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Management of post-prostatectomy urinary incontinence

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Abstract

Post-prostatectomy urinary incontinence (PPUI) can be a devastating complication of this form of surgery. Urinary incontinence is more common after a radical prostatectomy for cancer than following a simple prostatectomy or transurethral resection of the prostate for benign prostatic enlargement. The majority of patients do recover continence, although this may take up to 2 years. Only a minority require surgical interventions. This condition can manifest as stress, urge, functional, overflow or mixed UI. Treatment should commence as soon as the problem is recognized. The aim is to help patients achieve total continence so that they can regain their confidence and self-esteem, and benefit from an improvement in their quality of life. No one should have to suffer from PPUI since the currently available treatment options are highly efficacious. All patients should receive comprehensive counselling. Conservative therapy is highly effective, and pelvic floor muscle exercises are possibly the single most important treatment modality. Lifestyle advice and medication also play important roles. Non-conservative forms of management include injections, balloon compressions, slings and artificial urinary sphincters. The artificial urinary sphincter is the most effective and time-tested treatment for moderately severe and severe cases of UI, and the male sling is increasingly being recognized as an effective modality for mild to moderate degrees of stress UI. Future treatments should focus on minimally invasive and highly efficacious modalities.

Keywords: conservative treatment, interventional management, post-prostatectomy urinary incontinence.

Introduction

The International Continence Society (ICS) defines urinary incontinence (UI) as "the complaint of any involuntary loss of urine" (Abrams *et al.* 2003b, p. 38). The rising number of newly diagnosed cases of prostate cancer has led to an increase in the amount of radical prostatectomies (RPs), i.e. total removal of the prostate gland and the surrounding tissues, that are being performed. Post-prostatectomy UI (PPUI) can be a devastating complication of this form of surgery. The field of RP has also expanded to include patients with locally advanced cancers. Consequently, younger and more socially active individuals are developing UI.

On average, 4500 RP procedures are carried out annually in the UK, and the incidence of stress UI (SUI) following RP ranges from 1% to 87%. Fortunately, the percentage of patients who require surgical intervention for bothersome UI after a RP is only 5–7%. The incidence of UI following a simple prostatectomy, i.e. partial removal of the prostate, or transurethral resection of the prostate for benign prostatic enlargement is < 2%, and the number of individuals who need any interventions for troublesome UI is less than 0.1% (CRUK 2014).

Besides erectile dysfunction, UI is the most alarming complication of a RP. Several different types of UI are seen following prostatectomies: SUI is the commonest, followed by urge, mixed and overflow UI (UUI, MUI and OUI) (Bauer *et al.* 2009a).

Stress UI is characterized by involuntary leakage on effort or exertion, or sneezing or coughing. Urge UI manifests as involuntary leakage accompanied by or immediately preceded by urgency.

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Mixed UI is defined as involuntary leakage associated with urgency, and also exertion, effort, sneezing or coughing. Overflow UI is secondary to urinary retention as a result of either bladder outflow obstruction caused by strictures or poor bladder contractility, and is the least common variety (Abrams *et al.* 2003b).

Pathogenesis

According to the integral concept of the male continence apparatus, urinary continence in men depends on: the intact bladder neck, which acts as an internal urinary smooth muscle sphincter; the external sphincter, which is the main muscle involved in urethral closure; the connective and neuronal tissues of the urethra and pelvis; and also the ventral supporting apparatus suspending the bladder neck (Schwalenberg *et al.* 2010).

In RP, the entire prostate gland, and its surrounding capsule and seminal vesicles are removed. Although the precise aetiology of PPUI is not completely understood, damage to the neurovascular bundles, direct injury to the sphincters and bladder neck dysfunction are thought to play major causative roles.

Advances in our understanding of male pelvic anatomy and the pathogenesis of PPUI mean that the continence rate has greatly improved in the affected population. Surgeons performing prostatectomies stress the importance of preserving the bladder neck and the neurovascular bundles, and also avoiding damage to the external urinary sphincter. Therefore, large-volume centres with highly qualified and skilled personnel report the lowest incidence of PPUI.

Various other factors that influence PPUI include age, body mass index, pre-operative continence status and post-operative dedicated care (Bauer *et al.* 2009b).

Management of post-prostatectomy urinary incontinence

Effective treatment depends on a correct diagnosis of the type and severity of PPUI, and also the level of keenness and interest that the patient expresses.

Diagnosis

Treatment of PPUI should be a two-step process (Fig. 1) consisting of:

(1) an initial clinical assessment and non-invasive first-line treatment; and
(2) a specialized clinical assessment and possible surgical intervention if the first-line treatment fails or proves to be ineffective.

The management of UI in men is based on the 2008 European Association of Urology guidelines (Bauer *et al.* 2011).

The initial clinical assessment begins with the compilation of a detailed medical history that includes information about lifestyle, the volume of fluid intake and medication usage. This is followed by: a physical examination that includes neurological tests; urinalysis to exclude urinary tract infections (UTIs); an ultrasound scan to measure post-void residual urine volume; a pad test; and for those who have an interest in seeking treatment for their PPUI, a questionnaire about the degree of bother experienced by the patient that includes a quality of life (QoL) score.

This is immediately followed up by the initial non-invasive therapeutic measures. These consist of lifestyle and behavioural changes, bladder training, pelvic floor muscle training (PFMT) with or without biofeedback, and medication (Anderson *et al.* 2015).

These conservative measures will help to alleviate PPUI in the majority of cases, and very high patient satisfaction scores have been recorded. Therefore, it is important to commence these non-invasive measures as soon as or even before the problem becomes established (NCGC 2010).

The role of pelvic floor muscle training or exercises

Pelvic floor muscle training is an effective treatment for the majority of cases of PPUI, and is a useful form of therapy for all types of UI except OUI, which, fortunately, is rare. Various randomized controlled trials (RCTs) of PFMT combined with biofeedback have reported promising results. Pelvic floor muscle training in combination with duloxetine (a selective serotonin–norepinephrine reuptake inhibitor) has a synergistic effect when used to treat post-prostatectomy SUI. The exercises are simple to perform, have fewer side effects than other forms of treatment and are generally acceptable to patients (Ribeiro *et al.* 2010).

When these conservative measures are employed, the recovery of continence following a prostatectomy with may take up to 12 months, especially in mild to moderately severity cases. Various methods of quantification can be used

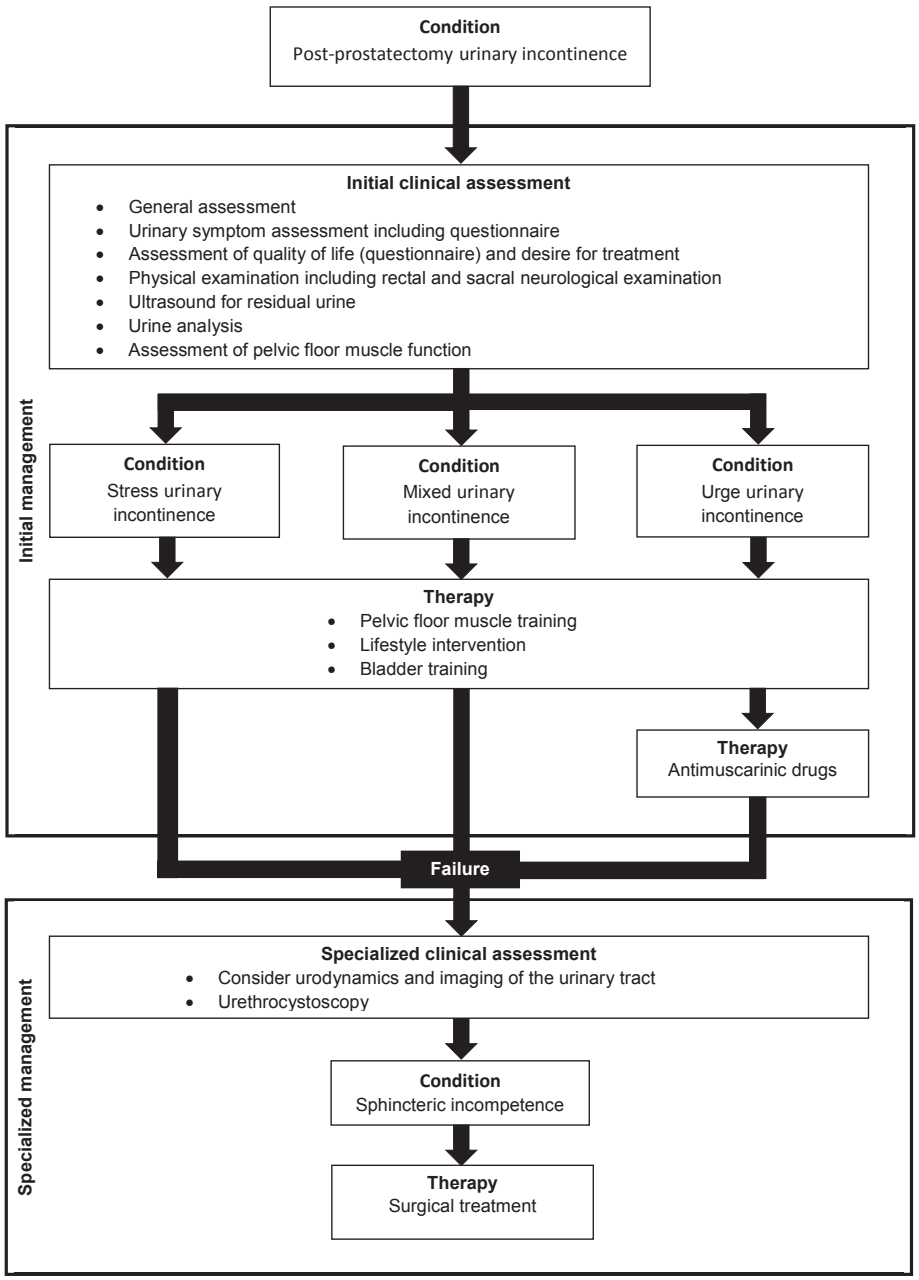

Figure 1. Initial and specialized assessment and management of post-prostatectomy urinary incontinence based on the 2010 European Association of Urology guidelines (adapted from Bauer *et al.* 2011, p. 987).

to assess the severity of PPUI. The 1-h pad test recommended by the ICS is a simple, easy-to-use and reproducible measure (Anderson *et al.* 2015).

Post-prostatectomy *de novo* urgency and UUI are common problems that respond to non-invasive therapies and medication. A variety of anticholinergic drugs (e.g. oxybutynin, tolterodine, solifenacin, trospium and fesoterodine), and mirabegron, a new β3 agonist, are frequently used to treat these conditions. The side effects of the anticholinergics include dryness of the mouth, indigestion, constipation, and visual and central nervous system reactions, especially in older patients. In very rare instances, refractory UUI requires invasive treatments such as botulinum toxin (Botox) injections in the bladder (Orasanu & Mahajan 2013) or sacral neuromodulation.

Specialized clinical assessment and interventional therapies

Specialized clinical assessment and possible intervention are indicated in patients who have failed to respond to conservative therapies for 12 months or more, and those whose degree of UI is considered to be severe and seriously affecting their QoL. Specialized clinical assessment documents an up-to-date history with bladder diaries, physical examination, urinalysis, ultrasound scans and 1-h pad tests, as well as

invasive investigations such as cystoscopy and urodynamic tests.

Cystoscopy evaluates the patency of the urethra and the bladder outlet, and excludes any strictures. Urodynamic tests assess bladder pressure and flow, and categorize the type and severity of the UI (Kim & Cho 2012).

Surgical treatment of post-prostatectomy urinary incontinence

Most individuals with PPUI suffer from SUI, especially those who have undergone RP. Fortunately, the vast majority of these patients (90%) regain continence within 6–12 months. Only 5–7% suffer from significant and bothersome UI that requires surgical intervention.

Surgical interventions for post-prostatectomy stress urinary incontinence

There are three main types of surgical interventions for PPUI (Foote *et al.* 1991; Herschorn *et al.* 2010):

(1) If conservative approaches fail, then the "gold standard" of treatment is the artificial urinary sphincter (AUS). This is considered to be the most effective, reliable and time-tested surgical intervention for all grades and levels of severity of post-prostatectomy SUI (Comiter 2007). The AUS is an antibiotic-coated silicone implant that has three components:
   (a) a cuff that is placed around the urethra, keeping this closed with a squeezing action that prevents any urinary leakage;
   (b) a pressure-regulated fluid reservoir that is placed in the abdomen; and
   (c) a control pump underneath the scrotal skin.

If due precautions and care are taken, then the procedure is relatively simple, and can generally be carried out under anaesthesia in approximately 90 min. The overall efficacy rate is 90%, and patients normally make a rapid post-operative recovery.

(2) Numerous types of male urethral slings have been described (Comiter 2007), but the most commonly used is the transobturator tape (TOT) sling. Male slings are rapidly becoming a popular alternative to AUSs in the treatment of mild to moderate degrees of UI (Jones *et al.* 2005). The TOT sling consists of a synthetic mesh tape that is placed underneath the bulbar urethra to reposition it higher up in the pelvis in order to achieve continence. Slings are generally less invasive and technically simpler than AUSs, and have an overall efficacy rate of 80% (Drai *et al.* 2013).

Both AUSs and male slings have inherent risks, such as infection, erosion and malfunction, which require additional treatments (Kumar *et al.* 2009). Post-prostatectomy patients with SUI who need surgical interventions but are unsuitable for the above two procedures are considered for a less-invasive but also less-effective third option involving injections and balloon therapy:

(3) Injection agents include polyacrylamide, carbon-coated zirconium oxide beads (Durasphere®), hyaluronic acid/dextranomer gel (Zuidex®), dimethyl sulfoxide/ethylene vinyl alcohol copolymer (Tegress® and Uryx®), hydoxyapatite microspheres in a carboxylmethylcellulose carrier gel (Coaptite®), and autologous muscle cells, stem cells and fibroblasts. These treatments are simple to deliver, less risky and effective in the short term, but long-term efficacy has not been proved.

Treatment of other types of post-prostatectomy urinary incontinence

A significant number of patients with PPUI also suffer from UUI, MUI and OUI. Fortunately, a large majority of individuals with UUI and MUI recover after undergoing conservative treatments alone. Only a small number require surgical interventions such as Botox injections in the bladder (Kuo 2004), sacral neuromodulation (Hussain & Harrison 2007), or urinary diversions such as catheters or bowel conduits.

Post-prostatectomy OUI is either caused by mechanical outflow obstruction, which is responsive to surgical treatment, or is secondary to a lack of bladder muscle contractions. Acontractile bladders are treated with intermittent self-catheter training, and indwelling urethral or suprapubic catheters. These patients may very occasionally benefit from sacral neuromodulation or even urinary diversions (Abrams *et al.* 2003a).

Conclusions

Post-prostatectomy UI is a devastating complication of this form of surgery that has a significant multifactorial impact on individuals and health services in terms of its personal, social, psychological, occupational and economic consequences.

More than 90% of these patients regain continence after undergoing conservative treatments alone. A small minority of symptomatic patients with PPUI require surgical interventions. The surgical options that are available for all forms of PPUI are highly effective, and are indicated after 6–12 months of failed conservative therapy. Although the AUS is considered to be the gold standard, male TOT slings are rapidly gaining in popularity as an effective alternative treatment for post-prostatectomy SUI (Léon *et al.* 2015).

Patients with PPUI should be educated about their condition, and encouraged to seek early treatment. No one should be left to suffer in silence since more than 50% of cases are curable, more than 75% are treatable and 100% are manageable. Further research and RCTs are required in order to explore prevention, and encourage innovation with regard to the ideal of less-invasive and more-effective therapies for PPUI.

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