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Bladder dysfunction disorders

diagnosis in women

Bladder dysfunction disorders include a wide variety of conditions, which may be influenced by many external factors, such as emotional stress, cold weather, fluid and food intake and medication. A systematic approach is essential to make the correct diagnosis

Bladder dysfunction is a common and disabling problem that severely affects the quality of elderly people, being one of the most psychologically distressing and socially disruptive problems they face. In the USA, the economic costs of bladder dysfunction are approximately \$6-billion annually in the community setting and approximately 10% of total nursing home care costs.^[1] These figures exceed the annual cost of dialysis and coronary artery bypass surgery combined.

Etiology of bladder dysfunction disorders

Bladder dysfunction disorders may present with different lower urinary tract symptoms (LUTS). There are many conditions causing LUTS, but the most common causes of bladder dysfunction are urinary stress incontinence (USI) and detrusor overactivity (DO).

USI is defined as 'the involuntary leakage of urine during increased abdominal pressure, in the absence of detrusor activity and desire to void'.^[1] USI has been demonstrated in 40 to 60% of women investigated for bladder dysfunction.^[1] USI is caused by urethral sphincter incompetence that may be due to either:

- **hypermobility of the urethra** (figure 1a and 1b) Insufficient support posterior to the bladder neck and proximal urethra create a lack of a proper 'backboard' against which the bladder neck and proximal urethra can be compressed during increases in abdominal pressure.

- **intrinsic sphincter deficiency** (ISD) (figure 2) ISD is caused by malfunction of the urethral sphincter, regardless of its anatomic position.

Urethral hypermobility and ISD may (and often do) co-exist in the same patient.

Detrusor overactivity (DO) accounts for 20 to 30% of cases of urinary incontinence. It is defined as 'a urodynamic observation characterised by involuntary detrusor contractions during the filling phase which may be spontaneous or provoked'.^[1] The association of DO and urethral sphincter incompetence is referred to as 'mixed urinary incontinence'. This accounts for 30% of cases of urinary incontinence.

Pathophysiology of mixed urinary incontinence

An association between bladder neck dysfunction and detrusor activity has been postulated in the pathophysiology of mixed urinary incontinence. In some women with urethral incompetence, urine enters the proximal urethra

Salient points

- Genital prolapse is an important cause of bladder dysfunction
- Female prostatitis is probably the most common cause of urethral syndrome
- Symptoms of UTI with negative urine cultures, may be due to infection in paraurethral glands
- Urethral sphincter incompetence may cause mixed urinary incontinence
- Urinary stress incontinence is the most common cause of bladder dysfunction

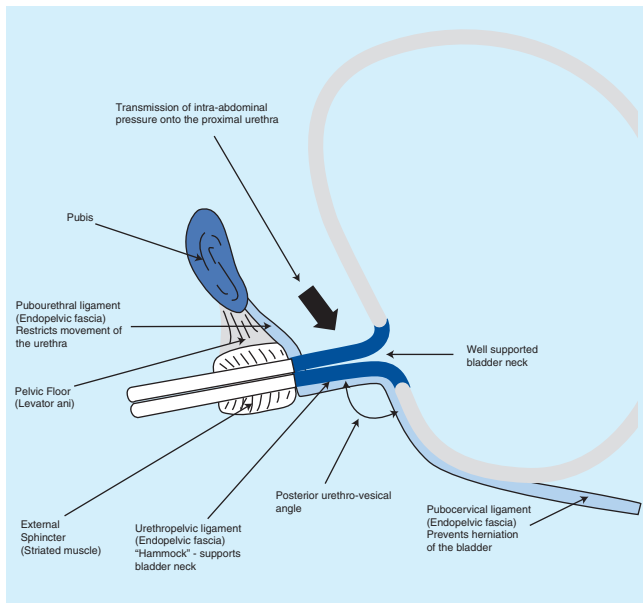


Figure 1a Anatomy of the female pelvis

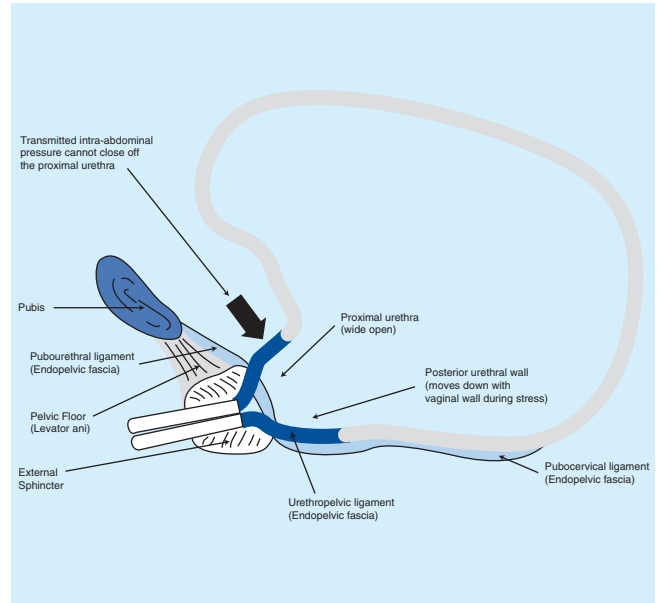


Figure 1b Insufficient support of proximal urethra

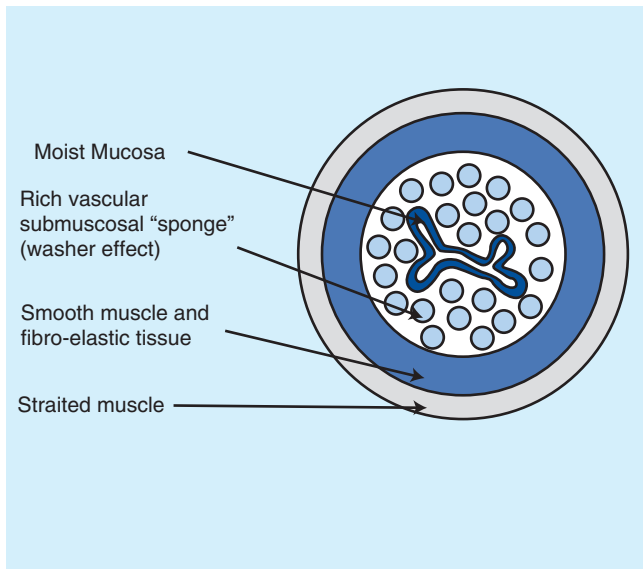


Figure 2 Intrinsic sphincter mechanism [2]

and triggers the normal voiding reflex of urethral relaxation, followed by detrusor contraction. This mechanism could explain coughing- or exercise-induced detrusor activity. More severe stress incontinence often leads to mixed symptoms.

Sensory urgency

This condition has the same symptoms of urgency and even urge-incontinence as in DO (motor urge inconti-

nence), but with a stable bladder without any abnormal bladder contractions. This may be caused by different conditions causing local irritation of the urethra or bladder, including urethral incompetence (as seen with mixed urinary incontinence) (figure 3).

Vaginal incontinence

Some women pass a small amount of urine into the vagina during micturition. When they stand up from the toilet it leaks out immediately. This should be distinguished from urethral incontinence, where people may leak whenever they stand up from the sitting position.

Vaginal fistulae are rare in first world countries, but may occur after radiotherapy or surgery. It is common in third world countries, mainly due to obstructive childbirth. Women present with continuous urinary leakage. On examination, the vagina usually contains urine and is clear of the normal secretion.

Causes of frequency and urgency

Systemic conditions

- large fluid intake
- diabetes mellitus
- diuretic therapy
- renal impairment
- diabetes insipidus
- hypercalcaemia

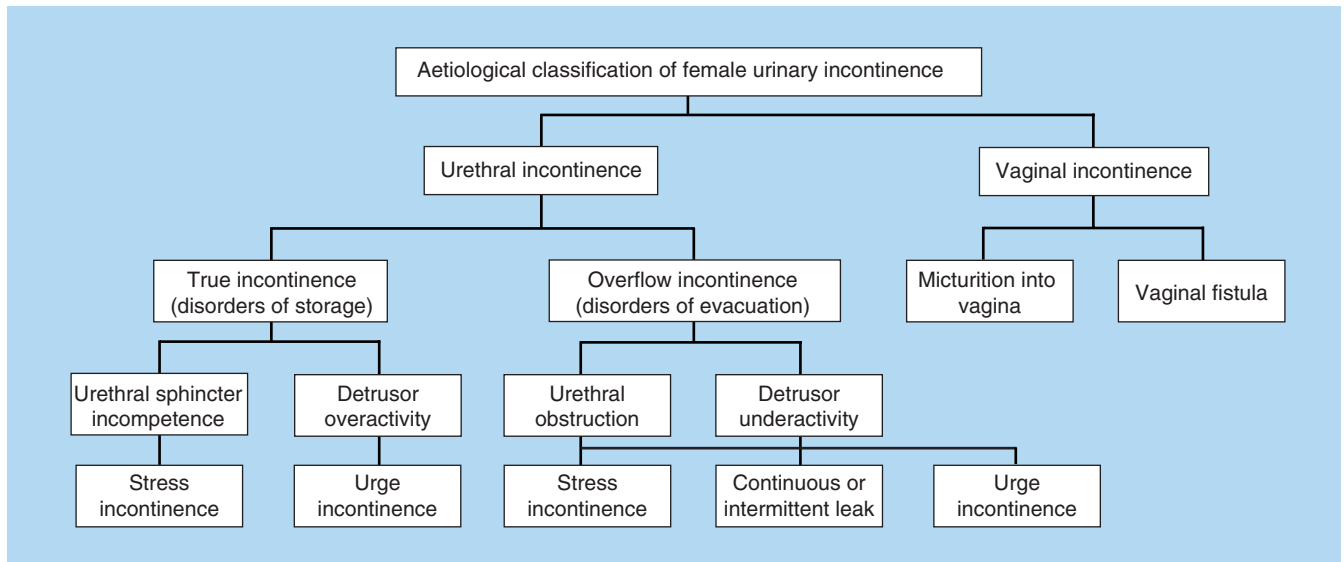


Figure 3 Female urinary incontinence

Local conditions

Conditions affecting the urethra

In the lumen of the urethra:

- stone
- tumour
- infection

Conditions in the wall of the urethra:

- urethral caruncle
- paraurethral gland infection (female prostatitis)
- obstruction
- atrophic urethral changes

Outside the urethra:

- chemical irritants, contraceptive foams, douches, diaphragm, obsessive washing
- uterine prolapse or vaginal vault prolapse
- vulvar carcinoma or genital condylomata
- cervicitis
- deficient urethral support
- hematocolpos or hydrocolpos

Conditions affecting the bladder

In the lumen of the bladder:

- stone
- tumour
- infection

In the wall of the bladder:

- interstitial cystitis
- cystitis cystica
- detrusor overactivity
- carcinoma *in situ*
- metaplastic trigonitis
- detrusor endometriosis
- schistosomiasis (bilharzia)

Outside the bladder:

- pressure on the bladder by tumour, pregnancy, obesity or ascites
- deficient bladder support - bladder and pelvic organ prolapse

Nerve supply of the bladder (detrusor hyperreflexia):

- supraspinal neurologic lesions, including: stroke, Parkinson’s disease, hydrocephalus, brain tumour, multiple sclerosis
- suprasacral spinal lesions (may present with detrusor external sphincter dyssynergia), including: spinal cord injury, multiple sclerosis, spina bifida, transverse myelitis

Urethral syndrome

Urethral syndrome is a very non-specific constellation of symptoms including urinary frequency, urgency, and suprapubic discomfort. Probably the most common cause of this condition is ‘female prostatitis’, which is an inflammation in the paraurethral glands. The patient has the typical symptoms of a UTI, but the urine cultures are often negative as the infection is in the glands around the

urethra and not in the urine. These patients present with pelvic discomfort, urine frequency, dyspareunia and negative urinary laboratory findings. It is often triggered by sexual intercourse. On clinical examination there is often tenderness over the urethral area during vaginal examination. Different bacteria have been postulated to cause female prostatitis, including chlamydia, enterobacteria, anaerobic bacteria and ureaplasma urealyticum. Treatment must consist of tissue-penetrating antibiotics for a prolonged time. This may include tetracycline, quinolones, trimethoprim, metronidazole and azithromycin. Adjuvant therapy includes applying local heat, prophylactic antifungal vaginal cream, external sphincter relaxants, biofeedback therapy and bladder training.^[3]

Interstitial cystitis

With interstitial cystitis, the mucus lining of the bladder disappears and the urine causes irritation of the bladder wall with a resultant inflammatory reaction. These patients are more sensitive to potassium in the bladder. Symptoms include severe frequency and lower abdominal pain, and often, pain with a full bladder that can be relieved by passing urine. Diagnosis of interstitial cystitis is based on excluding other causes of the same symptoms and is confirmed by a cystoscopy under general anaesthesia. During a cystoscopy the bladder is filled to a pressure of 80cm H₂O, emptied, and with a second filling multiple red bleeding spots (glomerulations) are visible. This appearance is called 'birds nests in a winter tree'. Histology of these red areas is non-specific and of no diagnostic significance, except to exclude other conditions.

Treatment

- hydrodistention of the bladder during the initial cystoscopy often improves the symptoms
- systemic treatment with amitriptyline and antihistamines
- use of analgesics: nonopioid analgesics including acetaminophen, nonsteroidal anti-inflammatories and even antispasmodics (opioids are only used if less powerful analgesics have failed)
- use of sodium pentosan polysulphate (Elmiron), a heparin analogue available in oral form
- bladder installations of heparin, dimethyl sulfoxide, Clorpactin or BCG vaccine
- subcutaneous heparin injections (heparin restores the mucous lining of the bladder)
- nerve stimulation of the sacral nerves (S2,3,4)
- in extreme cases, surgical intervention is indicated, with the removal of most of the bladder wall which is replaced with a segment of bowel

Diet

10 foods to avoid:^[4]

- cranberry juices & extracts
- coffee & tea products
- carbonated beverages & sodas of any type (diet and regular)
- tomatoes, tofu & some beans
- herbal teas
- tobacco
- alcohol & vinegars
- chocolate
- strawberries & other acidic fruits
- food additives & seasonings

Interstitial cystitis may be associated with other conditions such as endometriosis, chronic fatigue syndrome, Sjögren's syndrome and systemic lupus erythematosus.

Many drugs can cause nonbacterial cystitis, which will resolve with drug withdrawal. These drugs include aspirin, nonsteroidal anti-inflammatory agents, allopurinol and cyclophosphamide.

Cystitis cystica

This condition is associated with long-standing chronic bladder infection and is diagnosed by cystoscopy, with typical appearance of multiple small lumps in the bladder. There is a difference in opinion regarding the treatment of cystitis cystica, but it often responds well to an extended course of trimethoprim treatment as trimethoprim penetrates well into these lumps.

Metaplastic trigonitis

In some patients, the trigone has a white appearance which looks similar to bowel mucosa. Histology shows squamous metaplasia. This is not of any importance and not a pre-malignant condition, but it can cause irritation of the bladder and microscopic haematuria. No treatment is necessary, but cauterisation of the trigone is sometimes performed in severe cases.

Endometriosis of bladder

Patients may present with cyclic haematuria. Diagnosis is confirmed by cystoscopy and treated with laparoscopic excision.

The PPOD Syndrome

The PPOD (pronounced 'pea-pod') syndrome is described as mechanically induced pelvic pain and organic dysfunction. It is suggested to be caused by an 'atypical' mechanical disorder of the spine.^[5] The author has no knowledge of the condition, and is not convinced of its existence as a separate entity.

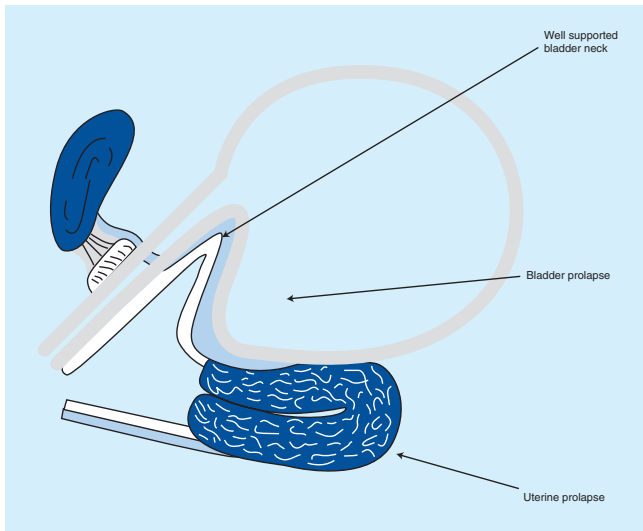


Figure 4 Bladder and uterine prolapse

Genital prolapse (figure 4)

The pubocervical fascia supports the bladder. As this fascia is attached to the cervix, lower urinary tract symptoms are common in women with genital prolapse. Voiding difficulty, bladder outlet obstruction and occult stress incontinence may coexist. Detrusor overactivity and urethral hypermobility also correlate with the degree of prolapse, but impaired detrusor contractility and intrinsic sphincter deficiency do not.^[6]

Outflow obstruction may be due to mechanical urethral kinking, or urethral and/or bladder neck compression by the prolapsed cystocele, prolapsed uterus, severe rectocele or prolapsed enterocele. Many women with severe prolapse, recall that as the prolapse worsened, their stress incontinence symptoms improved. Reducing the vaginal prolapse can produce stress incontinence in up to 80% of clinically continent patients with severe prolapse.^[7] This fact must be kept in mind during surgical treatment of prolapse.

Symptoms of bladder hyperactivity may include frequency, nocturia, urgency and urge incontinence. Urge incontinence resolved in 63% of women after surgical repair of uterine and/or vault prolapse.^[8]

Evaluation of patients with bladder dysfunction disorders

History

In evaluation of patients with bladder dysfunction disorders the following history should be obtained:

- type of incontinence (urge or stress)
 - immediate leakage after coughing or standing up is stress incontinence, but if the patient only

leaks a few seconds later then it is most probably due to a detrusor contraction. If a patient says that she has to run to the toilet, then it is normally urge incontinence, but it could also be that the running causes stress incontinence

- straining to void, poor urine flow or the feeling of incomplete bladder emptying
 - a patient may have difficulty passing urine due to urethral stenosis, kinking of the urethra due to bladder prolapse, or compression of the urethra due to uterine prolapse
- medications
 - alpha-blockers may relax the urethra and cause incontinence
 - alpha stimulants such as pseudoephedrine may cause difficulty in passing urine
- frequency
 - patients going to the toilet more than 7-8 times per day
- nocturia
 - passing urine more than 1-2 times a night (this may be caused by taking alcohol at night, even without bladder dysfunction)
- associated symptoms (dysuria, haematuria, suprapubic or perineal discomfort)
 - in these cases, one has to exclude bladder cancer, bladder stone or infection
- alteration in bowel habits or in sexual function
 - both these symptoms may be part of severe pelvic organ prolapse
- other diseases
 - cancer, diabetes, neurologic disease
- smoking
 - can cause bladder cancer

Voiding record

A diary should be kept for 24 to 48 hours, documenting the patient's fluid intake and urinary output. Voided volume should be recorded. The amount of incontinence should also be recorded. This diary would give an indication of bladder capacity by looking at the largest single voided volume. It would also differentiate between frequency and polyuria.

Physical examination

The following physical examinations should be undertaken:

- abdominal examination
 - to exclude a distended bladder or abdominal mass

- pelvic examination
 - to exclude atrophic vaginitis, urethritis, pelvic muscle laxity, bladder neck descent, cystocele, rectocele, uterine or vault prolapse and pelvic mass
- stress test
 - the patient is examined with a full bladder and is asked to give three coughs with an increasing in intensity. If the patient leaks with a tiny cough, then it is a possible indication of intrinsic sphincter deficiency, but if she only leaks with a very strong cough, then hypermobility of the urethra is indicated. If bilateral elevation of the bladder neck stops incontinence, then hypermobility of the urethra is indicated, but if she continues to leak, then it is a sign of intrinsic sphincter deficiency. If leakage occurs a few seconds after coughing, then it may be due to a detrusor contraction
- rectal examination
 - to assess skin irritation, anal sphincter control and faecal impaction
- neurologic examination
 - to assess mental status, sacral reflexes and perineal sensation (S2,3,4)
- other medical conditions
 - to exclude congestive heart failure and peripheral oedema
- post-void residual urine
 - this test is essential in all incontinent women and distinguishes between true incontinence (residual urine less than 50ml) and overflow incontinence (residual urine more than 100ml)

Laboratory investigation

The following laboratory investigations should be carried out:

- creatinine and electrolytes, fasting glucose and calcium (for patients with polyuria)
- renal and bladder ultrasound in patients with possible incomplete bladder emptying
- urine culture to exclude infections. If a patient has a negative culture but symptoms of infection, then infection in the paraurethral glands could be expected. But it may also be due to interstitial cystitis or other causes of bladder irritation
- urine cytology to exclude bladder cancer or carcinoma *in situ*

Urodynamic studies

The following urodynamic studies are recommended:

- uroflow: to measure the initial flow without catheters
- residual urine: to evaluate incomplete emptying
- cystometrogram: to evaluate detrusor contractions, bladder compliance and volume
- leak point pressure (LPP): high LPP = hypermobility; low LPP = intrinsic sphincter deficiency
- pressure flow study: to compare pressure in bladder with urine flow simultaneously

Conclusion

Diagnosis of bladder dysfunction disorders may be difficult and may only be confirmed following special investigations, which include urodynamic studies, radiological studies and cystoscopy under general anaesthetic. If the condition appears more complex than a simple urinary infection or other minor condition, it is advisable to refer the patient to a specialist interested in female urology.

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