REVIEW

CME CREDIT

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Evaluating and managing urinary incontinence after prostatectomy: Beyond pads and diapers

ABSTRACT

Men who become persistently incontinent after undergoing prostatectomy have a variety of options for regaining control, ranging from behavioral changes to surgery. To determine the best therapy, one should define the problem with a thorough urologic evaluation.

KEY POINTS

Surgeons are learning how to perform prostatectomy without injuring the distal urethral sphincter, which is the most important factor in maintaining continence.

Patients with mild incontinence who are poor surgical candidates may benefit from collagen injections at the bladder neck and proximal urethra.

The male sling procedure, performed using minimally invasive techniques, has shown promise.

Artificial urinary sphincters have good success rates, but many patients need a second operation to replace the device within 5 years.

Patients with incontinence due to bladder dysfunction can be helped by behavioral modifications, anticholinergic drugs, and new neuromodulation therapies.

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MANY MEN become incontinent of urine after undergoing prostatectomy. Fortunately, treatment options consist of more than pads and diapers: artificial sphincters or the less-invasive male sling procedure can help most men with sphincter dysfunction regain continence. For patients who are poor surgical candidates, other options may help, including behavioral changes, medications, neuromodulation therapy, or collagen injections, depending on the source of the problem.

This article reviews the incidence and causes of urinary incontinence following prostatectomy and its evaluation and management.

INCONTINENCE IS COMMON AFTER PROSTATECTOMY

Adenocarcinoma of the prostate is the most common cancer in men, and radical prostatectomy—the preferred treatment for many men with localized disease—often leaves the patient incontinent. Just how often depends on how incontinence is defined and what data are collected: estimates range from 2.5% to 87%.[1]

Benoit et al[2] evaluated the Medicare claims of more than 25,000 men who underwent radical retropubic prostatectomy and found that urinary incontinence was reported in 21.7% and continued in 7.9% after 1 year.

Kao et al,[3] in a multicenter study, mailed questionnaires to men who had undergone prostatectomy at least 6 months previously and found that 66% reported having urinary incon-

tinence, and 33% needed to wear pads or diapers. Bishoff et al,[4] in a nationwide survey, found that 56% still needed pads or diapers 12 months or more after retropubic prostatectomy.

THE BLADDER AND SPHINCTERS DETERMINE INCONTINENCE

Incontinence—failure to store urine—can be due to abnormalities of the bladder, the sphincters, or both.[5] To best treat the problem, it is important to determine whether one or both processes are present.

Multiple studies that assessed the relative contributions of bladder and sphincter dysfunction to postprostatectomy incontinence[6,7] have found the problem to be mainly in the sphincter; bladder dysfunction often contributes but is rarely the sole cause.

Sphincter damage causes most incontinence after prostatectomy

Men have two sphincters to control their flow of urine: proximal and distal.[8] The proximal (or internal) sphincter consists of smooth (involuntary) muscle in the bladder neck, prostate gland, and prostatic urethra. The distal (or external) sphincter, located at the end of the prostate, has both voluntary and involuntary muscle.

Before prostatectomy, men have 2 sphincters, afterward, they have only 1

During radical prostatectomy, the proximal sphincter is typically removed, so that continence depends solely on the distal sphincter. If the distal sphincter is also damaged, the patient will be prone to stress-type urinary incontinence

Although the most important goal of prostatectomy is to control the cancer, we also want to minimize postoperative morbidity, especially urinary incontinence and erectile dysfunction. Operative techniques for performing radical prostatectomy have evolved as the anatomy has become more clearly defined and as ways to minimize morbidity have been developed. Data show that the most important factor in preserving continence is careful apical dissection to avoid injuring the distal urethral sphincter.

New laparoscopic and robotic-assisted techniques use many of the same surgical principles as open surgery, but their impact on urinary continence rates has not been well studied.

Bladder dysfunction causes urgency and frequency

Bladder dysfunction can be caused by bladder overactivity or poor bladder compliance. Overflow incontinence can be caused by an underactive bladder or anastomotic narrowing.

After prostatectomy, bladder dysfunction is usually due to decreased bladder compliance, causing urinary urgency and frequency at low bladder volumes. Although some patients have preexisting bladder dysfunction, for most it develops because surgery weakens the pelvic floor and reduces resistance in the external sphincter. The procedure may also unmask occult bladder dysfunction.

EVALUATING INCONTINENCE

The evaluation of incontinence after prostatectomy depends on how severely the symptoms affect the patient's quality of life. Most prostatectomy patients have some incontinence immediately after the catheter is removed, but as the pelvic floor heals, continence can be achieved as early as a few weeks after surgery. Conservative urologists usually wait at least 1 year before offering surgical intervention. For the internist, if continence is not achieved by 6 months, a referral should be made to a urologist.

History should focus on incontinence issues

Evaluating postprostatectomy incontinence begins with a thorough history and physical examination. Every effort should be made to quantify and characterize the problem, including the frequency and character of incontinent episodes, the need for protection, and the number of pads used. A voiding diary kept for 3 to 5 days is often more accurate than the patient's accounts from memory and can provide valuable information regarding fluid intake, number of incontinence episodes, functional bladder capacity, and 24-hour urine output.

Validated quality-of-life questionnaires, such as the urinary distress inventory-6 short form, are often used to determine the severity of incontinence.

Medications should be reviewed, especially those with anticholinergic or diuretic actions that can affect bladder function.

A history of medical conditions and surgeries should focus on those with a possible impact on voiding, such as back, pelvic, or urologic surgery, stroke, radiation treatment, diabetes mellitus, vascular disease, and neurologic disease.

Physical examination

The physical examination should include a general urologic evaluation and a focused neurologic assessment, including:

- Evaluation of the surgical wound
- A postvoiding residual urine volume
- Abdominal straining or coughing in either the supine or upright position to assess urinary leakage
- Testing of perineal sensation and deep tendon and bulbocavernosus reflexes
- Rectal examination to assess anal sphincter tone and possible local cancer recurrence. Palpation of an indurated mass in the location of the prostate would be cause for suspicion.

Abnormal reflexes or anal tone may indicate a neurologic cause for voiding dysfunction.

Laboratory tests, including urinalysis and serum levels of prostate-specific antigen and creatinine, can help determine if a urinary tract infection is present or if cancer has recurred.

Cystourethroscopy and urodynamic evaluation

Cystourethroscopy can help determine the cause of incontinence. It is useful for ruling out bladder neck contracture and for the assessment of presurgical urethral anatomy. Examining the bladder may reveal epithelial lesions, calculi, or foreign bodies that may cause irritation and inflammation. Finding trabeculae, cellules (small outpouchings of the bladder wall, usually due to obstructive voiding patterns), or diverticula suggest a dysfunctional bladder. In addition, outlet obstruction can be evaluated by visualizing the vesicourethral anastomosis and the length of the urethra for stricture. The presence and function of the striated sphincter can also be assessed. Directly visualizing the lower urinary tract can also help determine whether a therapy such as injectable bulking agents or an artificial sphincter would be feasible.

Urodynamic evaluation is only indicated in the assessment of suspected bladder dysfunction. A good urodynamic study, measuring bladder filling, storage, and emptying, can help differentiate between sphincter and bladder dysfunction and help determine the appropriate therapy.

Gomha and Boone[9] evaluated 61 patients who had postprostatectomy incontinence with urodynamic testing, and found that all had stress incontinence and 48% had concomitant urgency or urge incontinence. In a similar study, Huckabay et al[10] found that 13% of patients with postprostatectomy incontinence had urgency-induced incontinence.

MANAGING BLADDER DYSFUNCTION

Bladder dysfunction following radical prostatectomy is managed the same way as bladder dysfunction from other causes. In the first postoperative year it is best to start with conservative measures such as behavioral modification with pelvic floor physical therapy.

Behavioral modification

Incontinence caused by bladder overactivity may be helped by restricting fluids and avoiding caffeine. Double voiding (ie, voiding again a minute or so after urinating) to more completely empty the bladder can also help.

For bladder overactivity, try double voiding, behavioral therapy, restricting fluids and caffeine

Burgio et al[11] found that biofeedback-assisted behavioral training before patients undergo prostatectomy can shorten the time it takes to regain continence postoperatively and can reduce the prevalence of severe persistent incontinence 6 months after prostatectomy.

Pharmacotherapy

Medications can be started after or along with behavioral therapy.

Anticholinergic drugs, especially oxybutynin (Ditropan) and tolterodine (Detrol), are most commonly used to treat an overactive bladder. Both drugs are available in immediate-release and extended-release forms and act to increase bladder compliance and reduce bladder overactivity. A generic form of immediate-release oxybutinin is available and is considerably cheaper than immediate-release Ditropan. Common side effects are dry mouth and constipation.

Newer agents, including the anticholinergics trospium (Sanctura) and solifenacin (VESIcare) and the antimuscarinic drug darifenacin (Enablex), have not been studied for efficacy against bladder dysfunction but are thought to be as effective as the older drugs.

Imipramine (Tofranil), a tricyclic antidepressant, is also commonly used to treat a noncompliant and overactive bladder. It improves bladder compliance by decreasing bladder contractility while increasing outlet resistance. Imipramine also has central and peripheral anticholinergic activity and inhibits the reuptake of norepinephrine and serotonin, producing a mild sedative effect.[12]

Evolving new therapies

Currently evolving therapies for overactive bladder include drugs such as botulinum toxin type A and electrical treatments such as sacral nerve stimulation. The details of these therapies are beyond the scope of this article.

Surgical treatment is rarely needed for bladder overactivity

Bladder overactivity that is refractory to the above therapies may require augmentation cystoplasty or urinary diversion via open or laparoscopic approaches, although these are rarely indicated.[13]

Most urologists wait a year after prostatectomy before offering surgery for incontinence

TREATMENT OPTIONS FOR SPHINCTER DYSFUNCTION

Postprostatectomy incontinence is mostly due to sphincter dysfunction. Treatment options are primarily surgical and include injectable therapy, the male sling procedure, and the artificial urinary sphincter. However, during the first year after prostectomy, pelvic floor physical therapy and behavioral modification is best.

Injectable therapy: Effect is not durable

Injectable therapy is primarily for patients who are poor surgical candidates and who have very mild forms of incontinence (1 pad/day). Therapy consists of injecting small volumes of collagen (2.5–5 mL) at the level of the bladder neck and proximal urethra. Multiple injections are usually required, although typically little or no improvement follows the first one or two injections.[14–16]

Bugel et al[17] injected silicone macroparticles (Macroplastique) in 15 postprostatectomy patients (9 had had radical prostatectomy) and found that their incontinence initially improved but then rapidly deteriorated: the success rate was 40% at 1 month, 71% at 3 months, 33% at 6 months, and 26% at 12 months.

Other studies confirm that success following injectable therapy, defined as either being cured of incontinence or greatly improved, tends to be poor for postprostatectomy incontinence, with rates ranging from 20% to 35%.[14,18,19] Patients who have had postoperative radiation therapy, adjuvant cryotherapy, or vigorous bladder neck incision for a postoperative anastomotic stricture are least likely to respond to injectable therapy.

The male sling procedure: A promising new treatment

Two types of male sling procedures have been recently developed as minimally invasive therapy for postprostatectomy incontinence. They are designed to restore urinary continence by putting constant tension on the bulbar urethra.

The Schaeffer bulbourethral sling is based on the technique used for female pubovaginal slings. Three bolsters (4 cm long and 6 mm in diameter) are placed underneath the bulbar urethra and tied to the rectus fascia.

In the original report in 1998, 56% of 64 patients who underwent the procedure, were cured and 5% were "significantly improved" after a mean follow-up of 22.4 months.[20] Revision (sling retightening) was required in 27% of patients and increased the success rate to 75%. Urinary tract erosion occurred in 6% of patients, and infections in 3%.

In response to a follow-up questionnaire sent out a median of 9.6 months after the first study was completed, 41% of patients reported they were completely cured. Persistent perineal numbness or discomfort was reported by 52%. Radiation therapy was associated with a high failure rate.[21]

Bone-anchored sling. In 2001, Madjar et al[22] introduced a less invasive procedure in which the sling is anchored to the pelvis with screws.

Sixteen patients underwent the procedure and were followed for a mean of 12.2 months.

Twelve (75%) were cured (defined as staying dry or using 1 protective pad daily with no leakage) and 2 (12.5%) were substantially improved (> 50% reduced daily pad use). In addition, 2 patients who had mixed incontinence before the procedure had resolution of stress incontinence as measured urodynamically, with persistent urge incontinence controlled on medical therapy. There were no erosions, infections, or revisions.

Comiter[23] prospectively followed 48 patients who were treated with the bone-anchored male sling for stress urinary incontinence following radical prostatectomy. At baseline, all patients rated their incontinence as severe (using at least 3 pads daily). At a median of 48 months after the procedure, average pad use had decreased from 4.6 ± 2.1 pads per day to 1.0 ± 1.7 ($P < .01$). Overall, 31 patients (65%) were cured (no problem, no pads), 7 (15%) were much improved (small problem, 1 pad daily), 3 (6%) were mildly improved (moderate problem, 2 pads daily), and 7 (15%) failed (big problem, ≥ 3 pads).

Although the bone-anchored male sling seems promising, long-term studies have not been done. In addition, a randomized trial comparing its efficacy with that of the artificial urinary sphincter is needed before it can be recommended as a replacement.

Artificial urinary sphincter is the gold standard

The artificial urinary sphincter is generally regarded as the gold standard therapy for postprostatectomy incontinence, especially for severe cases. The prototype artificial sphincter, introduced in 1973 by American Medical Systems (Minnetonka, MN),[24] was modified in the 1980s to the current AMS-800 model. Long-term data have demonstrated the AMS-800 to be effective and safe.

The artificial urinary sphincter works much like a blood pressure cuff to compress the bulbar urethra (**FIGURE 1**). The patient urinates by squeezing a scrotal pump that deflates the cuff and removes the compression on the urethra. The cuff automatically reinflates after about 3 minutes.

To be considered for an artificial urinary sphincter, the patient must regard his incontinence as detrimental to his quality of life; most have already tried conservative measures and the male sling procedure, without success. Patients should be good surgical candidates and have sufficient manual dexterity and mental capability to operate the pump.

Fulford et al[25] followed 61 patients for 10 to 15 years after placement of an artificial urinary sphincter. More than half the patients originally had neurogenic causes of sphincter dysfunction, and one fourth had postprostatectomy incontinence. After 10 years, 49 patients had needed at least one revision procedure, but 37 patients (61%) were continent with an artificial sphincter, either the original device or a replacement.

Venn et al[26] reported complete continence in 84% of 100 patients 10 years after placement of an artificial urinary sphincter, including 36% who had had the original device, 27% who had the device replaced due to mechanical failure, and 21% who had had the device replaced because of urinary tract erosion or infection.

Montague et al[27] reported on 113 patients with postprostatectomy incontinence after a mean follow-up of 73 months (range 20–170) after receiving an artificial urinary sphincter. Four patients (4%) were completely continent, 60% were "socially continent" (using 0–1 pad daily), 31% required 2 to 3 pads daily, and 4% used more than 3 pads daily. Overall, 28% reported they were very satisfied, 45% were satisfied, 18% were neutral, 6% were dissatisfied, and 4% were very dissatisfied.

In other case series, 76% to 96% of patients achieved socially acceptable urinary control (dry or mild incontinence), and around 90% of patients were satisfied.[28–37]

About half of artificial urinary sphincters need to be revised within 5 years

The main problem with the artificial urinary sphincter is that it often needs to be revised surgically. Clemens et al[36] reviewed the records of 70 patients who were incontinent after radical prostatectomy and had received artificial urinary sphincters. They determined that about half of patients can expect to undergo operative revision within 5 years following artificial urinary sphincter implantation. The major reasons for revision are mechanical failure, erosion, or infection. Having a single revision does not predispose patients to require another one.[38,39]

The artificial urinary sphincter

The artificial urinary sphincter, an implantable device, can restore continence for men who have become incontinent as a result of prostate surgery.

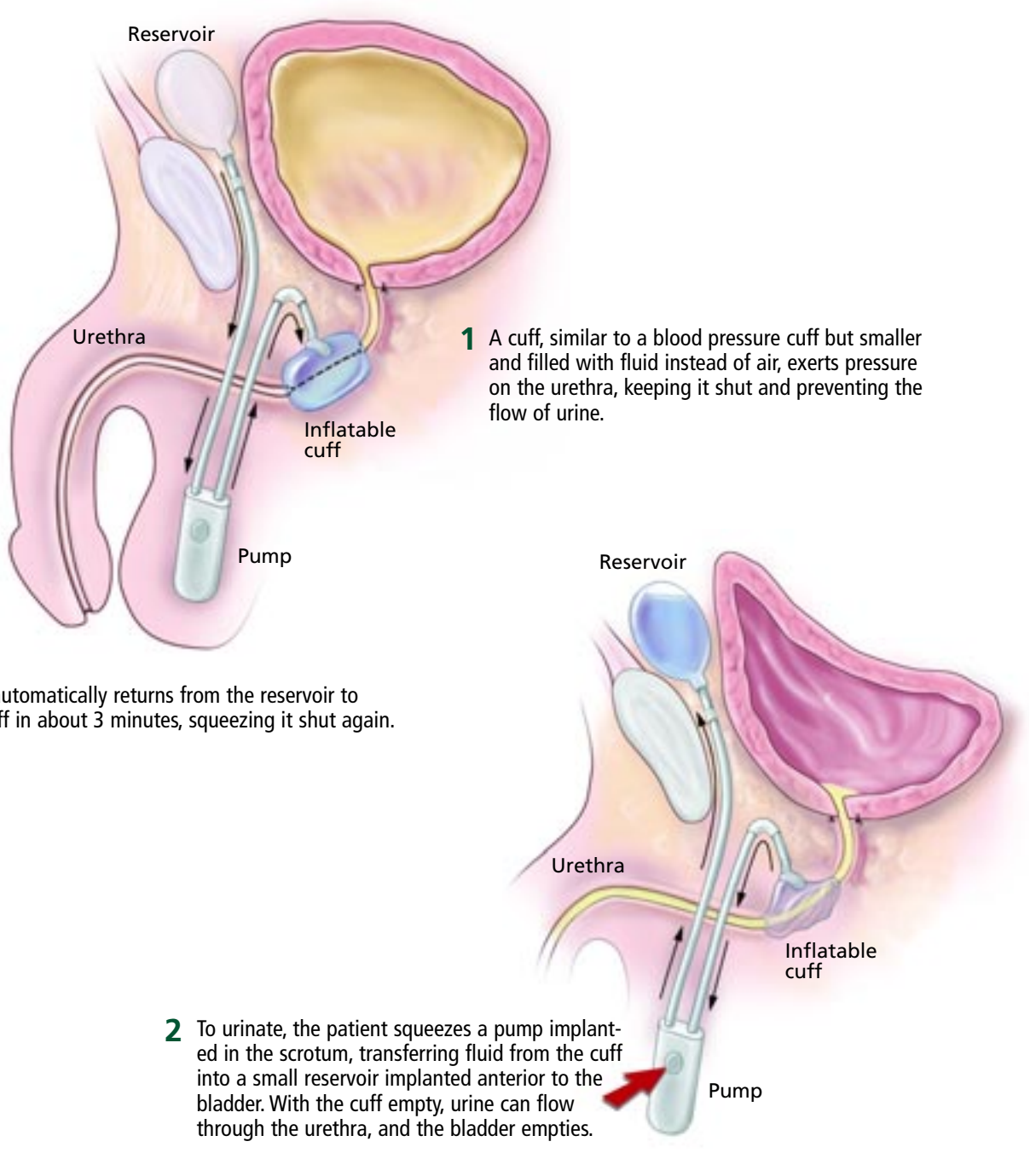

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FIGURE 1

FURTHER PROGRESS LIKELY

Incontinence continues to be a common problem following radical prostatectomy, although better understanding of the problem and improved surgical techniques should reduce the incidence. As research continues in new medications, neuromodulation, and operative procedures, a variety of good management options should be available to treat most patients.

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