Urinary Incontinence in Women

John Goforth, Michelle Langaker

Urinary incontinence, the involuntary loss of urine, can result from a multitude of etiologies and can have a significant negative impact on a woman's physical, social, economic, and psychological well-being. This commentary will review the current evidence regarding the screening, diagnosis, and treatment options for urinary incontinence in women.

Approximately 50% of women will experience some form of urinary incontinence in their lifetime, as prevalence and age are positively correlated [1]. Urinary incontinence imposes a significant economic burden, with annual cost estimates ranging from $19.5 billion to more than $76 billion [1, 2]. The demand for care of pelvic floor disorders is expected to increase approximately 35% between 2010 and 2030 [3].

Urinary incontinence is often divided into 3 distinct subtypes: stress urinary incontinence, urge urinary incontinence, and mixed urinary incontinence. Stress urinary incontinence involves the involuntary loss of urine due to physical activity such as coughing, laughing, or sneezing. The pathophysiology of stress urinary incontinence involves a weakening of muscular support at the urethrovesical junction, which causes hypermobility of the urethra during times of increased intra-abdominal pressure. A number of risk factors are associated with stress urinary incontinence, with 2 of the most common being parity and obesity. Urge urinary incontinence involves a sudden urgency to void, often with the sensation being too difficult to control. Most cases of urge urinary incontinence are idiopathic in nature and are due to an inability to inhibit detrusor muscle contraction. Mixed urinary incontinence involves a strong, uncontrollable urge to void accompanied by loss of urine during physical activity.

Fewer than half of women who experience urinary incontinence report seeking care for their symptoms due to the sensitive nature of the topic. Unfortunately, the condition can have a significant negative effect on quality of life. Due to women's difficulty in discussing incontinence, it is essential that medical practitioners screen for incontinence at routine office visits. A positive screening result should be followed by a physical exam and medical, surgical, gynecologic, and neurologic history. Often, clinicians use validated questionnaires to aid in the process of screening and diagnosis of urinary incontinence [1]. Bladder diaries that provide information on fluid intake, incontinence episodes, and voiding patterns are also beneficial supplements to the medical history used in diagnosing urinary incontinence type [1, 4]. The clinician's goal should be to use conservative treatment modalities initially, followed by more invasive procedures as necessary, always taking into consideration the patient's preferences.

Upon completing a patient's medical history, the clinician should perform a physical exam of all pelvic support compartments to rule out factors such as diverticula, fistulas, and vaginal discharge. Pelvic organ prolapse should also be assessed, as prolapse can mask the symptoms of urinary incontinence. A neurological exam that determines whether motor and sensory innervations to the perineum are intact and that tests for post-void residual urine volume will assess for neurological etiology. The physician should always rule out a urinary tract infection in the initial work-up of urinary incontinence. Constipation has also been known to cause symptoms of urinary incontinence and should be treated to see if the urinary incontinence resolves. Obese patients should be counseled on weight loss strategies, as obesity can lead to a nearly 4.2-fold increase in the risk of developing stress urinary incontinence.

As part of the physical exam, the clinician should assess for stress urinary incontinence with a cough stress test and assessment of urethral mobility. A positive cough stress test involves witnessing urine leakage simultaneous to a patient's cough [1]. If the patient has a negative cough stress test but has symptoms of stress urinary incontinence, the clinician could attempt to retrograde fill the bladder with 300 mL of fluid and retest, or he or she may use multichannel urodynamic testing to confirm the diagnosis [1]. Urethral mobility can be measured using the traditional Q-tip test. The clinician places a cotton swab in the urethra and then measures the degree of displacement of the urethra-bladder neck while the patient performs the Valsalva maneuver. A displacement of greater than 30 degrees relative to the horizontal indicates urethrovesical junction hypermobility due to decreased urethral support, while a displacement of less than 30 degrees is considered normal. A recent randomized controlled trial showed that placing the Q-tip in the vagina instead of the urethra is equivalent to the standard

Electronically published November 16, 2016.

Address correspondence to Dr. Michelle Langaker, Campbell University School of Osteopathic Medicine, PO Box 4280, Buies Creek, NC 27506 (Langaker@campbell.edu).

N C Med J. 2016;77(6):423-425.
0029-2559/2016/77616

Q-tip test in measuring urethral mobility and is preferred by patients as it causes less discomfort [5].

Pelvic floor exercises (Kegel exercises) are the first-line treatment recommended for stress, urgency, and mixed urinary incontinence. The goal is to reduce incontinence symptoms by strengthening the voluntary musculature of the pelvic floor (levator ani and urethral sphincter). All patients should be counseled on pelvic floor exercises as well as dietary fluid intake recommendations. Dietary fluid counseling should include the following guidelines: the patient should drink no more than 2 L of fluid per day, frequently empty the bladder, and limit caffeine intake. Physical therapy, which can greatly help patients with pelvic floor strengthening, should be utilized where possible.

Pessaries are another conservative option for both stress incontinence and urge urinary incontinence. Although studies have not demonstrated the effectiveness of pessaries for treating urinary incontinence, pessaries may be an appropriate option for patients with stress urinary incontinence who want to avoid surgery.

When treating urge urinary incontinence, pharmacotherapy should be given when first-line conservative treatments have failed. Multiple classes of drugs have been studied for the treatment of urge urinary incontinence including anticholinergics, beta-agonists, onabotulinumtoxinA, and estrogen.

Anticholinergic medications act by blocking M2 and M3 receptors on the bladder detrusor muscle, thereby inhibiting involuntary contractions. A meta-analysis examining the effects of different anticholinergic medications on urge urinary incontinence revealed modest improvement in urge incontinence symptoms compared to placebo. However, incontinence symptoms were rarely fully resolved, and patients' adherence to therapy diminished over time due to medication side effects. The anticholinergic medications in this analysis demonstrated similar efficacies and side effect profiles, with no single medication being superior to the others [6].

Beta-agonist therapy ultimately leads to detrusor muscle relaxation by binding to beta-3 adrenergic receptors. Randomized double-blind trials have demonstrated that the drug mirabegron significantly reduces the symptoms of urge urinary incontinence, and its adverse side effect rate is similar to placebo [7]. Contraindications to beta-agonist therapy include uncontrolled hypertension, end-stage renal disease, and liver impairment.

Another pharmacological therapy aimed at treating urge urinary incontinence is onabotulinumtoxinA, a neurotoxin produced by the bacterium *Clostridium botulinum* that causes muscle paralysis. Injecting the toxin into the detrusor muscle under cystoscopic guidance diminishes the contractility of the muscle. Trials comparing the effectiveness of anticholinergic medication to onabotulinumtoxinA injections found similar reductions in incontinence episodes [1].

Since many women with urinary incontinence are menopausal, estrogen deficiency may contribute to symptoms. While systemic estrogen therapy does not appear to be effective in the treatment of urinary incontinence, locally administered (topical) estrogen may be of benefit in decreasing urinary incontinence [1].

If conservative and/or medical therapies fail, surgical treatment is an option. The choice of procedure depends on the severity of symptoms and the type of incontinence. Stress urinary incontinence procedures are designed mainly to increase support of the urethra and urethral sphincter, while urge urinary incontinence procedures aim mainly at sacral neuromodulation. Studies have shown that surgery for urinary incontinence is better suited for individuals with urethral hypermobility; individuals lacking urethral mobility may benefit more from urethral bulking agents than from surgical urethral sling procedures [1].

Sacral neuromodulation is a procedure for treating urge urinary incontinence wherein a device is implanted that stimulates the sacral nerves that innervate the bladder and pelvis [1]. Sacral neuromodulation has been shown to improve urge urinary incontinence refractory to behavioral and pharmacologic treatment. An ongoing prospective study found that 80% of patients reported a significant improvement in incontinence symptoms at 3 years. However, 47% of subjects reported device-related adverse events after implantation [8]. The need for frequent battery changes, reimbursement, and logistical issues all led to patients' reluctance to use this treatment. As a possible alternative to the current continuous neuromodulation method, a recent study found that intermittent sacral neuromodulation was equally effective at treating incontinence symptoms. This intermittent treatment reduces battery use, thus increasing the time between battery changes [9].

In the last decade, the gold standard of surgical treatment for stress urinary incontinence has transitioned from the Burch colposuspension method to less invasive tension-free mid-urethral sling methods. This transition occurred following the collection of data showing that tension-free mid-urethral slings outperformed Burch colposuspension procedures in terms of postsurgical continence rates [10]. Two mid-urethral sling procedures are mainly utilized. The retropubic method was introduced first, followed 5 years later by the transobturator method, which attempted to reduce complications associated with the retropubic method (specifically, bladder perforations and pelvic hematomas). However, both procedures continue to have significant complications, including bladder injuries, pelvic pain, and difficulty voiding. The ultimate goal of both procedures is tension-free support of the urethra; the sole difference between the procedures is the route by which the sling is placed. A recent review and meta-analysis found the retropubic method to have a significantly higher 5-year-or-less subjective cure rate (82.5%) relative to the transobturator method (77.5%). However, no significant difference in objective cure rates was found between methods. Both methods also demonstrated an improvement in patient quality of life,

with no significant difference noted between treatments [11]. Newer, shorter, single-incision mini-slings that self-anchor to the pelvic sidewalls have demonstrated conflicting results [12]. Further research is needed to determine the long-term efficacy of single-incision mini-slings relative to standard-length slings.

The synthetic mesh used for urethral slings and prolapse repairs has been under scrutiny due to increased complication rates. The use of synthetic mesh for incontinence surgery and prolapse repair increased substantially in the 1990s despite limited data about long-term effects such as inflammation, rejection, and infection. Animal models have demonstrated that synthetic mesh has a catabolic effect on both elastin and collagen production, leading to structural compromise of pelvic tissue [13]. Common complications after mid-urethral sling placement were found to be overactive bladder, urinary obstruction, vaginal mesh exposure, chronic pelvic pain, infection, dyspareunia, and vesicovaginal fistula [14]. Although controversy surrounds the use of synthetic mid-urethral slings, this procedure is currently the standard of care for the surgical treatment of stress urinary incontinence.

Urethral bulking agents are currently a second-line treatment option for the majority of individuals. The procedure is minimally invasive and can be a first-line treatment for patients who are not good candidates for surgery. The goal is to inject a bulking agent transurethrally into the tissue surrounding the bladder neck and proximal urethra, thus augmenting urethral resistance during increased intra-abdominal pressure. Multiple bulking agents exist—including collagen, carbon-coated beads, and calcium hydroxylapatite—and research has not yet shown one agent to be superior over the others. Improvement in incontinence has been reported in 63%–80% of patients at 1 year [1]. The drawback to this procedure is that incontinence recurrence rates are relatively high, leading many patients to require multiple repeat injections [1, 15].

Further research into the prevention of urinary incontinence is necessary. Women who deliver a baby vaginally have nearly a 2-fold increase in developing stress urinary incontinence relative to women who deliver by cesarean section [16]. This can be attributed to the effects of a vaginal birth on the musculature and connective tissues within the pelvis. A meta-analysis concluded that the use of episiotomy during labor does not have a significant effect on subjective urinary incontinence at both 3 months and 3 years postpartum relative to spontaneous tears [17]. Multiple studies have demonstrated that utilizing pelvic floor exercises during pregnancy has a positive effect on postpartum urinary incontinence [1, 18].

In summary, all women should be screened for symptoms of urinary incontinence at routine office visits. Treatment should progress from conservative to more invasive until the patient's treatment goals are met. An improvement in quality of life should be the end goal for both the patient and the clinician; thus, continued research is crucial. NCMJ

John Goforth, MS medical student, School of Osteopathic Medicine, Campbell University, Buies Creek, North Carolina.
Michelle Langaker, DO chair and associate professor, Obstetrics and Gynecology, School of Osteopathic Medicine, Campbell University, Buies Creek, North Carolina.

Acknowledgments

Potential conflicts of interest. J.G. and M.L. have no relevant conflicts of interest.

References

1. Committee on Practice Bulletins—Gynecology and American Urogynecologic Society. ACOG Practice bulletin no. 155: urinary incontinence in women. Obstet Gynecol. 2015;126(5):e66-e81.
2. Coyne KS, Wein A, Nicholson S, Kvasz M, Chen CI, Milsom I. Economic burden of urgency urinary incontinence in the United States: a systematic review. J Manag Care Pharm. 2014;20(2):130-140.
3. Kirby AC, Luber KM, Menefee SA. An update on the current and future demand for care of pelvic floor disorders in the United States. Am J Obstet Gynecol. 2013;209(6):584.e1-5.
4. Jimenez-Cidre MA, Lopez-Fando L, Esteban-Fuertes M, et al. The 3-day bladder diary is a feasible, reliable and valid tool to evaluate the lower urinary tract symptoms in women. Neurourol Urodyn. 2015;34(2):128-132.
5. Meyer I, Szychowski JM, Illston JD, Parden AM, Richter HE. Vaginal swab test compared with the urethral Q-tip test for urethral mobility measurement: a randomized controlled trial. Obstet Gynecol 2016;127(2):348-352.
6. Reynolds WS, McPheeters M, Blume J, et al. Comparative effectiveness of anticholinergic therapy for overactive bladder in women. Obstet Gynecol. 2015;125(6):1423-1432.
7. Sanford M. Mirabegron: a review of its use in patients with overactive bladder syndrome. Drugs. 2013;73(11):1213-1225.
8. Siegel S, Noblett K, Mangel J, et al. Three-year follow-up results of a prospective, multicenter study in overactive bladder subjects treated with sacral neuromodulation. Urology. 2016;94:57-63.
9. T Hoen LA, Groen J, Scheepe JR, Blok BF. Intermittent sacral neuromodulation for idiopathic urgency urinary incontinence in women [published online ahead of print December 3, 2015]. Neurourol Urodyn. doi: 10.1002/nau.22938.
10. Novara G, Ficarra V, Boscolo-Berto R, Secco S, Cavalleri S, Artibani W. Tension-free midurethral slings in the treatment of female stress urinary incontinence: a systematic review and meta-analysis of randomized controlled trials of effectiveness. Eur Urol. 2007;52(3):663-678.
11. Ford AA, Ogah JA. Retropubic or transobturator mid-urethral slings for intrinsic sphincter deficiency-related stress urinary incontinence in women: a systematic review and meta-analysis. Int Urogynecol J. 2016;27(1):19-28.
12. Mostafa A, Lim CP, Hopper L, Madhuvrata P, Abdel-Fattah M. Single-incision mini-slings versus standard midurethral slings in surgical management of female stress urinary incontinence: an updated systematic review and meta-analysis of effectiveness and complications. Eur Urol. 2014;65(2):402-427.
13. Liang R, Zong W, Palcsey S, Abramowitch S, Moalli PA. Impact of prolapse meshes on the metabolism of vaginal extracellular matrix in rhesus macaque. Am J Obstet Gynecol. 2015;212(2):174.
14. Barski D, Deng DY. Management of mesh complications after SUI and POP repair: review and analysis of the current literature. Biomed Res Int. 2015;2015:831285.
15. Leone Roberti Maggiore U, Bogani G, Meschia M, et al. Urethral bulking agents versus other surgical procedures for the treatment of female stress urinary incontinence: a systematic review and meta-analysis. Eur J Obstet Gynecol Reprod Biol. 2015;189:48-54.
16. Tähtinen RM, Cartwright R, Tsui JF, et al. Long-term impact of mode of delivery on stress urinary incontinence and urgency urinary incontinence: a systematic review and meta-analysis. Eur Urol. 2016;70(1):148-158.
17. Hartmann K, Viswanathan M, Palmieri R, Gartlehner G, Thorp J Jr, Lohr KN. Outcomes of routine episiotomy. JAMA. 2005;293(17):2141-2148.
18. Fritel X, de Tayrac R, Bader G, et al. Preventing urinary incontinence with supervised prenatal pelvic floor exercises: a randomized control trial. Obstet Gynecol. 2015;126(2):370-377.