

EPISIOTOMY AS A MEANS OF PRESERVING

THE PELVIC FLOOR DURING LABOR, WITH A SIMPLE METHOD OF SUTURE*

R. A. D. GILLIS, M.D.

PITTSBURGH, PA.

ANATOMY OF THE PELVIC FLOOR

THE pelvic floor or pelvic diaphragm is a muscle-fibrous partition which closes in the abdominal cavity inferiorly. It closes the space known as the pelvic outlet or inferior strait, which is an oval space bounded anteriorly by the symphysis pubis, posteriorly by the top of the sacrum and coccyx, and laterally on either side by the rami of the pubes and ischia and the great sacrosciatic ligaments. Just as the abdominal cavity is separated from the thorax by a muscle-fibrous diaphragm, which is pierced by apertures for esophagus, aorta, and vena cava, so is the pelvic outlet closed by a similar diaphragm which is also pierced by three apertures for the passage of the urethra, vagina and rectum. To these three structures, as well as to the bladder, uterus and adnexa above them, the pelvic diaphragm forms the main support and by its integrity prevents bulging, herniation or prolapse of the pelvic and abdominal viscera.

During parturition, however, as the child passes through the vagina, the structures of the pelvic floor are subjected to a great amount of stretching and stress, which in the majority of cases it seems unable to withstand, and which results in more or less separation of its attachments, tearing of its fascia or rupture of its muscular fibers. As soon as the structures are torn the ends separate, forming a gap similar to that which takes place in the severance of a tendon or muscle elsewhere. This results in relaxation or sagging of the pelvic diaphragm with consequent displacement, prolapse or herniation of the organs to which it

gives support and relative amount of disability to the patient, depending on the temperament of the patient, the extent of the damage done and the skill with which it has been repaired.

In order to better indicate the structures involved and the changes which occur as a result of injury during delivery, the following facts concerning the anatomy of the pelvic floor or diaphragm should be kept in mind. This properly includes all the structures which close in the pelvic outlet from the peritoneum above, to the skin below. It consists of two distinct layers of muscles and their fascial coverings.

The inferior layer, derived from the primitive cloaca, includes the deep and superficial transverse perineal muscles, the bulbocavernosus, the ischiocavernosus, and the constrictor urethrae. These muscles are for the most part sphincters in action and have little or no supporting function.

The upper layer forms a broad sheet of muscle and fascia consisting of the levatores and the ischiococcygeus muscles on either side, the latter forming the posterior portion of the pelvic diaphragm while the levator ani forms the remaining lateral and anterior portions, except for a short space on the posterior aspect of the symphysis pubis, which is closed in by the triangular ligament. The levator ani is composed of two separate muscles. The external muscle, the iliococcygeus, arises from the rami of the pubis and the pelvic fascia of the white line as far back as the margin of the great sacrosciatic notch. Its fibers are inserted into the sacrum, coccyx, and anococcygeal raphe. The fibers pass from the two sides and decussate

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with one another in the space between the anus and coccyx. The internal portion of the levator, the pubococcygeus, arises

of the vagina posteriorly and is the portion subjected to the greatest amount of stretching and strain during labor. (Fig.

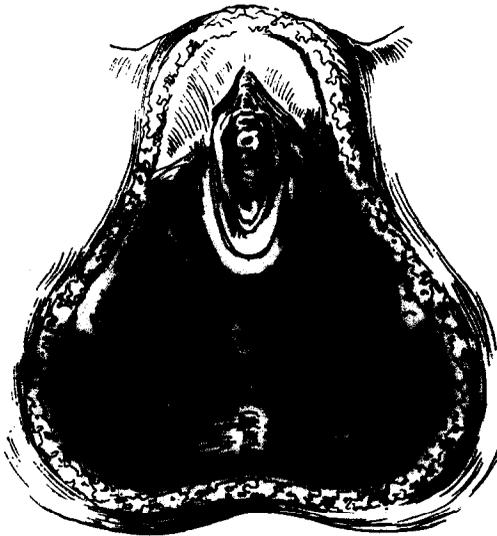


FIG. 1. Showing deep dissection of pelvic diaphragm with horseshoe-shaped margin of levator ani muscle with decussation of anterior fibers in perineal body (fibers of Luschka). Cut edge of rectovesical fascia as it rounds anterior free border of muscle to fuse with anal fascia (which has been removed), is seen. (Redrawn after Kelly.)

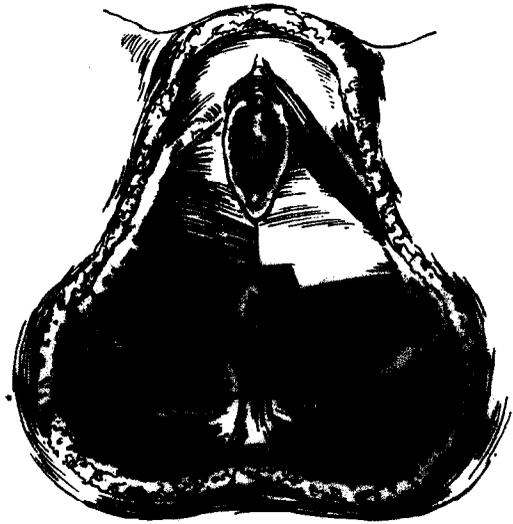


FIG. 2. Urogenital trigone or triangular ligament closing in pelvic outlet anteriorly and pierced by vagina and urethra. (Redrawn after Kelly.)

from the fascia on the back of the symphysis pubis, the pubic rami and from the obturator fascia. The outer and upper third is attached to the sacrum and coccyx; the middle portion, the puborectalis, decussates with its fellow of the opposite side to form a sphincter which slings the rectum to the symphysis pubis and is that portion of the levator most effective in lifting the rectum; the muscle fibers of the innermost third pass behind the vagina without insertion into the vaginal wall to join the longitudinal fibers of the rectum and the external sphincter ani, partly by direct union and partly by decussation with fibers from the opposite side in the space separating the anterior surface of the rectum from the posterior surface of the vagina—the so-called median raphe of the perineum, the muscle-tendinous spot or the central body of the perineum, etc. This internal portion of the levator ani forms, with its fellow of the opposite side, a sling for or constrictor

1.) Injury to the fascia and muscle in this location results in many cases from the overstretching incident to even natural labor and may result in separation of its attachments to the median raphe and rectum, with diastasis, sagging of the anterior rectal wall, and the later development of rectocele.

The levator muscle is covered by fascia, the upper surface by the rectovesical fascia, fascia supradiaphragmatica, or the visceral layer of pelvic fascia which completely closes in the pelvic canal except for the openings of the urethra, vagina and rectum. The lower surface is covered by the anal fascia, or fascia infradiaphragmatica, forming the inner wall of the ischio-rectal fossa and blending with the perineal and anococcygeal raphes. At the free border of the levator ani muscle, as it encircles the vagina laterally and posteriorly, the upper rectovesical layer fuses with the lower anal layer. This forms a fascial sling between the rectum and vagina and as has already been stated, this is the portion subjected to the greatest stress and strain during labor and when

injured is directly concerned with the formation of rectocele.

Closing in the open space between the pubic rami and the inner border of the levator bundles is the urogenital trigone or triangular ligament. It is composed of two strong fascial layers attached in front and at the sides to the pubis and ischiopubic rami as far back as the ischial tuberosities. Posteriorly and laterally it lies below and overlaps the levator muscle and its fascia. Its upper layer blends with the lower layer of the levator fascia. Between the two layers of the triangular ligament, lie the deep transverse perineal and the constrictor urethrae muscles. The urogenital trigone is pierced by the urethra and vagina, to both of which, as well as to the bladder and uterus above them, it gives considerable support, supplementing that of the rectovesical fascia above. Overstretching and laceration of the triangular ligament promote relaxation of the anterior segment of the pelvic floor with the formation of cystocele, urethrocele and prolapse of the anterior vaginal wall. (Fig. 2.)

INJURIES TO THE PELVIC FLOOR FROM PARTURITION

For practical purposes therefore as may be seen from the foregoing description, the structures of the pelvic floor may be arbitrarily divided into two segments; an anterior segment closing in the triangular area between the pubic rami composed from above downward of the anterior half of the rectovesical fascia and below the double layer of the triangular ligament; and a posterior segment composed chiefly of the levator ani muscle and the fascia covering its upper and lower surfaces. As the shape and dimensions of the pelvic outlet are subject to wide variations so are these two segments of the pelvic floor subjected to widely different amounts of strain and damage. While in a general way, this may be considered to depend on several factors, such as the size of the child, the

age of the gravida, the elasticity of the soft parts, the amount of scar tissue from previous repairs and the presence or absence of edema of the parts, the two most important factors to be considered are firstly the size of the baby's head and secondly the width of the pubic arch and the transverse diameter of the pelvic outlet. On the one hand, when the pubic arch is wide and the distance between the tubera ischi greater than 8 cm. the presenting parts fit up well between the pubic rami and closely under the symphysis, causing the anterior segment of the pelvic floor to be subjected to the greater amount of stretching and possible injury, with the subsequent development of cystocele, urethrocele, and prolapse of the anterior vaginal wall and bladder; whereas, on the other hand, when the pubic arch is narrow and the transverse diameter of the outlet contracted to less than 8 cm. as is found in the so-called funnel type of pelvis, the presenting part is displaced posteriorly and delivery then takes place more at the expense of the posterior segment of the pelvic floor. In this instance one would expect a greater incidence of injury to the sling of the pubococcygeus bundle of the levator and muscle and its fascia with the subsequent formation of rectocele and furthermore rupture posteriorly of the perineal body, vaginal sulci and occasionally the external sphincter ani and rectal wall.

Tissue reaction to stretching and strain depends to a great extent on the length of time allowed for the stretching to occur, or in other words on the rapidity or slowness with which the force is applied. That the tissues of the modern woman do not well withstand the tension and stretching incident to the average normal labor and that injuries to the pelvic soft parts occur in the great majority of so-called normal labors is a well-known fact. How much greater must they be, however, when the amount of the force is greatly increased in intensity and applied and exerted with an unnatural suddenness

which does not allow the tissues time to stretch as obtains in too rapid delivery with strong bearing down effort on the part of the patient without the relaxation of anesthesia, too rapid manual dilatation or breech extraction, the misuse of pituitrin to hasten delivery and the unnecessary and unskilled use of forceps, especially when they are used to rotate the head from a posterior or transverse to an anterior position. This may result in stripping the levator from its attachments to the pelvic wall or in deep sulcus tears, occasionally laying open the ischioanal fossa, the fatty tissue of which can be seen in the rent on the side subjected to the greatest amount of strain by rotation. Williams¹ states that injuries to the perineum are of very frequent occurrence, and cannot always be avoided even under the most skillful treatment. Statements as to their frequency vary considerably from those of the physician who has not had a single tear in a 1000 cases, to those who find more or less damage in more than 75 per cent of their primiparous labors. In the former case one would class the attendant as a rather poor observer, because as estimated by Williams,¹ lacerations occur in about 40 per cent of primiparous labors and in about 10 per cent of multiparous labors. These figures undoubtedly are given for lacerations characterized by open wounds where the vaginal mucous membrane or skin is torn along with the underlying structures. Such a laceration is easily recognized and in the majority of cases can be satisfactorily sutured. Much less fortunate are those patients in whom the vaginal integument and skin are not torn but in whom there have been submucous lacerations of the deeper structures of the pelvic floor or separation of the attachments of the levator to the median raphe and rectum. It is impossible to recognize such an injury at the time of labor and these patients are discharged with relaxed supports to the pelvic viscera, greatly enlarged vagina with loose sagging walls and a

relaxed, gaping introitus. Moreover laceration of the anterior segment of the pelvic floor including rectovesical fascia and the triangular ligament with the formation of cystocele is a more or less irreparable injury in a young woman and if repaired is likely to recur during subsequent delivery.

SCOPE OF EPISIOTOMY IN PREVENTION OF INJURY

To discharge a patient at the end of the puerperium as well as she was before she became pregnant is the supreme test of the competent obstetric practice and the only one by which our work should be judged. This well-being or fitness applies as well to the integrity of the perineum and pelvic floor, the size of the vagina and the proper supports of the pelvic organs as to the general constitutional health of the mother and child. That this is not accomplished and that the methods of preventing lacerations, and guarding the perineum described in textbooks are inadequate is mutely but forcibly testified to by the large number of women who flock to the gynecological clinics of the country for the repair of injuries incurred at childbirth and who state as the most significant fact in the history of their disability, that they have never been well since the birth of one of their children.

Kelly² states that "any considerable injury to the perineum means a laceration of the perineal fascias deep and superficial, the urogenital diaphragm, the levator fascia, and the anterior fibers of the pubococcygeus bundle of the levator ani muscles with consequent retraction of the muscle and separation of the torn ends. In the laceration of long standing there is always atrophy of disease." Pomeroy³ states:

Every primipara incurs a permanent modification of the pelvic floor in the course of a full-term delivery. In a high percentage of cases this is represented by an open lacerated wound and in nearly all of the others concealed damage to the levator ani muscles and fascia

is acknowledged to occur and to be the factor paramount in the various degrees of subsequent prolapsus uteri, cystocele and rectocele. We, as gynecologists, are devoting years of thought and ingenious labor to planning and executing operations for the repairs of injuries due to childbirth; but so far obstetricians have not faced and accepted a reasonable responsibility for the discovery of a plan to prevent, by sound surgical procedures serious birth divulsion damage to the structures of the pelvic floor. The general attitude toward saving the perineum in the second stage of labor as advocated by textbooks of obstetrics is that little can be done except encouraging gradual dilatation by the avoidance of precipitate expulsion or too rapid extraction in unfavorable positions.

Pomeroy⁴ concurs with others in the idea that: "Rending the birth canal to enlarge its caliber is strictly unsurgical." In no other phase of the practice of medicine or surgery are tissues allowed to be bruised, overstretched and rent apart as they are in childbirth, when the same end can be more easily and directly accomplished and more in keeping with surgical principles by cutting the tissues before tearing or divulsion occurs. This may be well accomplished by the operations of episiotomy or perineotomy which is an incision of the posterior vaginal wall and the structures of the perineum and pelvic floor and the restoration of the parts to an integrity similar to that of the nulliparous state after suturing, which is easily performed in a clean-cut, superficial wound. That it accomplishes this end in the majority of cases may be deduced from the description of the anatomy and relations of the structures involved. If the incision is made deeply enough and at the proper time, when the vaginal orifice is dilated to a diameter of about 4 cm. and when the structures of the pelvic floor and perineum, including the sphincter ani, have been well stretched and not overstretched, the incision will sever the following structures, namely, the vaginal mucosa, the united free border of the rectovesical and anal fascias, the

innermost and shortest portion of the pubococcygeus bundle of the levator muscle, especially where it decussates in the space between the rectum and vagina, the posterior portion of the triangular ligament, the superficial perineal muscles, the superficial fascia or fascia of Colles, and the skin. The incision may be made in the midline as in median episiotomy or laterally or bilaterally as in oblique, lateral or bilateral episiotomy. The median incision is to be preferred in the majority of cases because it passes through the stronger instead of the weaker structures, relieves tension symmetrically, and provides more ideal conditions for symmetrical reconstruction by suture. The only assailable point in the claim for superiority of the median incision is the risk of injury to the sphincter ani and of extension backward through the anal and rectal wall. This risk can be greatly minimized by having the anal sphincter thoroughly stretched and paralyzed before making the incision, or when in doubt, as in cases of funnel pelvis or when the child is disproportionately large, by using oblique incision. A relaxed sphincter cut in the midline is usually quite accessible for repair, easily sutured and heals promptly. Episiotomy, by cutting these structures either in the midline by median episiotomy or laterally by cutting through the belly of the muscle on one or both sides as in oblique, lateral or bilateral episiotomy, greatly diminishes the tension on the deeper structures of both the anterior and posterior segments of the pelvic floor, prevents submucous and subcutaneous lacerations and when properly sutured, restores the parts in the majority of cases to their original state.

REVIEW OF CASES

In a review of the last 500 consecutive cases of median episiotomy performed by the writer, primary healing of the wound and a satisfactory end-result were obtained in all cases. In the majority of them the integrity of the pelvic floor seemed

intact while in a small number there were slight or moderate degrees of relaxation of either the anterior or posterior segments.

external sphincter and stretching of the rectal wall before making the incision and also by diverting the incision to one or the



FIG. 3. Median episiotomy wound with sutures buried deeply into retracted severed attachments of levator ani muscle, rectovesical and anal fascias and urogenital trigone.

Six cases showed superficial infections or stitch abscess which did not in any way mar the end-result. Febrile puerperia occurred in 65 cases, 41 of which were attributable to incidental or intercurrent causes as bronchitis, mastitis pyelitis, etc. This gives a total morbidity from all causes of 13 per cent and a corrected morbidity of 4.8 per cent. Considering infection of the wound alone as a cause of morbidity, there were 6 infected wounds in all or 1.2 per cent.

There were 9 cases of bilateral extension up the vaginal sulci and 9 cases of unilateral extension. The majority of these occurred in forceps deliveries either before or after the incision of the perineum. The anterior fibers of external sphincter ani were cut or injured in 15 cases. Extension through the external sphincter occurred in 16 cases and extension through the sphincter and involving the anal margin or rectal wall in 8 cases or 1.6 per cent. With more attention to preliminary dilatation of the

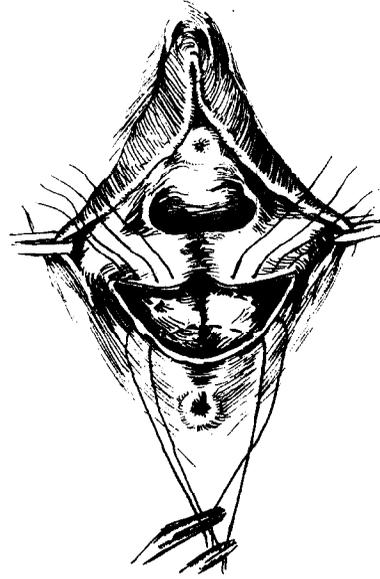


FIG. 4. Vaginal mucosa and underlying fascia closed with interrupted catgut sutures.

other side when extension backward seems imminent, the incidence of sphincter injuries and complete tears can be reduced.

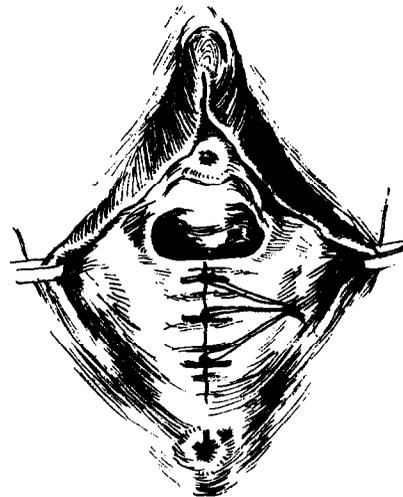


Fig. 5. Skin, superficial fascia and muscles closed with moderately deep silkworm gut sutures.

Where the pubic arch is narrow and the child of considerable size, or when there is edema of the vulva and perineum, it is safer to make an oblique incision one

side of the sphincter ani. Four of the cases with third degree tears had febrile puerperia and one a non-hemolytical streptococcus septicemia, but all healed primarily and in the end made good recoveries. There were 6 cases of phlebitis, 4 of which had pulmonary infarction. There were no deaths in the series.

Old lacerations were repaired through the episiotomy wound in 67 cases, second episiotomy on the same patient at a subsequent delivery in 75 cases, 3 episiotomies on the same patient in 11 cases and 4 episiotomies with same patient in 4 cases. Four patients complained of tenderness in the region of the perineum for several months after delivery but otherwise the results seemed almost uniformly good.

A SIMPLE TECHNIC FOR REPAIR

The wound is usually sutured immediately after delivery of the child while the patient is still anesthetized and before separation of the placenta has taken place. No ill effects from delivery of the placenta after the sutures have been placed and tied have been noted.

The introitus is retracted on either side by a Gelpi retractor or tenacula or sutures held by an assistant. Two or three sutures of twenty-day catgut are then placed deeply in the tissues of the deeper plane which should include the severed attach-

ments of the levator bundles with its fascia and urogenital trigone. The sutures are inserted deeply to bring back the structures, which have retracted as a result of their own elasticity, and are introduced at right angles to the course of the muscle fibers and fascial planes. (Fig. 3.) The sutures are clamped and left long to facilitate closure of the vaginal mucosa. This is done with interrupted or submucous catgut sutures including the fascial plane beneath the mucosa. (Fig. 4) The deep buried sutures are then tied and the skin of the superficial muscles and fascia are closed with interrupted silkworm gut. (Fig. 5.)

CONCLUSIONS

1. More or less damage to the pelvic floor is caused by delivery in the majority of women.
2. Episiotomy affords an efficient means of lessening the extent and ill effects of this damage.
3. In the proper environment, episiotomy does not seem to increase the morbidity or risk of delivery.

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