Female urinary stress incontinence

what causes it and how to treat it

Stress incontinence is the most common form of female urinary incontinence and may be caused by urethral hypermobility or intrinsic sphincter deficiency. The many conservative and surgical therapies that are available need to be tailored to meet each woman's needs.

CHRISTOPHER MAHER
MB BS, FRANZCOG CU

Dr Maher is a Urogynaecologist, Mater and Wesley Urogynaecology Units, Brisbane, Qld.

Urinary stress incontinence is the involuntary loss of urine when the intra-abdominal pressure is raised by activities such as coughing, sneezing, laughter and physical exertion. Stress incontinence is the most common cause of urinary incontinence in women and affects the social, psychological, occupational, recreational, domestic and social lives of 15 to 20% of women in the community.[1]

Sufferers experience significant difficulties including:

- increased laundering and sanitary protection costs
- embarrassment
- lower self-esteem
- withdrawal from social activities such as gym, netball, tennis, golf and dancing.

Stress incontinence is most common in women around the age of 50 years, with 43% experiencing at least monthly stress incontinence.[1] However, all age groups are affected: 40% of young nulliparous student nurses admitted some degree of stress incontinence and 33% of postmenopausal women report regular stress incontinence. Many of these women suffer associated pelvic floor dysfunction, including genital prolapse and faecal incontinence. While urinary stress incontinence is endemic in the community at least half of affected women never seek help.[2] The general practitioner is the first point of contact with medical services for these women, and is ideally placed to orchestrate the care of women with urinary stress incontinence.

IN SUMMARY

- **Urinary stress incontinence is the most common cause of urinary incontinence and is experienced by 20% of adult women, resulting in a significant reduction in quality of life.**
- **Half of all women suffering from urinary stress incontinence will not tell their general practitioner they have this problem.**
- **Aetiology is multifactorial but possible risk factors include age, obesity, constipation, parity, childbirth, smoking, connective tissue abnormalities and denervation of the pelvic floor. Hysterectomy and menopause are not risk factors.**
- **Pelvic floor exercises can significantly improve stress incontinence symptoms.**
- **Women should be offered treatment when they have to alter their lifestyle to minimise their stress incontinence.**
- **There are many conservative and surgical therapies available, which should be tailored to meet the individual's needs; pelvic floor exercises and the Burch colposuspension are two of the most widely used.**

What causes stress incontinence?

Urethral hypermobility

The upper urethra and bladder outlet are cradled by the vagina, pelvic floor muscles and paravaginal tissue (Figure 1). These tissues act like a hammock to resist the downward pressure on the bladder and urethra during episodes of raised intra-abdominal pressure, ensuring the intraurethral pressure remains greater than the bladder (intravesical) pressure, thereby avoiding urine leakage. The intraurethral pressure is further augmented by the sphincter urethra muscles which allow the urine flow to be interrupted midstream.

When the upper urethra and bladder outlet are poorly supported by the pelvic floor muscles and fascia the urethra becomes hypermobile at times of increased abdominal pressure. This lack of urethral support results in the intraurethral pressure being less than the intravesical pressure, leading to urinary stress incontinence. Urethral hypermobility is the leading cause of female urinary stress incontinence.

Intrinsic sphincter deficiency

A second cause of urinary stress incontinence, which is seen in about 15% of women, is poor urethral sphincter function. Frequently termed intrinsic sphincter deficiency (ISD), it involves a weak sphincter muscle allowing urine to leak from the bladder whenever intra-abdominal pressure exceeds urethral resistance. It is diagnosed by urodynamic studies and is associated with more severe stress incontinence, continuous leakage or gross leakage with minimal exertion.

Urinary stress incontinence is, therefore, a multifactorial condition that occurs when there is impaired urethral support or sphincter function and an increase in the intra-abdominal pressure causes the intravesical pressure to exceed the maximal intraurethral pressure.

Risk factors

Risk factors for stress incontinence include age, parity, childbirth, race, connective tissue abnormalities, neuropathy and chronically increased abdominal pressure (Tables 1 and 2).[3,4]

Menopause is not considered a significant risk factor for stress incontinence. Indeed, some studies suggest that incontinence is greater in

Surgical options for urinary stress incontinence

Transurethral injection of a bulking agent increases urethral resistance, leading to a significant reduction in the symptoms of female urinary stress incontinence. This is one of the several surgical options available for women with stress incontinence. Conservative therapies are also available, such as pelvic floor exercises and mechanical devices.

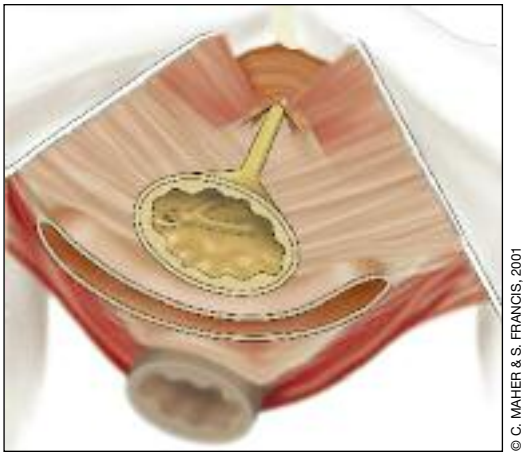


Figure 1. The urethral continence mechanism, including the sling-like support to the upper urethra and bladder and the distal urethral sphincter muscles (superior lateral view).

Table 1. Risk factors for stress incontinence

Age
Peak incidence at 50 years. The aged (over 70 years) may be at increased risk of failed continence surgery due to:
- poor tissue strength
- inefficient healing
- loss of urethral function

Parity
Stress incontinence is more frequent in:
- women who have had children than in those who have not
- women of higher parity
- women who have had high birthweight babies

Childbirth
Elective caesarean section may protect against stress incontinence.[3] The protective effect may become less obvious the greater the intervening time period from childbirth, as other lifestyle factors intervene.[4]

Race
Caucasian women are at greater risk than Asian or African women (the reason for this is unclear).

Connective tissue abnormalities
Women with stress incontinence have:
- increased number of enzymes (collagenases and elastases) that break down the connective tissue
- decreased total collagen content
- decreased type III collagen

Neuropathy
Damaged nerves innervating the pelvic floor and periurethral musculature may cause stress incontinence.

premenopausal than in postmenopausal women.[5] Hysterectomy is believed by many women to have caused their stress incontinence but there is no proof of this in the literature.

Table 2. Risk factors for chronically raised intra-abdominal pressure

Obesity
- Obesity is more common in women with stress incontinence than in continent women
- Surgical correction of incontinence is more difficult in obese women
- Long term efficacy of surgery may be reduced in obese women

Smoking and chest pathology
- Smokers are two to three times more likely to develop stress incontinence than nonsmokers – the cause is unclear but may be related to increased intra-abdominal pressure associated with coughing
- Chronic bronchitis is associated with an increased risk of stress incontinence

Constipation
- Chronic straining at defaecation is significantly more common in women with stress incontinence and genital prolapse than in normal controls

Pelvic tumours
- Fibroids
- Ovarian masses
- Bowel masses

Risk factors specific for ISD include:
- age over 50 years
- previous continence surgery
- prior pelvic radiation
- radical hysterectomy
- meningomyelocele.

Risk factors for increased abdominal pressure include obesity, smoking and chest pathology, constipation and pelvic tumours (Table 2).

History and examination

Several important points in the history and examination need to be recorded specific to urinary incontinence.

Table 3. Types of incontinence

Stress incontinence
Leakage with increased intra-abdominal pressure (coughing, physical exertion)

Urge incontinence
Uncontrolled leakage with an overwhelming need to urinate

Overflow incontinence
Leakage occurring with incomplete bladder emptying; usually seen in women with a slow urinary stream following surgery

Severe incontinence with minimal exertion
May be consistent with poor urethral function

Continuous leakage (day or night)
An ectopic ureter or fistula should be excluded

History
A history of the present illness should be taken, noting the following:
- type of leakage – stress, urge or overflow symptoms (Table 3)
- magnitude of leakage – need for pads, change in lifestyle to minimise leakage, decrease fluid intake
- previous treatments undertaken – pelvic floor exercises or surgery
- the impact the stress incontinence is having on quality of life.

Conditions that may be associated with stress incontinence include recurrent urinary tract infections, haematuria, pelvic pain, genital prolapse and bowel dysfunction.

Other conditions that should be considered are:
- acute angle glaucoma – a contraindication to anticholinergic therapy (oxybutynin [Ditropan]) used in the treatment of urge incontinence that

may coexist
- reproductive status – completed family, menopausal status, hormone replacement therapy
- dyspareunia
- neurological symptoms.

Examination

The weight or body mass index of the patient should be recorded and the presence of abdominal pain or masses excluded. On vaginal examination, look for:

- signs of stress incontinence – leakage from the urethra with coughing
- urethral hypermobility – can be assessed visually as a significant movement of the urethrovesical junction on coughing
- vaginal capacity, atrophy or scarring
- pelvic floor muscle strength – best assessed during digital vaginal examination with the woman asked to contract her pelvic floor as if she was trying to interrupt the passage of flatus or to stop urinary leakage occurring; the contraction strength can be graded from weak to excellent on a scale of 1 to 5
- prolapse, site and severity
- site of pelvic tenderness – urethra, bladder, vault, posterior vaginal wall or perineum.

Investigations

Investigations for urinary incontinence range in complexity from those that can be performed in the community to those only available in tertiary referral hospitals. Many women with stress incontinence also have symptoms of urge incontinence.

Appropriate initial investigations for stress incontinence are a urinary diary and microscopy, sensitivity and culture of urine. Resolution of symptoms following a course of antibiotics obviates the need for further investigation. A 48-hour urinary diary gives objective information on urinary output and input, frequency, nocturia, volume voided, episodes of urgency and incontinence and the number of pads used. Generally, women with an overactive bladder void small volumes frequently and experience large volume leakage, whereas women with stress incontinence tend to void less frequently and have episodes of leakage unrelated to voiding.

Treatment

The correction of reversible conditions that may exacerbate urinary stress incontinence is the first line of treatment. Bladder and chest infections should be treated, excessive fluid intake corrected, patients counselled regarding constipation and obesity, and medications adversely affecting bladder function changed (for example, the α-adrenoreceptor antagonist prazosin used in the treatment of hypertension causes urethral relaxation and may exacerbate stress incontinence).

As the vagina, urethra and lower bladder share the same embryological origin they also all have oestrogen receptors. Not surprisingly, vaginal oestrogen therapy such as oestradiol (Vagifem) or oestriol (Ovestin Cream, Ovestin Ovula pessaries) is helpful in alleviating postmenopausal symptoms of urinary urgency, frequency, urge and stress incontinence. An objective decrease in urinary stress incontinence has not been demonstrated following oestrogen therapy.

Alpha-adrenoreceptor agonists such as ephedrine (Ephedrine hydrochloride), phenylpropanolamine (Neo-Diophen) and pseudoephedrine provide some

Pelvic floor exercises

- Women will get the best results if they understand why pelvic floor exercises are important and are taught how to do them.
- Using diagrams to show women the relation between the pelvic floor muscles and the pelvic organs will help them understand the importance of the exercises (Figures A and B).
- Adequate instruction is vital as 50% of women who are only given verbal instructions on how to perform pelvic floor exercises are unable to correctly contract the muscles.
- Digital vaginal examinations provide a good opportunity for teaching women the correct muscle body to contract.
- The exercises should be performed 20 to 30 times daily.
- Precontracting or bracing the pelvic floor prior to abdominal straining is beneficial in minimising leakage.

Figure A. A saggital section of the pelvis displaying the intimate relation of the pelvic floor muscles to the bladder, vagina and rectum.

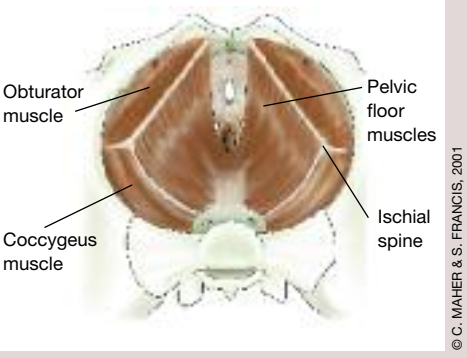


Figure B. The position of the pelvic floor muscles in relation to the bony pelvis and the urethral opening, introitus and anus.

improvement in stress incontinence by increasing urethral resistance. However, the use of this class of drugs is precluded for urinary stress incontinence as they lack selectivity for the urethral receptors and cause significant side effects (including hypertension, disturbed sleep, headache, tremor and palpitations).

There are many conservative and surgical therapies available for women with urinary stress incontinence, but these need to be tailored to suit the individual woman's requirements.

Figure 2. Continence devices: (top left, clockwise) Convene continence guard, FemAssist urethral device, tampon, Introl bladder neck support prosthesis and Contiform.

Table 4. Surgical procedures for stress incontinence

Vaginal
Anterior colporrhaphy (vaginal repair)

Bladder neck suspensions
Burch colposuspension
Marshall–Marchetti–Krantz procedure
Needle suspensions

Slings
Pubovaginal slings
Tension-free vaginal tape (TVT)
Intravaginal sling (IVS)

Transurethral injections
Collagen, macroplastique or fat

Artificial sphincters

Conservative therapies

Conservative therapy has few complications, does not compromise future surgery and should be available as a treatment option to all women. Indications for conservative treatment include:

- extremes of age (below about 30 and above about 80 years of age)
- pregnancy or intention to become pregnant
- postpartum
- unfit for surgery
- unwillingness to undergo surgery.

Pelvic floor exercises

All women with stress incontinence should be offered pelvic floor exercises. The importance of the exercises should be explained to the women and they should be taught how to perform them correctly (see the box on page 19). Significant improvement in stress incontinence symptoms is achieved in about half of motivated women who have been correctly instructed how to perform these exercises.[6] Referral to a dedicated pelvic floor physiotherapist may be appropriate for busy general practitioners.

Biofeedback therapies such as vaginal cones and electrical stimulation have not been demonstrated to be more effective than pelvic floor exercises alone in the management of stress incontinence.[7]

Mechanical devices

There are many continence devices available for motivated women who do not respond to pelvic floor exercises and who wish to avoid surgery (Figure 2). Women are best referred to units dedicated to the management of female urinary stress incontinence for these devices.

As many as 50% of women find a tampon inserted into the lower third of the vagina, parallel to the urethra, to be helpful in the control of stress incontinence with social sport such as tennis, aerobics, netball or golf.

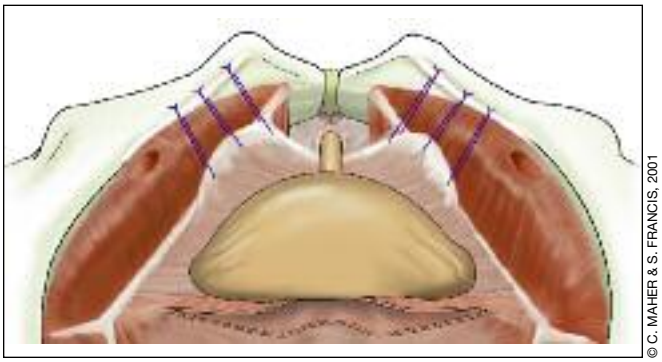
The Introl bladder neck support prosthesis comes in many sizes, and supports the urethra during straining by its two prongs fitting behind the symphysis. However, the device costs around $700 and up to 50% of women are either unsuitable for it or request its removal for a variety of reasons.[8]

The FemAssist is an externally applied urethral occlusive device that is placed over the urethral opening. It may be worn for up to four hours at a time before being washed in warm water, and should be replaced after being used for one week.

Surgery

Although pelvic floor exercises are without complications, success rates of only 20 to 25% are reported in randomised trials while those randomised to surgery had success rates of 75%.[9] The surgical treatment of stress incontinence, while having considerable room for improvement, is therefore the most effective treatment modality available. Importantly, women with stress incontinence due to ISD have a lower success rate at continence surgery than those with normal urethral sphincter function.[10]

Surgical options available in the management of stress incontinence are listed in Table 4. The most appropriate option depends on the patient's weight, her medical comorbidity, the severity of her incontinence, the presence of genital prolapse or risk factors for poor surgical outcome (including ISD, fixed urethra or previous continence surgery). Urodynamic studies are commonly performed preoperatively to document the presence of these risk factors and to exclude voiding difficulties or an overactive bladder that may mimic the symptoms of stress incontinence. Information obtained during these studies minimises the need for inappropriate surgery and allows the surgeon to fully inform patients as to the potential outcomes of surgery. (The website www.urogynaecology.com.au has patient information sheets on most continence procedures.)



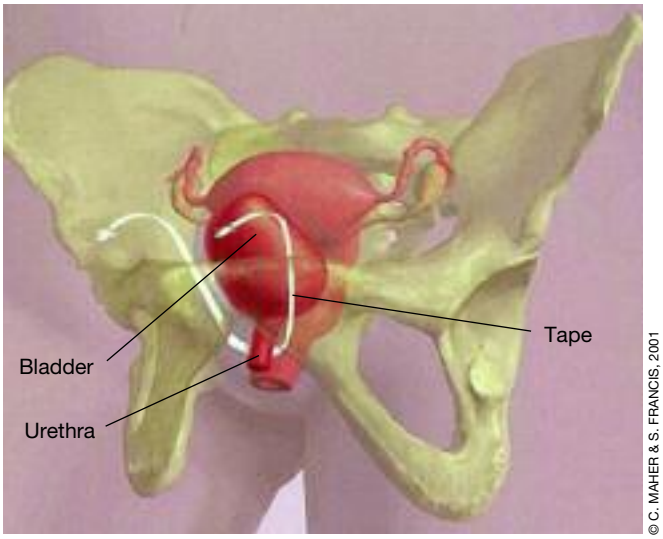


Figure 3 (above). The Burch colposuspension, showing the six Ethicon permanent sutures suspending the paravaginal tissue from the pectineal ligament at the level of the bladder neck.
Figure 4 (right). The tension-free vaginal tape in position around the urethra and bladder.

Burch colposuspension

The Burch colposuspension procedure remains the gold standard in the treatment of stress incontinence with an 85% success rate lasting at least 10 years.[11] At surgery, the paravaginal tissue is stabilised to the pectineal ligament using three permanent sutures bilaterally (Figure 3).

Slings

There are many different sling procedures available and they remain very popular in the USA, with success rates for stress incontinence equal to that of Burch colposuspension. However, the complication rate of voiding difficulties and detrusor instability is three times greater than that after colposuspension.[12]

Anterior colporrhaphy

Anterior colporrhaphy, with a 30 to 40% success rate at five years, is generally regarded as surgery for the correction of a cystocele and not as a continence procedure.[11]

Bladder neck needle suspensions

A variety of bladder neck needle suspensions (for example, Pereyra and Stamey) were popular in the 1980s. However, they have largely been discarded as their success rate at five years is only about 40%.[11]

Transurethral injections

Transurethral injections are ideally suited to the medically unfit and those with a fixed urethra, and are performed as day procedures. The bulking agent (fat, collagen, macroplastique) is cystoscopically injected around the bladder neck to increase urethral resistance. Top-up or repeated injections are frequently required but complications are rare. Transurethral injection should be regarded as a treatment to significantly reduce the severity of the symptoms rather than as a curative procedure.

Laparoscopic colposuspension

Laparoscopic colposuspension, first described by Vancaillie in 1990, may now be available from specialists. The laparoscopic approach is associated with a reduction in intraoperative blood loss, postoperative pain and a quicker return to normal activities compared with the open incision procedure. Both procedures have identical short term success rates.[13] The laparoscopic procedure has a longer operating time than the open procedure.

Tension-free vaginal tape

Another procedure that may now be available is the tension-free vaginal tape (TVT), which involves a sling of prolene mesh being placed suburethrally around the distal urethra (Figure 4). The procedure is performed under combined local anaesthesia and sedation, allowing the tape to be tensioned intraoperatively in response to the cough impulse. In large randomised studies the tension-free vaginal tape procedure was quicker to perform, had a shorter hospitalisation period and was cheaper than open colposuspension, with similar success rates and complications in the short term.[14]

Conclusion

Female urinary stress incontinence is a common and disabling condition in the community. As only 50% of women with the condition will complain of it to their general practitioner, all women should be asked about urinary incontinence at routine health checks.

Treatment should be offered when women have to alter their lifestyle to minimise their stress incontinence. The many conservative and surgical options available need to be tailored to meet each patient's requirements. Laparoscopic colposuspension and the tension-free vaginal tape are two exciting new procedures that require ongoing review. MT

A list of references is available on request to the editorial office.

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CHRISTOPHER MAHER MB BS, FRANZCOG CU

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