

able amount of it is got rid of when urine is passed on retiring to rest.

I do not pin my faith to any one way of training the bladder to empty itself. Neither do I think that any one method will be the best for everybody. The "second effort" was what I recommended in 1900, and it was found to be useful to several others besides my first patient. The method by "squirts" may suit others better. A medical friend has reminded me of an old method—sitting on the water-closet. There is no doubt that in this position there is greater power in straining, but I do not think that straining is necessary in the class of cases about which and for which I am writing. Straining comes in advanced cases of prostatic enlargement, but in these the idea of training the bladder comes almost too late. Some unfortunates with enlarged prostates have to strain so much that they must sit on the water-closet every time they pass water, because the bowels are apt to act at the same time. It might be a good plan, however, in some cases, to pass water sitting on the water-closet the last thing before going to bed. In this way a thorough emptying of the bladder may be secured.

I wish, in conclusion, to make it clear that I am treating of *early cases* and of the *commencement* of the formation of residual urine. *Obsta principii* is my motto. My last word of advice is—*take time, exercise patience, and insist on getting rid of the last drops.*

If any sufferers need encouragement, I can honestly say to them that several have benefited by my suggestions, and if others are encouraged to try and to persevere by what I have written, my object in writing this paper will be attained.

✓ TREATMENT OF CONTRACTION OF PELVIC OUTLET—
TWO CASES, ONE TREATED BY PUBIOTOMY, THE
OTHER BY INDUCTION.*

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I HAVE recently had under my care two cases of contraction of the pelvic outlet, each of which I believe exhibits some points of practical importance.

In this country contraction of the outlet has not received much attention. That it occupies an unimportant place in the

* Communicated to the Edinburgh Obstetrical Society, February 1912.

calculations of practical obstetricians is proved by the fact that it is absent or receives only a passing mention in the many discussions on the subject of pelvic contractions which have been held in recent years. The same is true of the text-books on midwifery. The treatment of contracted pelvis is almost invariably discussed in terms of the diameters of the inlet. That this neglect is unjustified is suggested by the statement of Whitridge Williams, based on a study of 2215 successive cases in which measurements were taken at full time, that in the United States the typical funnel pelvis constitutes 44 per cent. of all deformed pelvis in white women. This is a striking discovery. The same relationship, however, cannot apply in this country, in which rickets is the predominant cause of pelvic deformity, a deformity, from the obstetric standpoint, most marked at the brim, whilst in the United States only about 6 per cent. of pelvic abnormalities are due to rickets. The large number of funnel pelvis discovered by Williams¹ in his series, however, suggests the possibility of the absolute number being greater in this country than is ordinarily supposed. Within a few weeks I had two typical examples in my own practice.

If, as Williams suggests, the condition of funnel pelvis is due to a high assimilation, *i.e.* a fusion of the last lumbar and the first sacral vertebrae, the condition is brought into the category of a developmental deformity, a fact which increases the likelihood of its being independent of local influences, and supports the belief that the obstetric consideration it receives in this country is more meagre than its importance demands.

There are two distinct types of pelvis with contracted outlet. In the first the abnormality is superimposed on a condition of imperfect development, such as characterises the generally contracted or justo-minor pelvis. In the second—the typical funnel pelvis—the contraction is limited to the outlet, and would seem in the large number of cases to be associated with a high assimilation, which leads to a rotation of the innominate bones on a horizontal axis with an approximation of their lower ends. The typical funnel pelvis is present in 5.87 per cent. of white women, whilst the generally contracted funnel pelvis is only present in 9 per cent.² The cases which I shall relate belong to the former class.

The normal distance between the ischial tuberosities is 4 ins. (10 cm.). As the result of a study of his cases Whitridge Williams places the lower level of safety at 8 cm. ($3\frac{1}{4}$ ins.), but, as is well

known, the bisischial diameter may be reduced below this and yet a spontaneous delivery at term take place. This is possible either in the case of an unusually small child, or with an ordinary child it may occur in the event of the part of the pelvic outlet behind the transverse diameter being sufficiently large. In the present state of our knowledge we have no precise method of determining the size of the child, and the conditions forbid the employment of a method of discovering the relative sizes of head and maternal parts such as that of Müller for the case of the pelvic brim. It is clear that the only method available in the majority of cases, and it can be defined as only approximately scientific, consists in a measurement of the outlet behind the bisischial diameter. This should invariably be carried out in a suspicious case.

Special instruments have been devised for measuring the distance between the bisischial diameter and the tip of the sacrum, *i.e.* the posterior sagittal diameter, but it can be done with sufficient accuracy by placing the patient in the dorsal position at the edge of the bed with the legs drawn up, laying a pencil across the pelvic outlet at the level of the nearest points on the inner margins of the ischial tuberosities and with callipers marking off the interval between the centre of this line and the tip of the sacrum. One cm. subtracted from the measurement thus obtained gives the diameter available in the posterior part of the outlet.

With regard to the relation which must exist between the transverse and the posterior sagittal diameters before a spontaneous labour can be expected there is some difference of opinion. Klien,³ one of the first writers to formulate a scientific method of treatment of outlet contractions, states that with a transverse of 8 cm. a posterior sagittal diameter of 9 cm. is required, whilst Whitridge Williams places the latter figure at 7.5 cm. The latter author gives the following table of approximate measurements with which it is exceptional to get spontaneous labour:—

Bisischial Diameter.	Posterior Sagittal Diameter.
8.0 cm.	7.5 cm.
7.0 „	8.0 „
6.5 „	8.5 „
6.0 „	9.0 „
5.5 „	10.0 „

In the article from which this table is taken Whitridge Williams makes some interesting observations on the influence of posture upon the size of the outlet. Matthews Duncan, many

years ago (1854), referred to the enlargement of the antero-posterior diameter obtained by flexing the thighs on the abdomen, a result which may be considered as the converse of the increase in the conjugata vera, which Walcher thirty-five years later (1839) showed was produced by extending the legs on the pelvis. Since Walcher's discovery Matthews Duncan's observation has been rehabilitated by several workers. As Williams points out, the exaggerated lithotomy position cannot be maintained for any length of time unless an anæsthetic is given, and it is therefore not available in the majority of cases. This disadvantage is overcome by finding that a modified Sims' position, in which the legs are even more flexed than usual on the abdomen, gives equally good results.* Whilst he has not had enough of cases of funnel pelvis on which to dogmatise, Williams has convinced himself of the value of this procedure by a series of examinations carried out on normal women.

FIRST CASE.

Pubiotomy.—As far as I can make out this constitutes the second case of pubiotomy reported at the meetings of this Society. The first was recorded by Dr. Berry Hart in 1904. In that case the patient unfortunately died on the third day after the operation from chloroform poisoning. The operation was carried out in a patient with a narrowing of the brim, who had been delivered four years previously by craniotomy. The child was living.

The patient whose case I wish to record was sent to me by Dr. Gardner of Leith, to whom she had first entrusted herself for medical attention in this pregnancy. She was a strong woman of 28 years of age. There was no history or sign of rickets. The height was 4 ft. 11 ins.

She had had two children previously. The first went to full time, and was only delivered after craniotomy on 27th September 1908. The weight of the child was not noted. There is no information available as to the position. In view of the calamity just mentioned, induction of labour a month before full time was

* Williams states that "this observation is of very considerable practical importance, and that it emphasises in an unexpected manner the advantages of the exaggerated Sims' position for delivery. It not only brings about a degree of enlargement of the antero-posterior and posterior sagittal diameters sufficient to permit the spontaneous termination of labour, which would be impossible in the ordinary obstetrical position, but at the same time it should diminish the frequency of deep perineal tears by the same mechanism."

carried out in the second pregnancy. This child, however, was delivered on the 17th June 1910 after a very difficult and tedious forceps extraction, and lived only a few minutes. The forceps was applied because of the long delay of the head in the pelvis. The child was again not weighed. Dr. Gardner says that the head was born in an occipito-posterior position.

The pregnancy with which we are at present concerned was expected to reach full term about the 26th August 1911.

The measurements taken when I saw her are as follows:—

Interspinous diameter	22 cm. (9 ins.).
Intercrystal diameter	28 cm. (11 ins.).
External conjugate	19 cm. (7½ ins.).
Diagonal conjugate	Promontory not reached with the finger.
Between tubera ischii	8 cm. (3¼ ins.).
Antero-posterior diameter of out- let	11 cm. (4¾ ins.).
Posterior sagittal diameter	6 cm. (2½ ins.).

In view of the previous history, and especially the failure of induction of labour in the last pregnancy at a comparatively early period, namely the 36th week, and, in addition, having regard to the pelvic measurements, it was concluded that the most reasonable chance of obtaining a living child on this occasion would be obtained by waiting till full time and then delivering by Cæsarean section or pubiotomy. The two alternatives were explained to the patient and her husband. Cæsarean section was refused. The patient said that if other measures failed this time she would be willing to submit to this operation on a future occasion. It was accordingly decided to let the pregnancy continue till full time and then, if necessary, carry out pubiotomy. The fact that the patient was a multipara was recognised as enhancing the chance of a safe delivery being obtained by this means. The patient refused, even after strong advice given by Dr. Gardner and myself, to leave her house in favour of a nursing home.

Labour set in on the 27th August 1911 at 8 A.M. I saw her at 4 P.M., when the pains were very severe and very frequent, and chloroform was immediately administered by Dr. Gardner. The patient was slung up into the lithotomy position, the vulva was shaved and painted over with linimentum iodi, as were also the lower abdomen and the inner side of the thighs. The preparations were all carried out before the patient was examined, as

by this means it was believed that the risks of infection would be diminished. The examination, which was then made, showed the head to be well down in the pelvis and fixed in the R. O. P. position. It should be mentioned that the foetal heart could not be heard at any point in the abdomen, and this, we feared, pointed to some calamity, but it was attributed after the examination to the posterior position occupied by the child.

The bladder was emptied, the membranes were ruptured, and the forceps was applied in the hope that we might be dealing with a small head, and that with the moulding present it might be delivered instrumentally. In addition, the application of the forceps before division of the pubis, should this be necessary, obviates the risks of excessive separation of the bony edges with the attendant risks of laceration of the soft parts, which are present, if their application is carried out at a later stage. Three strong pulls failed to move the head in the least. The fixation of the head in a cavity constricted transversely determined us against attempting to rotate it into the anterior position, and pubiotomy was immediately carried out according to the method described by Döderlein. Some slight difficulty was encountered in passing the point of the curved needle through the opening in the periosteum made by the transverse incision along the upper margin of the pubis on the left side. When once introduced, however, it was easily guided along to the lower margin, at which it was projected under the skin. After forcibly dragging the left labium majus over to the other side to avoid injury of the subjacent vascular tissues the skin was incised and the point of the needle pushed through. The Gigli saw loosely fixed to the hook was then drawn through and severed the bone in a few minutes. Meanwhile the thighs of the patient were pressed together to prevent undue separation of the bony edges. The completion of the division of the pubis was recognised by the sensation given by the saw being dragged across the soft parts and by moving the finger down the front of the bone, when the breech was felt all the way down. There was only slight oozing from the wound, the greater amount of blood escaping through the upper opening. Altogether there could not have been more than one ounce lost.

The head was now extracted with the forceps with great ease and was soon followed by the trunk. During the process, so far as we could judge by the finger, the pelvic edges were separated at the most about $1\frac{1}{2}$ to 2 ins. This measurement is only approxi-

mate. During the extraction of the head the anterior vaginal wall tended to bulge out in front of it, and it could easily be seen how, unless great care were taken, the bladder would be torn from its bony attachments. This risk was obviated by using the left hand to hold and push back the prolapsing vaginal wall whilst the head was being extracted with the right hand. The perineum and vaginal walls were intact. There was no difficulty with the placenta. At the end of the operation the general condition of the patient was excellent; the pulse-rate was 66. The child was a well-developed and healthy female infant.

The lower wound was closed with horsehair, and covered with collodion; the upper also was closed except for a gap left at its outer part for a small gauge drain passed down for about two inches, care being taken to avoid inserting it between the bony edges. This drain was left in for two days. The lower wounds healed by first intention and the upper healed without the least difficulty under a collodion dressing applied after the removal of the drain.

The pelvis was supported for 3 days with a strip of 3-inch wide strapping rolled twice round the body. This was removed after the bowels moved, and was replaced by two strips, one on each side, passing back to the level where the body of the patient rested on the bed. The two strips were drawn firmly together in front by tapes passed through holes near the edges of the strapping. This arrangement was found quite satisfactory from the point of view of steadying the pelvis, and was infinitely more convenient for the nurse, as also for the dressing of the upper wound. It should be mentioned that the patient lay throughout in an ordinary bed with a firm mattress.

In connection with the after-treatment it should be mentioned that catheterisation was necessary for twenty-four hours. The urine drawn off was blood free. A hæmatoma, which formed at the most dependent part of the left labium majus, gave rise to some pain and discomfort, but it disappeared completely in fourteen days. Except for a sudden rise of temperature to 102° F., with as sudden a fall, early in the third week, the temperature never at any time rose up to 99° F. Except for two registers of 98·6° and 98·8° F. the temperature throughout the whole of the first fortnight was either normal or slightly subnormal. In other words there was a complete absence of even a mild septic infection such as is mentioned amongst the risks of the operation. As already indicated, also, there was no injury to the bladder

and urethra, another accident sometimes associated with this operation.

In this case the narrowing of the outlet, whilst alone sufficient to constitute a distinct obstacle to the passage of the child, was complicated by the occipito-posterior position occupied by the head. It is possible that an early examination might have led to a detection and rectification of this abnormality before the head became fixed in the pelvic cavity, but the narrowing present would almost certainly even then have precluded the possibility of a simple forceps extraction, and, in addition, the risks associated with infection would have been multiplied in the event of the pubiotomy being carried out. It is likely that the posterior position was dependent on the pelvic narrowing, and the want of any attempt at rotation was doubtless traceable to the same factor.

The patient got out of bed on the 17th day, and, except for a slight limp, which improved as she began to go about, there was no mechanical disturbance of any kind. When seen six weeks after the operation there was still a trace of the limp. The patient told me that she felt no discomfort on walking, but she imagined that her left leg felt a little weaker than the right. Dr. Gardner informs me that by the third month there was no trace of the limp. The patient is able to go about her duties without the least trouble of any description.

The child, which was $8\frac{1}{4}$ lbs. at birth, has never given any trouble.

An X-ray photograph, taken by Dr. M'Kendrick six weeks after the operation, shows that the pubic union is of a fibrous nature, and in addition that there is a small amount of separation of the articular surfaces of the sacro-iliac joints. This, no doubt, is dependent upon the slight separation of the pubic edges in front, with a consequent eversion of the innominate bones.

In conclusion, I would say that this case demonstrates what has been repeatedly shown on the Continent, in Dublin, Glasgow, and elsewhere, that the operation of pubiotomy may be employed with complete success in a suitable case if the requisite precautions be observed. It is interesting to note that the operation is still, so far as one can see, almost if not wholly rejected by the two great obstetric centres, London and Edinburgh. Personally I believe that the utility of the operation is beyond doubt. A factor which above all has conspired in its disfavour has been the unfortunate results attending on its employment in

infected or suspicious cases. The recent literature shows that injury to the bladder and urethra is becoming progressively less and less common.

From some interesting data supplied by an after-study of his cases Whitridge Williams concludes that the operation is especially useful in outlet contractions. Measurements were carried out after the lapse of an interval of time for the purpose of determining what effect, if any, the operation had exerted upon the size of the pelvis. In 16 out of 35 cases the distance between the tubera ischii had become increased following the operation. This increase varied from 1 to 3 cm. and averaged 1.62 cm. In three of the cases pubiotomy was carried out for dystocia in typical funnel pelves, and in them the subsequent increase in the bisischial diameter was from 7 to 8, 7 to 8.5, and 6 to 9 cm. respectively. In some cases there is, in addition, a slight permanent increase in the conjugata vera, but this is not so constant or so marked as the expansion of the outlet.

For these reasons pubiotomy is to be looked upon as the operation of choice in severe dystocia in a funnel pelvis demanding radical interference, for not only does it allow of an easy termination of labour, but in the majority of cases it results in a permanent enlargement of the outlet, with the prospect of subsequent spontaneous deliveries. By its means many narrowed pelves can be transformed into pelves of normal dimensions. Williams considers the operation of especial value in primiparous patients, because by deciding to carry it out if necessary one can await the test of labour.

Whilst there can be little doubt that the rule as formulated in the last paragraph is a useful ideal, it is one which must be subject to many exceptions, determined by the presence or absence of expert skill, etc. It is natural that Whitridge Williams should over-value the advantages of pubiotomy, as he deprecates induction, recognising only one, what may be called mechanical, indication for its use, namely post-maturity of the child. Whilst it may be true that in expert hands excellent results can be obtained in a primipara by the expectant line of treatment, terminated if necessary by pubiotomy, there can be no doubt that, taken all over, the best average results are gained by induction. The maternal risks must dominate the issue in the mind of the medical attendant. Alike from the domestic and the civic standpoint the mother's life is more important than that of the child, and whilst the maternal risks in induction are practically nil, the

mortality from pubiotomy (as also of Cæsarean section in the most suitable cases) is not under 2 or 3 per cent. Any departure from these considerations must be taken only where the mother is prepared to assume the extra risks. Such was the case in the record I have just read.

SECOND CASE.

Induction of Premature Labour.—In the management of this patient I was associated with Dr. Macalister of Forfar. She was a tall well-developed girl of 21, in whom the existence of a pelvic abnormality would scarcely have been suspected. She was first seen by Dr. John Phillips of London, who recognised the existence of the pelvic narrowing and indicated the possibility of an induction of premature labour being necessary. Her menstrual dates pointed to full time being about the 8th October 1911.

The measurements of the pelvis were as follows:—

Interspinous diameter . . .	20 cm. ($8\frac{1}{4}$ ins.).
Intercristal diameter . . .	25 cm. (10 ins.).
External conjugate . . .	18 cm. (7 ins.).
Diagonal conjugate . . .	Promontory could not be felt.
Between the tubera ischii . .	7 cm. ($2\frac{2}{5}$ ins.).
Antero - posterior diameter of outlet	11.5 cm. ($4\frac{1}{2}$ ins.).
Posterior sagittal diameter . .	8 cm. ($3\frac{1}{5}$ ins.).

An examination was made under chloroform on the 2nd September, and it was found by employing the manipulative method described by Munro Kerr that the head descended easily through the pelvic brim. As far as it was possible to say by palpation, the head seemed to be small at this date. The reason for the attempt to gauge the relative size of head and pelvis was based upon the belief that any difficulty in forcing the head through the brim would point, in the presence of the apparently roomy nature of the pelvic inlet, to an unusually large size of head, and this would give a positive indication for interference.

As it was, there was little to guide us in our treatment of the case. With the measurements of the outlet such as I have given them it was considered possible that a spontaneous delivery might occur if the patient were left to full term. As, however, the success or failure of this expectant line of procedure is determined to a large extent by a factor which we have no means of gauging with the least accuracy, namely the absolute size of the head, it

seemed to me that its adoption was associated with a distinct risk. Had the patient been a multipara the possibility of terminating, if necessary, the expectant treatment by pubiotomy, as in the case recorded above, might have been considered. Without further experience I am not prepared to perform pubiotomy in a primipara.

I should like here to emphasise a point to which little or no attention has been called, namely, that whereas it is now fairly easy to determine, by one or other of the methods devised for the purpose of gauging the relative sizes of the pelvic brim and foetal head, when to interfere by induction in a case of contraction of the inlet, we have no such methods to aid us in dealing with outlet deformities.

After consideration, however, of the data such as I have given them above, it was decided that the best results to mother and child would probably be gained by inducing labour, and it was determined to carry this out at the 37th week, the calculations being based on the dates given. This was accordingly done, and a bougie introduced on the 17th September was followed by the birth of the child on the 19th September. The labour lasted from 1.30 A.M. till 4 P.M. on the 19th September. The child was placed in the L. O. A. position, and the birth was normal except for a considerable delay in the pelvic cavity. The employment of forceps was avoided because of the well-known risks associated with instrumental delivery of a premature child. The perineum was uninjured. The recovery of the mother was uneventful. The child was 6 lbs. in weight at birth, and has since developed well in every respect. At the 9th week it was 9 lbs. 6 ozs. in weight. The mother was unable to nurse it, as she had decided to go to India for the Durbar and to leave it behind.

REFERENCES.—¹ *Obstetrics*, 1908, p. 705. ² *Trans. Amer. Gyn. Soc.*, vol. xxxvi. 1911. ³ "Die Geburtshülfliche Bedeutung d. Verengerungen d. Beckenausgangs," Volkmann's *Samml. klin. Vorträge*, No. 169.
