Pelvic organ prolapse and pelvic floor relaxation are common problems in older multiparous women, affecting approximately 16% of women aged 40 to 56 years. A detailed knowledge of pelvic anatomy is paramount for the proper evaluation and management of such patients. Although a thorough pelvic examination is always indicated, even experienced clinicians may be misled by the physical findings, having difficulty differentiating among cystocele, enterocele, and high rectocele by physical examination alone. Depending on the position of the patient and strength of the Valsalva maneuver, the surgeon may be limited in his or her ability to accurately diagnose the components of pelvic prolapse. Furthermore, with uterine prolapse, the cervix and uterus may fill the entire introitus, making the diagnosis of concomitant anterior and posterior pelvic prolapse even more difficult. Regardless of the etiology of the support defect, the surgeon must identify all aspects of vaginal prolapse and pelvic floor relaxation for proper surgical planning. Accurate preoperative staging should reduce the risk of recurrent prolapse. Therefore, it must be understood that radiographic evaluation has an important role in the identification of such defects, and should be considered as an extension of the physical examination. One must realize that not all patients with complex pelvic floor pathology need imaging; however, it does enhance one’s knowledge of the patient preoperatively, and accordingly finds its utility.

The most common reasons for obtaining an IVU in a woman with pelvic organ prolapse are to detect hydronephrosis and to evaluate for ureteral obstruction from previous pelvic surgeries. Moreover, although ureteral injuries during hysterectomy occur in 0.1% to 2.5% of cases, it has never been shown that routine preoperative IVU in patients with pelvic prolapse actually reduces the incidence of ureteral injury. Although the incidence of hydrourerteronephrosis is low in the prolapse patient, it does increase with worsening pelvic prolapse, and is more common with uterine prolapse than with vault prolapse. As such, routine IVU in the setting of pelvic organ prolapse is not necessary unless one is concerned about urothelial pathology.

**Fluoroscopy**

Fluoroscopy is an excellent technique for investigating pelvic organ prolapse. By instilling contrast material into the bladder (anterior compartment), vagina (middle compartment), or rectum (posterior compartment), the dynamic relationships among the pelvic organs may be viewed in real time.

**Cystography**

Lateral phase cystography is still used quite often because it allows for a static view of the bladder and bladder outlet in relation to the remainder of the bony pelvis. Voiding cystourethrography is mainly used for demonstrating a cystocele, evaluating bladder neck hypermobility, and demonstrating an open bladder neck at rest (sphincteric incompetence). Dynamic lateral fluoroscopy at rest and during straining is an important adjunct to the urodynamic evaluation – useful for demonstrating the presence of, and degree of, urethrovaginal hypermobility and cystocele formation. Although the radiographic findings do not always correlate well with urodynamic findings, in some
patients, especially the incontinent ones, cystographic demonstration of an open bladder neck makes the diagnosis of sphincteric incompetence or intrinsic sphincter deficiency more certain. Other pathologic conditions that may be detected by voiding cystourethrography include vesicoureteral reflux, vesicovaginal fistula, and urethral diverticula, which further substantiates its utility.

**Defecography**

Defecography, or evacuation proctography, is used for evaluating the posterior (anorectal) compartment. Commonly measured variables include rectal volume, rectal emptying, perineal and pelvic floor muscle function, and anal sphincter function. Although the clinical value of defecography in the evaluation and management of constipation is not well proven, the presence of an obvious anatomic abnormality in a fecally incontinent patient such as a large rectocele, severe intussusception, or prolapse, supports surgical intervention. Furthermore, sigmoidoceles and upper rectal pathology and prolapse may lead to the decision to resect this portion of bowel in severe redundancy. To properly evaluate the sigmoid colon, one must specifically discuss this with the radiologist ahead of time or even perform a formal barium enema study. Concomitant therapy of a large sigmoidocele may allow one to effectively manage coexisting defecatory dysfunction with the prolapse repair.

Evacuation proctography relies on opacification of the rectal vault with barium paste. Instilling the paste is quite cumbersome, requiring a large-caliber enema. Typically, 80 to 300 mL of paste is instilled, often confounded by reflux into the sigmoid colon. Fluoroscopic images are recorded with the patient relaxed and while performing active contraction of the pelvic floor; this should result in elevation of the pelvic floor musculature. The patient is then examined during cough and during maximal straining maneuver, noting any pelvic floor descent or fecal incontinence. Finally, defecation is accomplished, and note is made of any rectocele, incomplete emptying, or need for digital assistance with evacuation (functional phase of the study).

In the cooperative patient, dynamic proctography allows precise identification and quantification of a rectocele, measured as the maximum extent of an anterior rectal bulge beyond the expected line of the rectum. Rectal intussusception may be visible as a circumferential invagination of the rectal wall, presenting as mucosal prolapse through the anus in its most severe form. Limitations of this examination are the cumbersome and potentially painful instillation of rectal barium paste, lack of correlation between the viscosity of the paste and the individual patient’s stool, and the inability of many patients to defecate on command. Additionally, the presence of a rectocele in and of itself may be of limited concern, because previous studies have shown that an anterior rectal bulge is often demonstrated in nulliparous asymptomatic patients. Furthermore, the presence of, or size of, a rectocele does not correlate well with the completeness of barium evacuation.

**Colpocystourethrography**

First introduced in France in 1965, the colpocystourethrogram combines opacification of the bladder, urethra, and vagina. Modified and made popular in the mid 1970s, the colpocystourethrogram is a dynamic study of pelvic support and function. The anatomical relationships among the bladder, urethra, and vagina may be demonstrated, and, when combined with proctography, may be even more useful in outlining the anatomy of the normal pelvis and of complex pelvic organ prolapse.

The accuracy of dynamic colpocystoproctography is even further enhanced by opacifying the small bowel. The patient drinks oral barium 2 hours before the examination. With the vagina, bladder, small intestine, and rectum opacified, the vaginal axis may be measured at rest and with straining, and any prolapse of the anterior, middle, or posterior vaginal compartment is evident. Moreover, the examiner should be able to distinguish among various organs that may prolapse into a widened rectovaginal space, differentiating enterocoele from sigmoidocele, further refining the operative approach.

**Magnetic Resonance Imaging**

The development of fast-scanning magnetic resonance imaging (MRI) techniques has improved our ability to describe and quantify anatomical changes that may cause pelvic floor relaxation. Yang et al. were the first to popularize dynamic fast MRI for the evaluation of pelvic organ prolapse. Since then, other investigators have shown that MRI is more sensitive than physical examination for defining pelvic prolapse. Whereas some advocate the use of contrast opacification of the bladder, vagina, and rectum, others have shown that the vagina, rectum, bladder, urethra, and peritoneum are adequately visualized without any contrast administration. By avoiding instrumentation of the vagina or urethra, iatrogenic alteration of the anatomy is minimized.

Magnetic resonance imaging, however, can noninvasively survey the entire pelvis. The excellent differentiation among soft tissues and fluid-filled viscera provides visualization of the musculoskeletal support structures of the pelvic organs. Our group and others have previously demonstrated the clinical utility of MRI for evaluating bladder neck and urethral anatomy, and the utility of dynamic MRI for assessing pelvic floor descent and genital prolapse, and development of dynamic rapid sequencing has greatly improved the diagnostic utility of MRI by allowing exquisite anatomical detail during brief breathholds (Figures 3-3.1 and 3-3.2). Magnetic resonance