

# Management of Stress Urinary Incontinence

L. Elaine Waetjen, MD

Urinary incontinence is a common problem in midlife women; indeed, the prevalence peaks between the ages of 45 and 55 years.<sup>1</sup> Community-based studies estimate that up to half of all midlife women report at least monthly episodes of incontinence.<sup>1-3</sup> More severe incontinence is less common; about 15% report experiencing leakage several days or more per week.<sup>4</sup> While often described as a urogenital symptom of menopause, most epidemiologic studies have not shown an association with the menopausal transition or the postmenopausal state that is independent of age.<sup>5</sup> While not a life-threatening condition, incontinence significantly impacts both quality of life and physical health. Women with incontinence often curtail their social and physical activities, which can lead to social isolation, depression and decreased exercise.<sup>6-8</sup>

Stress urinary incontinence is defined as leakage of urine with increases in intra-abdominal pressure—such as with coughing, sneezing, jumping or other physical activity—in the absence of a bladder contraction. It is the most common type of incontinence in women under age 60, and accounts for about half of incontinence in all women.<sup>1</sup> Surgery for stress incontinence is one of the more common surgeries performed in women, with about

135,000 performed in the United States in 1998.<sup>9</sup> More than half of these surgeries are performed in women between the ages of 40 and 59, with a mean age of about 54 years.<sup>9</sup>

Risk factors for stress incontinence are shown in Table 1. While parity and, most specifically, vaginal delivery, is an important factor in the development of stress incontinence in younger women, it is not a strong predictor of stress inconti-

nence in midlife or older women.<sup>10</sup> In a study of postmenopausal nulliparous women and their parous sisters, for example, family history was a more important factor than was parity.<sup>11</sup> In women, the risk of developing stress incontinence during midlife and beyond increases with hormone use and obesity.<sup>4,12</sup>

## Pathophysiology of Stress Incontinence

Incontinence can be subdivided into types based on symptoms and the underlying mechanism of urine loss. Table 2 defines the common types of incontinence (stress, urge and mixed) by symptoms (patient-reported) and signs (clinical findings).

*Stress incontinence.* Stress incontinence is thought to be related to a structural and/or functional deficiency of the urethra. When pressure in the bladder exceeds pressure in the urethra, leakage occurs. Poor urethral support (urethral hypermobility) is hypothesized as a structural cause of stress incontinence; without firm, supportive tissue underlying the urethra, there is no “backstop” to assist with coaptation of the urethra when intra-abdominal pressure increases bladder pressure. A poorly functioning urethral sphincter is another cause of stress incontinence (intrinsic sphincter deficiency); when

the urethral sphincter, which encircles the mid-portion of the urethra, is deficient it cannot compensate for increases in intra-abdominal and bladder pressure.

*Urge incontinence.* Women with urge incontinence report getting the urge to urinate but not being able to get seated on the toilet without leaking urine onto their clothing. Triggers, such as running water or putting a key in the door, can precipitate episodes of urge incontinence. The mechanism of urge incontinence is uninhibited detrusor contractions, which are accompanied by a reflex relaxation of the urethral sphincter that allows leakage to occur, usually in larger amounts than with stress incontinence.

*Mixed incontinence.* Mixed incontinence occurs when both stress and urge incontinence are present; that is, leakage occurs with both coughing and sneezing, and women also experience a sense of urgency on the way to the bathroom.

## Diagnosis

Only about 12% of midlife women with incontinence report having discussed their incontinence symptoms with a healthcare provider.<sup>2</sup> Reasons for not seeking treatment include the perception that incontinence is not sufficiently severe to warrant treatment, embarrassment, the belief that incontinence is an inevitable consequence of child-bearing and/or aging, and lack of knowledge about the different treatment options that are available.<sup>13</sup> Because women may be reluctant to talk about their incontinence, clinicians should routinely ask their female patients if they are bothered by incontinence symptoms.

**Table 1. Risk Factors Associated with Stress Urinary Incontinence**

- Parity (vaginal delivery [greater risk than cesarean section])
- Diabetes
- High body mass index (overweight and obese)
- High waist-to-hip ratio/increased waist circumference
- Family history
- Smoking
- Chronic obstructive pulmonary disease
- Hysterectomy
- Systemic estrogen and estrogen + progestin hormone therapy
- White race

**Table 2. Common Types of Urinary Incontinence**

Type	Symptoms (Patient-Reported)	Signs (Clinician-Witnessed)
Stress	Leakage with coughing, sneezing, jumping, physical activity	Leakage with increases in intra-abdominal pressure (eg, coughing)
Urge	Leakage with a sense of urgency on the way to the bathroom	Leakage with an uninhibited contraction of the detrusor muscle
Mixed	Leakage with both stress and urge symptoms	Leakage with both increases in intra-abdominal pressure, and with an uninhibited detrusor contraction

The basic evaluation for stress incontinence includes a careful history and physical exam, with the goals of establishing a working diagnosis and identifying behavior or medical factors that may exacerbate stress incontinence. The initial working diagnosis of stress incontinence is based on symptoms. In the medical interview the patient reports leakage with coughing, sneezing, jumping or other physical activities that increase intra-abdominal pressure. Responses to questions about circumstances that elicit these symptoms have a sensitivity of approximately 86% and a specificity of

approximately 60% for stress incontinence.<sup>14</sup> In general, initiation of non-surgical treatments can be based solely on patient reports of symptoms.

As part of the initial evaluation, patients should be encouraged to complete a 2- to 3-day urinary diary (Figure, page 20) in which they document frequency of voids, frequency of leakage episodes and the patient-perceived reasons for these, as well as the amount and types of fluids being consumed. Evaluation of stress incontinence using such a diary is often helpful to clinicians

*(continued on page 20)*

## Management of Stress Urinary Incontinence

(continued from page 15)

for two reasons. First, compared to simple interview questions, the diary is a more reliable diagnostic tool for establishing the frequency and type of incontinence episodes. Second, the diary can help to tailor behavioral management.

To evaluate for other causes of stress incontinence symptoms (eg, urethral diverticula and, possibly, pelvic masses) clinicians should perform a focused genitourinary physical exam, including a cough stress test, analysis of post-void residual, and urinalysis.

A cough stress test can confirm the diagnosis of stress incontinence. The test is best performed with the patient in the standing position with a full bladder to maximize the possibility of eliciting an incontinence episode; the woman stands and coughs while the clinician observes for leakage that is simultaneous with the cough. A post-void residual urine volume measured within 10–15 minutes of a void by simple catheterization or bladder scan should be done to rule out urinary retention as a contributing cause of stress incontinence when retention is suspected (eg, in women with neurological symptoms or in the elderly) and always prior to considering surgical treatment. Finally, clinicians should send a urinalysis to screen for underlying intrinsic bladder causes of stress incontinence, such as a urinary tract infection.

The following tests are generally reserved for situations in which the diagnosis is unclear, when conservative treatments fail, or when surgical management is planned.

Time	Urinate in toilet	Leaking accident	Reason for accident	Fluid Intake (type, amount)
6 a.m.				
7 a.m.				
8 a.m.				
9 a.m.				
10 a.m.				
11 a.m.				
12 noon				
1 p.m.				
2 p.m.				
3 p.m.				
4 p.m.				
5 p.m.				

### Notes

---



---



---



---



---



---

### INSTRUCTIONS

1. In the 1st column mark an **(X)** every time you urinate into the toilet.
2. In the 2nd column mark an **(X)** every time you accidentally leaked urine.
3. If an accident occurred, indicate the reason or circumstances surrounding the accident in the third column. For example, "coughed", "bent over", "sudden urge".
4. Under "**Fluid Intake**" describe the type (coffee, tea, apple juice, etc.) and amount (1/2 cup, 1 quart, 8 oz., etc) of fluid you consumed.
5. Circle the time when you got up in the morning and when you went to bed.
6. Record the number and type of pads used.
7. Under "**Notes**" write any additional information you would like to include. For example, type and dose of medication you may be on for your urinary incontinence.

**Figure. Example of a urinary diary.**

# Whether urodynamic testing improves treatment outcome is unclear.

- *Pad weights:* Pad weights can be useful when a diagnosis of incontinence cannot be made objectively in the office or when a woman's reported symptoms are worse than suggested by clinical exam or urodynamics. Women seal the pads they wear throughout 1 day in an air-tight bag. When brought to the office, the bags are weighed as a means to quantify urine leakage.
- *Q-tip test:* The Q-tip test is diagnostically useful only for determining the optimal surgical approach to the management of stress incontinence. With the woman in a supine position, a lubricated Q-tip is inserted into the urethra, and the angle from the floor is measured at rest and with strain. If the resting or straining angle is greater than 30 degrees, urethral hypermobility is diagnosed, and any stress incontinence surgery that supports the urethra may be performed. When there is no hypermobility, urethral bulking is generally considered the best surgical treatment (see "Surgical treatment," page 22).
- *Multi-channel urodynamics:* Considered the gold standard for distinguishing between stress incontinence and detrusor overactivity incontinence (urge incontinence), urodynamic testing allows simultaneous measurement of pressures inside the urethra, bladder and abdomen. It also helps to document the severity of stress incontinence, identify intrinsic sphincter deficiency as a cause of stress incontinence and

evaluate voiding function. Urodynamic testing is most helpful in women whose symptoms are not easily categorized as stress or urge incontinence, and in women with mixed incontinence or suspected intrinsic sphincter deficiency when surgery is being planned and/or when voiding dysfunction is suspected. Whether urodynamic testing improves treatment outcome is unclear.

## Treatment

In treating women with stress incontinence, clinicians should always start by addressing behaviors that may be contributing to or exacerbating symptoms. Non-surgical treatments should always be explained—and a trial of these treatments encouraged—before recommending or referring a patient for surgery.

*Behavioral modification strategies.* Several strategies involve the use of behavioral approaches to improve stress incontinence.

- *Incontinence pads.* While not a treatment for stress incontinence, incontinence pads can improve related symptoms until leakage symptoms improve or resolve with treatment. Women requiring the use of pads for their stress in-

tinence will often use menstrual pads because they are familiar and less expensive, and because purchasing incontinence pads may be more embarrassing to some patients. However, menstrual pads do not provide the absorbency and skin protection provided by incontinence pads, underscoring the need to encourage the use of incontinence pads when a patient has skin irritation or breakdown.

- *Fluid restriction.* Women are encouraged by the popular media and dieting programs to consume large volumes of fluid, even though the health and weight-loss benefits are not established. The urinary diary can help establish the amount of fluids a woman consumes. There are no specific recommendations for the exact volume of fluids that should be consumed on a daily basis, and the requirements will vary based on ambient temperature and physical exertion. However, limiting total fluid intake to about 64 ounces/day (for the average sedentary woman) seems reasonable and can significantly reduce the number of leakage episodes experienced by women who overdrink for their level of activity.
- *Weight loss.* For overweight and obese women, there is randomized controlled trial data showing that even a 5%-10% reduction in weight can decrease the frequency of stress incontinence by up to 60%.<sup>15</sup>
- *Timed voiding.* For women who void less frequently than every 4

hours, increasing the number of voids per day and decreasing the interval between voids can reduce the amount of urine in the bladder; this, in turn, may decrease the frequency of stress incontinence episodes.

- *Cough suppression.* Smokers should, of course, be encouraged to quit and women with poorly controlled asthma, allergies or other lung diseases should have these conditions optimally treated. The less a woman with stress incontinence coughs, the less she will leak.

*Non-surgical treatment.* After or while working on behavior modifications to reduce stress incontinence symptoms, non-surgical treatments can be offered. These include the following:

- *Incontinence pessaries.* Incontinence pessaries are rings (“incontinence ring”) or discs (“incontinence disc”) with knobs that are fitted inside the vagina such that the knob sits underneath the urethra for support. Currently, there is no method to predict which women benefit from these devices, but they can be considered a treatment option for all women regardless of age. Clinically observed efficacy ranges from no effect on stress incontinence to satisfactory or complete resolution of symptoms. They can be worn all the time (with occasional changes by the patient or clinician) or just during the activities that induce stress incontinence episodes (eg, running or aerobics).

## **L**ong-term effectiveness of pelvic floor strengthening is not well-studied, but is probably dependent on patient motivation to continue with a maintenance program indefinitely.

- *Pelvic floor exercises.* Pelvic floor muscle (levator ani) exercises, commonly called “Kegels,” can improve stress incontinence by increasing the strength, bulk and coordination of the levator ani; a strong contraction of these muscles provides support of the urethra. Improvement in symptoms of up to 70% has been reported in motivated women compliant with the treatment program.<sup>16</sup> For pelvic floor muscle training instruction, women should not be asked to stop their urine flow but rather to contract the muscles they would use to delay a bowel movement.

Trained clinicians (eg, physical therapists or nurse practitioners) can use manometry, biofeedback or electrical stimulation to help women who have difficulty isolating the pelvic floor muscles.

Vaginal weights, which can be purchased easily on the Internet, can also be used to isolate and strengthen the levator ani muscles.<sup>17,18</sup> Women should also be taught to coordinate a pelvic floor muscle contraction at the time of a cough or sneeze; this maneuver, referred to as “the knack,” prevents stress incontinence episodes.<sup>19</sup> Long-term effectiveness of pelvic floor strengthening is not well-studied, but is probably dependent on patient motivation to continue with a maintenance program indefinitely.

- *Medications.* Duloxetine, a serotonin- and norepinephrine-reuptake inhibitor primarily used as an anti-depressant, is approved for the indication of stress incontinence in some countries, but not in the United States. The effectiveness of this medication is limited, with significant side effects.<sup>20</sup>

*Surgical treatment.* Surgery is reserved for women with diagnosed stress incontinence (ie, by a positive cough stress test or urodynamics) and for those in whom behavioral and non-surgical treatments have failed. A number of surgical procedures are currently being performed; the best have a success rate of approximately 85% (cured or significantly improved to patient satisfaction).<sup>21,22</sup> The very long-term outcomes (beyond 5 years) of stress incontinence surgeries have not been well studied. One observational study showed that approximately 30% of women who have a stress incontinence surgery will have a second one in their lifetimes,<sup>23</sup>

suggesting a long-term success rate of less than 70% (as not all women will choose to undergo a second surgery after a recurrence of stress incontinence).

Innovation to improve surgical outcomes has led to a surge of new stress incontinence surgical devices on the market. FDA approval for these devices does not require the rigorous study mandated for drugs, and many of the procedures performed with these new devices have entered surgical practice without sufficient safety or long-term effectiveness data. Some novel devices have later proved harmful or less effective than standard treatments. When considering surgery, clinicians and patients need to be aware of this potentially dangerous trend in stress incontinence surgeries. While some of these new procedures may prove to be excellent options, patients should ideally be advised against undergoing such procedures outside of clinical trials, or should at least be made aware of the limited data to support their use.

The safety and efficacy of the surgical procedures described below are supported by clinical evidence.

- *Retropubic suspensions.* The Burch and Marshall-Marchetti-Krantz (MMK) surgeries have been considered the “tried and true” procedures for stress incontinence to which other surgeries have been compared. These can be performed either via an abdominal incision or by laparoscopy. The goal of these surgeries is to reduce urethral hypermobility by suspending the mid- and proxi-

## I nnovation to improve surgical outcomes has led to a surge of new stress incontinence surgical devices on the market.

mal urethra to structures of the pubic rami.

- *Pubovaginal or suburethral slings.* The traditional sling procedure involves strapping of graft material (synthetic mesh grafts, autologous tissue such as rectus fascia or fascia lata, cadaveric fascia or skin grafts, or xenografts such as porcine skin) under the urethra at the urethrovesical junction. This surgery, which is associated most with voiding dysfunction and new-onset urinary urgency symptoms, is often used when a previous surgery has failed, or in women with severe stress incontinence and intrinsic sphincter deficiency.
- *Mid-urethral slings.* This class of surgery was developed based on the anatomic knowledge that the main point of continence is the sphincter located at the mid-urethra. These surgeries are minimally invasive and can be done in the out-patient setting using local, regional or light general anesthesia.

Special devices have been developed to assist in placing various types of synthetic mesh in the sub-urethral tissues. While there are many companies now producing various iterations of these procedures, there are two main types: the original Tension-free Vaginal Tape (TVT) approach places the mesh through the retropubic space and under the urethra via two 0.5-cm suprapubic abdominal incisions and a single 1-cm suburethral incision, and the transobturator tape (TOT) approach involves placing the mesh through the transobturator space and under the urethra via two 0.5-cm inner-thigh creases and one 1-cm suburethral incision. While the TVT has been studied for 5 years, with results that match those seen with the retropubic suspensions (Burch and MMK),<sup>24,25</sup> randomized clinical trials with longer-term results using the TOT are forthcoming. Most of the other devices on the market (with different meshes and routes of mesh placement) have not yet been adequately studied to justify support of their use, and should not be considered interchangeable with the TVT or TOT mid-urethral slings.

- *Urethral bulking agents.* Intra- or peri-urethral bulking is reserved for women without hypermobile urethras. This is a simple procedure in which a bulking agent, most commonly bovine collagen, is injected into the peri-urethral tissues with the assistance of the cystoscope. The goal is to nar-

row the urethra at the bladder neck, creating increased resistance along the urethra. In most cases, women require repeat injections to maintain continence as collagen degrades with time.

### Summary and Conclusions

While a common problem for midlife women, many such women do not seek treatment for stress urinary incontinence. Clinicians should, therefore, inquire about bothersome stress incontinence symptoms in their female patients. After a simple clinical evaluation, behavioral and non-surgical treatments can be initiated based on symptoms alone, and these conservative approaches to stress incontinence can significantly improve symptoms in up to 70% of women. In this way, primary care clinicians can successfully treat most stress incontinence symptoms in women, referring a patient to a specialist only after a trial of all behavior modification techniques and prescribing pelvic floor exercises. Surgery is an effective treatment for women who have demonstrated the signs of stress incontinence, and for whom behavioral and non-surgical management have failed.

**L. Elaine Waetjen, MD, is Associate Professor, Department of Obstetrics and Gynecology, Division of Urogynecology, University of California, Davis, Sacramento, CA.**

*Dr. Waetjen reports no conflicts related to the content of this article.*

*This article includes discussion of off-label use of medications.*

*Received: May 8, 2007*

*Accepted: July 23, 2007*

### References

- Hannestad YS, Rortveit G, Sandvik H, Hunskaar S. A community-based epidemiological survey of female urinary incontinence: the Norwegian EPINCONT study. *Epidemiology of Incontinence in the County of Nord-Trøndelag. J Clin Epidemiol* 2000;53:1150-7.
- Sampselle CM, Harlow SD, Skurnick J, et al. Urinary incontinence predictors and life impact in ethnically diverse perimenopausal women. *Obstet Gynecol* 2002; 100:1230-8.
- Brown JS, Grady D, Ouslander JG, et al. Prevalence of urinary incontinence and associated risk factors in postmenopausal women. Heart & Estrogen/progestin Replacement Study (HERS) Research Group. *Obstet Gynecol* 1999;94:66-70.
- Waetjen LE, Liao S, Johnson WO, et al. Factors associated with prevalent and incident urinary incontinence in a cohort of midlife women: a longitudinal analysis of data: Study of Women's health Across the Nation. *Am J Epidemiol* 2007;165:309-18.
- Sherburn M, Guthrie JR, Dudley EC, et al. Is incontinence associated with menopause? *Obstet Gynecol* 2001;98:628-33.
- Nygaard I, Girts T, Fultz NH, et al. Is urinary incontinence a barrier to exercise in women? *Obstet Gynecol* 2005;106:307-14.
- Grimby A, Milsom I, Molander U, et al. The influence of urinary incontinence on the quality of life of elderly women. *Age Ageing* 1993;22:82-9.
- Moghaddas F, Lidfeldt J, Nerbrand C, et al. Prevalence of urinary incontinence in relation to self-reported depression, intake of serotonergic antidepressants, and hormone therapy in middle-aged women: a report from the Women's Health in the Lund Area study. *Menopause* 2005;12:318-24.
- Waetjen LE, Subak LL, Shen H, et al. Stress urinary incontinence surgery in the United States. *Obstet Gynecol* 2003;101:671-6.
- Rortveit G, Hannestad YS, Daltveit AK, Hunskaar S. Age- and type-dependent effects of parity on urinary incontinence: the Norwegian EPINCONT study. *Obstet Gynecol* 2001;98:1004-10.
- Buchsbaum GM, Duecy EE, Kerr LA, et al. Urinary incontinence in nulliparous women and their parous sisters. *Obstet Gynecol* 2005;106:1253-8.
- Hendrix SL, Cochrane BB, Nygaard IE, et al. Effects of estrogen with and without progestin on urinary incontinence. *JAMA* 2005;293:935-48.
- Koch LH. Help-seeking behaviors of women with urinary incontinence: an integrative literature review. *J Midwifery Womens Health* 2006;51:e39-44.
- Brown JS, Bradley CS, Subak LL, et al. The sensitivity and specificity of a simple test to distinguish between urge and stress urinary incontinence. *Ann Intern Med* 2006;144:715-23.
- Subak LL, Whitcomb E, Shen H, et al. Weight loss: a novel and effective treatment for urinary incontinence. *J Urol* 2005;174:190-5.
- Hay-Smith EJ, Dumoulin C. Pelvic floor muscle training versus no treatment, or inactive control treatments, for urinary incontinence in women. *Cochrane Database Syst Rev* 2006(1):CD005654.
- Seo JT, Yoon H, Kim YH. A randomized prospective study comparing new vaginal cone and FES-Biofeedback. *Yonsei Med J* 2004;45:879-84.
- Herbison P, Plevnik S, Mantle J. Weighted vaginal cones for urinary incontinence (Cochrane Review). *Cochrane Database Syst Rev* 2002(1):CD002114.
- Miller JM, Perucchini D, Carchidi LT, et al. Pelvic floor muscle contraction during a cough and decreased vesical neck mobility. *Obstet Gynecol* 2001;97:255-60.
- Mariappan P, Alhasso A, Ballantyne Z, et al. Duloxetine, a serotonin and noradrenaline reuptake inhibitor (SNRI) for the treatment of stress urinary incontinence: a systematic review. *Eur Urol* 2007;51:67-74.
- Black NA, Downs SH. The effectiveness of surgery for stress incontinence in women: a systematic review. *Br J Urol* 1996;78:497-510.
- Chene G, Amblard J, Tardieu AS, et al. Long-term results of tension-free vaginal tape (TVT) for the treatment of female urinary stress incontinence. *Eur J Obstet Gynecol Reprod Biol* 2007;134:87-94.
- Olsen AL, Smith VJ, Bergstrom JO, et al. Epidemiology of surgically managed pelvic organ prolapse and urinary incontinence. *Obstet Gynecol* 1997;89:501-6.
- Ward KL, Hilton P. A prospective multicenter randomized trial of tension-free vaginal tape and colposuspension for primary urodynamic stress incontinence: two-year follow-up. *Am J Obstet Gynecol* 2004;190:324-31.
- Ward KL, Hilton P, UK and Ireland TVT Trial Group. Tension-free vaginal tape versus colposuspension for primary urodynamic stress incontinence: 5-year follow up. *BJOG* 2008;115:226-33.