



Review article

Diagnosis and conservative management of female stress urinary incontinence

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ABSTRACT

Urinary incontinence affects 17–45% of women worldwide and stress urinary incontinence is responsible for 48% of all cases. Detailed history, physical examination and investigations are crucial to identify the diagnosis underlying the incontinence symptoms to select effective therapy. Although mid-urethral sling procedures are considered to be ‘gold standard’ treatment of SUI, conservative treatment with pelvic floor muscle training and lifestyle modification is still the first line of management. This article discusses the diagnosis and conservative management of female SUI.

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Introduction

The International Continence Society (ICS) defines stress urinary incontinence (SUI) as a complaint of involuntary loss of urine on effort or physical exertion (e.g., sporting activities), or on sneezing or coughing.¹ Urinary incontinence affects 17–45% of women worldwide and SUI is responsible for 48% of all cases.² The problem can occur at any age, but the prevalence and extent of urinary incontinence rise in women with increasing age. In Taiwan, epidemiological studies conducted have shown an overall prevalence of 4.3%, but it is 25% in the 50–65 years age group.³ SUI is a social stigma and it has been shown to restrict social activities of women suffering from this problem. Only 27% of women with SUI seek help, as they perceive this problem as an occurrence of the natural aging process.³ SUI is caused by weakening of the pelvic floor muscles which support the urethra and bladder (urethral hypermobility) and/or weakness of the urethral sphincter [intrinsic sphincter deficiency (ISD)]. Risk factors for the development of SUI are advancing age, obesity, vaginal delivery, vaginal or pelvic surgery, chronic cough and chronic constipation.^{4,5}

SUI is diagnosed from clinical assessment and urodynamic studies (UDS). The mid-urethral sling procedure is considered to be the “gold standard” treatment of SUI, because it is a minimally

invasive procedure and it offers high cure rates in a single session that lasts no more than 30 minutes. Furthermore, it can be performed as an outpatient procedure.⁶ However, the first line management of SUI is still conservative treatment with pelvic floor muscle training (PFMT) and lifestyle modifications.

Furthermore, surgery of any type is not suitable for all patients. In particular, women with significant comorbidities may not be good surgical candidates. Moreover, some otherwise healthy SUI patients may find unacceptable the associated risks, pain, and recovery time, with no exertional activities (e.g. lifting more than 5 to 10 pounds), and no sexual activity for 6 weeks, and may choose to forgo surgery, despite continuing SUI symptoms.⁴

In this review, the diagnosis and conservative management of SUI will be discussed.

Diagnosis

According to Blaivas, the bladder is an “unreliable witness”; this is due to the fact that lower urinary tract symptoms are poor predictors of the underlying diagnosis of urinary incontinence.⁷ Therefore, history and physical examination are crucial to identify the diagnosis underlying the incontinence symptoms, to select effective therapy.⁸

History

As defined, women with SUI present with a complaint of involuntary leakage of urine during coughing or sneezing. They

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may also complain of leakage of urine when performing daily activities like walking, climbing up stairs or routine exercise.

It is important to specify the circumstances, frequency and severity of leaks of urine in women with SUI when consulting in the clinic. This can be assessed by various methods, like urinary symptoms and quality of life questionnaires and a bladder diary. A 3-day bladder diary provides the means for assessing information on fluid intake (type and amount), voiding frequency and volume, together with the frequency of leaks.⁹

Occult SUI may be diagnosed in 25–50% of prolapse patients,¹⁰ therefore, complaints of a mass protruding from the vagina should be queried.

Urinary tract infection (UTI) is a known cause of urinary incontinence, especially urgency incontinence, and therefore symptoms and details regarding treatment of UTI should be sought.

Constipation is one of the causes of incontinence, due to incomplete bladder emptying; also, chronic straining causes a weakness of the pelvic floor muscles, therefore a history of constipation should be elicited.

A detailed medical history should be sought before commencement of treatment, as it may directly affect bladder function. Diabetes mellitus and neurologic diseases like Parkinson's disease, cerebrovascular accident, multiple sclerosis, spinal cord injury and congenital defects, may impair sensorimotor function. Congestive heart failure and chronic respiratory diseases causing chronic cough, cause abnormal stress to the bladder, by increasing volume and pressure. Dementia and psychiatric disease lead to cognitive impairment or failure of voluntary bladder control.

Impaired neuromuscular function, or tissue integrity caused by vaginal delivery and prior pelvic surgery, are risk factors for stress incontinence. Details regarding parity, mode of delivery and complications during delivery, such as instrumental use and perineal trauma should be sought. A history of pelvic surgery, especially prior surgery for stress incontinence, pelvic organ prolapse and radical hysterectomy for malignancy, will help in deciding on further management.

Medication history is important, as it may contribute to urinary incontinence. The medications are as described with their mechanism of action. Alpha-adrenergic blockers, neuroleptics and benzodiazepines decrease urethral pressure. Bethanechol and cisapride increase bladder pressure. Diuretics increase bladder pressure and volume of urine. Anticholinergics, antiparkinsonism agents, β -blockers and disopyramide increase bladder pressure and cause impaired voiding. These medications affect indirectly; angiotensin-converting-enzyme inhibitors cause chronic cough, iron and narcoleptics cause constipation and psychotropics cause mental status changes.⁸

Other risk factors associated with urinary stress incontinence are obesity (body mass index >30), high impact sports and causes of an increase in the intra-abdominal pressure, like intra-abdominal masses¹¹ and chronic cough due to smoking.

Examination

A general examination should include the woman's BMI, abdominal and pelvic examination, including assessment of pelvic floor muscle tone, and demonstration of urine leakage or the cough test. Abdominal examination is done to reveal abdominal mass which may increase pressure on the bladder, causing incontinence. A neurological examination may be required if the history suggests possible neuropathology.

The physician must look for objective evidence of involuntary urine loss, document detrusor function sufficient to empty the bladder, assess the sphincter mechanism, both intrinsic and extrinsic to the urethra, and discover any evidence of other causes (e.g., fistulas) of, or contributors (e.g., infection) to, urinary incontinence.

Vaginal prolapse should be assessed, as prolapse of the anterior vagina to or beyond the introitus may result in "paradoxical continence," in which poor sphincter function is masked by the pinching-off of the bladder neck by the prolapse.

The tone and strength of the pelvic floor muscles can be assessed by inspection (drawing up of the anus, lifting of the posterior wall of the vagina and narrowing of the vaginal introitus), digital palpation (e.g., the Oxford score) or more advanced techniques such as perineometry and electromyography.⁵

The cough test provides the means for documenting SUI. This clinical test is simple and reproducible. A positive cough test carried out with an empty bladder, with the patient in the supine position, tends to indicate an intrinsic urethral sphincter deficiency. The cough test is recommended for documenting SUI prior to surgery. In cases with a negative cough test, it is recommended to check the bladder volume and repeat the test, in particular with the patient standing upright.⁹

Investigation

Investigations required for conservative management of stress incontinence are bladder diary, urinalysis, residual urine measurement, uroflowmetry test and pad test.

A bladder diary will provide valuable information on the voiding habit. Patients should be encouraged to complete a minimum of 3 days of the diary, covering variations in their usual activities, such as both working and leisure days.¹² The patient records the volumes voided, as well as the time of each micturition, day and night; additional information, for example, fluid intake, incontinence episodes and the use of pads, can be also collected. Such voiding diaries have been found in a systematic literature review to have the highest cost-effectiveness of all additional tests that can be used in primary care alongside clinical history.⁵

Urinalysis, a mandatory investigation, includes urine dipstick analysis, microscopy and culture and sensitivity, which is performed to rule out UTI. It is also a screening tool for hematuria and glycosuria as indicators of underlying pathology. If there is persistent microscopic hematuria, further investigation should be carried out with renal ultrasound and cystoscopy, to rule out other pathology like calculi or urinary tract malignancy. Positive nitrite and leukocyte esterase tests for bacteriuria and pyuria, respectively, on dipstick urinalysis, are 90% specific for UTI. A urine test for culture and sensitivity should be performed once dipstick urinalysis is positive. Glycosuria can be a sign of diabetes mellitus, a disease that can cause urinary incontinence via several mechanisms, such as neuropathy, polyuria and recurrent UTI. Proteinuria can be a sign of renal disease.⁵

The measurement of post-void residual volume, by bladder scan or catheterization, should be performed in women with symptoms suggestive of voiding dysfunction or recurrent UTI. A bladder scan should be used in preference to catheterization on the grounds of acceptability and lower incidence of UTI.¹²

Uroflowmetry, which is a non-invasive procedure, is performed to measure the flow rate and volume voided per second, to detect obstructed voiding.

A pad test is only indicated if the patient complains of urinary incontinence, but it is not clinically demonstrable. A standard 1 hour pad test is performed and if there is an increase in the weight of the pad by 1 g or more, the test is significant.

A urodynamic study is not recommended for conservative management of stress incontinence; it is mainly indicated before performing surgery for stress incontinence. However, the purpose of a urodynamic study, is to reproduce patient symptoms in a monitored setting; therefore, urodynamic studies are recommended when the history and clinical examination are insufficient to reach a diagnosis.

Management

PFMT

PFMT should be the first line treatment for stress incontinence, as it has no serious adverse effects, however, the training needs proper instruction and close follow-up to be effective.¹³

The use of PFMT as a treatment for SUI did not become widespread until after 1948, when Arthur Kegel, a professor of obstetrics and gynecology in the USA, established its regular practice. In his paper *Progressive resistance exercise in the functional restoration of the perineal muscles* he reported the successful treatment of 64 patients with urinary stress incontinence, hence the term Kegel exercises, a common misnomer for pelvic floor exercises as described by Kegel.¹¹

The rationale for PFMT is based on two concepts, which are improvement of urethral resistance and pelvic visceral support, including urethral support, by increasing the strength of the voluntary PFM and voluntary contraction of the PFM before increase in intra-abdominal pressure.¹⁴

An optimal pelvic floor exercise regime would change the morphology and position of the muscles to enable subconscious contraction, a mechanism thought to occur in continent women.¹⁵

The pelvic floor consists of several muscles that include the anal sphincter, the ischiocavernosus, the bulbospongiosus, the transverse perineal muscle, the striated urogenital sphincter and the levator ani (puborectalis, pubococcygeus, and iliococcygeus muscles). The PFM are skeletal muscles consisting of 33% fast fibers and 67% slow fibers.¹⁶ The normal function of these muscles is to squeeze around the vaginal, urethral, and anal openings and to lift inwards in a cranial direction.⁶

The principles of muscle training are overload, specificity, maintenance and reversibility. Overload can be achieved by maximum contractions, lengthening of the holding periods, increase in number of repetitions and reduced rest intervals. Strength training for skeletal muscles can be achieved by eight to 12 slow velocity maximal contractions, three to four series, three to four times a week. Maximal contractions and the duration of the exercise period are the most important factors in increasing and maintaining muscle strength. At least 15–20 weeks of exercise are recommended, because the effects in the first 6–8 weeks are mainly caused by neural adaptation, and muscle hypertrophy continues over months and years.⁶

Specificity is very important, as many patients contract other muscles together or instead of PFM. At least 30% of patients cannot contract these muscles voluntarily, or they may do a valsalva maneuver when asked to contract the PFM. Maintenance of the training program on a regular basis is important to improve the length of time and the power of the contraction. Reversibility means that the length of time and the power of the contraction decline if the patient follows a reduced exercise program.⁶

The mechanisms of action of PFMT are by strength training and counterbalancing. Strength training builds more muscle bulk to the pelvic floor, providing support and elevating the levator muscle plate. It also enhances hypertrophy of the endopelvic fascia, which increases urethral stability. Counterbalancing is a maneuver performed by consciously contracting the pelvic floor muscle prior to a physical stress and then maintaining the contraction during the stress. This maneuver prevents the urethra and bladder base descending and enhances continence.¹¹

There is no standardized treatment program, but the National Institute for Clinical Excellence (NICE) recommends a trial of supervised pelvic floor exercises, consisting of at least eight contractions three times a day for a minimum of 3 months, as a first-line treatment for urinary incontinence.¹¹

It is often reported that PFMT is more commonly associated with improvement of symptoms, rather than a total cure. However, short-term cure rates of 35–80%, defined as <2 g of leakage on different pad tests, have been found after PFMT for SUI.¹³

The highest cure rate was presented in a study where women had thorough individual instruction by a trained physiotherapist, close follow-up once every 2nd week and a total training period of 6 months. High adherence and low dropout were recorded.⁶

Long-term results depend on compliance and motivation. They are important factors for the success of PFMT; furthermore, appropriate training and supervision by a physiotherapist or specialist nurse is considered essential. Studies have shown that successful results were maintained after 10 years, in two-thirds of the patients originally classified as successful and 33% of the patients had surgery. However, only 8% had undergone surgery in the group originally being successful after training, whereas 62% had undergone surgery in the group initially dissatisfied with training.¹⁷ There were no differences in reported frequency or amount of leakage between women not operated on and women operated on, and women who had surgery reported significantly more severe leakage and to be more bothered by urinary incontinence during daily activities, than those not operated on.

As a preventive measure to urinary incontinence, PFMT should be offered to women in their first pregnancy.¹²

Biofeedback

Biofeedback has been defined as “a group of experimental procedures where an external sensor is used to give an indication on bodily processes, usually in the purpose of changing the measured quality”.¹³ Biofeedback apparatus is commonly used to assist with PFMT, where it is combined with PFMT to help women learn how to contract the PFM to improve training performance.¹⁸ They are based on either pressure measurements or surface EMG.¹³ Examples of biofeedback are vaginal cones, manometry and electromyography. Biofeedback is controversial, because studies have shown that PFMT is effective without biofeedback.^{13,18} However, it could be useful in women who cannot actively contract their PFM, as the information and support generated from biofeedback assists in motivating them to adhere to therapy.¹¹

Incontinence vaginal pessary

The incontinence vaginal pessary is designed to elevate the bladder neck and if properly fitted, does not cause outflow obstruction. The vaginal pessary is usually inserted in women who are unfit for surgery, due to advanced age, or have multiple medical problems. It is also used to treat women with exercise-induced incontinence. A study by Robert and Mainprize showed that successfully fitted women had less pelvic surgery and leaked less, but had a poor success rate for long term use. They concluded that the incontinence pessary was successful in a small proportion of women.¹⁹

Lifestyle modification

There are several lifestyle factors that are associated with stress incontinence. They are obesity, excessive or decreased fluid intake, smoking, heavy work, or high impact activity and constipation.

Obesity is an independent risk factor for stress incontinence,⁶ therefore, these women should be referred for a weight loss program. Increasing body weight causes increased abdominal weight, increased intra-abdominal pressure, and increased intravesicular pressure and urethral mobility, resulting in incontinence. Studies have shown that a 5–10% weight loss in women with urinary incontinence resulted in marked improvement of incontinence, and it

has been suggested that improved incontinence may motivate overweight and obese women to lose weight.²⁰ Obese women are advised to reduce weight before surgery for stress incontinence and this may, itself, reduce the severity of stress incontinence, hence surgery may not be required. A behavioral weight loss intervention was more effective than an educational control program in decreasing stress related urinary incontinence through 12 months, but the benefits at 18 months were more limited. Thus, lifestyle interventions should be considered the first line treatment for overweight and obese women reporting stress incontinence.²¹

Type 2 diabetes is associated with a 50–70% increased risk of incontinence in women, hence, women at high risk for diabetes who were randomly assigned to an intensive lifestyle intervention involving weight loss and exercise, had a substantially lower prevalence of SUI.²⁰

Women with stress incontinence, who consume excessive amounts of fluid as recorded in the bladder diary, should be advised to reduce their fluid intake. By contrast, those who severely reduce intake are prone to UTI and constipation, which would worsen the incontinence, therefore should be advised regarding adequate amounts of fluid intake.

Constipation is associated with urinary incontinence. Straining during defecation may lead to pudendal nerve damage, or weaken the PFM, hence, women should be advised on adequate fluid intake, a high fiber diet and may need stool softeners or laxatives to alleviate symptoms.

Smoking is another independent risk factor for urinary stress incontinence. A recent study on the relation between maximal intravesical peak pressure generated by cough (CIPP) and clinical factors in stress incontinence, found that current and former smokers has a similar risk factor. Therefore smoking has a long-lasting effect and women should be advised to refrain from smoking.²²

In conclusion, before conservative management of SUI, a detailed history, clinical examination and investigations should be performed to diagnose SUI. Once diagnosis is made, the first line treatment is PFMT and lifestyle modifications like weight loss, especially for women who are obese.

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