

Review Article

INCONTINENCE AND VOIDING DIFFICULTIES ASSOCIATED WITH PROLAPSE

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ABSTRACT

Purpose: Prolapse is the protrusion of a pelvic organ beyond its normal anatomical confines. It represents the failure of fibromuscular supports.

Materials and Methods: A MEDLINE search was done using the keywords cystocele, uterine prolapse, vault prolapse, enterocele or rectocele in combination with urinary incontinence. We reviewed 97 articles. From this material the definition, classification, incidence, symptoms and evaluation are described.

Results: Prolapse and urinary incontinence often occur concomitantly and cystocele, rectocele, enterocele, uterine descent or vaginal vault prolapse may also be present. The pathophysiology of prolapse encompasses direct and indirect injury, metabolic abnormalities and chronic high intra-abdominal pressure. Anterior vaginal wall prolapse may present as stress incontinence. A large cystocele may cause urethral kinking and overflow incontinence. Uterine descent can cause lower back and sacral pain. Enterocele may cause only vague symptoms of vaginal discomfort. A rectocele can lead to incomplete evacuation of stool. A thorough history and physical examination are the most important means of assessment. A voiding diary helps determine functional bladder capacity. Uroflow examination determines the average and maximum flow rates, and the shape of the curve can help identify Valsalva augmented voiding. Multichannel urodynamics or video-urodynamics with prolapse reduced can be important. The advantages of dynamic magnetic resonance imaging include excellent depiction of the soft tissues and pelvic organs, and their fluid content during various degrees of pelvic strain. To our knowledge whether it is cost-effective in this manner has not been determined.

Conclusions: Correction of prolapse must aim to restore vaginal function and any concomitant urinary incontinence.

KEY WORDS: bladder, vagina, prolapse, cystocele, rectocele

In the third millennium there will be 20 million women in the United States between ages 45 and 65 years, and another 23 million older than 65 years.¹ Of these patients the number requiring treatment for prolapse with or without urodynamic stress incontinence (SI) is unknown but in 1997 22.7/10,000 American women underwent prolapse surgery.² From these data, and the fact that the diagnosis and treatment of urodynamic SI already costs about US \$42 billion it is clear that the economic burden of prolapse and urodynamic SI will be staggering.

Prolapse and urinary incontinence often occur concomitantly.^{3–6} With pelvic relaxation being a global phenomenon cystocele, rectocele, enterocele, uterine descent or vaginal vault prolapse may also be present.^{1,3,5,6} Ideally all defects will be addressed simultaneously.^{3,7}

METHODS

A MEDLINE search was performed using the keywords cystocele, uterine prolapse, vault prolapse, enterocele or rectocele in combination with urinary incontinence. We reviewed 97 articles. From this material the definition, classification, incidence, symptoms and evaluation are described.

DEFINITION AND CLASSIFICATION

Prolapse is the protrusion of a pelvic organ beyond its normal anatomical confines and it represents the failure of fibromuscular supports to maintain normal position.⁸ Thus, vaginal vault prolapse results from the lack of suspensory support from the pelvic sidewalls (fig. 1, A). With straining the weakened support can lead the vault to within 1 cm of the plane of the introitus (fig. 1, B). Two-thirds of affected women have concomitant cystocele and/or rectocele (fig. 1, C to E).⁹ A central cystocele is primarily the result of weakened pubocervical fascia, while a lateral defect results from detachment of the pubocervical fascia from the arcus tendineus. Rectocele evolves from decreased rectovaginal fascial support, while enterocele derives from a defect in the pubocervical and rectovaginal fasciae. The urogenital hiatus is a functional gap in the levator ani through which the urethra, vagina and rectum pass, receiving their support from the pubic bone anterior, the levator ani lateral, and the perineal body and external anal sphincter posteriorly. Baseline tension within the levator ani presses the rectum, vagina and urethra against the inside of the pubic bone. This continuous tension keeps the vagina closed, while preventing prolapse. The levator ani muscles form a horizontal pelvic shelf for the pelvic organs, such that the pelvic ligaments and fascia are not under strain. However, after injury to the levator ani muscle or

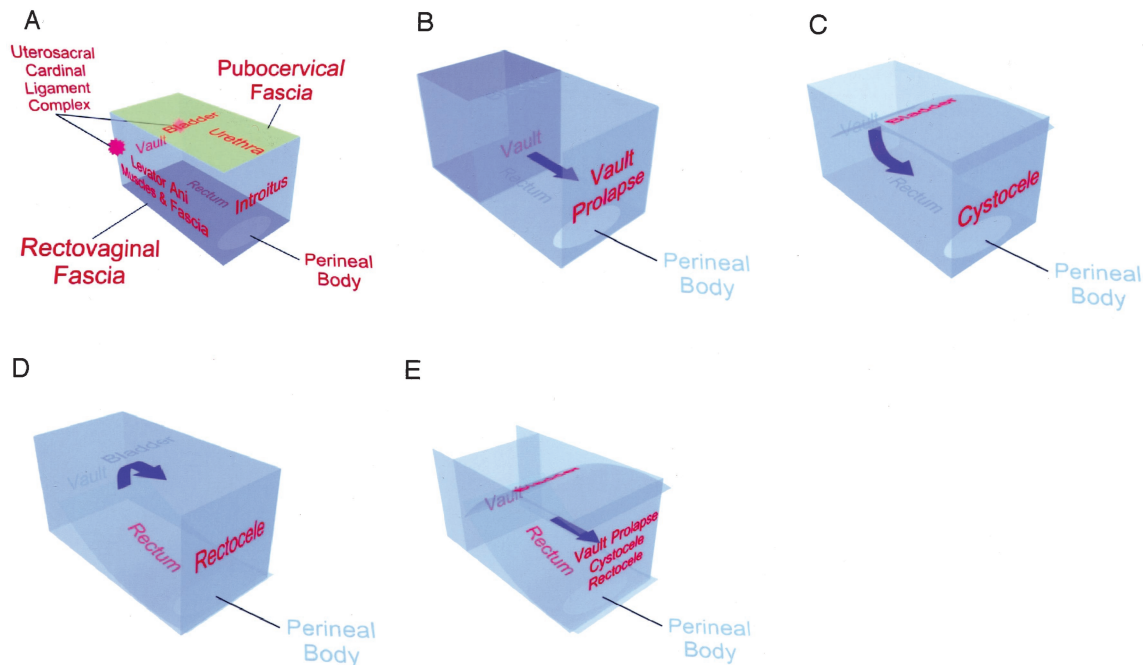


FIG. 1. A, normal vaginal support anatomy. B, vault prolapse. C, cystocele. D, rectocele. E, triple compartment prolapse

fascia the vagina may open and these pelvic organs may move downward, straining these connective tissues to the point of clinically apparent and often symptomatic prolapse.

Staging or grading classifications of prolapse abound. In 1994 the International Continence Society (ICS) adopted a system designed to improve intraobserver and interobserver agreement.¹⁰ This quantitative grading system measures the position of midline vaginal structures in relation to remnants of the hymenal ring. All measurements are in cm and they are recorded while the patient is straining. Negative cm measurements refer to structures above the hymenal ring, while prolapsed structures beyond the hymenal ring are measured as positive cm values. Structures reaching the hymenal ring are recorded as 0 cm. There are 9 measurements recorded in each patient, namely 2 anterior, 2 apical, 2 posterior, 2 external and total vaginal length (fig. 2). These measurements are formatted on a 3 × 3 board.¹¹ If the leading edge of prolapse is above the hymenal remnants, it is stage 1. At or between 1 cm above and 1 cm through the hymenal remnant is stage 2. Stage 4 is more than 1 cm beyond the hymen, while total vaginal eversion is stage 3 (fig. 3).

INCIDENCE

The incidence of prolapse is difficult to assess because mild degrees may be asymptomatic.⁸ The available data show

differences in parity, age and race.⁸ Thus, half of parous women may demonstrate some degree of prolapse, although only 10% to 20% report symptoms severe enough to warrant gynecologic investigation.¹² On the other hand, nulliparous women account for fewer than 2% of patients.¹³ The incidence of prolapse increases with age.¹⁴ For example, in 1 series of 190 women with severe prolapse¹⁴ 60% were older than 60 years. Prolapse is more common in white women (5.4% to 11%)^{13,15} than in black and Asian women (0.6% to 2%).^{13,16}

PATHOPHYSIOLOGY

The pathophysiology of prolapse is multifaceted, encompassing injury, metabolic abnormalities and abnormal intra-abdominal pressure,¹⁷ and most patients probably have more than 1 cause. During childbirth the pressure of the head of the fetus at the pelvic outlet combined with maternal expulsion forces can stretch and compress the pudendal and perineal nerves, and exert a direct disruptive effect on the pelvic floor muscles and connective tissues, leading to diffuse pelvic floor pelvic floor weakening. These effects may be compounded by laceration injuries to the perineum, and internal and external anal sphincters.^{18–21} Denervation injuries of the pubococcygeus and external anal sphincter complex have been demonstrated after 42% to 80% of vaginal

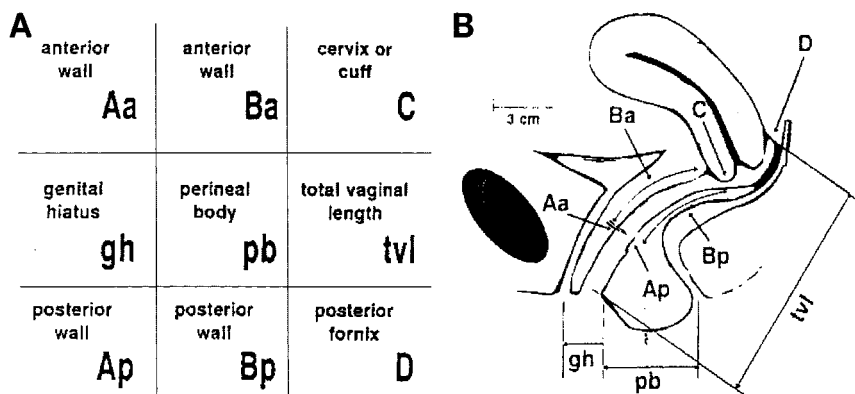


FIG. 2. A, 3 × 3 ICS grid for recording quantitative description of pelvic support.⁸ B, 9 ICS sites used for pelvic organ support⁸

ANATOMICAL CHANGES AND THEIR CONSEQUENCES

Figure 1 shows a paradigm that is conceptually helpful.^{17,37} All that is needed to keep the urogenital hiatus closed and the pelvic organs in their normal position is a well contracted levator ani.³⁷ If these muscles can no longer contract effectively, the pelvic ligaments may be exposed to such tension that with time they can no longer accommodate it. Thus, some patients with prolapse after childbirth achieve improvement from pelvic floor exercises, whereas others do not. If the levator ani muscles are injured with poor in situ repair or if pudendal/perineal denervation injury is present, the levator ani may not contract appropriately, and the effect of exercises on prolapse or SI may be minimal.

Prolapse is generally regarded as a global disease, that is part of a general pelvic collagen and levator ani muscle disorder with the stage and symptomatic aspects differing among patients. It is necessary to define the extent of prolapse in all compartments.

Anterior compartment. Mild or moderate prolapse with a grade 1 cystourethrocele or cystocele is often associated with SI, whereas women with advanced anterior compartment prolapse often do not complain of SI.⁴⁰ This continence may result from artificial enhancement of the urethral sphincteric mechanism through urethral kinking or compression.⁴¹ After the tissue of the cystourethrocele or cystocele is returned to its normal position by a vaginal pessary, the pressure transmission ratio (PTR) may be less than 1⁴⁰ and occult SI may become overt. PTR is obtained during a urethral pressure profile study and it is calculated as the change in urethral pressure (Up) during a cough divided by the change in bladder pressure (Vp) multiplied by 100, that is $(\Delta Up/\Delta Vp) \times 100 = PTR$. Normally the change in urethral pressure is equal to or greater than the change in vesical pressure, so that urine is not expressed from the urethra and the PTR is 1 or greater than 1. However, when the change in urethral pressure is less than the change in vesical pressure, stress urinary incontinence may become apparent and the PTR is less than 1. Poor transmission of abdominal pressure to the urethra during sudden increases in intra-abdominal pressure is believed to contribute to SI.⁴¹ The pubocervical (endopelvic) fascia normally helps these components of the anterior vaginal wall form a hammock to support the bladder and bladder neck.^{42,43} Mild deficiencies in this support may lead to cystourethrocele.

A grade 2 or 3 cystocele may cause urethral kinking, urethral compression, pressure dissipation and bladder outlet obstruction, while enhancing maximum urethral closure pressure (fig. 4, A).^{40,44,45} After the cystocele is reduced with a pessary^{40,44} or vaginal packing⁴⁵ maximum urethral pressure is significantly decreased and occult SI may become evident. Of 67 patients examined by multichannel urodynamic studies, and urethral pressure profiles at rest and with straining before and after reduction 24 (36%) had a PTR of less than 1, of whom 17 demonstrated occult SI.⁴⁰ All 24 patients underwent a modified Pereyra procedure with anterior repair and after 3 to 6 months all were continent with urethral pressure profiles that showed good abdominal pressure transmission with coughing. The remaining 43 patients underwent cystocele repair without bladder neck suspension and all were continent. Another 3 groups of investigators⁴⁶⁻⁴⁸ used videourodynamics and/or urethral pressure profiles to assess patients with grade 2 or 3 cystocele.⁴⁴⁻⁴⁶ They determined that with pessary reduction 25% to 69% of patients had SI with intrinsic sphincter deficiency in 40% to 50%. In addition, others found that patients with grade 2 or 3 cystocele had a 52% incidence of detrusor overactivity (DO), while those with grade 1 cystocele had a 20% incidence of DO.⁴¹

Middle compartment. Reduction of ICS grade 2 or higher uterine or vaginal vault prolapse is associated with a de-

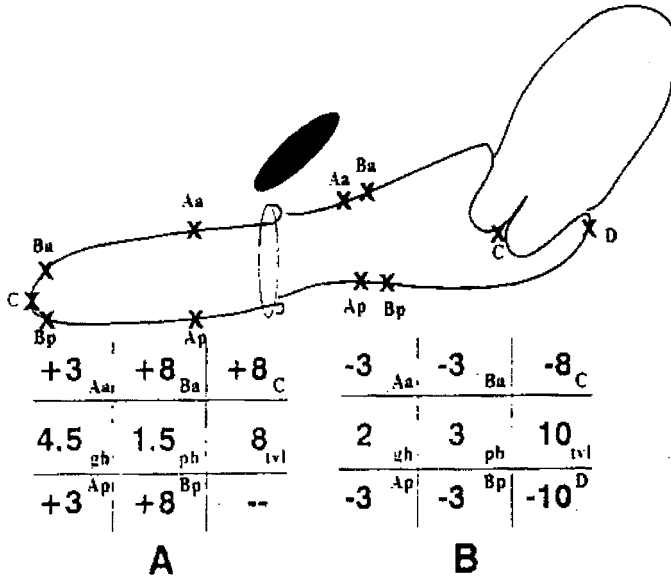


FIG. 3. A, grid and line diagram of ICS stage 4 complete vaginal eversion.⁸ B, stage 0 normal support.⁸ Aa and Ba, anterior wall. C, cervix or cuff. gh, genital hiatus. pb, perineal body. tvl, total vaginal length. Ap and Bp, posterior wall. D, posterior fornix.

deliveries.^{22,23} Similar injuries have not been recorded after elective cesarean section^{23,24} but they have been found when the operation is performed during longer than average stage 2 labor.²² Denervation injury has been detected as late as 5 years after vaginal delivery^{25,26} and it may be cumulative with increasing parity.^{24,27,28} Levator ani denervation has been found in 50% of women with symptomatic prolapse and asymptomatic prolapse.²⁹ Other factors include birth weight greater than 4 kg, bearing down prior to full cervical dilatation, prolonged second stage of labor, forced delivery of the placenta and forceps assisted delivery.^{4,21,30}

Connective tissue diseases that affect collagen processing and remodeling may weaken pelvic floor support. Marfan's syndrome, an autosomal dominant disease affecting the fibrillin 1 gene,³¹ leads to skeletal and ocular abnormalities, and cardiovascular problems. Ehlers-Danlos syndrome is a spectrum of autosomal dominant disorders resulting from defects in various collagen genes. Common manifestations are mild joint hypermobility and hyperextensive skin.^{17,31-33} Carley and Schaffer recently studied women with Marfan's or Ehlers-Danlos syndrome and found that 33% of the former and 75% of the latter patients had a history of pelvic prolapse, while 42% and 50%, respectively, reported urinary incontinence.³¹ Between 10% and 30% of otherwise normal women with prolapse demonstrate joint hypermobility, suggesting alterations in collagen processing.^{32,34} Mathrubutham et al documented changes in connective tissue breakdown in women with pelvic floor weakening.³⁵ The changes were associated with increase collagenase and elastase activity, leading to continued collagen and elastase breakdown, and resynthesis, resulting in constant pelvic floor connective tissue remodeling. A direct association of joint hypermobility with prolapse,^{17,33} particularly rectal prolapse,³⁶ has been reported. Other metabolic factors affecting connective tissue support are aging,¹⁷ estrogen deficiency^{13,17,30} and vitamin C deficiency.^{13,27,30}

The most important factor in prolapse may be constantly elevated intra-abdominal pressure caused by obesity, pulmonary disease, constipation or frequent straining at work.^{4,29,30,37} Iatrogenic causes are primarily surgical, most commonly injury during hysterectomy.⁴ Burch colposuspension and pubovaginal sling operations change the vaginal axis and may predispose to enterocele formation.^{13,38,39}

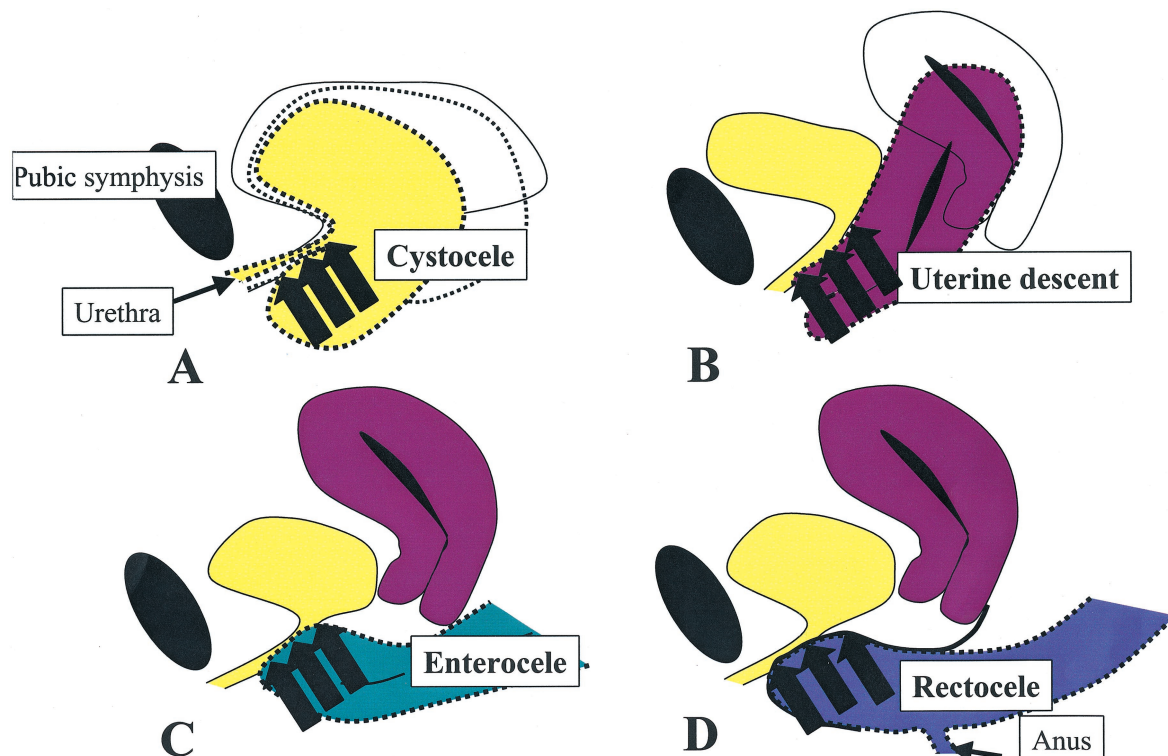


FIG. 4. A, cystocele. B, uterine descent. C, enterocele. D, rectocele. All causing urethral compression or kinking. This enhances urethral sphincteric continence mechanism. Reduction of prolapse during urodynamics minimizes this artifact.

crease in the PTR⁴⁷ and a significant lessening in maximum urethral closure pressures.^{47–49} The reasons for continence before pessary/barrier (any device used to support the prolapsed compartment) placement or surgical correction are the same as in cystocele, namely urethral kinking and compression (fig. 4, B and C). In our videourodynamic experience we have seen bladder neck or proximal urethral compression with middle compartment prolapse and rarely urethral kinking but always with concomitant anterior compartment prolapse. Bump et al evaluated 11 continent women with grade 3 vaginal vault or uterine descent and found 8 with a PTR of less than 90% of normal.⁴⁷ Maximum urethral closure pressure decreased significantly with a barrier in place. Wall and Hewitt assessed 19 patients with post-hysterectomy vaginal prolapse and found obstructive voiding dynamics, characterized by a mean peak flow rate of 11 ml per second and a detrusor pressure at peak flow of 50 cm H₂O.⁵⁰ Of the women 47% demonstrated SI with barrier placement. Voiding complaints included urgency in 79% of cases and urge incontinence in 63%, while urodynamically confirmed DO was present in only 16%. Hertogs and Stanton studied 48 women in whom colposuspension cured SI and found that placement of a barrier in the vagina decreased peak force transmission

by 59%.⁵¹ When a barrier was used to block force transmission by a high cystocele, SI recurred in almost all patients.

Posterior compartment. Myers et al evaluated 90 patients with isolated posterior compartment prolapse.⁵² Only patients with reduced grade 3 posterior wall defects had significant decreases in maximum urethral closure pressure and functional urethral length, and increases in leakage volume with the Valsalva maneuver. It may become clinically significant in patients with a maximum urethral closure pressure of between 25 and 35 cm H₂O. After barrier reduction these patients may show urethral sphincter deficiency. As with anterior and middle compartment prolapse, high grade posterior compartment prolapse may cause bladder outlet obstruction by urethral compression (fig. 4, D).

SIGNS AND SYMPTOMS

The signs and symptoms of prolapse are more closely related to the type and site of a lesion than to its size.³⁰ Addison et al categorized the main symptoms and their frequency (see table).⁵³

Cystourethrocele and cystocele. Anterior vaginal wall prolapse may present as SI, particularly if there is hypermobility of the urethrovesical junction or a history of incontinence procedures. A large cystocele may cause urethral kinking and significant post-void residual urine greater than 250 ml.³ Accompanying complaints include frequency, urgency with or without DO, prolonged voiding, nocturia, difficulty initiating voiding and incomplete emptying.³

Uterine descent. Uterine descent can cause lower back and sacral pain by placing tension on the uterosacral ligaments and accompanying nerves. Patients with procidentia may also complain of bloodstained purulent vaginal discharge related to irritation and infection of the cervical mucosa.

Enterocele or vault prolapse. Enterocele may cause only vague symptoms of vaginal discomfort. Dehiscence of the vaginal vault presents as acute pain and small bowel may be seen at the vulva. The bowel may strangulate or the vault

Symptoms associated with genital prolapse

	% Pts
Tissue protrusion	Greater than 90
Pressure	Greater than 90
Impaired coitus	37
Difficult voiding	33
Urinary incontinence	33
Difficult walking	25
Difficult defecating	25
Pelvic pain	17
Urinary frequency/urgency	14
Nausea	10
Low back pain	10
Mucosal irritation/ulceration	10

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may dehisce, creating an acute surgical emergency with an incidence of less than 1%.³ One of us (SLS) has treated 2 cases of vault dehiscence, including 1 with small bowel strangulation.

Rectocele. A rectocele can prevent complete evacuation of stool and patients may use digital reduction to help evacuate stool. Patients also complain of backache or left lower quadrant abdominal pain if constipated.

DIAGNOSIS AND EVALUATION

History and physical examination. A thorough history and physical examination are the most important means of assessing prolapse and urinary complaints. The history should be focused on the nature of the symptoms and whether SI, urgency, urge incontinence or nocturia are present. The duration of symptoms and what conditions make the symptoms better or worse should be determined, as should any prior medical (anticholinergic or α -blockers) or surgical therapy. Review of the patient prescription and over-the-counter medications also provides useful information. α -Blockers decrease the maximum urethral closure pressure, so that SI may become evident. Changing the type of antihypertensive drug to an angiotensin-converting enzyme inhibitor or β -blocker may resolve this symptom. It is also important to review patient bowel habits. Constipation is a common complaint and it may stimulate bladder μ receptors, which may decrease bladder contractility and incomplete bladder emptying.

The patient should be examined first while supine. Abdominal examination focuses on determining whether there is a distended bladder, tenderness to palpation or an abdominal mass. Stress incontinence can be identified by asking the patient to strain (Valsalva maneuver) or cough. If there is a momentary pause prior to leakage, cough induced DO may be present. Sensory and motor function of the lower extremities and perineum should be examined. The integrity of the S2-S4 sacral nerve arc can be assessed by digital rectal examination and induction of the bulbocavernosus reflex. This reflex involves contraction of the bulbocavernosus and ischiocavernosus muscles, while squeezing or tapping the clitoris. This reflex can be difficult to elicit and it may not be present in neurologically intact women. Alternatively the bulbocavernosus reflex can be studied by evaluating the latency time of sacral evoked potentials by stimulating the clitoris and recording the response with a needle electrode in the bulbocavernosus muscle. Digital rectal examination is representative of the external anal sphincter, which is a composite of all of the striated perineal muscle innervated by S2-S4.

The patient is then changed to a lithotomy or left lateral recumbent position. Using a right-angle Sims speculum speculum the posterior vaginal wall is retracted to expose the anterior wall. The patient is asked to strain or perform the Valsalva maneuver, which allows the characteristics of a cystourethrocele or cystocele to be noted and the examiner to determine whether SI is present. Retracting the bladder neck with the speculum can reveal whether the bladder neck is mobile and whether a Burch colposuspension could be used. A substitute for determining bladder neck hypermobility is the cotton swab test. A lubricated, sterile cotton swab is placed into the urethra to the level of the bladder neck. While the patient is straining, the change in angle from resting to straining is measured with an orthopedic goniometer. A change of 30 degrees or more is thought to be representative of urethral hypermobility. We do not use the cotton swab test in our practice because establishing hypermobility alone does not change treatment. We still use the tension-free vaginal tape or pubovaginal sling procedure to address cases of stress incontinence whether or not hypermobility is present.

Measurements of anterior vaginal wall prolapse are recorded in accordance with ICS recommendations.¹⁰ The pos-

terior vaginal wall is then retracted while the patient strains or bears down and the presence of a rectocele, enterocele, uterine descent or vault prolapse is noted. If a retinaculum is placed on the lower lip of the cervical os and gentle traction is applied, the degree of uterine prolapse can be recorded. Performing digital rectal examination while retracting the anterior vaginal wall may aid in evaluating the grade of rectocele and enterocele. If the examination remains equivocal, having the patient stand and strain may increase the detection of prolapse from any of the 3 pelvic compartments. A retinaculum can also be applied while the patient is in this position to ascertain equivocal uterine prolapse. It is also useful to place the nondominant examiner hand on the abdomen during patient straining to determine if straining is of sufficient quality to aid diagnosis. The examination is completed with bimanual pelvic examination to assess the presence and size of the adnexa and uterus. While documenting the results of these studies, it is important to note the patient position used for examination.

Urodynamic studies. A midstream urine specimen should be obtained for microscopy and culture prior to urodynamic studies. When irritative voiding complaints are present, such as dysuria or strangury, cytology examination is advisable to exclude transitional cell carcinoma of the bladder. If high grade dysplastic or malignant cells are present, cystoscopy with bilateral pyelograms, random bladder biopsies and upper tract imaging with spiral computerized tomography are recommended. A 3-day voiding diary, including the time, amount voided and time and amount of fluid consumed, indicates functional bladder capacity. In endemic areas or high risk populations urine culture for acid-fast bacilli is recommended.

Uroflow examination determines the average and maximum flow rates, and the shape of the curve can help to identify Valsalva augmented voiding (shown by multiple peaks and troughs). Multichannel urodynamics or videourodynamics with prolapse reduced can be important when incontinence procedures or prolapse surgery has failed.

Videourodynamic assessment is expensive and it should be used selectively. Otherwise, simple multichannel urodynamics should suffice for most patients. However, videourodynamics may provide some physiological and anatomical information that may be useful in indicated patients with multiple prior operations for prolapse or incontinence. Whether such studies are necessary to evaluate the ability of prolapse to produce bladder outlet obstruction during urodynamic assessment is really physician dependent. However, the literature emphasizes the importance of urodynamic assessment with prolapse reduction to assess potential occult SI and DO.⁴⁴⁻⁴⁶

Fluoroscopy during videourodynamics can augment the surgeon assessment with regard to prolapse. To determine vault prolapse prior to placement of the urodynamic bladder and rectal catheters a ring forcep with a 4 × 4 cm sponge can be dipped into contrast medium, and the vault can be outlined with dye and removed. While the patient is performing the Valsalva maneuver a lateral view of the pelvis can determine vault prolapse with the patient sitting or standing. If an enterocele is in question after videourodynamics is completed, a defecography study can be performed. It can be performed with the patient sitting or standing. Examinations with the patient standing are indicated when the patient history and symptoms imply prolapse that was not documented during physical examination. The standing position may hopefully increase the effects of gravity on prolapse and enhance prolapse recognition. The sitting and standing positions during physical examination, videourodynamics or defecography may lead to false-negative and false-positive conclusions. The former occurs if the patient has vaginal stenosis, a poor Valsalva maneuver or straining effort, or an undetected pessary. A false-positive result may occur with a

calcified pessary, or a vaginal/rectal foreign body, rectal or cervical tumor and severe constipation.

Urethral pressure profile and Valsalva leak point pressure measurements are controversial. Results differ significantly depending on the type of measuring device⁵⁴ and patient position,⁵⁵ while urethral pressure profiles have been poorly reproducible. Moreover, urethral pressure profile measurements do not consistently differentiate between continent and incontinent women, and do not always correlate with the severity of incontinence.⁵⁶ Indeed, in a recent review Weber suggested that "urethral pressure profilometry is not a useful diagnostic test for stress urinary incontinence in women."⁵⁶

Newer techniques may improve the clinical value of these measurements. Kulseng-Hanssen described ambulatory recording of urethral and bladder pressure, which proved helpful in patients with mixed urge and stress incontinence.⁵⁷ Wolters et al used computer assisted virtual profilometry, in which the measurement catheter is stopped at intervals during withdrawal while the patient coughs.⁵⁸

Imaging. Perineal ultrasound is useful for identifying the anatomy of the bladder neck and anterior or posterior vaginal wall prolapse.⁵⁹ Dietz and Clarke, who used translabial ultrasonography with urethral pressure profilometry, found a positive correlation between urethral diameter and maximum closing pressure.⁶⁰ Urethral hypermobility did not correlate with the pressure profile but a lower maximum pressure was seen in patients with a widely open bladder neck. However, perineal ultrasound for prolapse has not gained in popularity and it is not part of our regular assessment for prolapse or incontinence.

The 3 pelvic compartments can be well imaged through dynamic fluoroscopy with contrast medium in the bladder, vagina, small intestine and rectum.⁶¹⁻⁶⁴ The patient is positioned on a commode, asked to contract the pelvic floor muscles, and then to strain and evacuate the bowels and bladder. Altringer et al noted that dynamic fluoroscopy was more accurate than physical examination for detecting significant prolapse of each compartment.⁶¹ The limitations of dynamic fluoroscopy are that it is invasive and time-consuming (30 to 45 minutes), entails radiation exposure and costs 25% to 30% more than an excretory urogram.

Dynamic magnetic resonance imaging (MRI) for prolapse evaluation was first reported in 1991 by Yang et al.⁶⁵ Long acquisition times necessitated great cooperation from the patient for images to be captured with minimal motion artifact. Stronger, more rapid gradients and phased array coils allow T2-weighted dynamic imaging in as little as 2 seconds. Gufler et al used dynamic MRI with single slice, half-Fourier RARE sequences to examine patients with urinary incontinence or genital prolapse.⁶⁶ They compared this study with dynamic fluoroscopy and bead chain urethrocytography, and concluded that dynamic MRI provided more information.

Criticism of the need for supine imaging with MRI led Fielding et al to study the effect of changes in position using a 0.5 Tesla open magnet.⁶⁷ Except for the posterior urethrovesical angle all pelvic structures remained stable in each position.

Pannu provided a review of MRI in prolapse, noting that it has several advantages over fluoroscopy, such as better depiction of soft tissues, and absent of radiation and iodinated contrast medium.⁶⁸ However, Gousse et al argued that half-Fourier, single shot, turbo spin-echo MRI does not reliably detect rectoceles.⁶⁹ This apparent inaccuracy is attributable to the anterior rectal wall not being easily distinguished from the posterior rectal wall on rapid sequence MRI if the rectum is empty because the rectal walls are easily collapsible, making many rectoceles more difficult to diagnosis.

Many groups have recommended opacification of the rectum with contrast material in an effort to decrease false-negative results. Singh et al pointed out that prolapse grading is possible using the same landmarks as in the ICS

system, making MRI particularly useful for the objective evaluation of surgical results,⁷⁰ although Hodroff et al found that MRI did not distinguish well between stages I and II prolapse.⁷¹ Chu and DeLancey reported a system for grading urethral support⁷² and Hoyte et al, who obtained axial and sagittal T1 and T2-weighted images with 3-dimensional reconstructions, found statistically significant differences in the volume, shape and integrity of the levator muscle in asymptomatic and incontinent patients, and those with prolapse.⁷³ Perk et al suggested that MRI is particularly helpful in patients with complex prolapse for differentiating SI resulting from bladder neck malposition from that caused by intrinsic urethral damage and in determining the cause of surgical failure.⁷⁴ We have found MRI to be an excellent radiological tool for the assessment of prolapse. However, its everyday application for the evaluation of prolapse before or after surgical correction is not warranted. Its experimental use to define better in vivo anatomical relationships has been insightful but we have not found any advantage over a careful history and physical examination performed by an experienced clinician.

CONCLUSIONS

Prolapse may have a significant clinical effect on urethral sphincter function. Prior to contemplating prolapse surgery a detailed history/physical examination and urodynamic studies with prolapse reduction are needed. The correction of prolapse must aim to achieve the restoration of vaginal function with the patient under 1 anesthesia.

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