An understanding of the anorectal anatomy and its relationship to the pelvic floor is essential to understanding the pathophysiology of pelvic floor dysfunction and thus how to evaluate and manage its disorders.

The pelvic floor is composed of the pelvic floor musculature, the fascia of the pelvic floor, the associated viscera that pass through, and the blood vessels and nerves that supply these structures. The major components of the pelvic floor from cephalic to caudal are the peritoneum, viscera, endopelvic fascia, levator ani muscles, and external genital muscles.

Support of the Pelvic Floor

The pelvic organs when removed from the body are a limp and formless mass. Their shape and position in vivo are dependent on their various attachments to the bony skeleton through the pelvic muscles and connective tissue. These tissues can have an active or passive role in pelvic visceral support. The passive support structures are the sacrum, coccyx, pubic rami, parietal fascia, endopelvic fascia, and levator tendons. The primary active support structures are the levator ani muscles.

Fascia and Ligaments of the Pelvic Floor

The walls and floor of the pelvis are lined by the parietal endopelvic fascia, which continues on the internal organs as visceral fascia and serves to attach the pelvic organs to the pelvic walls (Figure 4-3.1). Unlike fascia in the abdominal wall, which contains regularly arranged collagen bundles, this fascia has variable amounts of collagen, elastin, and fibrovascular elements. Much of the strength of this endopelvic fascia is derived from the walls of arteries and veins that run within it.

In the female, on each side of the pelvis, the endopelvic fascia connects the cervix and vagina to the pelvic wall. The attachment forms a broad sheet, laterally extending from the cephalad parametrium, which attaches the uterus to the sidewall, to the inferior paracolpium, which attaches the vagina to the side wall at the level of the levators. The cephalic paracolpium is lengthy and attaches the vagina to the pelvic walls. More caudally the attachment is more direct. It is this attachment that stretches the vagina between the rectum and the bladder. Support of the bladder is dependent on the attachment of the bladder to the vagina posteriorly and the support of the vagina by the more caudal paracolpium. Similarly, the posterior vaginal wall and rectovaginal fascia form a barrier to the anterior bulging of the rectum and thus prevent formation of a rectocele. In the most distal vagina, the vaginal wall is attached directly to surrounding structures without a paracolpium. Anteriorly, it is fused to the urethra, posteriorly with the perineal body and laterally with the levator ani muscles. Damage to the upper supports of the vagina results in vaginal and uterine prolapse whereas damage to the lower supports results in a cystocele and/or rectocele formation.

Posterior to the rectum is the mesorectum, which contains both blood vessels and lymphatics that supply and drain the rectum. This is loosely bound down the front of the sacrum and coccyx by connective tissue known as the fascia propria. The lateral ligaments, which attach the rectum to the pelvic walls, are condensations of the fascia propria and contain loose areolar tissue, nerves, and small blood vessels. Thus, the mesorectum can be mobilized by dissection in the “mesorectal plane” leaving the mesorectum invested in this thin layer of fascia. The sacrum and coccyx are also covered in a thicker fascia, which extends downward and forward, just superficial to the anococcygeal ligament known as Waldeyer’s fascia. Anteriorly the rectum is covered with a layer of visceral fascia that extends from the anterior peritoneal reflection to the urogenital diaphragm. This is Denonvilliers fascia and lies between the rectum and vagina (or prostate in men). Nerves important to bladder control and male sexual function pass through this fascia. The hiatal ligament, originat-
Anatomic Correlates

From the pelvic fascia, surrounds the rectum and vagina and maintains their patency during levator contraction.

In addition to the bony support of the pelvis, there are two true tendons. The arcus tendineus fascia pelvis (ATFP) and arcus tendineus levator ani (ATLA). These are dense aggregations of connective tissue, predominantly collagen, that provide lateral passive pelvic support. These tendons are condensations of the obturator and levator ani fascia. The ATLA inserts anteriorly at the pubic rami and posteriorly at the ischial spine. The ATFP lies medial to the ATLA at the anterior insertion of the pubic rami and inserts posteriorly at the ischial spine. These tendons provide anchoring sites for the levators and the vagina and thus are key to the support of the pelvic floor.

Muscles of the Pelvic Floor and Perineum

The pelvic diaphragm, composed of the levator muscles and their fascia, form a muscular sheet through which the pelvic visceral structures (lower rectum and vagina) pass. It functions to support the pelvic viscera and helps to maintain urinary and fecal continence.

Levator Ani

The levator ani muscular sling is composed of three muscles: the pubococcygeus, the iliococcygeus, and the ischiococcygeus (see Figure 4-2.4, Chapter 4-2). The iliococcygeus originate from the ischial spine and posterior obturator fascia and insert into the anococcygeal raphe, the coccyx, and the sacrum, forming a shelf on which the pelvic organs may lie.

The pubococcygeus arises from the posterior pubis and anterior obturator and inserts into the anococcygeal raphe, the sacrum, and coccyx. Various muscle subdivisions have been assigned to the medial portion of the pubococcygeus depending on its attachments. These include puborectalis, pubovaginalis, and pubourethralis.

The puborectalis originates from the pubis and inserts into the anococcygeal raphe. It is the medial and inferior portion of the pubococcygeus. The puborectalis is a U-shaped muscle that originates from the pubic bones and passes behind the rectum forming a sling. The puborectalis passes beside the vagina to which it is attached laterally (here named the pubovaginalis) and then passes posterior to the anorectal junction. It provides support for the rectum and indirect support for the vagina, bladder, and urethra by drawing these structures anterior toward the pubic bone. Indirect elevation of the anterior vaginal wall and urethrovaginal neck is provided by the bulk of the puborectalis muscle as it draws the rectum and posterior vaginal wall forward with contraction. The tonic contraction of the puborectalis closes the urogenital hiatus, contributes to the posterior curve of the vagina, and reduces pressure on the pelvic outlet. When its tone is lax, the urogenital hiatus opens, the anorectal angle becomes obtuse, and the levator plate sags.

The levator muscles maintain constant tone and, provided they are functioning, the supportive ligaments and fascia are under no tension. When the pelvic floor muscles relax or are damaged, the intraabdominal pressures are applied to the pelvic organs and ligaments. The ligaments function well for short periods under this stress but will stretch and weaken over time, eventually leading to organ prolapse and problems with incontinence.

Rectal and Anal Muscles

The rectal muscles, from mucosa to serosa are the muscularis mucosae, an inner circular layer followed by an outer longitudinal layer (Figure 4-3.2). The inner muscular layer forms the rectal valves and transitions into the internal anal sphincter (IAS). The outer longitudinal layer extends from the sigmoid colon where it envelops the circumference but is thickest at the taenia colon. This muscle splays and becomes confluent at the rectosigmoid junction descending down the rectum to the anorectal junction. Fibers from this muscle descend into the intersphincteric groove where they splay out and may cross both the IAS and external anal sphincter (EAS) and ultimately insert on the perineal and perianal skin. Some of the fibers above the anorectal junction insert into the perineal body and the coccyx.