
Urinary Incontinence— Part II: Treatment

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Introduction

Female urinary incontinence affects millions of women of all ages, and has a significant impact on quality of life and healthcare costs. Part 1 of this article (Sept/Oct 2004, pages 23-28) dealt with evaluation of the midlife woman with suspected urinary incontinence. What follows is a brief review of the surgical and nonsurgical treatments for stress and urge urinary incontinence.

SUI Treatment Strategies:

Nonpharmacologic

Treatments for stress urinary incontinence (SUI) include medications, pelvic floor exercises, biofeedback, pelvic floor electrical stimulation, electromagnetic innervation, vaginal continence devices, urethral obstructive devices, urethral bulking agents and surgery.

Pelvic floor exercises improve pelvic floor function by enhancing urethral resistance as a result of increasing strength and endurance of the periurethral and paravaginal muscles.¹ These exercises lead to improvement of symptoms in 56-95% of patients.^{2,3} Patients who are selected for treatment with pelvic floor exercises should be self-motivated and demonstrate an ability to isolate the correct muscles on pelvic exam. If patients are unable to isolate the correct muscles on their own, then pelvic floor exercises with biofeedback are indicated. Bump et al⁴ demonstrated that 25% of women who performed Kegel exercises did not isolate the correct muscle, but instead strained. Biofeedback with auditory and visual information

regarding contraction of the levator ani, gluteal and rectus muscles improves patient awareness and correct isolation of pelvic floor muscles.⁵ Some studies indicate improvement as high as 87% with biofeedback.^{6,7}

Some patients are unable to isolate their pelvic floor muscles, even with biofeedback. Pelvic floor electrical stimulation and electromagnetic innervation are alternatives for these patients. These modalities isolate and contract the pelvic floor muscles for the patient and improve overall muscle tone. With pelvic floor electrical stimulation, a vaginal or anal electrode probe is inserted twice daily to stimulate and strengthen pelvic floor muscles using low amperage. In a randomized, sham-controlled trial, Sand et al⁸ found that 27% of the patients with SUI were cured and 62% were improved with the use of pelvic floor electrical stimulation.

Alternatively, electromagnetic innervation stimulates pelvic floor muscles to contract using a fluxing electromagnetic field, and without the need for invasive probes. Electromagnetic innervation can be performed with the patient sitting fully clothed on the electromagnetic chair. In one trial⁹ the 20-minute treatments were administered biweekly, for a total of 6 weeks. Forty-five percent of patients were improved and 29% were cured of SUI using electromagnetic stimulation.

Incontinence pessaries are another treatment option. One study determined that 24% of women with SUI were subjectively cured using these devices.¹⁰

Incontinence pessaries may be ideal in patients with concomitant prolapse. External urethral occlusive devices (Femassist, CapSure) as well as internal devices (Femsoft) also are available for SUI, but are not widely accepted.

SUI Treatment Strategies: Pharmacologic

Medications for the treatment of SUI, including alpha-adrenergic agonists such as ephedrine and pseudoephedrine, act on smooth muscle to increase resting urethral pressure. Care must be taken when prescribing these medications because increased risk of cerebrovascular accidents and hypertension has been reported in some patients using them. Tricyclic antidepressants, such as doxepin and imipramine, have anticholinergic-like effects and central alpha-adrenergic effects; these agents can be used for the treatment of both SUI and urge urinary incontinence (UUI). Duloxetine is a serotonin- and norepinephrine-reuptake inhibitor that also has been shown to improve symptoms of SUI in 44% of women.¹¹

Patients who have severe SUI without urethral hypermobility and a positive empty supine stress test most likely have type III incontinence;¹² in this condition the urethra is well supported but there is a significant reduction in the intrinsic urethral pressure. This is usually determined by either a urethral closure pressure ≤ 20 cm H₂O or an abdominal leak point pressure < 60 cm H₂O. These patients respond well to treatment with

periurethral bulking agents, given with local anesthetic in the office or ambulatory surgery center. Currently, the bulking agents that have been approved by the FDA are gluteraldehyde cross-linked collagen (Contigen®) and pyrolytic carbon-coated beads (Durasphere®). These materials are injected either periurethral or transurethral with the aid of an urethroscope or cystoscope to coapt the bladder neck by suburothelial injection of the bulking agent.^{13,14}

SUI Treatment Strategies: Surgical

Current surgical options for SUI include retropubic urethropexies (ie, Marshall-Marchetti-Kranz and Burch procedures), bladder neck slings (pubo-vaginal, transvaginal bone-anchored and transvaginal Cooper's ligament slings) using various materials, and midurethral tension-free slings placed from vagina to abdomen, abdomen to vagina, or through the obturator foramen to the vagina. All of these surgeries have the ability to achieve cure (dry) rates for SUI in excess of 75% with good longevity,¹⁵ unlike many of the needle suspension operations (ie, Raz, Pereyra, Vesica and Stamey procedures) and transvaginal bladder neck plications that have been abandoned by most surgeons. These procedures vary in their efficacy for the treatment of concurrent detrusor overactivity, and may even cause de novo detrusor overactivity.

UUI and Overactive Bladder Treatment Strategies: Nonpharmacologic

Treatment options for UUI and overactive bladder are primarily nonsurgical, and include behavioral and dietary modifications, medications, pelvic floor electrical stimulation, electromagnetic innervation, sacral neuromodulation and bladder augmentation, and diversion operations.

The simplest behavioral interventions rely on monitoring and adjusting fluid intake and diet. Review of the bladder diary offers a great deal of information about a patient's voiding habits and fluid intake. Limiting the use

of caffeinated and alcoholic beverages and other foods known to increase urgency can improve symptoms.

Bladder-retraining programs for UUI aim to teach the patient to resist and inhibit the sensation of urgency when it occurs, delay micturition and establish cortical control over micturition.^{5,16} "Bladder drill" utilizes pelvic floor muscle contractions to inhibit detrusor contractions through the "vesico-inhibitory pathways" (which suppress voluntary detrusor contractions at the termination of normal micturition) in combination with distraction techniques. Strict voiding intervals are set based on the frequency of incontinence episodes documented in the voiding diary, and patients void only at prescribed time intervals. The intervals are then increased by 15-20 minutes each week or 30 minutes every 3 weeks, depending on patient response.^{5,16} Using these techniques, Flynn and colleagues¹⁷ showed an 80% reduction in the number of UUI episodes, and Wyman et al¹ reported an 18% cure rate with a 51% reduction in incontinence episodes.

Biofeedback was found by Nygaard et al¹⁸ to resolve urodynamic detrusor overactivity in 44% of women. Pelvic floor electrical stimulation and electromagnetic innervation are also effective in the treatment of UUI and detrusor overactivity, with cure rates ranging from 30% to 50%.¹⁹

UUI and Overactive Bladder Treatment Strategies: Pharmacologic

Several medications are available for the treatment of UUI and overactive bladder syndrome. Most of these medications are anticholinergics that act to inhibit the binding of acetylcholine to muscarinic receptors; either blocking involuntary detrusor contractions completely or decreasing their amplitude.²⁰ Antimuscarinic agents such as oxybutynin and tolterodine and their oral and transdermal extended-release formulations are widely available for the treatment of overactive bladder and UUI. Other antimuscarinics used include

hyoscamine and probantheline bromide.

Tricyclic antidepressants such as imipramine and doxepin have anticholinergic-like effects, as well as central adrenergic effects, which increase bladder outlet resistance and are useful for mixed incontinence. Anticholinergic side effects, including dry mouth and constipation, may limit compliance with some of the older preparations. New pharmacotherapies are currently under investigation. Extended-release, intravesical and transdermal delivery have greatly reduced side effects by eliminating the first-pass metabolism of oxybutynin to its primary metabolite. New formulations awaiting FDA approval include the quaternary amine trospium, and the M₃-receptor antagonists solafenacin and darifenacin, which may further improve the therapeutic index and long-term successful treatment of overactive bladder and UUI.²⁰

UUI and Overactive Bladder Treatment Strategies: Surgical

Surgical therapy may be an option for some women, but bladder augmentation and urinary diversion are rarely necessary. Newer operative techniques, such as sacral neuromodulation, provide an excellent treatment option when incontinence is refractory to medications, devices and behavior modification. Sacral neuromodulation was first introduced in 1981 for the treatment of urge incontinence, urgency and frequency, and nonobstructive urinary retention.²¹ A small electrode lead usually is placed in the S3 foramina, and connected to an external pulse generator for testing. If there is a > 50% reduction in symptoms, a subcutaneous programmable pulse generator is subsequently implanted in the subcutaneous tissue of the buttocks. It has been FDA-approved since 1997, with 63% of UUI patients demonstrating at least a 50% reduction in leakage episodes per day and continence rates of 40-50%.^{21,22}

Experimental work with new oral medications, intravesical vanilloids (Capsaicin and Resinefertoxin), botu-

linum toxin intravesical injections and genetic engineering should offer us many new alternatives for treating UUI in the future.

Summary and Conclusions

Urinary incontinence can be an emotionally and socially debilitating condition when left untreated. Incontinence severity ranges from occasional leakage with strenuous exercise to nursing home admission for management of the problem. Increased awareness and screening should begin in the primary care physician's office. Simple office evaluation and initial management may effectively help many women who suffer from urinary incontinence. Many treatment modalities exist for urinary incontinence. Earlier evaluation and treatment may significantly reduce the morbidity and cost of untreated urinary incontinence. ■

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Dr. Sand receives grant/research support from ALZA Corporation, Watson Laboratories and Yamanouchi Pharma, and serves as a consultant for Ortho McNeil Pharmaceuticals, Watson Laboratories, Yamanouchi Pharma, Boston Scientific AMS, and Intevue. Dr. Sand also serves on the speaker's bureau for Ortho McNeil Pharmaceuticals and Watson Laboratories. Dr. Botros reports no affiliations related to the content of this article.

Submitted: May 21, 2004. Accepted: August 2, 2004.

References

- Wyman JF, Fantl JA, McClish DK, et al. Comparative efficacy of behavioral interventions in the management of female urinary incontinence. Continence Program for Women Research Group. *Am J Obstet Gynecol* 1998; 179(4):999-1007.
- Benvenuti F, Caputo GM, Bandinelli S, et al. Reeducative treatment of female genuine stress incontinence. *Am J Phys Med* 1987;66:155-68.
- Ferguson KL, McKey PL, Bishop KR, et al. Stress urinary incontinence: Effect of pelvic muscle exercise. *Obstet Gynecol* 1990;73:671-75.
- Bump RC, Hurt WG, Fantl JA, et al. Assessment of Kegel pelvic muscle exercise performance after brief verbal instruction. *Am J Obstet Gynecol* 1991;165:322-27.
- Gormley EA. Biofeedback and behavioral therapy for the management of female urinary incontinence. *Urol Clin North Am* 2002; 29(3):551-57.
- Burns PA, Pranikoff K, Nochajski TH, et al. A comparison of effectiveness of biofeedback and pelvic muscle exercise treatment of stress urinary incontinence in older community-dwelling women. *J Gerontol* 1993;48:167-74.
- Susset JG, Galea G, Read L. Biofeedback therapy for female incontinence due to low urethral resistance. *J Urol* 1990;143:1205-8.
- Sand PK, Richardson DA, Staskin D, et al. Pelvic floor electrical stimulation in the treatment of genuine stress incontinence: A multicenter, placebo-controlled trial. *Am J Obstet Gynecol* 1995;173:72-9.
- Sand PK, Appell R, Bavendam T, et al. Factors influencing success with extracorporeal magnetic innervation (EXMI) treatment of mixed urinary incontinence. Presented at the International Bladder Symposium, Washington, DC, November 4-7 1999.
- Robert M, Mainprize TC. Long-term assessment of the incontinence ring pessary for the treatment of stress incontinence. *Int Urogynecol J Pelvic Floor Dysfunct* 2002; 13(5):326-29.
- Norton PA, Zinner NR, Yalcin I, et al. Duloxetine versus placebo in the treatment of stress urinary incontinence. *Am J Obstet Gynecol* 2002;187(1):40-48.
- Blaivas JG, Salinas J. Type III stress urinary incontinence: The importance of proper diagnosis and treatment. *Surg Forum* 1984;35:473-75.
- Lightner D, Calvosa C, Andersen R, et al. A new injectable bulking agent for treatment of stress urinary incontinence: Results of a multicenter, randomized, controlled, double-blind study of Durasphere. *Urology* 2001;58(1):12-5.
- Koduri S, Dobre D, Goldberg RP, et al. Long term success of periurethral collagen injections: a retrospective analysis. *Int Urogyn J* 2000;11(1):549.
- Leach GE, Dmochowski RR, Appell RA, et al. Female stress urinary incontinence clinical guidelines panel summary report on surgical management of female stress urinary incontinence. *J Urol* 1997;158(3):875-80.
- Iselin CE, Webster GD. Office management of female urinary incontinence. *Urol Clin North Am* 1998;25(4) 625-45.
- Flynn L, Cell P, Luisi E. Effectiveness of pelvic muscle exercises in reducing urge incontinence among community residing elders. *J Gerontol Nurs* 1994;20: 23-7.
- Nygaard IE, Kreder KJ, Lepic MM, et al. Efficacy of pelvic floor muscle exercises in women with stress, urge and mixed urinary incontinence. *Am J Obstet Gynecol* 1996;174(1) 120-5.
- Goldberg RP, Sand PK. Extracorporeal electromagnetic stimulation for urinary incontinence and bladder disease. In: Atala A, Shode D (eds), *Bladder disease: Research concepts and clinical applications*. Kluwer Academic/ Plenum Publishers, 2003.
- Huggins ME, Bhatia NN, Ostergard DR, et al. Urinary incontinence: Newer pharmacotherapeutic trends. *Curr Opin Obstet Gynecol* 2003;15(5):419-27.
- Pettit PD, Thompson JR, Chen AH. Sacral neuromodulation: New applications in the treatment of female pelvic floor dysfunction. *Curr Opin Obstet Gynecol* 2002;14(5): 521-5.
- Bosch JL, Groen J. Sacral (S3) segmental nerve stimulation as a treatment for urge incontinence in patients with detrusor instability: Results of chronic electrical stimulation using an implantable neural prosthesis. *J Urol* 1995; 154:504-7.