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## THE TECHNIQUE OF SYMPHYSIOTOMY

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In 1958 one of the authors (D.C.)<sup>1</sup> drew attention to the possibility of symphysiotomy offering a solution to special problems arising in labour—especially in Bantu parturients. A most cautious note was sounded at that time, for the experience gained from our first 150 cases was regarded as inadequate to justify mature conclusions or clearly defined advice.

Our continued study over the years, however, enabled us to arrive at a more mature recent appraisal of the technique, indications and limitations of symphysiotomy, based on our experience and analysis of the results achieved in over 500 cases.<sup>2</sup> Yet the 'technique' of symphysiotomy merits more detailed consideration, for our departmental experience of over 1,200 symphysiotomy operations to date has impressed us that strict adherence to essential minutiae in operative technique is a prerequisite to achieving consistently good results.

The results of Hofmeyr<sup>3</sup> and others in Natal of whom we have knowledge could possibly have been improved by preliminary study of an adequate description of the operative procedure, such as that provided most comprehensively to date by Zarate.<sup>4</sup> Indeed, we employed Zarate's method at the beginning of this series, but while analysing complications as they arose over the years, we introduced our own modifications of the 'closed' symphysiotomy technique, which now appear to produce the best results when projected into universal practice. We therefore feel that the ensuing description and illustrations should prove helpful.

## THE SURGICAL ANATOMY OF SYMPHYSIOTOMY

## The Joint

The symphysis pubis is a secondary cartilaginous joint whose articular surfaces are covered with hyaline cartilage and in which the main uniting medium is a disc of fibrocartilage (Fig. 1).

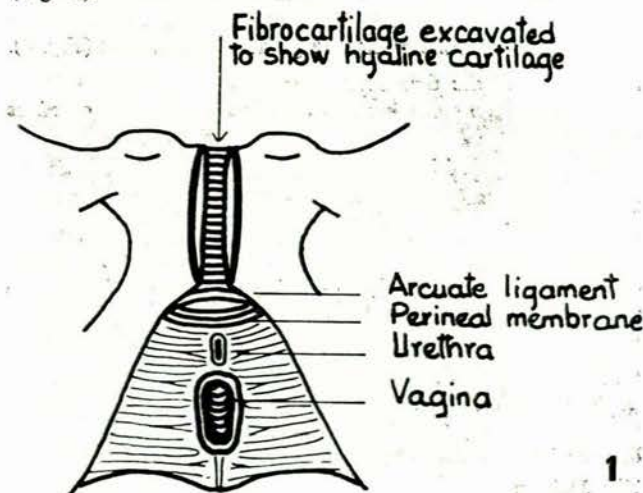


Fig. 1. Diagram of the symphysis pubis.

An important aspect in which our technique differs from that of previous contributors to this field rests in the emphasis which we place on dividing this fibrocartilage cleanly at symphysiotomy without damage to the hyaline cartilage, for in our experience injury to the hyaline cartilage, caused by the dividing knife, predisposes to infection and symphyseal pain in the puerperium. Hyaline cartilage in the depths of the joint is more prone to injury than in the more superficial regions, for the fibrocartilage is narrower behind than in front. It follows that accurate definition of the position of the joint is essential before introduction of the knife. Should doubt

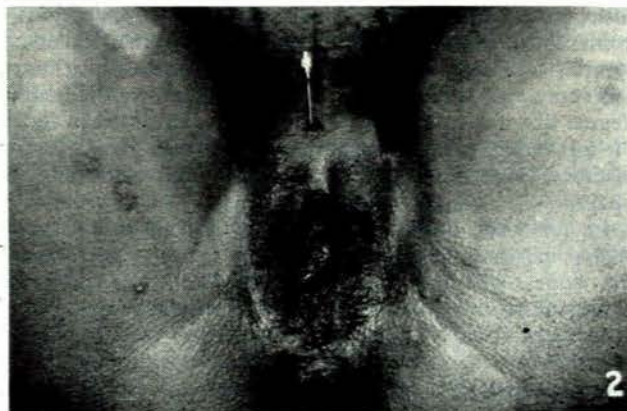


Fig. 2. Hypodermic needle employed to locate the fibrocartilage and to serve as a 'guide-wire' to the incision at symphysiotomy.

exist, our technique of preliminary probing with a needle, which may be left *in situ* as a 'guide wire', is an important aid to the exact location of the joint (Fig. 2).

## The Ligaments

Weak superior and posterior ligaments are reinforced by strong anterior and inferior ligaments. The inferior one, the arcuate ligament, is separated from the perineal membrane by an interval transmitting the dorsal vein of the clitoris.

These ligaments offer minor resistance to a sharp dividing knife, and any difficulty encountered in symphysiotomy is almost certainly due to the knife erroneously encountering hyaline cartilage, for—from a practical standpoint—one can assume that the uninjured joint is never ossified among parturients. This observation is based on our study of the pelvimetries of over 3,000 patients presenting with clinical disproportion.

Postoperative union is by dense fibrosis, but this tends to soften and stretch in subsequent pregnancies and labours.

In front it is impossible to avoid division of anastomotic branches of the external pudendal vessels, but the skin incision should not be made too low, in order to avoid a greater concentration of anastomotic branches in this region. Bleeding is increased by departure from the midline.

On deeper penetration with the knife it is usually impossible to avoid some injury to the vesical venous plexus, but—once again—the danger is increased by divergence from the midline, by unnecessarily deep penetration, and by extending the incision into the perineal membrane, thereby injuring the dorsal vein of the clitoris as it joins the vesical plexus.

Resultant haemorrhage is usually venous and responds to anterior vaginal wall and overlying skin pressure. Even so occasional haematomata develop, but it has never been necessary to re-open the operative area to establish haemostasis.

An occasional superficial arterial twig requires suture in the line of the incision.

#### THE RELATIONSHIP OF SYMPHYSIAL SEPARATION TO PELVIC EXPANSION

In a gynaecoid pelvis every centimetre of symphyseal separation produces an increase of approximately 8% in pelvic brim, cavity, and outlet area; thus the absolute increase in area produced by symphysiotomy is less in a small pelvis than that obtainable in a larger pelvis.

While the increase in area is of overriding importance in most cases, the fact that transverse diameters tend to benefit almost three times as much as antero-posterior diameters assumes importance when pelvises manifest preponderant antero-posterior or transverse contractures.

The expansion produced by symphysiotomy stretches the perineal membrane, which is therefore particularly vulnerable to any further stretching or trauma. Excessive symphyseal separation is harmful to the sacro-iliac joints, and previous authors have therefore tried to define the degree of safe separation which may be permitted in terms of an absolute safe maximum—such as 3.5 cm., for instance, according to Zarate,<sup>4</sup> or 5 cm. according to Spain.<sup>5</sup>

In our view, however, such advice is misleading for it is the 'increase' in separation of the articular surfaces of the bones which governs the expansion and potential danger. Thus a joint may commence with a separation of little more than  $\frac{1}{2}$  cm., permitting a total safe separation of no more than 3 cm. at one extreme; another which commences with a separation of as much as 2 cm. can safely be allowed to expand up to 4 cm. An increase of no more than 2.5 cm. is—in our view—the upper limit of 'increase' of symphyseal separation which is justifiable.

#### OPERATIVE TECHNIQUE AND POSTOPERATIVE CARE

Our operative technique, including modifications of Frank's<sup>6</sup> and Zarate's<sup>4</sup> subcutaneous symphysiotomy technique, is described below.

##### *The Position of the Patient*

The patient is placed in an exaggerated lithotomy position with her buttocks overhanging the edge of the table. Control of the thighs during symphysiotomy is important,

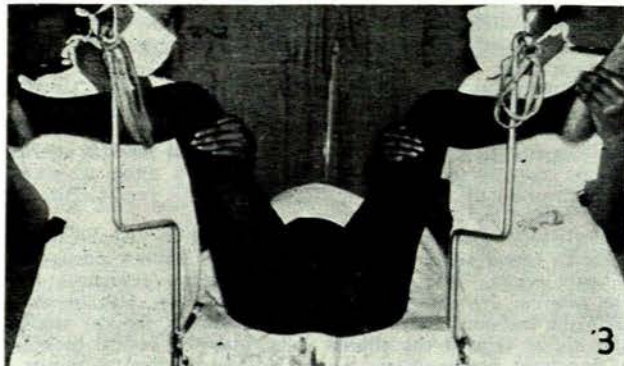


Fig. 3. Assistants support the patient's feet and knees at symphysiotomy and avoid abduction of the thighs beyond an intervening angle of 80°.

for complications ensue readily from incorrect control. Two assistants support the patient's feet in their hands, with the patient's knees and thighs resting against their chests (Fig. 3). The angle between the thighs should not exceed 80°, and further abduction from this original starting point should be resisted. Thus the thighs should not be abducted in an attempt to gain further separation—this should be attained by further division of uncut ligaments if required. In rare cases in which difficulty is experienced in locating the joint despite the use of our technique of preliminary probing with a needle, some help may be gained by temporary abduction of the thighs. With crowning of the head the thighs should be adducted, thus relieving tension on the perineal membrane.

After delivery, and upon completion of such subsequent operative procedures as are necessary, the assistants approximate and lower the patient's legs before strapping her knees together for two days. In the ward the patient

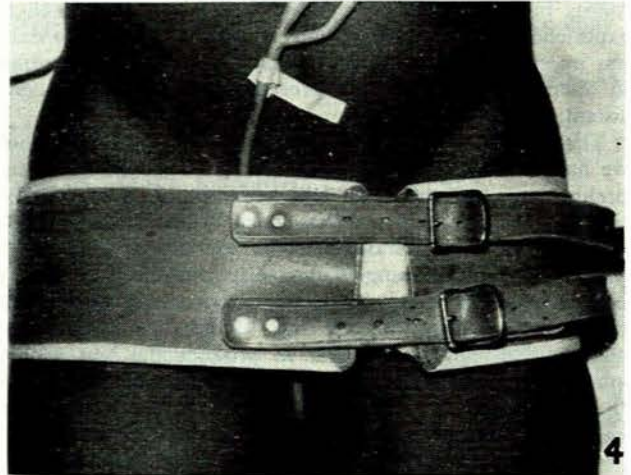


Fig. 4. A leather belt encircling the trochanters adds to the patient's self-confidence during the phase of early postoperative ambulation.

is nursed on her side for a couple of days, and she derives much subsequent comfort from the wearing of an 8-inch-wide leather belt encircling the greater trochanters (Fig. 4).

##### *Preparation of the Operative Area*

Very thorough cleansing and asepsis are essential to reduce the possibility of infection of the urinary and genital tracts or of osteitis pubis. After draping the patient, a No. 6 Jacques catheter is inserted and left in the urethra. The skin overlying the symphysis pubis is infiltrated with 0.5% lignocaine; about 2 ml. suffices. The infiltration is continued down to the symphysis, and in cases where the actual joint space is not readily identified (either before or after infiltration) a needle may be used as a probe to identify the joint, and may be left *in situ* as a guide wire. The perineum is also infiltrated in the line of the proposed episiotomy, but a formal pudendal block is avoided, since this tends to abolish the pelvic-floor reflex and thereby inhibits bearing-down efforts.

The catheter and urethra are now displaced laterally by the index and middle fingers of the left hand (for a right-handed surgeon). The index finger should identify and lie directly beneath the symphyseal joint (Fig. 5).

##### *The Incision*

A solid-bladed scalpel (Glaxo-Allenbury, bistoury knife

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Fig. 5. The index and middle fingers displace the urethra and bladder-neck laterally and palpate the posterior aspect of the symphysis during symphysiotomy.  
Figs. 6 and 7. Alternative methods of holding the knife for symphysiotomy.

No. 14554) should be employed, and alternative methods of holding the scalpel are shown in Figs. 6 and 7.

The scalpel is inserted through the skin overlying the symphysis pubis to enter the joint in the midline at the junction of its upper and middle thirds. The blade traverses the joint until the point is felt impinging upon the depths of the vaginal epithelium by the underlying index finger of the other hand—careful control of depth being important. The upper third of the uncut symphysis is then used as a fulcrum against which the scalpel is levered to incise the lower two-thirds of the symphysis and overlying ligaments, including the arcuate ligament. Incisions are made by repetitive pivoting movements—the blade of the scalpel being advanced as required. After the desired transection has been achieved, the scalpel is returned to the vertical position and rotated through 180° (without withdrawing the blade from the joint) to permit incision of the remaining upper portion of the symphysis pubis with its overlying ligamentous supports.

An alternative method of dividing the upper part of the symphysis and any remaining fibres is to reintroduce the scalpel with its cutting edge facing downwards, and point at the top of the symphysis. The remainder of the joint and ligaments is then incised in a downward and backward direction by firm controlled pressure.

We cut through all the fibres of the joint and the arcuate ligament in most instances, but carefully preserve the triangular ligament. A separation of about 2.5 cm. usually ensues, and this is best gauged by being able to insert a thumb into the divided joint. If further separation is desired this should be attained by further division of uncut ligaments, and the temptation to abduct the thighs to gain separation should be resisted to avoid unnecessary complications.

#### Mode of Delivery of the Foetus

When the cervix is fully or almost fully dilated, the foetal head often descends very rapidly after symphysiotomy, endangering the flimsy remaining supports of the urethra. Consequently the woman should be instructed not to bear down with contractions until such additional carefully controlled force is found to be necessary, and an extensive episiotomy is performed irrespective of the apparent laxity of the perineum. Furthermore, the mode of delivery of the shoulders has to be modified to avoid tension on the vulnerable vestibular region; the baby must not be swept forward when the anterior shoulder appears beneath the vestibule, but must be extracted in the line of its descent. Obstetric forceps—especially rotation with Kielland's forceps—are avoided as being potentially injurious to the vulnerable bladder neck and urethra, and their supports. A ventouse extractor may be employed if required.

After delivery the divided symphysis is compressed between the thumb and index and middle fingers for a couple of minutes to express clots and promote haemostasis. Lacerations of the vagina and cervix are excluded by inspection, and the integrity of the uterus is established by manual exploration in all cases. The episiotomy is then repaired and the symphysiotomy skin incision is closed with a single stitch.

#### Postoperative Care

A Foley's catheter (size 14 Charriere with 5 ml. bulb) is inserted immediately, and 'closed-circuit' continuous urinary drainage is effected for five days. Strict asepsis with sulphonamide or appropriate antibiotic cover is essential.

The assistants approximate and lower the patient's legs, and her knees are strapped together for two days. In the ward the patient is nursed on her side for a couple of days, and is given the 8-inch-wide leather belt encircling the greater trochanters, as described earlier (Fig. 4). This usually helps her considerably.

On the third day the catheter is removed and the patient is encouraged to sit out of bed. Care is taken to check on the possibility of residual urinary infection and special attention is paid to its efficient ablation, if present. Ambulation should commence the following day with the aid of a walking-stick tipped with rubber, and the support of the leather belt. Normal ambulation is usually achieved by the tenth day, when the leather belt can be discarded. A final check is made on the patient's gait, and evidence of osteitis pubis or sacro-iliac strain is excluded before discharge on the 14th day, with advice to avoid lifting heavy weights and to refrain from undertaking undue muscular exertion for another month.

#### COMPLICATIONS OF SYMPHYSIOTOMY

##### Urinary Tract Complications

Infection of the urinary tract with *E. coli* and proteus organisms is exceedingly common, but the pyrexia usually settles within 48 hours of removal of the catheter. Greater attention to asepsis during the insertion of the catheter and more careful management of the indwelling catheter and its drainage system should reduce the frequency of this complication. Eight-hourly chlorhexidine (1/5,000) bladder lavage adds further to the safety measures.

Haematuria is not at all infrequent in the immediate postoperative phase, but its nature is usually trivial and transitory. More pronounced haematuria has been observed on a few occasions and—in retrospect—this was probably consequent upon inadvertent incision of the bladder wall with the dividing knife at symphysiotomy. All such cases responded to continuous drainage and keeping the bladder free of clots.

In our series of over 1,200 symphysiotomies to date, four

patients have developed vesico-vaginal fistulae and 12 severe vestibular tears, some of which have involved the urethra. All of these have been repaired successfully as primary or secondary procedures with full restoration of urinary continence. These injuries were preventable and were consequent upon the following lapses: uncontrolled delivery of the head; failure to bring the patient's thighs together at the time of crowning of the head; employing the vulnerable vestibular area either as a fulcrum for the anterior shoulder to facilitate delivery of the posterior shoulder, or as a fulcrum for the foetal occiput during delivery of the after-coming head of a breech presentation with a Mauriceau-Smellie-Veit manoeuvre; or the injudicious use of forceps.

In the light of our experience the dangers of stress incontinence following symphysiotomy appear to have been exaggerated in previous publications. Possibly the low incidence of stress incontinence in our patients is due to our operative technique and postoperative care, but an additional factor may lie in our Bantu patients having a better measure of urinary control than their European sisters. Thus in 505 cases previously reported, any stress that occurred was only temporary and responded to conservative measures.<sup>2</sup>

#### *Impaired Uterine Action*

Occasionally ineffective uterine action follows symphysiotomy. Whereas such a secondary impairment of uterine action following symphysiotomy always responds to oxytocin infusion, it is worth emphasizing—in passing—that good uterine action, or the ability of impaired uterine action to respond to oxytocin infusion, must be clearly ascertained before symphysiotomy is performed.

The incidence of postpartum haemorrhage is high, and uterine atonicity was responsible for this in 77% of our first 505 cases.<sup>2</sup> Intravenous ergometrine should therefore be administered with the birth of the anterior shoulder, and intravenous infusion of dextrose in water containing 10 units of 'syntocin' should be continued for an hour after delivery.

#### *Traumatic Postpartum Haemorrhage*

The episiotomy or associated vaginal tears are responsible for about one-quarter of the remaining cases of postpartum haemorrhage following symphysiotomy, in our experience. Haemorrhage from an extensive episiotomy can be reduced by applying and maintaining a pair of sponge-holding forceps on either side of the line of the proposed incision.

Haemorrhage not infrequently occurred from the skin incision overlying the symphysiotomy site, but this is usually venous in origin and controllable by pressure in front of and behind the pubic symphysis. Occasionally haemostatic skin sutures are required as soon as the joint has been divided.

Our experience to date also includes the complications of haemorrhage occurring from a uterus which was actually incised owing to insufficient care in dividing the symphysis.

#### *Failed or Incomplete Symphysiotomy*

In the early phase of our investigation of symphysiotomy

the surgeons failed to locate the fibrocartilage in three instances. We have subsequently overcome this difficulty by preliminary location of the fibrocartilage with the hypodermic needle employed for skin infiltration.

Inadequate separation is not uncommon, but it is easily rectified by reintroduction of the scalpel into the joint and division of ligamentous remnants which prevent complete separation—these are usually superior and posterior fibres. We regard it as important to repeat our condemnation of achieving further separation by forceful abduction of the thighs, for this not only puts unnecessary strain on the hip joints, producing tremendous leverage (in one case this actually led to the fracture of the superior pubic ramus), but also tends to permit uncontrolled springing open of the symphysis with possible attendant damage to the soft tissues and an unpleasant cracking noise.

#### *Retropubic Haematoma and/or Sepsis*

The opportunity of examining the retropubic area at caesarean section immediately after symphysiotomy presented itself in a few instances in the early phase of this project—at a stage before we<sup>2</sup> had been able to evolve strict indications and limitations for the operation, and were adhering to Zarate's<sup>4</sup> method. The fact that haematoma formation in the retropubic area was clearly visible in each instance lent support to our impression that some degree of haematoma formation is inevitable after symphysiotomy, but this appears to be self-limiting following Zarate's or our method of symphysiotomy and never requires operative interference to achieve haemostasis. In the single instance in which an 'open' method of symphysiotomy was employed at the outset of this study, however, subsequent retropubic infection required drainage.

On the other hand, in view of our impression that the incidence of postoperative pain and delayed ambulation is in some measure proportionate to the degree of haematoma formation, attempts to avoid unnecessary haemorrhage by adhering strictly to the midline and avoiding injudicious depth of the incision are of importance no less than is the precautionary haemostatic measure of compressing the symphyseal area for a few minutes after delivery as previously described. Zarate's method of tearing the ligamentous remnants at symphysiotomy did not appear to offer safeguards in practice, over and above our own, in avoiding haematoma formation, despite Zarate's theoretical claims in this connection.

Injuries to the bladder or urethra predispose to more extensive haematoma formation and/or sepsis. Such avoidable complications are consequent upon injudicious depth of the incision and failure to push the juxta-urethral portion of the bladder well aside, in addition to the urethra, during the symphysiotomy incision. These injuries usually declare themselves at the outset by haematuria, and render it advisable to postpone the removal of the self-retaining catheter until the eighth puerperal day.

#### *Delayed Ambulation and Pain*

Ambulation can usually begin on the fifth postoperative day as previously described, and recently has been achieved by many patients on the third postoperative day,

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but retropubic haematoma and/or sepsis, or undue symphyseal separation at symphysiotomy may contribute to delayed ambulation, and to pubic or suprapubic pain. Continued rest on a hard bed, local shortwave diathermy, and a well-fitting supporting belt speed return to normal ambulation.

Relapses in ambulation occasionally result from trauma (e.g. falling down) or premature weight-bearing, but once again these complications respond to the aforementioned conservative measures.

The careful avoidance of undue separation in our method of symphysiotomy may have been responsible for the infrequency of the complication of sacro-iliac pain or backache, but temporary pain in the symphyseal area was not uncommon during convalescence. Pain in the hips—while also responding to this treatment—was occasionally slower to vanish than the other forms of pain which have been described.

#### *Osteitis Pubis*

Whereas radiographs of the pelvic area were occasionally diagnosed as osteitis pubis by the radiological staff, we were often more inclined to regard the radiological appearances as being those of extensive hyperaemic decalcification. The speedy response to treatment of these patients lent support to our view, and we were impressed that the pubic bones appeared to be far more resistant to infection than we had anticipated.

The most recalcitrant patients appeared to be those in whom there had been a complete or incomplete severance of a portion of hyaline cartilage at symphysiotomy, and the importance of adhering strictly to the midline has already been emphasized. Another avoidable complication—that of extravasation of urine—is also a pre-

disposing factor which may occur more frequently than is appreciated. These patients are probably those in whom a minor degree of retro- and infrapubic calcification was visible when radiographs were taken some time later.

#### SUMMARY AND CONCLUSIONS

We describe our technique of symphysiotomy in this paper. This has evolved gradually, being moulded by most thorough examination of all possible avoidable factors, attending complications as they arose during more than 1,200 symphysiotomies performed in our department to date.

Special consideration is given to the complications which may follow symphysiotomy, and to the precautions required in their prevention.

Those proposing to undertake symphysiotomy are urged to pay attention not only to the minutiae of the technique of symphysiotomy described herein, but also to the indications and limitations of the operation, which have been described elsewhere.<sup>2</sup>

This publication is in large measure a reflection of the pooled experience of the Obstetric and Gynaecological staff of King Edward VIII and McCord Zulu Hospitals, to whom we wish to express our indebtedness.

Special thanks are also due to Prof. E. N. Keen, Mr. J. Fogel, and Dr. Alan B. Taylor for their help, and to Dr. T. M. Adnams, Superintendent of King Edward VIII Hospital, for access to the case histories of many patients required for this publication.

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