Anatomy of the Perineal Body*

CHANGYUL OH, M.D.,† ALLAN E. KARK, M.D.‡

From the Department of Surgery, Mount Sinai School of Medicine of the City University of New York, New York, New York

THIS REPORT is a continuation of a previous study of the anatomy of the external anal sphincter.[9] The perineal body occupies the space between the posterior membranous urethra and anterior anorectal junction in the male and between the posterior wall of the vagina and anorectal junction in the female. This area is of crucial importance to the urologist, proctologist, and surgeon alike for various types of perineal surgery: abdominoperineal resection, perineal prostatectomy, pull-through procedures, repair of urethrorectal fistula, etc. Urologic complications following perineal surgery, such as urethral stricture, urethroperineal fistula, and urinary difficulty or incontinence, particularly in patients who have undergone abdominoperineal resection[12] and perineal prostatectomy,[5] are frequently seen.

Therefore, it is important to clarify the detailed anatomy of the perineal body, particularly the complex relationships in the male.

Method

Forty-six specimens were examined in this study: 21 female and 25 male. The sources of the material varied: eight specimens were from cadaveric kidney donors, four were from infants, and the rest were necropsy specimens from adult patients dying of conditions unrelated to the anorectum.

Anatomic dissection was performed in three-dimensional planes in conjunction with histologic sections. The perineal region is not easy to dissect anatomically, even with the aid of an underwater technic and a loop magnifier.[9] Therefore, these studies were supplemented at each stage with histologic sections in the coronal, sagittal and horizontal planes.

Present Study

Perineal Body in the Male: In Order to understand the details of our anatomic findings, we first provide a broad outline of the boundaries which we consider best describe this area.

The perineal body is a bridge which extends laterally between the borders of the puborectalis muscle, an anterior portion of the levator muscle. It is rectangular in shape, but this may vary and it may appear wedge-shaped, depending on the degree of fixation in the cadaver. In the posteroanterior direction it connects the anorectal junction to the posterior membranous urethra above and the bulbocavernosus below. The superior boundary is the converging layer of Denonvillier's fascia, and the lower limit is the superoanterior portion of the deep external sphincter (Figs. 1 and 2).

On midsagittal section of the perineum, the following muscles or fascial planes are intimately related to the perineal body from above downwards (Fig. 2). Denonvillier's fascia is the uppermost structure; it curves anteriorly to the undersurface of the posterior lobe of the prostate and inserts into the

† Assistant Professor.

‡ Chairman and Franz W. Sichel Professor.

* Read at the meeting of the American Proctologic Society, New York, New York, June 11 to 14, 1972.

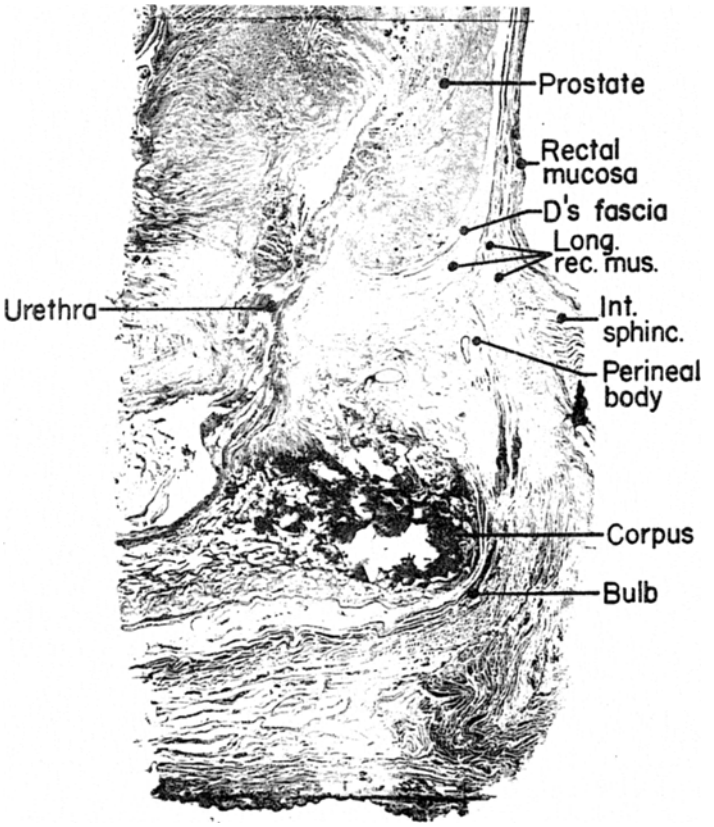


FIG. 1. Midsagittal section of the anterior anorectal junction. The composition of the perineal body is well illustrated, along with protruding fibers of internal sphincter extending into the rectourethral muscle. Most of the anal sphincters are missing in this section.

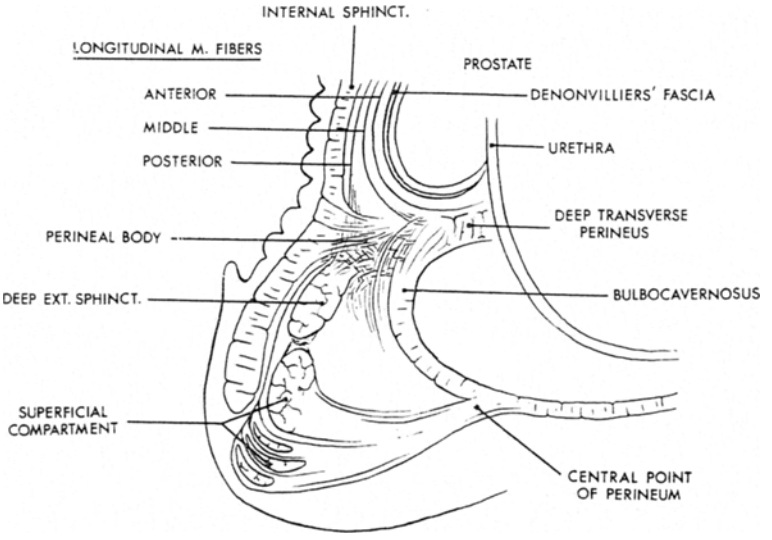


FIG. 2. Semidiagrammatic drawing of Figure 1, showing the relationship between the perineal body and associated structures, particularly the direction of longitudinal fibers of the rectum.

apex of the prostate just behind the urethra (Fig. 2).

The longitudinal muscle of the rectum travels parallel to Denonvillier's fascia and, at the anorectal junction, it divides in three directions: the anterior muscular fibers curve anteriorly and blend into the posterior membranous urethra; they are clearly iden-

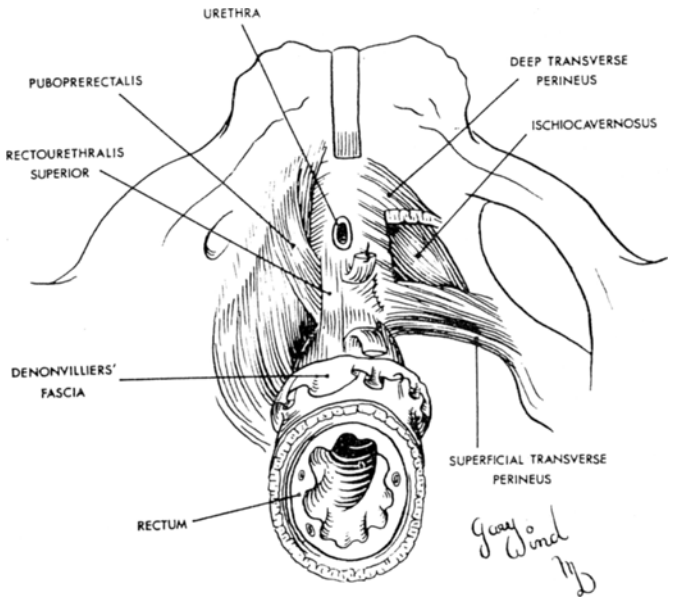


FIG. 3. View from the pelvic surface. Having reflected Denonvillier's fascia, the strand of anterior longitudinal rectal muscle (rectourethralis superior) runs between the levator muscles (puboprerectalis) and blends with the membranous urethra.

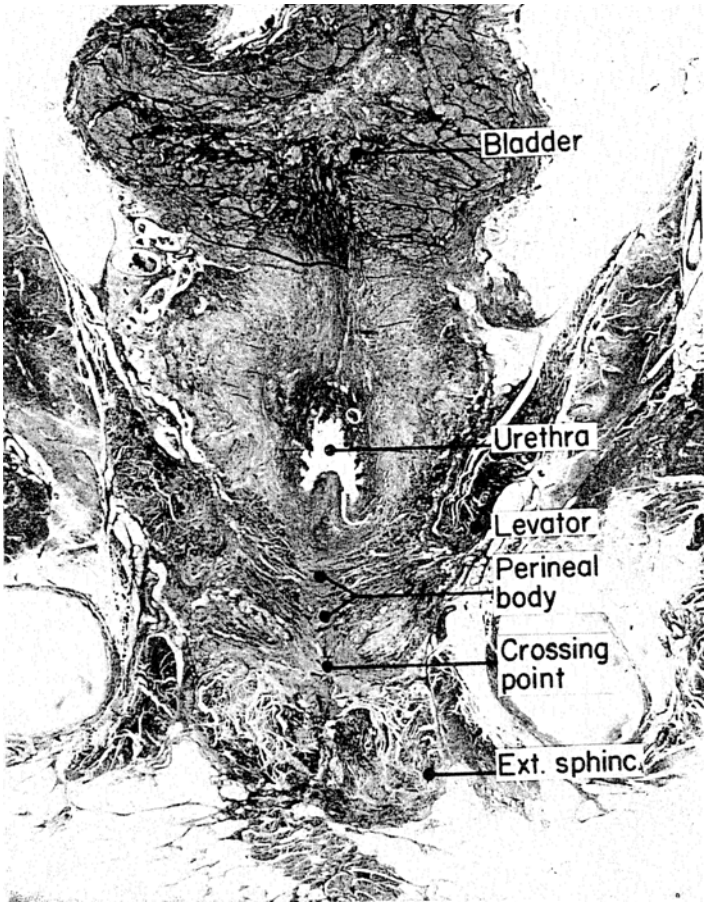


FIG. 4. Coronal section of the perineum at the region of the perineal body, showing the levator muscle and transverse perinei intermingling with the perineal body.

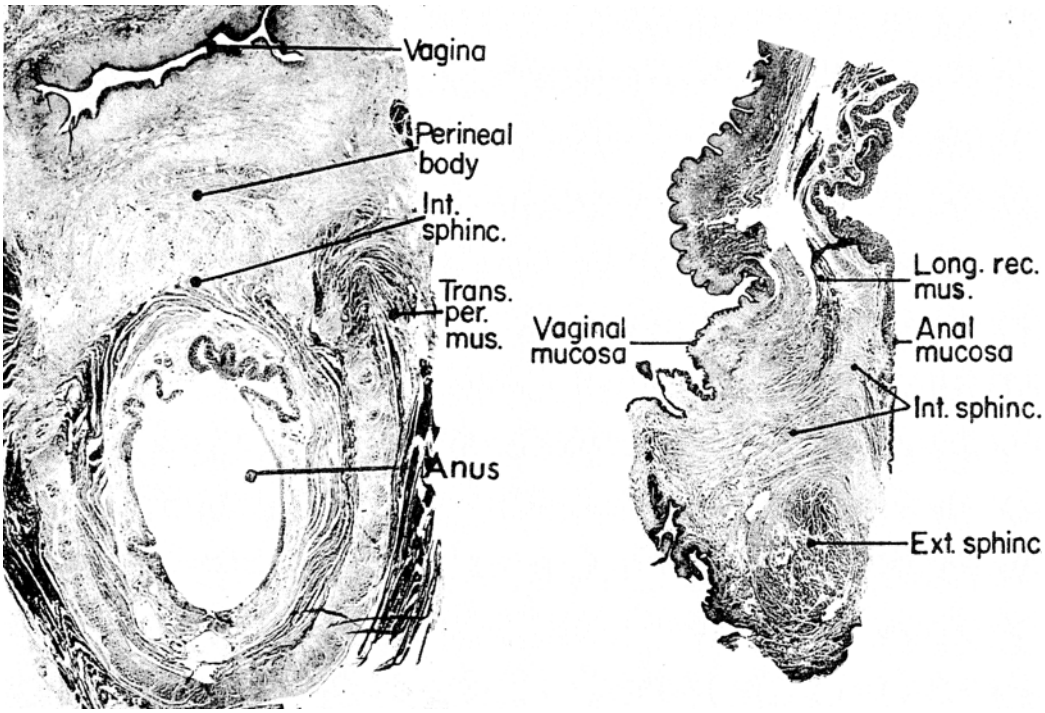


FIG. 5 *(left)* Horizontal section of the female perineum. The entire posterior wall of the vagina and anterior anal wall are occupied by a fibromuscular mass (perineal body). The internal sphincteric muscle protrudes into the perineal body. (Reproduced with permission of Oh and Kark.[9])

FIG. 6 *(right)* Anterior midsagittal section of the female. The longitudinal rectal muscle curves anteriorly at the upper portion of the perineal body. The internal sphincteric muscle fibers extend to the posterior wall of the vagina. The whole external sphincter appears as a single muscle bundle. (Reproduced with permission of Oh and Kark.[9])

tifiable by anatomic dissection from the pelvic surface, running as two distinct strands of muscle fibers between the levator muscles (Fig. 3). The posterior longitudinal rectal fibers, on the other hand, run straight downward, interdigitating with the internal sphincteric muscle, and meet with the decussating fibers of the deep external sphincter muscle and transverse perinei; between these two layers (the anterior and posterior muscle fibers), some remaining fibers curve anteriorly, first along with anterior fibers, and then angulate inferiorly and finally meet and blend with the bulbocavernosus muscle.

This laminated pattern of longitudinal rectal muscle is limited to the midline of the anterior perineum; in this situation it is approximately 1 cm wide, and these fibers intermingle with levator muscle bilaterally (Fig. 4). At this level of V-angulation, the internal sphincteric muscle projects into the angulation and interdigitates with the longitudinal rectal muscle (Fig. 2). This corresponds to the rectourethralis muscle (or anocentralis) of Smith.[10] These fibers are more clearly defined as the rectovaginalis in the female (Figs. 5 and 6).

These smooth muscles (longitudinal rectal muscle and internal sphincteric muscle) are bound with striated muscle of the deep transverse perineum and form the posterior leaf of the urogenital diaphragm.

The lowermost part of the perineal body is composed mainly of decussating fibers

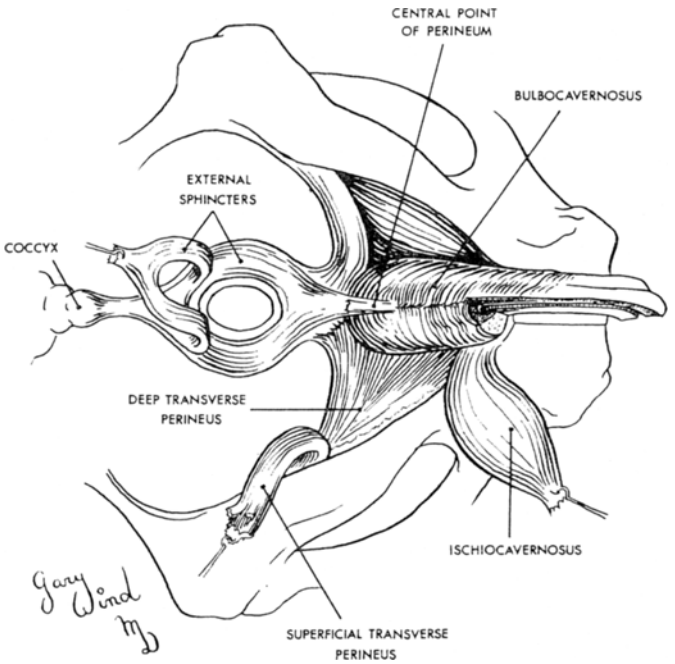


FIG. 7A. View of the perineum from below, showing the relationship between the external anal sphincter, superficial transverse perineum, ischiocavernosus, and deep transverse perineum.

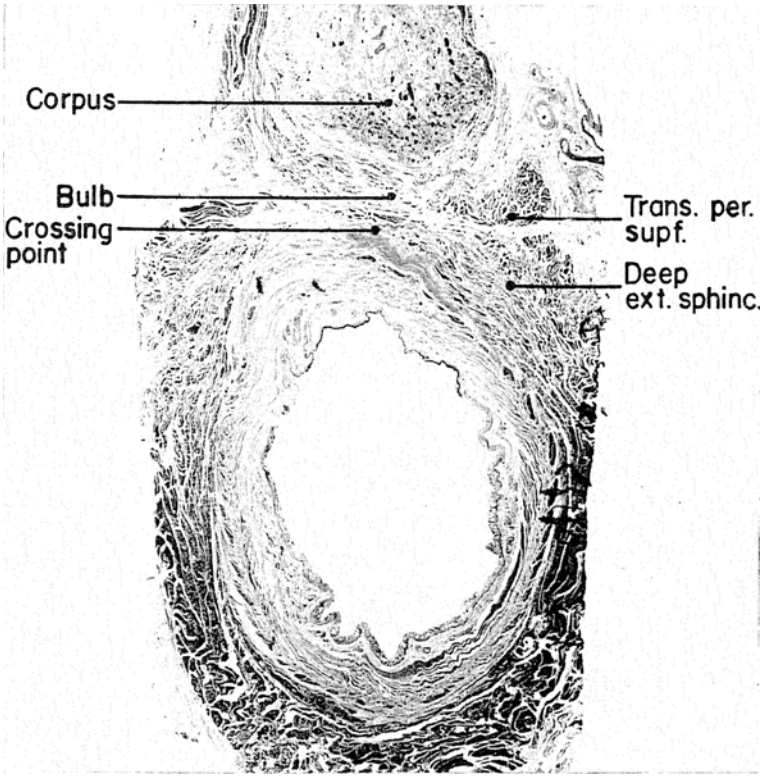


FIG. 7B. Horizontal section of perineal body at a lower level, showing the pattern of decussation between the external anal sphincter, transverse perineal muscle, and bulbocavernosus.

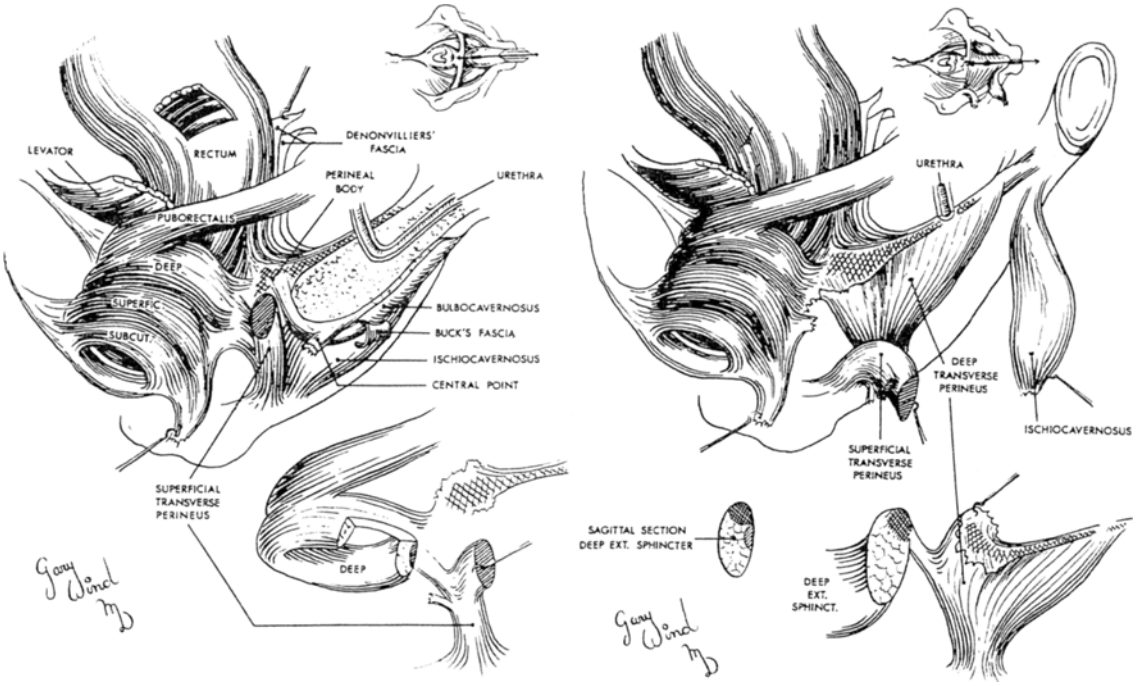
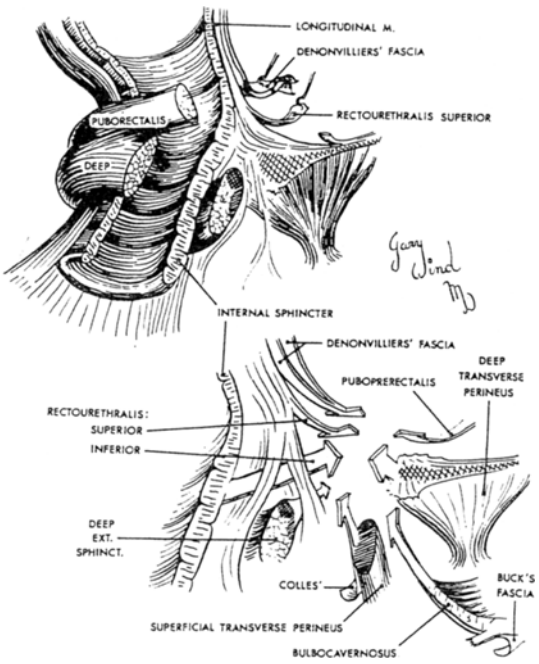


FIG. 8. *(above)*. Midsagittal section of the perineum as marked by the arrow in the inset *(right upper corner)*. The superficial transverse perineal muscle gives cross-fibers to the superficial and deep external sphincters. The detailed structure is demonstrated in the inset on the right lower drawing.

FIG. 9 *(above, right)* The deep transverse perineal muscle gives cross fibers to the deep external sphincter at its upper portion. Thus, the deep external sphincter consists, in part, of contributions from both transverse perinei.

FIG. 10 *(below, right)*. The composition of the perineal body is shown by arrows. Ten elements contribute in forming the perineal body.



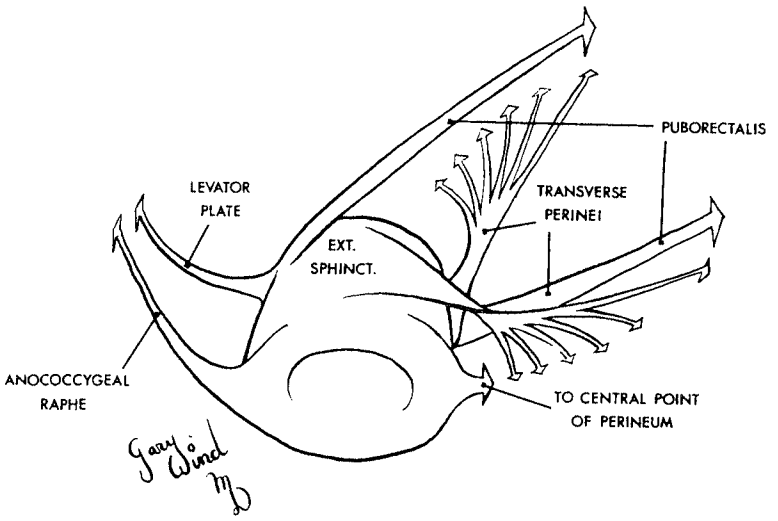


FIG. 11. Schematic drawing of the external anal sphincter and its bony attachment. The anal sphincter is loosely attached to the coccyx and firmly anchored to the ischiopubic bone through the decussating fibers of the perineal body and suspended to the pubis by the puborectalis and levator muscles.

between the deep external sphincter and the deep and superficial transverse perinei (Fig. 7). The anterosuperior portion of the deep external sphincter gives fibers to the opposite side of the superficial transverse perineal muscle. Also, the small belly of the superficial external sphincter at its upper end gives fibers to the medial portion of the superficial transverse perineal muscle (Fig. 8). The upper portion of the deep external sphincter muscle decussates with the opposite deep transverse perineal muscle (Fig. 9). The posterior belly of bulbocavernosus muscle blends into the perineal body along with Buck's fascia and Colles' fascia and forms the anterolateral border of the perineal body (Fig. 10).

Thus, the perineal body corresponds to a heavily used traffic center in which all the regional fibers and muscles are either crossed or intermingled and form a solid, inseparable musculotendinous mass. This mass is firmly anchored to the bony structures by way of the levator muscle (puboprerectal muscle), deep and superficial transverse perineal muscle, and indirectly by the puborectalis. The fibrotendinous mass of the perineal body serves as a connecting center of the anal canal to the genital organs, and fixes the anal musculature to bony tissue in a most secure way. This is the most non-distensible region of the anal canal; its extent is not always uniform and depends on the pattern of the surrounding structures. It is roughly 1.5–2.0 cm in transverse width, 1.0–1.5 cm in its anteroposterior extent, and 2.0–2.5 cm in vertical extent, forming a rectangular or wedge-shaped mass (Fig. 11).

The perineal body is connected further downward by way of the fibrotendinous sheath, which traverses the anterior part of the external and internal anal sphincter, and forms the anterior part of the conjoined longitudinal fibers. This sheath also extends downward between the deep external sphincter and the superficial transverse perineal muscle, then inserts into the central point of the perineum along with the superficial compartment of the external sphincter[9] (subcutaneous or superficial portion of the external sphincter muscle) (Fig. 12). In this manner, the whole anterior portion of the anal sphincter is firmly anchored to the perineal body and, in turn, it is fixed and suspended to the ischium and public bones.

Perineal Body in the Female: The perineal body in the female is located between the anterior anal wall and the posterior vaginal wall. It is much wider and thicker than in the male.

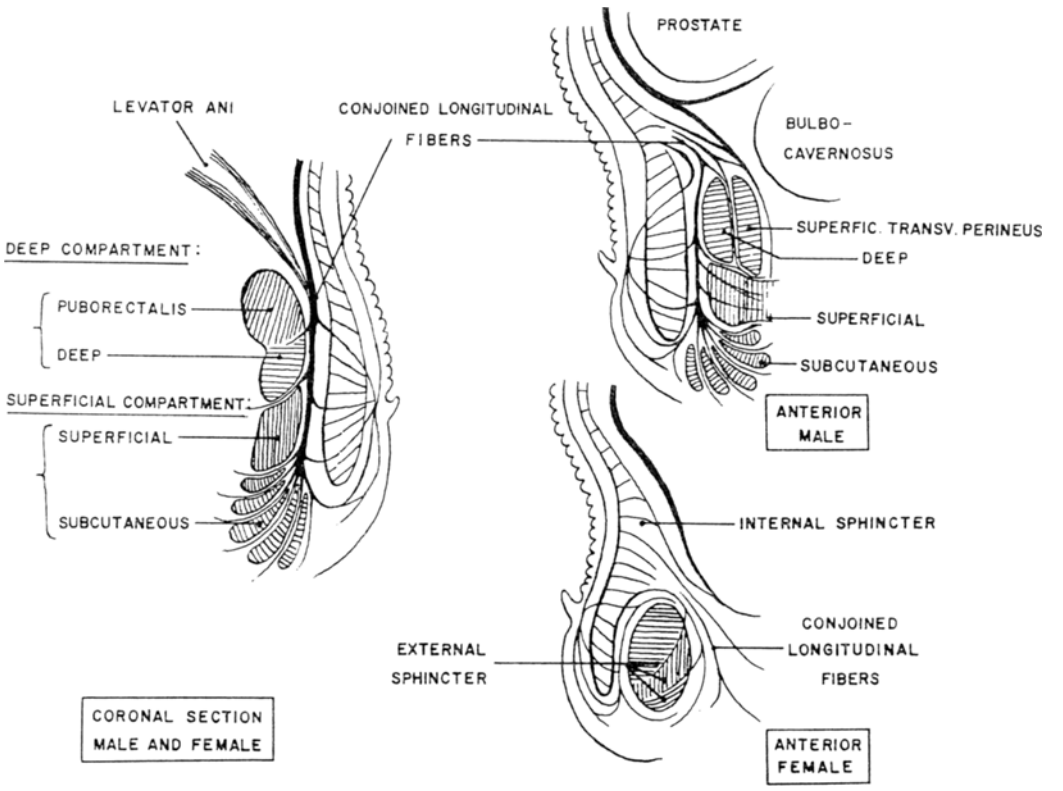
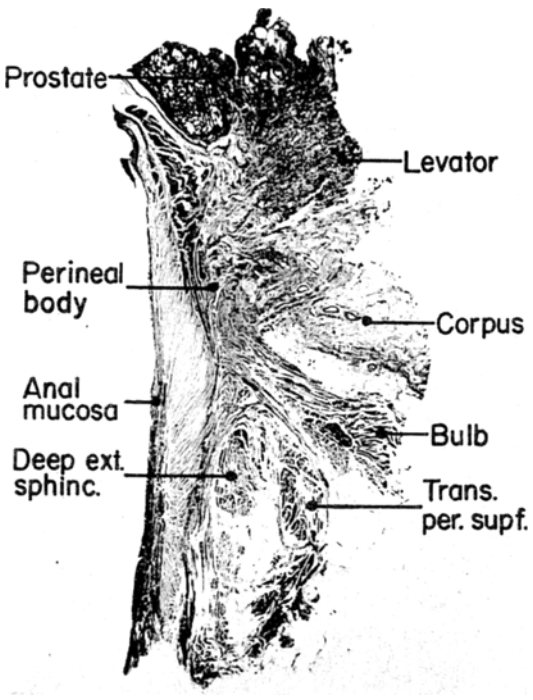


FIG. 12A. The differences of external anal sphincter are shown clearly by location and sex. (Reproduced with permission of Oh and Kark.[9])

FIG. 12B. Anterior parasagittal section of the male. A fibromuscular mass (perineal body) occupies the space between the upper end of anal wall, membranous urethra, prostate, external sphincter, bulbocavernosus and superficial transverse perineal muscle.



On cross-section (horizontal) it is a fibromuscular mass occupying the entire area between the posterior portion of the vagina and the anterior portion of the anal wall. Posteriorly the perineal body extends into the internal anal sphincter, while anteriorly it is firmly adherent to the vaginal muscularis submucosae (Fig. 5). However, the longitudinal extension is not as clearly demonstrated as the horizontal. On the anterior midsagittal section, the longitudinal rectal muscle starts to curve anteriorly toward the posterior wall of the vagina at the level of the anorectal junction (Fig. 6). The direction of the anterior curve becomes gradually less sharp as it approaches the anal verge,

and the longitudinal fibers eventually blend with the fibers of the internal sphincteric muscle. This portion of fibromuscular bundle (rectovaginalis muscle) corresponds to the rectourethralis superior in the male. Below this layer, a bulky fibromuscular bundle runs across the posterior wall of the vagina to the internal anal sphincter in a horizontal direction, though it curves slightly downward towards the vaginal wall. At this level, almost the entire internal sphincteric muscle communicates freely with fibers of the anovaginal septum, and no remnants of longitudinal rectal muscles are seen. This layer of fibromuscular bundles corresponds to the rectourethralis inferior in the male.

Similarily, the lowermost limit is the level of the decussating fibers of the upper portion of the external sphincter and the transverse perinei muscle, exactly the same arrangement as occurs in the male. Thus, the broad and thick perineal body of the female occupies the upper half of the space anterior to the anal canal, and compensates for the relatively small and weak single muscle bundle which represents, in the anterior wall, the whole of the external anal sphincter (Fig. 12A). The perineal body is suspended to the pubic bone by the puborectalis and puboprerectal muscle (levator muscle), and firmly fixed to the ischiopubic ramus through the transverse perinei.

Discussion

MacAlister,[8] in 1889, first named the firm connective tissue mass of the perineum "the perineal body." It has been given several synonyms, including "median fibrous nucleus of the perineum,"[3] "central perineal tendon,"[4] "septum urorectale,"[6] "central point of the perineum,"[1] "central tendon of the perineum,"[7] and "central tendinous point of the perineum."[2] It corresponds embryologically to the site of fusion of the anal tubercles and the pelvic bar (urogenital septum), which separates the cloacal sphincter into anal and urogenital portions. The extent and attachments of this fibromuscular mass have been variously described, often with significant differences.

Delbet[3] records the perineal body as a septum interposed between the rectum and the urethra, extending downward as far as the skin of the perineum, upward as far as the bottom of the rectovesical recess of the peritoneum, and laterally as far as the medial borders of the pubococcygeal muscles. Smith[10] and subsequently Gorsch,[4] Uhlenhuth and Hunter,[11] confirmed this view, which describes many muscles and tendons of the perineum either originating from or inserting into this vertical body. Thus, they describe the following muscles or planes of fascia as intimately related to the perineal body from above downwards: supra-anal or superior pelvirectal fascia, rectourethralis, urethral fibers of levator ani, infra-anal fascia, triangular ligament, fascia of bulbocavernosus, transverse perineal muscles, reflections of deep perineal fascia (Buck) and Colles' fascia; the extension from the external sphincter, conjoined longitudinal muscles, and subcutaneous fascia.

Wilson,[13] on the other hand, from his extensive and careful studies, has viewed it differently. He has separated the perineal body from the central point of the perineum, which he regards as forming a point of connection for the various components of the external sphincter, superficial transverse perineal muscle, and the median posterior border of the perineal membrane.

Courtney[2] described the central tendinous point of the perineum as consisting of a decussating area of fibrotendinous and muscular fibers of some considerable depth in a vertical direction; these fibers, in his view, neither arise from nor insert into this area, but can be traced directly through the central tendinous point of the perineum, where they resume their muscular configuration again to pass on to their various points

of attachment. In other words, the fleshy bellies of these muscle fibers become fibrotendinous, then resume their normal configuration again after decussation.

Thus, there is no unanimity in description of the composition of the perineal body regarding its anatomic extent and structural components. This is largely because of difficulty in anatomic dissection and the complexity of the structure and partly because of individual anomalies. However, these difficulties can be resolved by careful three-dimensional dissection and histologic sections.

We have previously presented the significant anatomic differences between the anterior portion of the external anal sphincter and the lateral and posterior portions, and the differing configurations of the anterior parts of the external sphincters in men and women.[9] These differences largely reflect the specific anatomic constructions of the perineal body in men and women.

In essence, our present study shows that the perineal body is a composite structure, a fibromuscular, rectangular mass, 1.5–2.0 cm wide, 1.0–1.5 cm in anteroposterior direction, and 2.0–2.5 cm in vertical extent. It occupies the space between the puboprerectalis in its lateral extent, lies posteroanteriorly between the anorectal junction and the posterior membranous urethra, and is bordered above by Denonvillier's fascia, lying under the apex of the prostate and below by the upper border of the deep external anal sphincter.

Thus, the present description differs from that of Delbet,[3] in that we do not include the downward extension of longitudinal coat below the deep external anal sphincter, and from that of Wilson,[13] who did not provide details of attachment of the perineal body to the bony walls, or of the relationship of the components of the perineal body to each other. It differs also from the view of Courtney,[10] who regarded the perineal body as simply a cross-over point rather than as a part of the complex mass of tissue, tendinous and muscular, described above.

In the male, the perineal body is the key structure which anchors the anal canal to the ischiopubic bones. In the female, on the other hand, it is a reinforcing element of the smaller external anal sphincter; it is more loosely attached to the bony pelvis because the vaginal canal is interposed between rectum and pubis, and therefore it is expansile during childbirth. The structural differences may partly contribute to the relatively high incidence of rectal prolapse and occurrence of anterior anal fissure in the female.

Summary

Detailed anatomy of the perineal body is described, with particular emphasis on the male because of the proximity of the urethra, which is important in perineal surgery. The perineal body, a fibromuscular mass, lies between the upper end of the anterior anal canal and the posterior portion of the urethral membrane and bulbocavernosus in the male, and between the upper half of the anterior anal wall and entire posterior portion of the vagina in the female. The female perineal body is much thicker and wider than that in the male, and compensates for the relatively weak and small single external sphincter anteriorly.

Acknowledgment

The authors thank Dr. G. Wind for his time and effort in preparing anatomic illustrations and to Dr. P. Wilk, who assisted in the anatomic dissections.

References

1. Callander CL: Surgical Anatomy. Philadelphia, W. B. Saunders, 1947, p 449
2. Courtney H: Anatomy of the pelvic diaphragm and anorectal musculature as related to sphincter preservation in anorectal surgery. Am J Surg 79: 155, 1950
3. Delbet P: Vessie, Uretre, Prostate, Verge, Perinee. Poirier and Charpy's Traite d'Anatomie Humaine. Second edition. Paris, 1907, volume 5, fasx 1

4. Gorsch RV: Proctologic Anatomy. Second edition. Baltimore, Williams and Wilkins, 1955, p 86
5. Hudson PB: *In* Urology. Third edition. Edited by ME Campbell, JH Harrison. Philadelphia, W. B. Saunders, 1970, volume 3, p 2470
6. Keibel: Quoted by Smith GE10
7. Lawson JON: The functional anatomy of the pelvic floor muscles and associated sphincter, Recent Advances in Pediatric Surgery. Second edition. New York, Grune & Stratton, 1969, chapter 5, p 58
8. MacAlister A: A Text Book of Human Anatomy. Philadelphia, P. Blakiston Son & Co., 1889, p. 353
9. Oh C, Kark AE: Anatomy of the external anal sphincter. Br J Surg 59: 717, 1972
10. Smith GE: Studies in the anatomy of the pelvis, with special reference to the fasciae and visceral supports. J Anat 42: 198, 1908
11. Uhlenhuth E, Hunter DT: Problems in the Anatomy of the Pelvis: An Atlas. Philadelphia, J. B. Lippincott, 1953, p 8
12. Ward JN, Nay HR: Immediate and delayed urologic complications associated with abdominoperineal resection. Am J Surg 123: 642, 1972
13. Wilson PM: Anchoring mechanisms of the ano-rectal region. Part I. S Afr Med J 41: 1127, 1967

The American Society of Colon and Rectal Surgeons
(The American Proctologic Society)

Founded in 1899, the primary purposes of the American Proctologic Society are to accumulate and disseminate knowledge, and encourage teaching and research pertaining to the colon and rectum. The Society's activities are designed to carry out these objectives.

Scientific Program: The Annual Convention of the American Proctologic Society is a 3½-day meeting, with sessions devoted to all facets of diagnosis and treatment of diseases of the colon and rectum. In addition to participation by members, many of the world's outstanding physicians and surgeons have appeared at the Society's meetings. The program generally consists of individual papers, symposia, and a series of instructional courses. Exhibits, both scientific and technical products, are also an integral part of the convention. All members of the medical profession are welcome to attend these programs.

Continuing Medical Education: Many short courses in colonic and rectal surgery are presently being offered throughout the country, and the American Proctologic Society is working to increase the number of such courses available, as well as to expand the number and scope of instructional courses presented at its Annual Convention.

Loan Fund: Of primary concern to the Society are the education and training of individuals in colon and rectal surgery. To this end, the Society has for many years maintained a special Loan Fund to which residents may apply for assistance to enable them to complete their training.

Research: To encourage and support research in colon and rectal diseases, the American Proctologic Society Research Foundation was established in 1957. Grants are available from the Foundation in support of research projects in colon and rectal problems upon application from any accredited physician in this country.

Publications: Almost from its inception, the Society published the proceedings of its Annual Conventions in the form of *Transactions,* which contributed significantly to the medical literature. In 1958, replacing *Transactions,* the American Proctologic Society founded a new journal, *Diseases of the Colon & Rectum,* which is published bimonthly by J. B. Lippincott Company.

Slide Library: The Society also maintains an interesting Slide Library of colonic and rectal diseases, which can be lent out to qualified individuals or institutions interested in the dissemination of education in these matters.

The American Proctologic Society was founded by a small group of surgeons that included Dr. Joseph Mathews, who was at that time President of the American Medical Association. He joined twelve other surgeons to organize the American Proctologic Society and became its first President. The Society is now approaching a membership of 900, all of whom either limit their practice entirely to colon and rectal surgery or have a special interest in it.

Information regarding membership and application blanks may be obtained from:

The American Society of Colon and Rectal Surgeons
320 West Lafayette
Detroit, Michigan 48226