THE CLASSIFICATION AND DIAGNOSIS OF URINARY INCONTINENCE IN WOMEN

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WOMEN subject to urinary incontinence often are reluctant and ashamed to admit it, and they may be slow to seek medical attention because they believe that theirs is a unique disability. They curtail their social activities because of the constant insecurity resulting from unpredictable loss of urine with consequent odor and irritation. They may resort to various articles of protection, such as pads, rubber pants or aprons, and even towels, before seeking medical help. As a result, the physician who corrects the defect, and restores the patient's composure so that she may resume normal activities, will have an eternally grateful patient besides achieving great satisfaction himself.

The many causes of urinary incontinence make it imperative that a correct diagnostic evaluation be made if treatment is to be successful. A faulty diagnosis may lead to the wrong therapy that may make the condition considerably worse and thereby may jeopardize the results of secondary treatment. For these reasons, we propose to classify the types of urinary incontinence and to present the diagnostic studies we have found to be most helpful in evaluating this condition. The cooperative efforts of the gynecologist and the urologist are most desirable for thorough investigation of this complex problem.

Classification of Incontinence

There are five types of incontinence: (1) stress incontinence, (2) urgency incontinence, (3) dribbling incontinence with otherwise normal voiding, (4) dribbling incontinence with no voiding, (5) paradoxical or overflow incontinence.

(1) *Stress incontinence* is characterized by progressive involuntary loss of urine when physical activity such as coughing, sneezing, laughing, lifting, climbing stairs, or stooping, increases intraabdominal and intravesical pressure. This incontinence occurs with no preceding sensation of bladder distention or an urge to void. The extent of urinary loss may range from occasional dribbling associated with maximal stress, to extensive gushing occurring with only minimal exertion or positional change. Stress incontinence rarely occurs in nulliparous women, but typically occurs in parous women who have sustained occult lacerations during childbirth. There is loss of urethral support, and urethral resistance is unable to overcome increases in intravesical pressure. The onset of the condition is insidious

and it is progressive, becoming worse with menopausal atrophy.

Stress incontinence generally does not occur in the presence of a large cystocele, since increased intravesical pressure is transmitted away from the urethra rather than against the vesical neck. However, the surgical repair of a cystocele may produce stress incontinence by increasing the hydrostatic pressure on a lax urethra.

(2) *Urgency incontinence* is characterized by a feeling of fullness in the bladder, an uncontrollable urge to void, and subsequent precipitous loss of urine. Women with this type of incontinence have no urinary control when there is an urge to void. Urge incontinence may have a gradual or precipitous onset, and is not related to parity. It can be associated with stress incontinence, but it may occur independently. In the latter case, activity or stress will not result in urinary loss.

Several conditions will produce urge incontinence. Infections (including tuberculosis) may cause cystitis and urethritis that produce an irritable bladder; interstitial cystitis produces the same symptoms. Multiple sclerosis and cerebral vascular accidents may produce a neurogenic bladder characterized by uninhibited bladder contractions producing urge incontinence or "precipitous" micturition.

(3) *Dribbling incontinence with otherwise normal voiding* may be due to an ectopic ureter, a small vesicovaginal fistula, stress incontinence, a urethral diverticulum or an autonomous neurogenic bladder due to myelodysplasia or trauma to the sacral spinal cord.

An ectopic ureter emptying into the urethra or vagina produces symptoms that usually are first noted when complete continence cannot be achieved in childhood. In some women the loss of urine is so slight that the presenting complaint may be only a long-standing, persistent vaginal discharge. With a history of the onset of dribbling incontinence after a surgical procedure a search should be made for a small vesicovaginal or ureterovaginal fistula.

The early differentiation between a ureterovaginal fistula and a vesicovaginal fistula is important because a ureterovaginal fistula usually should be promptly corrected surgically in order to prevent stricture, hydronephrosis, and pyelonephritis. The surgical repair of a vesicovaginal fistula should be deferred until all local inflammatory changes have subsided. This generally requires three months, although a longer period may be desirable.

Constant dribbling with intermittent voiding may occur in women who have severe stress incontinence wherein urethral resistance is so low that any activity results in urinary loss.

A large urethral diverticulum often will fill with urine in the course of normal voiding. The diverticulum then will empty when the upright position is assumed. A chronically infected urethral diverticulum causes recurrent dysuria, irritative bladder symptoms, and dyspareunia.

The autonomous neurogenic bladder is often characterized by constant dribbling

with intermittent voiding. This occurs most frequently in children with myelomeningoceles or myelodysplasia, often associated with spina bifida. Trauma or tumors of the sacral spinal cord may occasionally produce this type of neurogenic bladder. The patient with an autonomous bladder voids in a characteristic manner by contracting the abdominal musculature and straining in the Valsalva manner. Pressure in the suprapubic area is also effective in emptying the bladder.

(4) *Dribbling incontinence with no voiding* usually occurs in association with a large vesicovaginal fistula that keeps the bladder constantly empty. The condition also exists in the presence of bilateral ureterovaginal fistulas or a unilateral ureterovaginal fistula when the opposite kidney is absent, or there is obstruction of the opposite ureter. A vesicovaginal fistula and a ureterovaginal fistula may coexist. Occasionally constant dribbling without voiding occurs when a neurogenic bladder is produced by lesions in the sacral cord as described above.

(5) *Paradoxical or overflow incontinence* is produced by an obstructive or neurologic lesion that prevents emptying of the bladder at voiding. The amount of residual urine insidiously increases, and the bladder distends until urethral resistance is exceeded and dribbling occurs. Often the patient has no discomfort associated with the distended bladder, and seeks medical aid because of the associated incontinence.

Diagnostic Evaluation

A careful history is of considerable assistance in evaluating the incontinent patient, since it often gives the clinician important clues in regard to the origin of the condition. It is helpful to know about previous surgical operations, and the time of onset and the degree of incontinence—on the basis of the amount of perineal protection that the patient requires. Many women have a minor degree of incontinence that is of little concern to them and thus may be of little concern to the physician. Incontinence may consist of constant dribbling, a loss of urine with stress, or may be secondary to an uncontrollable urge to void. Normal voiding may or may not occur. If there is normal voiding, the size and character of the urinary stream, the presence or absence of hesitancy, and of dysuria and hematuria are important considerations.

From the foregoing discussion, it is apparent that the patient's medical history is important, but only gives clues to the underlying cause of the incontinence, and aids in the selection of appropriate diagnostic tests and examinations. These procedures can be divided into two groups: (1) general examinations, used in all cases of incontinence; and (2) special examinations, used for specific conditions. The general examinations should include a general physical examination with special attention to the abdominal and pelvic examination, urinalysis, urography, and cystoscopy. The special examinations include the cystometric examination, cinefluorographic studies, special dye studies, and urethrography.

General Examinations

A pelvic examination is most helpful if it is performed in a systematic fashion. Abdominal palpation may reveal a large mass in the suprapubic area. Inspection of the external genitalia will demonstrate the presence or absence of local irritations and excoriations due to urinary loss. If the patient is asked to bear down or to cough, in the presence of stress incontinence or relaxations of the anterior vaginal wall, characteristic urethral rotation may be demonstrated and there may be a gush of urine through the urethral meatus. Urine may also issue from the vagina secondary to fistulous communications. Careful palpation of the anterior vaginal wall before instrumentation may reveal a thickening and tenderness of the urethra because of a urethral diverticulum. Frequently a diverticulum can be decompressed by digital pressure and its fluid can be seen to extrude through the urethral meatus. Fistulous defects may also be felt in the anterior vaginal wall.

The next step in careful pelvic examination involves inspection of the vagina. The Graves's speculum may be sufficient, although a Sims's speculum may be necessary to detect a small vesicovaginal or urethrovaginal fistula. The Sims's position may facilitate such an examination. The extent of pelvic floor relaxation can be determined by applying traction on the cervix with a tenaculum and urging the patient to bear down or to cough. Sometimes a cystocele can be detected only in the upright position.

Bimanual and rectovaginal examinations can be of great assistance, but should be reserved for the conclusion of the pelvic examination. In this manner, bladder sensitivity can be determined and a pelvic mass may be felt. When there is a cystic mass anterior to the cervix, catheterization should be employed to differentiate this mass from a distended bladder. Bimanual examination also will demonstrate a mass that impinges directly on the trigone of the bladder or pushes the cervix or uterus against the trigone. A previous suspension, ventral fixation or adhesion of the uterus to the anterior abdominal wall, secondary to cesarean section, can also be diagnosed.

Urinalysis is important, and a clean voided specimen may be examined initially, although a catheterized specimen is most desirable. If there is evidence of a urinary tract infection, culture and sensitivity studies should be obtained. In selected patients, specimens should be obtained to determine possible tuberculous involvement of the urinary tract.

Renal function studies are desirable as a routine procedure. A simple 15-minute phenolsulfonphthalein (P.S.P.) or urea clearance test will rapidly give an evaluation of the patient's renal status.

An *intravenous pyelogram* should be done on every patient with urinary incontinence. It provides a basis for estimating renal function and may demonstrate serious pathologic changes in the urinary tract which are asymptomatic. When incontinence occurs after a surgical procedure, or when the possibility of an ectopic

ureter exists, urography may provide definitive diagnostic evidence.

Panendoscopic and cystoscopic examinations are desirable preoperatively in all incontinent women. A fistula or diverticulum frequently can be diagnosed by the use of a panendoscope and a finger placed along the anterior vaginal wall. The panendoscope allows complete visualization of the urethra. Inspection of the bladder with the cystoscope will reveal whether or not pathologic changes are in the bladder which cause urge incontinence. A large, atonic bladder can be easily recognized and the presence of a vesicovaginal fistula frequently can be determined. Furthermore, the location of a fistula relative to the ureteral openings can be observed, and a catheter can be placed through a small fistula, for identification at the time of surgical repair. In the presence of tiny fistulas, local scarification or fulguration may encourage spontaneous healing. Ureteral catheterization with retrograde pyelograms may be helpful in determining the presence of a ureterovaginal fistula.

Special Examinations

The *cystometric examination* should not be overlooked as an aid in the evaluation of the incontinent patient. It can give valuable information that may indicate the desirability of medical treatment rather than an operative procedure.

The technic of cystometric examination is simple. The patient is instructed to void; then a Foley catheter is placed in the bladder and the amount of residual urine is measured. The Foley catheter is allowed to remain in situ while hot water and cold water are alternately run into the bladder. If the patient is unable to differentiate between hot and cold, the sensory side of bladder inervation has been interrupted. Then, water is allowed to run into the bladder in order to determine capacity and intravesical pressure (which is measured in centimeters of water) *(Fig. 1, A and B).* Uninhibited contractions can be noted, and in patients with extremely irritable bladders, methantheline bromide, U.S.P.,* given intravenously in a dose of from 75 to 100 mg. will differentiate between bladder spasm and uninhibited contractions. To determine the capacity of the bladder the patient is asked to indicate when filling reaches the point at which a maximal voiding urge is produced. The determination of the presence or absence of saddle anesthesia and the bulbocavernosus reflex completes the neurologic examination of the bladder. Before removing the Foley catheter, urethral length is measured and, with a special, calibrated catheter, urethral resistance is measured at one-half centimeter intervals along the urethra. The bladder is allowed to remain full, and after removal of the catheter, the extent of urinary continence can be determined in relation to quiet standing and stress.

When bladder dysfunction is of neurogenic origin, operative procedures tend to aggravate the problem, particularly if the patient already has a large amount of

**Banthine, G. D. Searle & Co.*

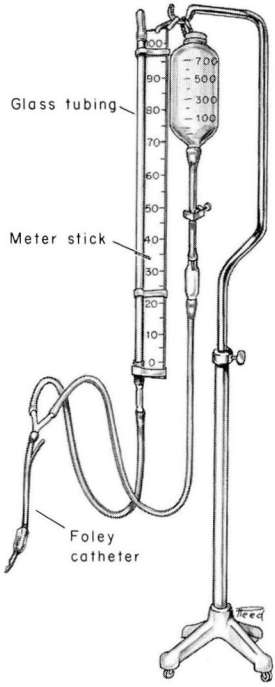
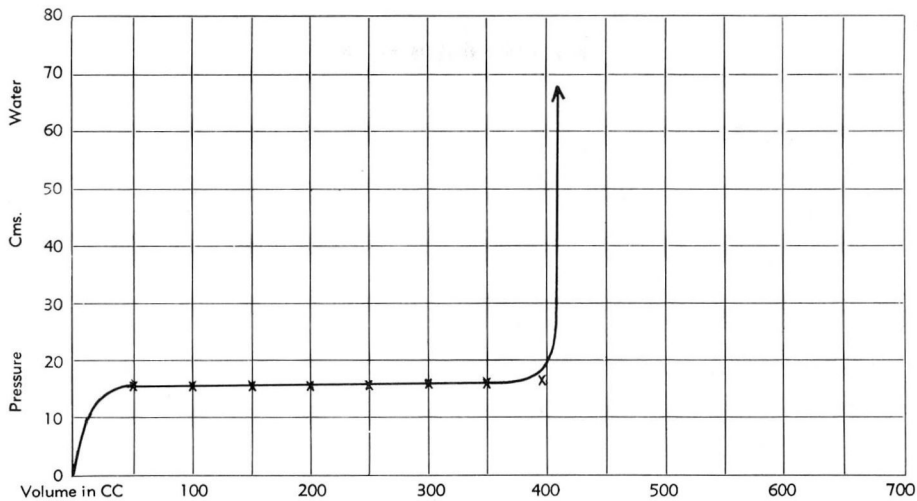


Fig. 1. A, Equipment for a cystometric examination.

residual urine. Banthine given orally, 50 mg. four times daily, often will produce great improvement by suppressing uninhibited contractions and thereby increasing the bladder capacity.

Cinefluorographic studies provide further assistance in the evaluation of stress incontinence. These studies employ cinefluorography of patients in the act of coughing, straining, and voiding. The technic consists of filling the bladder with a radiopaque contrast medium and using an image amplifier that makes it possible to take movies during these activities. The movies can then be reviewed for evidence of anatomic variations and defects. The technic is admittedly experimental, but we have found it to be of considerable assistance in providing evidence of the mechanisms involved in stress incontinence.

The differential diagnosis of fistulas may present a diagnostic problem, and the use of certain media will often be useful. When a small vesicovaginal fistula is present, a tampon may be placed in the vagina, and a dilute solution of methylene blue can be injected into the bladder through a catheter. After a few minutes the tampon is removed; if methylene blue is found on the tampon it indicates the presence of a fistulous tract *(Fig. 2A).* (In some patients it has been helpful to



Sensation to Heat Yes
—to Cold Yes
—to Distention Yes

First Desire 100

Uninhibited Contractions None

Voiding Average Amount

—Interrupted or Uninterrupted Stream

—Hesitancy None

Neurological Findings:
No saddle anesthesia
Intact bulbocavernosus reflex

Capacity —Supine 400
—Standing
Residual Urine 0

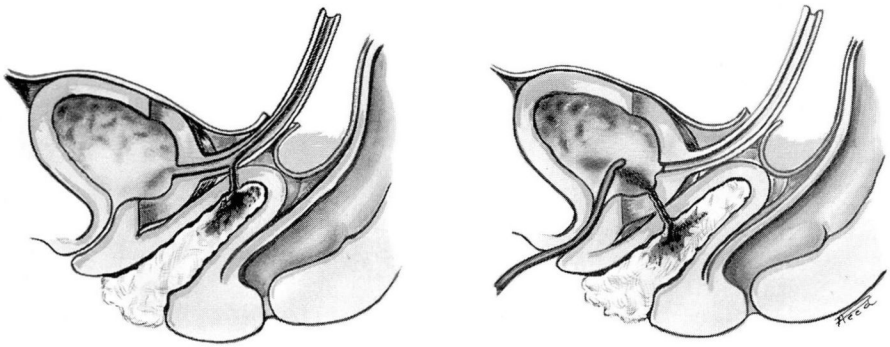
Clinical Diagnosis:
Normal bladder

Comment:

Fig. 1. B, Normal cystometrogram.

observe the apex of the vagina when introducing the methylene blue into the bladder.) When no fistulous tract is thus demonstrated, 1 ml. of indigo carmine should be given intravenously after a new tampon has been placed in the vagina *(Fig. 2B).* Indigo carmine is excreted by the kidneys, and if there is a ureterovaginal fistula, the dye will be found on the tampon. This dye may also help to identify ectopic ureteral orifices.

A urethrogram is of value in demonstrating urethral diverticula; *Figure 3* is a sketch showing the technic. An opening is made in a Foley catheter proximal to the bag, and the opening distal to the bag is closed. The Foley catheter is inserted into the bladder, the bag is inflated and is pulled tightly against the vesical neck. Contrast medium is inserted into the catheter and thereupon fills the urethra. If a diverticulum is present it often will become filled with the



A B

Fig. 2. A, Sketch showing technic of demonstrating the presence of a ureterovaginal fistula by placing a tampon in the vagina and injecting indigo carmine intravenously. B, Sketch showing technic of demonstrating the presence of a vesicovaginal fistula by placing a tampon in the vagina and injecting methylene blue into the bladder via catheter.

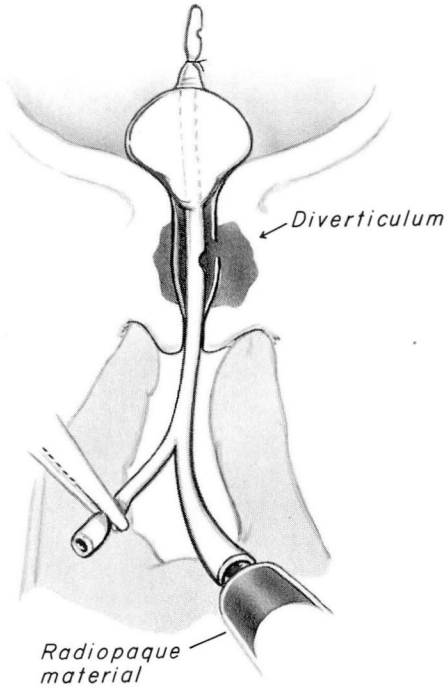


Fig. 3. Sketch showing technic of performing urethrography.

contrast medium and a urethrogram will demonstrate it. Special catheters are also available commercially for use in making urethrograms.

Conclusion

The classification of urinary incontinence and the diagnostic procedures we have found to be most helpful in determining the cause of incontinence, have been presented in detail. No attempt has been made to discuss therapy, but it is clear that it will be based on an exact determination of the cause of the incontinence. We advocate a thorough and critical evaluation of the incontinent woman, using the diagnostic procedures that we have presented.