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Postprostatectomy stress urinary incontinence

Current and evolving therapies

Background
Postprostatectomy stress urinary incontinence (PPSUI) is a clinically significant problem with an incidence of 3–60%.

Objective
This article discusses the indications and efficacy of current and evolving surgical therapies for PPSUI as a guide for general practitioners.

Discussion
Surgical intervention can be considered for bothersome PPSUI persisting longer than 12 months for which conservative therapy has failed. Careful preoperative assessment and counselling is necessary to select appropriate candidates for surgical intervention. When considering the success of various therapies for PPSUI, patient satisfaction is often related to the magnitude of incontinence pad reduction, rather than absolute pad usage per day. Currently, there are several surgical therapies available for PPSUI including bulking agents, the artificial urinary sphincter (AUS-800®) and male sling devices. The AUS-800® remains the gold standard for moderate to severe PPSUI, however, sling devices demonstrate promising short to intermediate term results.

Following a radical prostatectomy, 3–60% of men will suffer from postprostatectomy stress urinary incontinence (PPSUI).[1–3] Although mild in most instances, 4% of men will suffer significant leakage necessitating pad usage.[2]

The aetiology of PPSUI is multifactorial and can be related to bladder dysfunction characterised by:

- detrusor overactivity and/or
- decreased bladder compliance and/or
- intrinsic sphincter deficiency (ISD).[2,4,5]

Intrinsic sphincter deficiency is thought to be caused by injury to the striated sphincter complex during ligation and division of the dorsal vein complex. The smooth musculature of the urethra, which also contributes to continence, can be damaged during surgery by placement of large, deep sutures for the anastomosis or injury to the neurovascular bundle.[6]

Urinary incontinence in men can be a debilitating condition and is associated with anxiety, depression, social withdrawal and relationship breakdown.[7] Often these effects are compounded by the erectile dysfunction that often occurs in the postoperative period. The severity of urinary incontinence is largely subjective and does not necessarily correlate with the number of pads per day a patient uses, or pad weight over a 24 hour period. The best assessment takes into account the psychosocial aspect of urinary incontinence and includes validated quality of life questionnaires such as the Incontinence Quality of Life (IQOL) and International Prostate Symptom Score (IPSS) (see *Resource*).

The management of PPSUI must include emotional support, as well as therapies aimed at restoring continence. The role of the general practitioner in co-managing PPSUI is to provide ongoing support to the patient and their carers, and to coordinate investigations and treatment in liaison with the treating urologist. Given the increasing diagnosis and treatment of prostate cancer, PPSUI is a clinically significant problem.

Management

Approximately 56% of patients will suffer PPSUI in the peri-operative period following catheter removal. This decreases to 21% at 3 months, and to 14% at 1 year.[8]

Initial management of PPSUI consists of emotional support and reassurance that in most cases steady improvement is expected, and an assessment of potential cofactors such as urinary tract infection and overflow incontinence. Pelvic floor exercises, the use of incontinence pads, as well as a trial of anticholinergics can be initiated in the early postoperative stages. Ongoing skin irritation due to ammonia dermatitis and difficulty with pads may necessitate the use of condom catheters, penile clamps and indwelling urinary catheters to improve control. Surgical therapy can be considered in men with PPSUI that persists beyond the first postoperative year, or earlier in men who have severe symptoms.[8] Surgical devices aim to prevent incontinence during storage by increasing bladder outlet resistance while allowing unimpeded flow during emptying.[2]

Pre-operative assessment

Pre-operative assessment includes a thorough urological history and examination. Transient causes of incontinence must be excluded, such as delirium, urinary tract infections, pharmacological, excess urine production, restricted mobility and stool impaction.[2,9] A psychological assessment should be achieved using a validated quality of life questionnaire (see *Resources*).

Figure 1. A) Urethral lumen before injection, B) the Macroplastique® syringe – coaptation can be assessed during the injection, C) Luminal coaptation postinjection

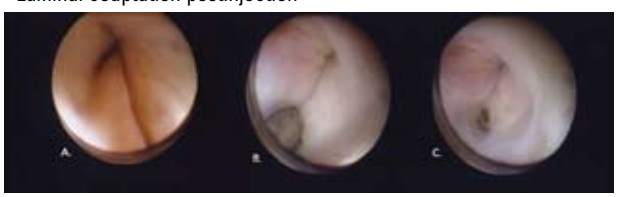
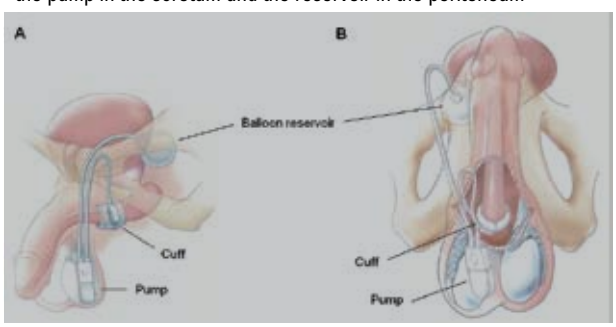


Photo courtesy: Uroplasty Ltd, Great Britain

Figure 2. A) An oblique and B) ventral in situ view of the AMS-800® artificial urethral sphincter. Note the cuff placement at bulbar urethra, the pump in the scrotum and the reservoir in the peritoneum



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Baseline investigations include urinalysis and renal function tests.[2,9] Formal urodynamics testing is used to assess:

- bladder compliance
- degree of sphincter weakness, and
- the component of detrusor overactivity contributing to the aetiology of PPSUI.

A cystoscopy should be performed to assess the bladder neck for an anastomotic stricture.[2,9]

Surgical therapies

Transurethral bulking agents

Transurethral injection of a bulking agent into the bladder neck, such as Contigen® and Macroplastique®, is an early treatment option for mild PPSUI secondary to ISD (*Figure 1*).[10] These aid continence by supporting the intact sphincter until the patient's sphincter system is functional.[11] Relative contraindications to bulking agents include excessive scarring or previous radiotherapy.[12] Bulking agents may work for minor stress incontinence but are often short lived and disappointing, and can actually worsen the sphincter function in some cases. In addition, the presence of nondegradable bulking agents can compromise subsequent efforts to restore continence.

Artificial urinary sphincter

The artificial urinary sphincter (AUS) has been the gold standard and effective treatment for moderate to severe PPSUI for over 20 years.[13] The cuff can be placed around the bladder neck or bulbar urethra, while the pump is placed in the scrotum, and the pressure regulating balloon placed in an extraperitoneal location (*Figure 2*).[13] A prerequisite for insertion of an AUS is good manual dexterity and cognition to competently cycle the device.

Total continence (zero pads per day) with this device is reported as high as 57–67%, while significant improvement occurs in more than 90% of patients.[14] Approximately 11% of patients with an implanted AUS report ongoing severe incontinence.[2] Of these, 80% are 'dry'

Figure 3. Oblique view of the AMS-800® double-cuff. Note the tandem cuff placement at bulbar urethra, the pump in the scrotum and the reservoir in the extra-peritoneal space

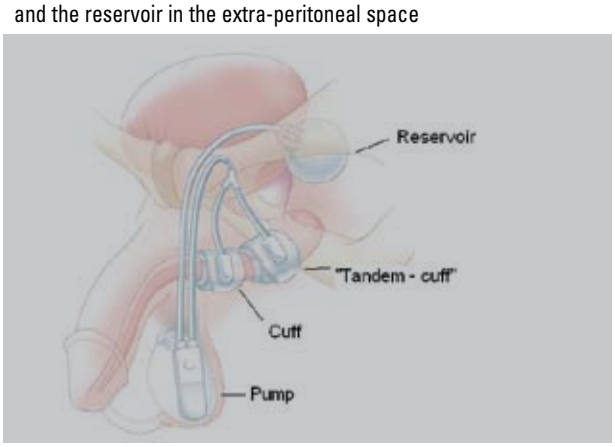

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Table 1. Comparison of the advantages and disadvantages of each surgical therapy

Device	Advantages	Disadvantages
Bulking agents	Performed as a day case, less invasive than devices	Need repeated injections. Long term failure is common
AMS-800®	High success rates for all levels of incontinence	Patient needs cognitive ability and manual dexterity to operate device. Relatively contraindicated following radiotherapy
InVance® AdVance®	Does not need to be operated manually, allows physiological voiding	Only effective in mild to moderate incontinence
ARGUS® ProACT®	Able to be adjusted postoperatively to maintain continence. Effective for a wider spectrum of incontinence than fixed male slings	Device migration has been reported. Invasive means of device adjustment

after revision of the device and insertion of a second or 'tandem cuff' AUS (*Figure 3*).[2,15]

The expected lifespan of an AUS is around 10 years, with a likely need for revision due to either mechanical failure or urethral atrophy.[2] Radiation therapy is a relative contraindication to AUS insertion as it has been associated with reduced detrusor compliance and increased risk of cuff erosion.[16] Complications are urethral erosion (4%) and infection (1.4%).

Male perineal slings

Male perineal slings have been developed to provide treatment for men who have mild to moderate leakage, not severe enough for an AUS, but enough to restrict day-to-day activities. They provide fixed compression of a bulbourethral segment and allow physiological voiding without the need for device manipulation, and are less expensive than the AUS. Slings can be considered for mild to moderate PPSUI and/or in patients who are unable to operate an AUS device.[2] Prior pelvic radiotherapy and/or detrusor overactivity are contraindications for implantation of the male sling.[2] *Table 1* shows a comparison of the advantages and disadvantages of incontinence therapies.

The Invance® is the first generation of male perineal slings. It is anchored to the inferior pubic rami with bone screws, and achieves continence by providing fixed compression of a urethral segment (*Figure 4*). Success of this device declines with increasing severity of incontinence, therefore, the Invance® sling is only recommended for mild to moderate PPSUI.[17,18] Contraindications for this device are prior radiation therapy, previous insertion of an AUS, and detrusor hypercontractility. Complications include osteomyelitis and pain related to the bone screws.

Figure 5. A) Anatomical landmarks for insertion of the ARGUS®, the bulbospongiosus and ischiocavernosus muscles, B) the trocar placement, C) in situ position of the ARGUS® sling

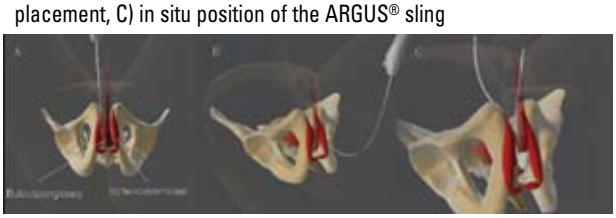

Photo courtesy: Promedon™ SA, Cordoba, Argentina

The second generation of male perineal slings are the Argus® and the AdVance® sling systems.

The Argus® consists of a padded foam cushion fixed to the bulbar urethra and provides 'adjustable' compression of a urethral segment (*Figure 5*). Data for this device is limited, with small cohort numbers. Intermediate term results (7.5 months) in moderate to severe PPSUI are encouraging with a reported 'dry' rate of 73%, improvement (<1 pad per day) in 10%, and a 17% failure rate (<2 pads per day).[19] Complications include urethral erosion (6%), infection (4%), and transient dysuria (21%).

The AdVance® is a 'transobturator' sling (*Figure 6*). It aims to correct the 'urethral hypermobility' that results from a radical

Figure 4. InVance® bone anchored male sling. Note the position of the titanium screws on the inferior ramus

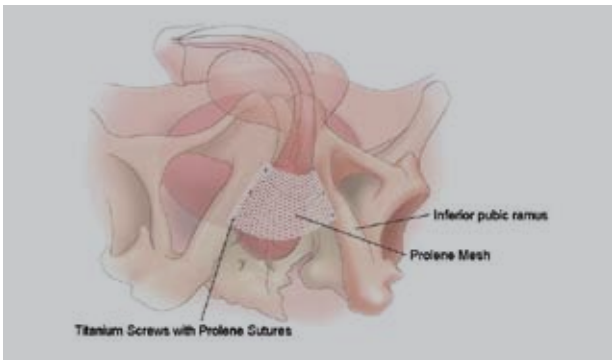

Photo courtesy: American Medical Systems, Minnekonta, Minnesota

Figure 6. A) Ventral aspect of the AdVance® sling in situ, B) oblique view showing the angle of the bulbar urethra postimplantation

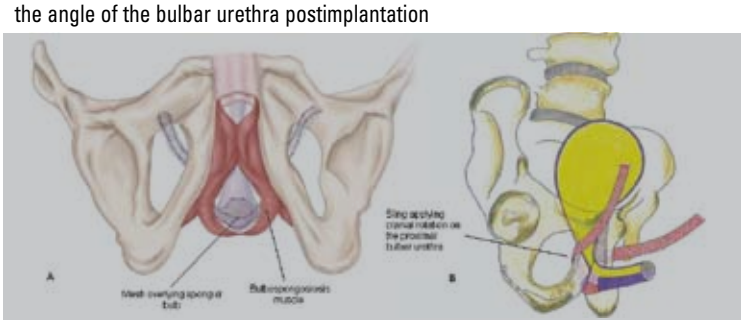

Photo courtesy: American Medical Systems™ Minnekonta, Minnesota

Figure 7. Placement of the ProACT® device. The pelvic floor is perforated next to the urethra in cephalad and lateral direction

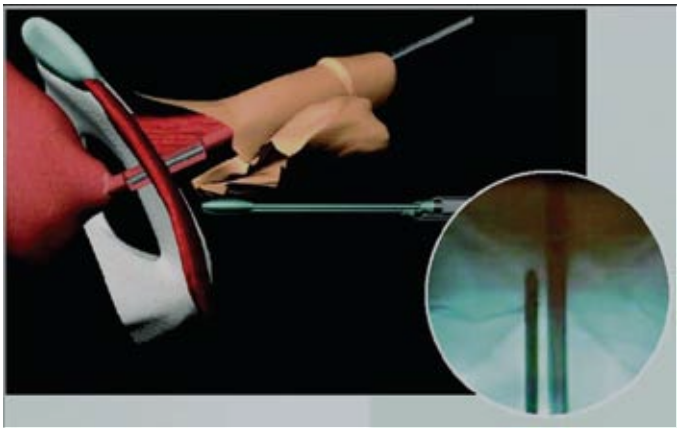

Photo courtesy: Uro-Medica

prostatectomy where the membranous urethral supports through the prostate and puboprostatic ligaments are lost. The sling lifts the bulbomembranous urethra vertically rather than simply compressing it, and the transobturator technique eliminates the risk of bladder perforation that can occur during the retropubic sling insertions. Long term data on erosion is unknown, however short term data suggests success rates of 80–90% and low morbidity.[20]

The ProAct® incontinence device

ProACT® is a novel implantable device consisting of two separate balloons that are placed just distal to the bladder neck (*Figure 7*). Re-injectable ports are located in the scrotum, which allows adjustments to balloon pressure. Intermediate term data is promising with a reported reduction in pad usage from 4.5 to one pad per day over a 60 month period.[21] This data demonstrate the ProACT® may be considered as an alternative to an AUS.[21] Pelvic radiation within the previous 12 months, and detrusor overactivity are contraindication for a ProACT® device.

Conclusion

Postprostatectomy stress urinary incontinence will effect 3–60% men who undergo a radical prostatectomy. While this can be a debilitating condition, it is self limiting in the majority of cases. Reassurance, and careful explanation that things will improve, are the mainstay of treatment in the initial stages.

If PPSUI lasts beyond the first postoperative year or symptoms are severe, surgical intervention can be considered once bladder overactivity and strictures have been excluded. With any treatment of incontinence, the psychological, as well as the physical aspects must be addressed.

The AUS is the gold standard for treating moderate to severe PPSUI. What has been lacking is treatment for the vast majority of men who have mild to moderate PPSUI, or are unable to operate a sphincter. The more recent development of slings, and the ProACT® balloon are options for treating this group of men. The second generation slings, the AdVance® and Argus® have demonstrated promising intermediate results for the treatment of mild to moderate PPSUI. The ProACT® balloon has good intermediate results for mild to severe PPSUI, and may be considered as an alternative to the AUS. The best assessment of any incontinence treatment is a validated quality of life questionnaire, as the number of pads per day does not necessarily correlate with the severity of symptoms.

Summary of important points

- Surgical therapy can be considered in men with PPSUI that persists beyond the first postoperative year or earlier in men who have severe symptoms.
- Formal urodynamics testing is used to help determine the aetiology of PPSUI, which includes bladder dysfunction, sphincter weakness or a combination of the two.
- The best assessment of device success is a 'quality of life questionnaire/analysis' as the number of pads a patient uses per day does not always correlate with bothersome symptoms.
- The AUS remains the 'gold standard' for severe PPSUI, with slings and other devices more suited for mild to moderate PPSUI.

Resource

Incontinence Quality of Life and International Prostate Symptom Score sheets: www.gp-training.net/protocol/docs/ips.doc.

Conflict of interest: Prem Rashid has been a visitor to the American Medical Systems (AMS) US manufacturing facility undertaking a cadaveric dissection clinic and observed operative procedures by high volume implant urologists affiliated with AMS during that time. No commercial organisation initiated or contributed to the writing of the article apart from granting permission to use diagrams of their respective devices.

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