorities recommend that delivery be allowed to occur spontaneously, except in the presence of pressing indications, as forcible extraction of the child through a rigid, undilated vagina will almost certainly lead to the production of a tear. Likewise, it is usually advised that the operation be practically restricted to multiparæ, and that the tension be relieved by deep lateral perineal incisions when immediate delivery becomes necessary.

I admit that these precautions were formerly justified, but at the same time I contend that they may be omitted and prompt delivery by forceps or extraction rendered as safe as spontaneous delivery, provided the perineum and vagina have been thoroughly dilated preliminary to the pubiotomy. For this purpose, the gloved hand, folded in the shape of a cone and well lubricated, is slowly passed into the vagina, which is gradually dilated until it will readily admit the closed fist, and after that still further dilated by the fingers of both hands placed back to back. By this means a degree of dilatation is obtained in a few minutes which is nearly comparable to that effected by the head of the child, and which secures such relaxation of the vaginal wall as enables it to accomodate itself without rupture to the rapid separation of the cut ends of the bone.

That this is the case is shown by the fact that a vaginal tear occurred in only one of my thirteen cases, notwithstanding the fact that nine of the women were pregnant for the first time. The same procedure also minimizes the frequency of perineal laceration, which occurred in only three of our cases. In two instances the tear was of the first degree, while in the other, which occurred in a multipara following the breech extraction of a large child, it extended down to, but not through the sphincter. These results, which are eminently satisfactory, could hardly have been better in normal spontaneous labor or in ordinary low forceps operations, and clearly demonstrate the prophylactic value of preliminary manual dilatation of the vaginal outlet, as well as its superiority over deep perineal incisions.

Injury to the Bladder.—Such lesions usually occur in one of two ways; either by the inability of the adherent bladder to follow the gaping pubic bone or by its perforation with the needle. Both are much less liable to occur when Döderlein's technic is employed, as the preliminary separation of the tissues from the posterior surface of the bone markedly decreases the possibility of the first-mentioned accident, while the second can only occur when the needle is introduced subcutaneously. This is clearly shown by the fact that injuries to the bladder were not observed in my series nor in the twenty-five cases operated upon by Döderlein, while they were quite frequently noted in Bumm's series of cases. Naturally, they will occur less frequently when Stoeckel's suggestion is followed of determining the location of the bladder before the operation by the use of the catheter and making the section on the side of the pelvis not occupied by it;

but punctured wounds cannot be entirely avoided as long as the needle is introduced entirely subcutaneously.

In view of the possibility of this accident, the patient should be catheterized after the delivery of the child, when the presence of blood-stained urine should lead to the diagnosis of a bladder lesion. If it be merely a puncture, spontaneous healing will usually follow if a retention catheter be used; but when the injury is more extensive the bladder should be drawn up into the wound and the injury be repaired by suture.

Hematoma.—In a considerable proportion of the cases reported in the literature, convalescence was complicated by the development of a hematoma in the labium majus on the side of the operation. Unless the hemostasis has been absolute, hematomata will certainly occur and give rise not only to a certain amount of discomfort, but also predispose to infection, occasionally suppurate and materially increase the probability of a phlebitis. Unfortunately, they represent one of the unavoidable complications of the operation and cannot always be avoided. They were noted in two of my cases, and in one instance underwent suppuration.

Phlebitis.—Thrombosis of the vessels of the thigh on the side of the operation is likewise a not infrequent complication, and was noted in one of my cases. It is usually due to infection, associated with deep communicating vaginal tears, labial hematomata or lesions of the bladder. That it is probably often due to unrecognized lesions of the bladder is shown by the fact that it ceased to occur, in Kroemer's experience, after the introduction of the routine employment of the retention catheter during the first part of the puerperium.

Hernia.—In rare instances, as reported by Franz, Hartmann, and Mann, hernias may later protrude through the pubiotomy wound. This was usually noted in cases which had been complicated by suppurative processes and particularly when an inguinal hernia already existed. According to Mann, it may be due to one of several factors: either to a diastasis through the lower part of the rectus muscle, to the absence of union between the ends of the pubic bone or to stretching of the tissues uniting them.

Indications for Operation.—As pubiotomy is undertaken principally in the interests of the child, its justifiability will depend entirely upon the maternal mortality and the rapidity of recovery following it. Consequently its results will have to be compared

with those following the induction of premature labor, symphyseotomy and Cesarean section for the enlarged relative indication.

At the 1907 meeting of the German Gynecological Congress, Döderlein presented an analysis of 170 pubiotomies reported by thirty-five writers and performed either by his own technic or that of Bumm, with a maternal mortality of 4.1 per cent. In the discussion following his paper, nineteen speakers gave their experience, aggregating 319 cases with six deaths, a mortality of 1.88 per cent. This difference clearly demonstrates the improvement in technic resulting from increased personal experience, as the smallest number of operations reported by any one speaker was five, while the average was seventeen cases, and affords a marked contrast to the statistics of Döderlein, in which are included many isolated cases by individual operators. Moreover, Gigli, in a personal communication to Montgomery, stated that he had collected reports from nearly 300 operations with a mortality of between 1 and 2 per cent., which practically became reduced to zero upon deducting the cases which were already infected when operated upon. Bumm, in the *Zentralblatt für Gynekologie* for May 9, 1908, stated that fifty-two operations had been performed in his clinic, with a single death from embolic pneumonia, a mortality of 1.92 per cent.

When it is considered that a considerable proportion of the cases reported in the literature manifested signs of infection at the time of operation, which undoubtedly increased the number of deaths from that cause, a mortality of 2 per cent. should be considered as highly satisfactory, and should justify the prediction that in the future it will become materially diminished in the hands of experienced operators in judiciously selected cases.

It must, however, be admitted that even so small a mortality as 2 per cent. compares unfavorably with that following the induction of premature labor, which in competent hands should not exceed a fraction of 1 per cent. On the other hand, it should be remembered that with pubiotomy 95 per cent. of the children will be born alive at full term with excellent prospects of further development, as compared with 75 to 80 per cent. of poorly developed children following the induction of premature labor, from which must be further deducted the large number which will succumb in the succeeding months.

Accordingly, I feel very strongly that pubiotomy will eventually practically supersede the employment of the latter operation in the treatment of moderate degrees of pelvic contraction.

Particularly as the figures just given do not adequately indicate its full advantages, for the reason that the knowledge that one possesses in pubiotomy, a satisfactory method of overcoming the disproportion between the size of the head and the pelvis will lead to the more extensive adoption of expectant treatment in such cases, with the result that 75 or 80 per cent. of the labors will end spontaneously at full term, while pubiotomy would probably not be required in more than one-fourth of the remaining 20 to 25 per cent. In this event, approximately only 5 or 6 per cent. of the women presenting moderate degrees of pelvic coutraction would be exposed to the comparatively small dangers of pubiotomy; while, on the other hand, if the induction of premature labor were the recognized method of treatment, it would necessarily be employed in a much larger proportion of cases, say 25 to 30 per cent. Consequently, the much more frequent employment of the latter operation, even with its comparatively low mortality would probably lead to the death of as many women in a given series of cases as the less frequent employment of the more dangerous pubiotomy. Moreover, similar considerations applied to the child would still further accentuate the advantages of pubiotomy and place the results following the induction of labor in an even less favorable light.

Thus, assuming that the figures given above are approximately correct and that two series of 1000 cases of moderately contracted pelves were treated by pubiotomy and the induction of labor, respectively, it would appear that the former operation would be required in fifty and the latter in 250 women; and that if the maternal mortality were, respectively, 2 and $\frac{1}{3}$ per cent., the number of deaths would be identical in both series. On the other hand, admitting that the fetal mortality were 10 and 25 per cent., respectively, five children would be lost in the former and sixty-two in the latter series. Or, to put the matter more forcibly, a greater number of children would have been saved had craniotomy been performed in all cases in which pubiotomy was indicated.

Naturally, it might be suggested by the advocates of the induction of premature labor that such calculations are not convincing. That they are not purely speculative, however, is demonstrated by the figures recently adduced by Bürger, which are based upon an analysis of 49,000 labors occurring in Schauta's clinic in Vienna. In this series there were 4240 contracted pelves with a fetal mortality of only 2.2 per cent. in the cases in which spontaneous labor occurred; whereas it rose 4.3

per cent. in the cases treated expectantly, including all deaths following craniotomy, pubiotomy and Cesarean section. Results which cannot be approximated by the most enthusiastic advocate of the induction of labor.

It seems almost unnecessary to compare the results following pubiotomy and symphyseotomy. It is generally admitted that the fetal mortality is identical in both operations, while the maternal mortality is 2 per cent. in the former as compared with 8 to 12 per cent. in the latter. Moreover, the convalescence is far less satisfactory and much more prolonged after symphyseotomy, as is conclusively shown by Thies' recent report upon the fifty-three operations performed in Zweifel's clinic.

Having shown that pubiotomy is superior to the induction of labor and symphyseotomy, it remains to consider to what extent it enters into competition with Cesarean section. In the first place, it must be stated that the former operation is not indicated when the conjugata vera measures less than 7 cm. Consequently there can be no competition except in pelves above that limit; namely, in the so-called "border-line" cases, in which it is generally impossible to predict the outcome of labor in any given case. Moreover, it must be admitted that if the decision were based entirely upon the general mortality of the two operations, it would have to be given in favor of pubiotomy, as an analysis of the reports of the best operators shows that the average mortality in Cesarean section is in the neighborhood of 5 per cent.

The researches of Reynolds, however, inidcate that this figure does not altogether represent the true state of affairs, but that, admitting the competence of the operator and the excellence of his technic, the results will vary greatly according to the period of labor at which the operation is performed. Thus, in an analysis of 289 cases, he found that the mortality was 1.2, 3.8 or 12 per cent., respectively, according as the operation was performed during the last days of pregnancy, or early or late in labor. As his results are in accordance with my own experience, I feel justified in holding that the results of Cesarean section performed just before or at the very onset of labor are superior to those of pubiotomy, both as regards the actual mortality and ease of convalescence of the mother, not to mention the fact that all of the children are saved, instead of only 95 per cent. as in pubiotomy. On the other hand, Cesarean section performed early in labor has a somewhat greater mortality than pubiotomy; while if not resorted to until the second stage is well advanced there can

be no comparison between the two operations, as the former has a mortality of 10 or 12 per cent. and the latter of only 2 per cent.

Accordingly, if it were possible to predict in a given case that engagement would not occur, the best interests of both the mother and child would be served by performing Cesarean section at an appointed time a few days before the expected date of confinement; as by so doing the child would certainly be saved, with a minimal risk and an almost ideal convalescence for the mother. Unfortunately, in the class of pelves under consideration, such a prediction is never possible in women pregnant for the first time and only exceptionally in multiparæ. Therefore, in primiparæ Cesarean section would not be indicated at the time of election, unless one were willing to assume the responsibility of operating unnecessarily upon a considerable number of women when one knew by experience that a large proportion of them would be delivered spontaneously if subjected to the test of labor. For this reason, early elective Cesarean section would be justified only in multiparæ in whom the history of previous labors had clearly indicated that nature was habitually unable to overcome the disproportion between the size of the head and the pelvis.

On the other hand, if Cesarean section is not done at the very onset of labor, I consider that the best interests of the patient will be served if she be treated expectantly, allowed to go into the second stage of labor, and then subjected to pubiotomy, if engagement does not occur after several hours of strong pains, or in the presence of certain conditions which indicate the necessity for prompt delivery. Under such circumstances, Cesarean section is a dangerous operation and, while it may save a few more children, exposes the mother to a risk five or six times greater than if pubiotomy had been employed and therefore does not seem to me to be justifiable.

To my mind, the great advantage of pubiotomy in the treatment of border-line cases of pelvic contraction consists in the fact that it affords the possibility of subjecting the patient to the test of labor in suitable cases and then of interfering for the sake of the child without subjecting the mother to too great danger. In other words, it enters into competition with high forceps, prophylactic version and craniotomy rather than with Cesarean section.

I have repeatedly stated that its lowest limit should be placed at a conjugata vera of 7 cm., but unfortunately its upper limit cannot be so readily given; and while, generally speaking, the operation will rarely be indicated when the conjugata vera exceeds 8.5 cm., it may occasionally become necessary in larger pelves. Indeed, it may be said that its upper limit cannot be defined and that it is justified in any case, no matter what the pelvic measurements may be, in which a prolonged test of labor demonstrates that the uterine contractions are unable to overcome the disproportion. For this reason, it may be indicated in practically normal pelves when the child is unusually large, as well as in certain cases of brow and mento-posterior presentations in which version is contraindicated.

In addition to the well known varieties of pelvic deformity, it may also find a considerable field of usefulness in certain cases of outlet contraction or funnel pelvis, as has been shown by the experience of Van de Velde and myself. In such cases the indication is afforded not merely by a certain degree of shortening in the distance between the tubera ischii, but only after a most careful study of all the measurements concerned, and particularly of the anterior and posterior sagittal diameters of the outlet to which I have directed attention in the appropriate chapter of my text-book.

I desire to emphasize the fact that if good results are to be obtained, pubiotomy should be regarded as a primary operation, and should not be resorted to after the failure of high forceps or version. If delivery be urgently demanded in such cases, I feel that it is better to perform craniotomy than to subject the mother to any risk for the sake of a child whose life has already been compromised. Moreover, I feel that it should not be employed in cases of infection, as a large part of the fatal results recorded in the literature have occurred in that class of cases. At the same time, it may be permissible when the temperature is slightly elevated but definite signs of infection are not present, as in Case IX, but even under such circumstances I believe that the prognosis is markedly impaired.

Finally, I wish to go on record as stating that I do not consider that pubiotomy is an operation for the general practitioner; for, although, it is usually readily performed, it may at any time lead to serious complications which will tax to the utmost the resources of even an experienced operator.

Case Histories.—CASE I.—McCoy, Obst. No. 2484. Colored v-para, age twenty-six years. Generally contracted rhachitic pelvis: 23.5, 24.75, 30, 19.5 and 10.5 cm. Pubic arch wide, transverse of outlet 10.5 cm. Has had three spontaneous labors at term and two macerated children at about the seventh month.

The child lay in L. O. T., and was apparently of large size. The first stage of labor lasted nineteen hours; and after five hours of strong second-stage pains, only a small segment of the head had become engaged. As there was apparently no probability of the occurrence of spontaneous labor, pubiotomy was determined upon.

Operation: February 13, 1906. Left-sided pubiotomy by the open method; forceps applied to the sides of the head. On making traction, the ends of the bone gaped for 5 cm. and the child was readily delivered. There was considerable hemorrhage from the pubic wound, which was controlled by compression. No injury to the perineum, vagina or bladder. The cutaneous wound was closed by formalin catgut sutures, several of which included the periosteum. Drainage of labial wound. The child was born in good condition, weighed 4055 grams and presented the following head measurements, 15, 12.5, 10, 9.5 and 8.5 cm.

The puerperium was uneventful, the highest temperature being 100.7 degrees on the day of delivery. Catheterization was not necessary. There was considerable swelling of the left labium majus due to hematoma formation. The patient was out of bed on the twenty-nineth day, walked on the thirty-first and was discharged in good condition on the thirty-sixth day. At that time the wound over the pubis was found to be healed by first intention, though the left labium majus was still considerably indurated. The outer surface of the pubis presented a slight depression at the site of the section, while its inner surface was smooth and no trace of the section could be detected. There was a painful thickening in front of each sacro-iliac joint, which was more marked on the right side. This projected 1½ cm. beyond the surface so that the promontory of the sacrum seemed to lie in a depression. Locomotion was very satisfactory although there was definite motility at the pubic wound. Vaginal examination showed: outlet excellent; cervix slight stellate tear; uterus forward, movable and well involuted; appendages negative.

The patient was seen again one month after the operation, when all trace of the swelling about the sacro-iliac joints had disappeared except for a slight non-sensative ridge on the left side.

CASE II.—Hupka, Obst. No. 2553. White i-gravida, twenty years old. Generally contracted, funnel-shaped pelvis: 23, 26, 30, 18.25, and 10 cm. Pubic arch very narrow, transverse of outlet 7 cm.

I saw patient in consultation after she had been in labor for fourteen hours and found the cervix fully dilated and a fair-sized child presenting at the superior strait in L. S. A. frank breech. In view of the combination of breech presentation and funnel pelvis, it was thought best to perform pubiotomy. The patient was therefore sent to the hospital and the operation begun one and one-half hours later. During this interval there had been no descent in spite of strong pains.

Operation, April 13, 1906: preliminary manual dilatation of vaginal outlet, pubiotomy by Döderlein's method on the left side. The anterior foot was brought down and extraction readily effected, during which the cut ends of the bone gaped 4 cm. There was almost no hemorrhage. The perineum and vagina were not torn. After expressing the placenta, the upper wound was sutured and an adhesive plaster bandage applied about the pelvis. The child was born in good condition, weighed 2660 grams and presented the following head measurements: 12.5, 11.5, 10, 9.5 and 7 cm.

The puerperium was uneventful except for slight abdominal distention on the fourth day. Highest temperature 100.3 degrees. The patient's only complaint was that she was compelled to lie in one position. She sat up on the twenty-fourth day and was discharged on the twenty-second day, when the following conditions were noted: outlet excellent; cervix very slight transverse tear; uterus forward, movable and well involuted; appendages normal; locomotion excellent. Large callus on anterior but no trace of the wound palpable on posterior surface of pubis; sacro-iliac joints clear. The pelvic measurements were unchanged except that the transverse of the outlet had been increased 1 cm.

Patient returned to the hospital January, 1907, two months pregnant, and stated that she had had no trouble since her discharge. Examination showed slight motility at the site of the operation. This pregnancy ended spontaneously at the seventh month. She reappeared May 10, 1908, and stated that she was again between seven and eight months pregnant, felt perfectly well and arranged to return to the hospital for delivery.

CASE III.—Adams, Obst. No. 2501. Colored i-gravida, age 16 years. Generally contracted rhachitic pelvis: 23.25, 22.75, 28, 16.5 and 8.75 cm. Pubic arch wide, transverse of outlet 10 cm.

The child lay in L. O. T. Total duration of labor-thirty-two and a half hours. As there was no advance after three hours of strong second-stage pains and the head still at the superior strait in the posterior parietal position, pubiotomy was determined upon.

Operation, July 2, 1906: Typical left-sided Döderlein pubiotomy, preceded by manual dilatation of the vaginal outlet. Easy delivery with forceps. No note as to extent of gaping.

Slight hemorrhage, no vaginal and a very slight perineal tear, which required one suture for its repair. The child was born alive, weighed 2415 grams and presented the following head measurements: 13.25, 11.5, 8.5, 8.25 and 7.75 cm. The head was markedly moulded, presented an extensive caput and a deep depression where the posterior parietal bone had been pressed upon the promontory of the sacrum.

The puerperium was uneventful, the highest temperature being 100.5 degrees on the seventh day. Catheterization not necessary. She was kept in bed for four weeks and was discharged on the thirty-seventh day. At that time the outlet was excellent; cervix not torn; uterus retroflexed and adherent, appendages not felt; locomotion excellent; no sign of callus upon either anterior or posterior surface of pubic bone or at sacro-iliac joints.

The patient returned for inspection, December 19, 1907, and stated that she had since been operated upon for the displaced uterus. Examination showed a slight callus on the anterior surface of the pubic bone, but no trace of the wound posteriorly. Sacro-iliac joints normal. No subjective symptoms except for slight cystitis following suspension of uterus.

Case IV.—Stewart, Obst. No. 2763. Colored i-gravida, nineteen years old. Flat rhachitic pelvis with double promontory: 25.75, 26.25, 31.25, 17.5 and 8.5 cm. Pubic arch wide, transverse of outlet 10.5 cm. Child in R. O. T.

The patient was sent into the hospital from the outpatient service after having been in labor for fifteen hours, with the cervix 4 cm. in diameter. Eight hours later the membranes ruptured and examination showed the cervix fully dilated, but the head not engaged. As there was no advance after three hours of good second-stage pains, pubiotomy was determined upon.

Operation, October 25, 1906. Typical left-sided Döderlein pubiotomy by Dr. Goldsborough. Immediately after severing the pubic bone the head descended to the level of the ischial spines; easy mid-forceps delivery, during which the ends of the bone gaped 3 to 4 cm. There was but slight hemorrhage and no perineal or vaginal tear. The child was born alive, in good condition, weighed 3230 grams and presented the following measurements: 13.15, 11.25, 9.25, 8.5 and 7.5 cm.

The puerperium was somewhat disturbed. There was marked abdominal distention on the third day, when the pulse reached 140 and the temperature 102 degrees. The patient was quite sick until the bowels moved, after which her condition became satisfactory. There was some edema and a small hematoma of the left labium majus. At no time was catheterization necessary. She was out of bed on the eighteenth day and was discharged on the twenty-third day.

On discharge the outlet was excellent; cervix, slight bilateral tear; uterus retroflexed, movable and well involuted; appendages

negative. There was considerable callus on the anterior surface of the pubic bone, but no trace of it posteriorly. No motility on passive movement of thighs. Walks without pain.

January 13, 1908, the patient was delivered spontaneously at her own home of a child weighing seven pound, which presented the followiug measurements, 13.5, 11.25, 9.25, 8.5 and 7.5 cm. Puerperium normal and locomotion perfectly satisfactory.

CASE V.—Anderson, Obst. No. 2728. Colored i-para, age twenty-four years. Generally contracted rhachitic pelvis, 22 22.75, 25, 15 and 9.75 cm. Pubic arch wide, transverse of outlet 10½ cm. Marked false promontory of sacrum. Previous pregnancy ended at seven months.

Patient did not learn to walk until she was seven years old. Child presented in L. S. A. frank breech. Slight contractions for three days, definite pains, however, began 5 P. M., November 26, 1906, and the membranes ruptured spontaneously at 9 P. M., when the cervix was almost fully dilated. As there was no advance three and a half hours later, pubiotomy was determined upon.

Operation, November 27, 1906, Dr. Goldsborough: After manual dilatation of the vaginal outlet, left-sided Döderlein pubiotomy. Extraction easy and rapid, but the amount of gaping between the ends of the bones was not noted. As there was considerable hemorrhage, the placenta was expressed almost immediately after the delivery of the child. This, however, did not completely check the bleeding, and on examination a deep tear was found in the left and anterior portion of the vagina, extending from the vaginal outlet almost to the cervix. A finger introduced into the tear came in contact with the cut ends of the bone, which were about 2 cm. apart. This wound, as well as a second-degree perineal tear, was closed with interrupted catgut sutures. As there was still considerable hemorrhage, an iodoform pack was introduced into the vagina and a small drain brought out through the labial incision. The patient presented marked signs of collapse during and just after the operation, but revived after the injection of saline solution.

The child gasped a number of times, but could not be resuscitated. It was 57 cm. long, weighed 4050 grams and presented the following head measurements: 13.25, 12.75, 10.5, 10.25 and 9 cm. No definite cause for its death could be ascertained. Dr. Goldsborough did not consider it due to the operation, as the extraction had been easy and only required two minutes, but was inclined to attribute it partly to the fact that the patient took the anesthesia very badly and partly because the resuscitation was intrusted to a student, as the serious condition of the patient claimed the services of all the assistants.

The puerperium was distinctly abnormal and the patient was seriously ill for several days, the temperature reaching 102.2 on the seventh day and the pulse varying between 100 to 120.

Catheterization was necessary for several days, and there was considerable edema of the left side of the vulva, but no definite hematoma formation. This did not interfere with a satisfactory recovery, as the patient was out of bed on the twentieth and was discharged on the twenty-eighth day, when the following conditions were noted: outlet excellent; cervix not torn; a linear scar on left side of vagina; uterus forward, moveable, well involuted, appendages not felt. There was a slight callus on the outer surface, but no trace of the bone wound on the inner surface of the pubis. Sacro-iliac joints normal, no motility on passive movement of thighs.

The patient was seen again six months later, when she reported that she was in excellent condition and had no trouble in walking or working.

CASE VI.—Boston, Obst. No. 2739. Colored i-gravida, age seventeen years. Generally contracted rhachitic, assimilation pelvis with six sacral vertebræ. Measurements: 21, 23, 29, 16.5 and 9.5 cm. Pubic arch narrow. The child lay in L. O. A. Membranes ruptured twenty-four hours after the onset of labor, when examination showed that the cervix was fully dilated. Two hours later the head was still at the superior strait, with marked over-lapping of the bones and a large caput which reached to the ischial spines.

Operation, December 4, 1906: Preliminary manual dilatation of vaginal outlet. Left-sided Döderlein pubiotomy. High forceps were applied to the sides of the head, which was readily extracted. The bone incision gaped 4 cm. Slight hemorrhage, no vaginal or perineal tear. The child was born in good condition, weighed 3230 grams and presented the following measurements: 14.5, 11.5, 9.5, 9.5 and 8.5 cm. The left parietal bone was markedly distorted and presented a deep depression where it had pressed upon the promontory of the sacrum

The puerperium was febrile, though the patient was at no time seriously sick. The highest temperature was 101.5 degrees, except for a single rise to 102.3 on the seventh day. There was some edema of the vulva on the third day. No trouble with the bladder; catheterization not necessary. The patient was out of bed on the seventeenth day and was discharged on the twenty-eighth day, when the following conditions were noted: outlet excellent; cervix, slight bilateral tear; uterus forward, movable and well involuted, appendages not felt. Slight callus on anterior surface of pubic bone, but no trace of section posteriorly. Sacro-iliac joints normal. Locomotion normal.

The patient reported in April, 1908, that she has been perfectly well since the operation.

CASE VII.—Waters, Obst. No. 2851. Colored i-gravida, sixteen years old. Generally contracted, rhachitic assimilation pelvis, with six sacral vertebræ. Measurements: 23.5, 23.5, 26.5, 14.25 and 8.75 cm. Pubic arch wide, transverse of outlet 10½ cm.

The child lay in L. S. A. and on account of the small size

of the pelvis, it had been determined to perform Cesarean section at the onset of labor. This was not done as the membranes ruptured prematurely and within fifteen minutes after the first pain one foot, and a little later both feet appeared at the vulva. When I saw the patient two hours later, the cervical canal was obliterated and the external os two-thirds dilated, with the breech still at the superior strait. In view of the prolapse of the feet, Cesarean section seemed contraindicated and pubiotomy appeared to offer the most conservative method of delivery.

Operation, February 3, 1907: After dilating the vulva manually and completing the dilatation of the cervix, pubiotomy was done on the left side by Döderlein's method, and the child readily extracted, during which the cut ends of the bone gaped for 6 cm. There was but slight hemorrhage and no vaginal or perineal tear. The child was born in excellent condition, weighed 3040 grams and presented the following head measurements: 13, 11, 9.6, 8.75 and 7.5 cm.

The patient was very comfortable during the puerperium, in spite of the fact that a small hematoma developed in the left labium majus and catheterization was necessary for ten days. The highest temperature was 102 on the fourth day. The patient was out of bed on the sixteenth day and developed a slight phlebitis in the left leg four days later, which was not accompanied by a rise in temperature and did not materially prolong her stay in the hospital, as she was discharged on the thirty-seventh day in excellent condition. At that time the following conditions were noted: outlet excellent; cervix, slight bilateral tear; uterus forward, movable and well involuted; appendages normal. No callus on either surface of pubic bone, sacro-iliac joints normal. Definite motility on passive movement of thighs. Seen May, 1908, three months pregnant.

Case VIII.—Strange, Obst. No. 2964. Colored i-gravida, age eighteen years. Generally contracted rhachitic assimilation pelvis. Measurements: 21.75, 23, 27.75, 16.5 and 9.5 cm. Pubic arch good and transverse of outlet 10 cm.

Child in R. O. P. The first-stage pains were not severe. Membranes ruptured spontaneously at the end of forty hours, when the cervix was found to be fully dilated and the head resting at the superior strait. As there was no advance after three hours of strong secoud-stage pains, pubiotomy was determined upon.

Operation, by Dr. Goldsborough, April 15, 1907. Typical left-sided Döderlein pubiotomy, easy high forceps delivery, during which the bone wound gaped 5 to 6 cm. There was very little hemorrhage, no injury to the vagina and only a superficial perineal tear which required two sutures for its repair. The child was born somewhat asphyxiated, but was readily resuscitated. It weighed 2450 grams and presented the following measurements: 13.75, 10.25, 9.5, 8.75 and 7.25 cm.

The puerperium was uneventful, the highest temperature being 100.2. The patient was very comfortable and did not require catheterization. She was out of bed on the eighteenth day, walked on the twenty-third day and was discharged on the thirty-fifth day. Examination at that time showed: outlet excellent; cervix, slight left-sided tear; uterus forward, movable, well involuted; appendages not felt. Slight callus on anterior, but none on posterior surface of pubis. Sacro-iliac joints normal, locomotion excellent, no motility on passive movement of thighs. Patient not seen since.

CASE IX.—Bowie, Obst. No. 3149. Colored i-para, thirty-two years old; spontaneous delivery of small child five years previously. Flat rhachitic pelvis; measurements: 25, 26, 30.75, 16 and 10.5 cm. Pubic arch fair, transverse of outlet 9 cm. Large child in R. O. T.

The patient was admitted after having been in labor for twenty-four hours with the membranes ruptured and the external os 3 cm. in diameter with thick margins. Twenty-four hours later the patient showed signs of exhaustion, with a temperature of 100.2 degrees. Examination showed that the cervix was 5 cm. in diameter and the uterus tightly contracted over the child. The head was movable at the superior strait, the posterior parietal bone presenting and the ear lying just in front of the promontory. In view of these conditions, prompt delivery seemed imperative.

Operation, Dr. Storrs, September 10, 1907: After stretching the vaginal outlet and completing the dilatation of the cervix by Harris' method, a left-sided Döderlein pubiotomy was done. The child was delivered after an easy high forceps operation, during which the ends of the bone gaped for 3 cm. There was no vaginal or perineal tear. The child gasped several times, but could not be resuscitated. Unfortunately, its weight was not noted. The head was markedly moulded, but showed no definite depression, death being probably due to the prolonged dry labor.

The puerperium was uneventful, except for marked mental disturbance, the highest temperature being 101.2 degrees on the ninth day. In the absence of the nurse, the patient got out of bed on the fourth day, and after that turned freely in bed. She was allowed to walk on the twenty-second day and was discharged on the twenty-fifth day. At that time the condition of the soft parts was excellent, Locomotion satisfactory and painless, no callus on either surface of the bone wound, sacro-iliac joints normal, no motility on passive movements of thighs.

CASE X.—Walters. Obst. No. 3070. Colored i-gravida, age seventeen years. Generally contracted, rhachitic, coxalgic pelvis. Considerable scoliosis, with convexity directed to the right; numerous cicatrices over right buttock. Measurements, 19, 19.5, 25.5, 16.5 and 9.75 cm. Pubic arch and transverse of outlet normal. The child lay in L. O. T. The entire labor

lasted sixty-one hours, fifty-two of which belonged to the first stage. Owing to the fact that several serious cases were going on simultaneously, both in the in and out-patient services, which kept the entire staff busy, the patient was not seen until she had been in the second stage for nearly six hours; the pains, however, were not severe. At that time examination by the resident obstetrician showed the cervix fully dilated, the head at the superior strait, with the posterior parietal bone presenting. It was not possible to operate upon her for another four hours, but at that time she was in good condition and the child's heart apparently normal.

Operation, October 14, 1907: Typical left-sided Döderlein pubiotomy, easy high forceps, though rotation did not occur until the perineum was well distended. No vaginal or perineal tear, no hemorrhage. No note was made as to extent of separation of the ends of the pubic bone. In spite of the easy delivery, the child was born dead and could not be resuscitated. It weighed 2410 grams and presented the following measurements: 15, 13, 9, 8.5 and 7.5 cm. No cause for death discoverable.

The puerperium was uneventful, the highest temperature being 100.4, except for one occasion on the fifth day, when it reached 101.6 degrees, which was attributed to a stitch abscess in the upper wound. Catheterization was not necessary. The patient moved freely in bed at the end of the first week, out of bed on the twenty-third day and was discharged on the twenty-ninth day. Examination at that time showed the perineum excellent; cervix not torn; uterus forward, movable and well involuted and appendages normal. No callus on either surface of pubic bone, sacro-iliac joints normal. Locomotion excellent, no motility on passive movement of thighs.

The patient was demonstrated three months after the operation when she walked and ran perfectly satisfactory.

Case XI.—Slatoff, Obst, No. 3175. White i-gravida, age nineteen years. Funnel-shaped pelvis with following measurements: 26.5, 27.2, 31, 19, diagonal conjugate could not be measured. Pubic arch narrow, transverse of outlet 7 cm., anterior sagittal 6 cm., posterior sagittal 7 cm. Child lay in L. O. A.

The entire labor lasted twenty-two and a half hours. Examination at the end of twenty hours showed the cervix fully dilated, membranes ruptured, head well below the ischial spines. As there was no advance two and a half hours later, pubiotomy was determined upon.

Operation, October 25, 1907. Typical left-sided Döderlein pubiotomy. Forceps readily applied, but strong traction was necessary in order to bring the child to the vulva. After the outlet was well distended, the forceps were removed and the head expressed by Ritgen's maneuver. There was no tear of the vagina or perineum, and no hemorrhage from the pubiotomy wound. The child was born alive in good condition, weighed

3275 grams and presented the following head measurements: 13.25, 11, 9, 9.25 and 6.75 cm. There was a deep mark over the forehead from pressure exerted by the tip of the sacrum.

A lead tape outline of the suboccipito-frontal diameter when applied over a diagram corresponding to the measurements of the pelvic outlet showed that spontaneous delivery would have been impossible.

The puerperium was uneventful, the highest temperature being 100.4 degrees. The patient was catheterized but once, turned spontaneously in bed on the third day, was on the twentieth day and discharged six days later. At that time the following note was made: outlet excellent; cervix not torn; uterus retroflexed and movable; appendages not felt. Some induration in left labium majus; slight callus on anterior, but none on posterior surface of pubic bone. Sacro-iliac joints normal, locomotion excellent, definite motility at bone wound.

The patient was seen three months later, when she stated that the results of the operation had been perfectly satisfactory, and that she was able to attend to all of her duties without discomfort.

CASE XII.—Frazier, Obst. No. 3211. Colored i-gravida, age seventeen years. Generally contracted pelvis: 21, 23.5, 26.5, 17.5 and 10 cm. Pubic arch narrow, transverse of outlet 8 cm.

The patient was in the ward nearly one month before labor; pains commenced at 7.30 P. M., November 23, 1907. Vaginal examination at 2.50 P. M. the next day showed that the cervix was 5 to 6 cm. in diameter, the child in R. O. T., with the posterior parietal presenting. When I saw her at 7 P. M., after three hours of strong second-stage pains, the cervix was completely dilated, the head movable at the superior strait, with the sagittal suture just behind the symphysis and the right ear over the promontory of the sacrum. There was a marked caput. In view of the persistent posterior parietal presentation, pubiotomy was determined upon.

Operation, November 24, 1907: After preliminary dilatation of the vaginal outlet, the saw was applied by Döderlein's method and the left pubic bone severed without great difficulty. Forceps were applied to the sides of the head, which did not descend in spite of vigorous traction, the ends of the bone gaping only 2½ cm. On introducing a finger through the upper incision, it was found that the bone was held together by some of the fibers of the anterior pubic ligament, but upon severing them separation occurred to the extent of 5 cm. and the head was readily brought to the outlet and finally delivered by Ritgen's maneuver. There was slight hemorrhage during the operation.

The child was deeply asphyxiated when born, but was resuscitated without great difficulty. It weighed 3250 grams and presented the following measurements: 14, 12.5, 9.5, 9.25 and 8.5 cm.

The perineum or vagina were not torn, but upon inspecting the external genitalia it was found that a deep tear had occurred on the left side of the vestibule which extended from the anterior margin of the vaginal opening to above the clitoris, whose left crus had been torn through. The urethra was not involved. A finger introduced into the tear could be brought out through the upper pubiotomy incision and came in contact with the cut ends of the pubic bone. The laceration was closed by interrupted catgut sutures except at its apex through which a small iodoform drain was passed.

The puerperium was uneventful, the highest temperature reaching 102 degrees on the sixth day. The patient had difficulty in voiding and required catheterization for a number of days. There was some swelling about the left labium majus and a fistulous tract persisted for some days at the upper end of the vestibular wound, which, however, closed spontaneously. The patient sat up on the twentieth day and was discharged on the twenty-sixth day.

At that time the pubiotomy wound was found healed by first intention, there was no induration or swelling of the vulva, the outlet was excellent, the cervix had a slight stellate tear, uterus retroflexed, movable and well involuted, appendages not felt. No trace of the bone wound could be felt on either surface of the pubis. There was apparently no motility on passive movement of thighs. Locomotion was excellent and the patient presented no subjective symptoms.

CASE XIII.—Turner, Obst. No. 3337. White ii-gravida, twenty-five years old, entered hospital in labor, March 11, 1908. Generally contracted funnel pelvis: 20.5, 26, 29, 18 and 11 cm. Pubic arch narrow, transverse of outlet 7 cm.; anterior sagittal, 5; posterior sagittal, 6.5, and antero-posterior diameter 9.5 cm. Former labor very difficult on account of the outlet contraction, child died from fractured skull after a most difficult low forceps operation.

Labor began 5 P. M., March 11; cervix completely dilated and membranes ruptured at 6.15 A. M., March 12. At that time the child lay in L. O. T. with head movable at superior strait. As engagement had not occurred two hours in spite of strong pains, it was determined to perform pubiotomy, in view of the past history.

Operation, March 12, 1908: Preliminary manual dilatation of vaginal outlet, Döderlein subcutaneous pubiotomy on left side. The head was readily brought to the vulva and delivered without the use of traction rods, the ends of the pubic bone gaping 4½ to 5 cm. There was very little hemorrhage. The perineum or vagina was not torn, although there was a slight tear in the vestibule to the left of the urethral opening, which was repaired by two catgut sutures. The child was born in good condition, weighed 3820 grams and presented the following measurements: 14.5, 11.5, 9.75, 9 and 8 cm. A lead tape moulding of the sub-

occipito-frontal circumference of the head applied over a diagram of the pelvic outlet clearly showed that spontaneous labor could not have been expected.

The puerperium was uneventful, the highest temperature being 99½ degrees. The patient was catheterized for the first two days, but suffered very little discomfort. On the fifth day she turned freely in bed, sat up on the fifteenth day and was out of bed on the eighteenth day. At discharge on the twenty-fifth day the pubiotomy wound was found to be well healed; no callus on the posterior surface of pubic wound and very little on anterior. No motility on passive movements of thighs; locomotion normal and without pain. Six weeks later her condition was most satisfactory in every respect, and she was able to do everything which she had done before the operation.

CONCLUSIONS.

1. In thirteen pubiotomies performed at the Johns Hopkins Hospital there were no maternal and three fetal deaths, only one of which was attributable to the operation.

2. All patients were delivered immediately after the operation by forceps or version. There were no injuries to the bladder, three perineal, and only one deep communicating vaginal tear, notwithstanding the fact that nine of the patients were primiparæ.

3. The relative infrequency of injury to the soft parts is attributed to the employment of Döderlein's technic, but particularly to extensive, preliminary, manual dilatation of the vagina and perineum.

4. The after-treatment is not so onerous as is generally stated and is greatly facilitated by the use of the Bradford frame. Immobilization of the pelvis is not necessary. The patients usually move spontaneously in bed on the third or fourth day, get up on the twentieth day and are discharged on the thirtieth day with satisfactory locomotion. Healing generally occurs by the formation of fibrous tissue, and in at least one-fourth of the cases there is definite motility between the ends of the bone.

5. The maternal mortality should be less than 2 per cent., provided the operation is performed by competent operators upon uninfected women, who have not been exhausted by previous attempts at delivery.

6. It is indicated in contracted pelves in which the conjugata vera does not fall below 7 cm., and after a test of several hours in the second stage of labor has shown that the disproportion between the head and the pelvis cannot be overcome, as well as certain cases of outlet contraction.

7. In multiparæ with a history of repeated difficult labors or in primiparæ presenting excessive disproportion, it is inferior to Cesarean section performed at the end of pregnancy or at the onset of labor. In other cases it does not enter into competition with it; as it is the operation of choice in border-line pelves after the patient has been subjected to the test of labor, and at that time is five or six times less dangerous than Cesarean section.

8. It should replace high forceps, prophylactic version, induction of labor and craniotomy upon the living child in uninfected women.

9. It should not be employed in infected patients or after failure to deliver by other means. It should be regarded as a primary operation, whose dangers are infection, deep tears and hemorrhage.

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