Original Article

Pelvic Floor Dysfunction

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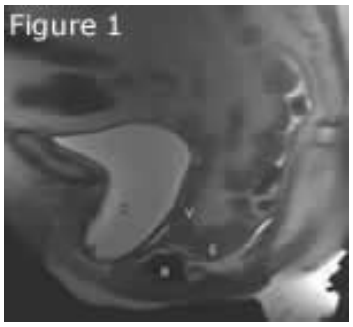
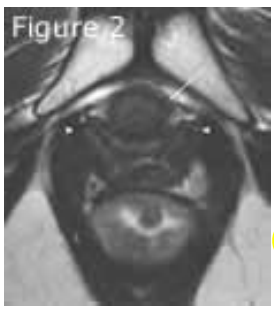
August 1, 2007

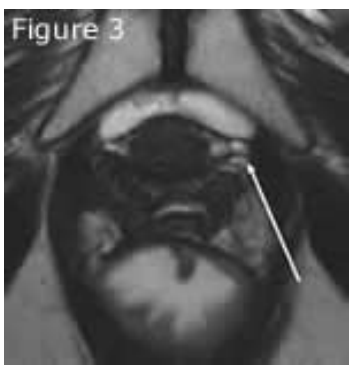


Pelvic floor dysfunction is a relatively common condition occurring primarily in postmenopausal parous women with symptoms that can be functionally debilitating and embarrassing. These include urinary and fecal incontinence, difficulty voiding and defecating, pain, pressure, and pelvic organ prolapse. The common occurrence of this condition is seen by the large industry for absorbent undergarment products for incontinence. Organ prolapse was also seen on physical examination in up to one-third of approximately 27,000 postmenopausal women [1]. More than one abnormality is typically present in patients, so global evaluation of the pelvic floor is suggested.

Currently, there are many possible methods for assessing patients, such as physical examination, urodynamics, transperineal/anal ultrasound, fluoroscopy, and magnetic resonance imaging (MRI). These methods can provide complementary information to guide patient management. Treatments include physical therapy, pelvic support with pessaries, sphincter repair or bulking with collagen, and surgical repair of fascial defects. Multiple surgeries can be needed to repair recurrent organ prolapse. Imaging can help by demonstrating the nature and severity of pelvic floor abnormality responsible for the patient's symptoms.

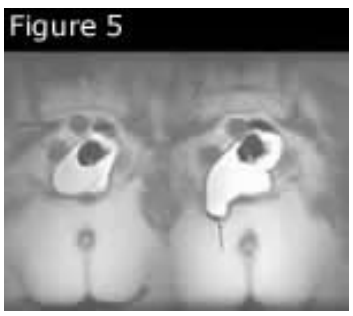


Examples of particular instances where imaging is helpful are determining the nature of the prolapsing organs in patients with severe prolapse; diagnosing enteroceles and sigmoidoceles; distinguishing enteroceles from sigmoidoceles and anterior rectoceles; diagnosing atypical prolapse such as bladder posterior to the vagina or small bowel anterior to the bladder; determining the effect of prolapse in one compartment on another; diagnosing focal fascial defects such as in the pubocervical, rectovaginal, or paravaginal fascias; localizing urethral collagen deposits; identifying urethral diverticula; and assessing sphincter and muscle integrity [2]. The role of imaging is to help explain the anatomic basis for the patient's symptoms, to identify clinically unsuspected pelvic floor defects and masses, and to guide surgical repair [3-7].



MRI has the benefit of evaluating the anterior, middle, and posterior compartments of the pelvis; providing dynamic functional information; providing soft-tissue visualization of the sphincters, visceral attachments, and pelvic floor musculature, all while lacking ionizing radiation and capability of multiplanar imaging. This ability to offer one-stop assessment is a tremendous advantage. Currently, the main drawback of MRI is supine imaging that can limit the dynamic component of the examination. Imaging has been performed on upright scanners and increasing availability and field strength of these scanners may ultimately lead to MRI being the one imaging test for pelvic floor dysfunction [8, 9]. Additional understanding of the muscular and ligamentous abnormalities seen on MRI is also needed.

The basic method of performing pelvic floor MRI is to acquire dynamic T2-weighted or gradient echo images in the midsagittal plane during patient straining for determining pelvic organ prolapse. In addition, high-resolution T2-weighted images demonstrate the visceral attachments, pelvic floor musculature, and sphincters. Sterile lubricating jelly or gadolinium can be administered rectally and vaginally to help patients strain/defecate and outline rectoceles [10, 11]. Prolapse is measured relative to the pubococcygeal line from the inferior pubis to the coccyx, relative to the midpubic line bisecting the pubis, or relative to the "H" line from the pubis to the puborectalis sling [2, 12, 13]. Rectocele depth is measured relative to the anal canal. Abnormal findings on sagittal images during patient straining include descent and rotation of the urethra with change of the urethral axis from vertical to a more horizontal lie. There is descent of the bladder, which bulges into the anterior vaginal wall giving a cystocele (Fig. 1) [2]. The cervix descends into the vagina and the small bowel prolapses into the rectovaginal space giving an enterocele. There is bulging of the rectal wall for an anterior or posterior rectocele. The levator muscle also balloons out increasing the size of the hiatus. In all instances, abnormalities on imaging have to be correlated clinically because only symptomatic findings are treated.



An exciting advantage of MRI is the ability to visualize the soft tissues of the pelvic floor and the potential for this to help doctors better understand and treat pelvic floor dysfunction. Usually, the striated muscle of the urethra is hypointense on T2-weighted images; there are hypointense lateral urethral ligaments; the vagina has an "H" shape on axial images with anterior orientation of the lateral walls; and there is close apposition of the lateral vagina to the levator muscles, a relative symmetry of the levator muscles, a concave appearance of the levator muscles on coronal images, and continuity and relative hyperintensity of the internal anal sphincter and hypointensity of the external anal sphincter (Figs. 2 and 3) [2, 14, 15]. Alteration of the shape of these soft tissues, change in bulk and signal intensity, disruption or absence of the ligamentous structures, and complications of urethral bulking agents have been described in symptomatic patients (Figs. 4 and 5) [15-20].

Future directions include standardization of reporting of prolapse with better correlation with clinical measures and more detailed evaluation and understanding of the soft tissues of the pelvic floor. Accurate assessment of patients and advances in imaging may help to reduce the need for repeat surgeries.