

Ultrasound Imaging of the Pelvic Floor



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KEYWORDS

• Ultrasound • Vaginal ultrasound • Endoluminal ultrasound • Endoanal ultrasound

KEY POINTS

- Ultrasound is a detailed anatomic assessment of the muscles and surrounding organs of the pelvic floor.
- Anatomic variability and pathology, such as prolapse, fecal incontinence, urinary incontinence, vaginal wall cysts, synthetic implanted material, and pelvic pain, can be easily assessed with endoluminal vaginal ultrasound.
- Knowledge of pelvic floor anatomy is essential for effective ultrasound imaging techniques.

INTRODUCTION

The pelvic floor is a complex system, and adequate assessment of pelvic floor disorders is greatly supplemented by pelvic floor imaging. Rather than focusing on the clinical examination of pelvic floor surface structures, imaging modalities, such as sonography, allow for immediate, real-time confirmation of anatomic findings. Pelvic floor ultrasound offers a low cost, minimally invasive method of assessing pelvic floor anatomy and function. For example, clinical assessment of the anatomy of the levator ani by palpation requires significant skill and teaching.^{1–3} Clinical diagnosis by imaging has been shown to be more reproducible than palpation and provides a more objective method of teaching.³

PELVIC FLOOR ANATOMY

The female pelvic floor and the levator ani complex are composed of muscle fibers and a fascial network, which spans the area underneath the pelvis. An intact, well-innervated pelvic floor is necessary to maintain pelvic organ support, facilitate

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Obstet Gynecol Clin N Am 43 (2016) 141–153

<http://dx.doi.org/10.1016/j.ogc.2015.10.007>

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urination and defecation, and allow childbirth. The pelvic floor muscle hammock, or levator ani complex, is comprised of five distinguishable subdivisions, based on MRI studies (Fig. 1).^{4,5} The pubovaginalis muscle arises from the posterior aspect of the pubic rami and inserts in the anterior vaginal wall at the level of the midurethra. The puborectalis muscle arises from the posterior aspect of the pubic ramus and runs posteriorly to form a sling around the rectum. During childbirth the puborectalis sustains the most stretch in vaginal delivery.⁶ The puboperinealis muscle arises from the posterior aspect of the pubic rami and bilaterally inserts in the contralateral side of the perineal body. The puboanalis muscle arises from the posterior aspect of the pubic rami and inserts into the intersphincteric groove between the internal anal sphincter (IAS) and external anal sphincter (EAS). The iliococcygeus muscle arises from the arcus tendineus levator ani and runs medially to fuse at the midline in the iliococcygeal raphe. An intact pelvic floor muscle hammock functions to keep the urogenital hiatus closed by compressing the vagina, urethra, and rectum against the pubic bone during contraction.

The pelvic organs and levator ani muscle complex are encased by a dense network of endopelvic fascia. This network aids in pelvic organ support and keeps the pelvic organs in proper orientation during daily activities. Innervation of the pelvic floor is provided through the pudendal nerve and sacral nerve plexus arising from L4-S5. The pudendal nerve primarily innervates the anal and urethral sphincter, thus controlling the continence mechanisms. The levator ani nerve innervates the major musculature that supports the pelvic floor. The sacral nerve plexus is a distal component of the lumbosacral plexus and innervates the levator ani complex.

Knowledge of pelvic floor anatomy is essential for effective ultrasound imaging techniques. Advancing ultrasound technologies have improved the ability to detect pelvic floor defects and gain insight into the pathophysiology of pelvic floor disorders.

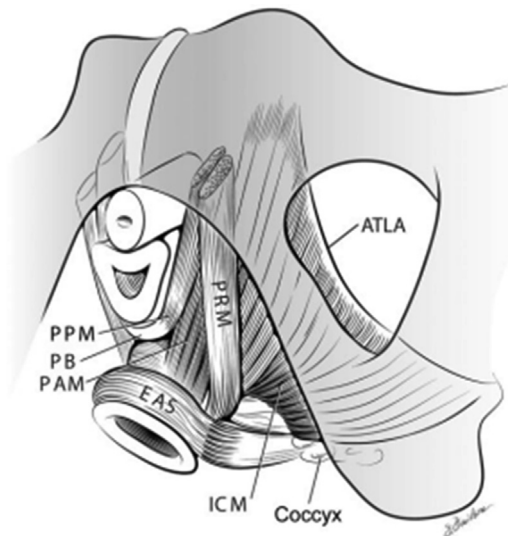


Fig. 1. Musculoskeletal anatomy of the female pelvic floor. ATLA, arcus tendineus levator ani; EAS, external anal sphincter; ICM, iliococcygeus muscle; PAM, puboanalis muscle; PB, perineal body; PPM, puboperinealis muscle; PRM, puborectalis muscle. (From Kearney R, Sawhney R, DeLancey JO. Levator ani muscle anatomy evaluated by origin-insertion pairs. *Obstet Gynecol* 2004;104:172; with permission.)

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