European Association of Urology Guidelines on Male Urinary Incontinence


Abstract

Context: Urinary incontinence (UI) is a common condition in elderly men causing a severe worsening of quality of life, and a significant cost for both patients and health systems.

Objective: To report a practical, evidence-based, guideline on definitions, pathophysiology, diagnostic workup, and treatment options for men with different forms of UI.

Evidence acquisition: A comprehensive literature search, limited to studies representing high levels of evidence and published in the English language, was performed. Databases searched included Medline, EMBASE, and the Cochrane Libraries. A level of evidence and a grade of recommendation were assigned.

Evidence synthesis: UI can be classified into stress urinary incontinence (SUI), urge urinary incontinence (UUI), and mixed urinary incontinence. A detailed description of the pathophysiology and diagnostic workup has been reported. Simple clinical interventions, behavioural and physical modifications, and pharmacological treatments comprise the initial management for all kinds of UI. Surgery for SUI includes bulking agents, male sling, and compression devices. Surgery for UUI includes bladder wall injection of botulinum toxin A, sacral nerve stimulation, and cystoplasty/urinary diversion.

Conclusions: This 2022 European Association of Urology guideline summary provides updated information on definition, pathophysiology, diagnosis, and treatment of male UI.

Patient summary: Male urinary incontinence comprises a broad subject area, much of which has been covered for the first time in the literature in a single manuscript. The
1. Introduction

Urinary incontinence (UI) is a common condition in elderly men causing a severe worsening of quality of life (QoL), and a significant cost for both patients and the health care systems [1]. Male UI guidelines was previously covered within the UI guidelines, published for the first time in 2001 and updated in 2017 [2]. The fifth International Consultation on Incontinence, based on the work of 23 committees and 200 experts, included a specific section on male UI and was published in 2013 [3]. Currently, the European Association of Urology (EAU) guidelines on male UI (full text and pocket) can be found at the EAU website Uroweb [4]. The following summary of the 2022 male UI guidelines aims to report a practical, evidence-based, guideline on definitions, pathophysiology, diagnostic workup, and treatment options for men with different forms of UI.

2. Evidence acquisition


A total of 1054 unique records were identified, retrieved, and screened for relevance. After a preliminary search, 663 were excluded: 255 due to being female, animal, child, and duplicates; 49 for being protocols; 106 for being on neurogenic UI; and 253 being abstracts that were off topic. Finally, 391 papers were evaluated by the panel members for inclusion in the UI guideline.

A modified GRADE approach was used to evaluate the relevant literature [5], and for each recommendation within the guideline, an accompanying rating of strength is available [6,7]. Additional information can be found online at the EAU website: http://www.uroweb.org/guideline/.

3. Evidence synthesis

3.1. Definitions and epidemiology

UI is defined as an unintentional loss of urine and has a reported prevalence of 11% in men aged 60–64 yr and 31% in men ≥85 yr of age, and affects up to 32% of men with lower urinary tract symptoms (LUTS) [8–10].

UI can further be classified into three types: stress urinary incontinence (SUI), urge urinary incontinence (UUI), and mixed urinary incontinence (MUI). UUI is the most bothersome urinary symptom [11], and men value improvement in urge incontinence more than other symptoms [12].

The recommendations for the epidemiology and pathophysiology overview of male UI are provided in Table 1.

Overflow UI (urine loss in a small amount in a totally full bladder), postmicturition dribble (urine loss immediately after micturition), nocturnal enuresis (urine loss during sleep), and total incontinence (full inability of the bladder to store any urine) are specific forms of UI that are outside the current scope of this publication.

The increasing prevalence of all male UI by age is mainly due to the impact of UUI rather than SUI. Very few studies have included the impact of ethnicity on the prevalence of male UI [13–15], demonstrating no difference in the prevalence of any kind of UI across racial/ethnic groups.

3.2. Pathophysiology

Male UI is mediated by two anatomically separate units: the internal urethral sphincter (IUS) and the external urethral sphincter (EUS) [3,16]. Physiological male urinary continence depends on the integrity of EUS and/or IUS, the supporting structures, and neural innervation. The EUS is the main determinant of male continence, since men without IUS can still retain urinary continence. Damage to the support mechanism, injury to the pelvic nerve, and detrusor overactivity can all contribute to male UI.

The main risk factors for male UI include advanced age, immobility, urinary tract infections (UTIs), diabetes, cognitive impairment, and neurological disease [10,17].

3.3. Diagnostic evaluation

Medical history and physical examination of males with UI are the same as for male LUTS, and should allow UI to be categorised into SUI, UUI, or MUI, and to identify other types of UI (overflow UI and, nocturnal enuresis) or those that need rapid referral to an appropriate specialist (eg, pelvic diseases and neurological conditions). The history should include details of the type, timing, and severity of UI; associated voiding; and other urinary symptoms. A physical examination should include an abdominal examination, to detect an enlarged bladder or other abdominal mass, as well as a perineal and digital rectal examination.

Specific validated questionnaires can help quantify UI severity. Moreover, some questionnaires are responsive to change and may be used to measure outcomes, though evi-
funding on their sensitivity is inconsistent [18–20]. No evidence was found to indicate whether the use of QoL or condition-specific questionnaires have an impact on the outcome of treatment.

Voiding diaries (also known as micturition time charts, frequency/volume charts, and bladder diaries) are a standardised semiojective method of measuring symptom severity, including the frequency and extent of UI episodes, voided volume, and 24-h or nocturnal total urine volume [21]. A number of observational studies have demonstrated a close correlation between the data obtained from voiding diaries and standard symptom evaluation [22–25]. Another study found that keeping a voiding diary had a therapeutic benefit [26].

Pad tests could quantify the severity of UI and monitor patient’s response to treatment, although their usefulness to predict the outcome of treatment is uncertain. Despite this, early postoperative testing with pad tests may predict beneficial response to treatment, although their usefulness to predict the outcome of treatment is uncertain [26].

Postvoid residual (PVR) volume measurement can be applied with caution to men with non-neurogenic UI, as the prevalence, severity, and clinical application of PVR in men with UI are uncertain. Several studies demonstrated that ultrasound (US) measurement of PVR is preferable to catheterisation [27–32].

Urodynamic testing (multichannel cystometry and videourodynamics) and specific tests of urethral function (urethral pressure profilometry, Valsalva leak point pressure, and retrograde urethral resistance) should be considered on an individual basis, such as in cases when invasive treatment is considered. A Cochrane review showed that the use of urodynamic tests increased the likelihood of prescribing drugs or avoiding surgery, while there is limited evidence that it should be used for the assessment of postprostatectomy UI [8].

Imaging (US, magnetic resonance imaging, and computed tomography scan) can improve the understanding of the anatomical and functional abnormalities that may cause UI and thus help its management [12]. In clinical research, imaging can be used to investigate the relationship between the lower urinary tract, the pelvic floor, and the possible treatment outcomes. US and magnetic resonance imaging have largely replaced x-ray imaging.

Dipstick urinalysis may indicate a UTI, proteinuria, haematuria, or glycosuria [13–16]. UI may occur during symptomatic UTI [33], and existing UTI may worsen during a UTI [34]. The rate and severity of UI were, however, unchanged after eradication of asymptomatic bacteriuria in nursing home residents [35].

Recommendations for the overall diagnosis of UI are provided in Table 2.

### 3.4. Conservative treatment

#### 3.4.1. Simple clinical interventions

**3.4.1.1. Lifestyle interventions.** Modification of lifestyle factors such as obesity, smoking, level of physical activity, and diet may improve UI. Fluid restriction is a common strategy to relieve symptoms. It is proposed that any advice on fluid consumption should be based on 24-h fluid intake and urine output measurement [36,37].

**3.4.1.2. Treatment of comorbidities.** In patients with multiple comorbidities, optimising the associated disease may...
reduce the severity of urinary symptoms [38]. Although drug regimen modification is considered a possible intervention, there is limited supportive evidence [39].

3.4.1.3. **Constipation.** A multimodal intervention, such as behavioural therapy, assisted toileting, and fluid restriction, reduces UI and constipation incidence in elderly men [40]. However, there is no evidence to show whether treatment of constipation improves UI, although both constipation and UI appear to be improved by certain behavioural interventions.

3.4.1.4. **Containment.** Containment refers to the use of absorbent pads, urinary catheters, external collection devices, and penile clamps. A systematic review (SR) of six randomised controlled trials (RCTs) found that pads filled with superabsorbent material were superior to standard pads [26]. A randomised crossover trial found that a leaf-shaped type of pad was preferred to rectangular pads in mild UI [41].

A Cochrane review compared different types of indwelling catheters and reported no difference between various materials [42]. An SR reported similar rates in UTI outcome or upper tract changes between the use of suprapubic and urethral catheter drainage; however, patients with suprapubic catheters were less likely to have urethral complications [43]. A Cochrane review found no difference between different types or regimens of intermittent catheterisation [44].

An RCT in 56 men with postprostatectomy incontinence (PPI) compared sheath drainage system, body-worn urinal, penile clamp, and absorbent pads. Most men prefer to use a combination of devices and pads to meet their lifestyle needs. A hinge-type penile clamp was good for short vigorous activities as it was the most secure, least likely to leak, and most discreet clamp, although almost all men described it as uncomfortable or painful [45].

3.4.2. **Behavioural and physical modifications**

3.4.2.1. **Prompted or timed voiding.** In prompted voiding, carers rather than the patient initiate the decision to void. Two SRs confirmed the superiority on continence outcomes in comparison with standard care [46,47]. Timed voiding is defined as fixed, predetermined, time intervals between toileting, applicable for those with or without cognitive impairment; however, the evidence comes from two RCTs with inconsistent improvement compared with standard care in cognitively impaired adults [48].

3.4.2.2. **Bladder training.** Bladder training aims to correct the defective patterns of frequent urination and poor bladder control, and restores patient’s confidence in controlling bladder function. The add-on effect of bladder training to anticholinergic therapy may improve urinary frequency and nocturia but not UI [49].

3.4.2.3. **Pelvic floor muscle training.** An SR demonstrated that pelvic floor muscle training (PFMT) alone or in combination with biofeedback and/or electrical stimulation is effective for PPI management. PFMT significantly reduces the time to continence recovery [50]. Another meta-analysis reported that biofeedback and/or pelvic floor muscle electric stimulation significantly improved continence recovery rates at 1- and 3-mo intervals after surgery compared with PFMT alone [51]. However, evidence from a Cochrane review showed no overall benefit at 12 mo after surgery [52]. An RCT compared PFMT with no treatment in men undergoing transurethral resection of the prostate (TURP) and reported comparable incontinence rate at 12 mo [53]. By contrast, another RCT demonstrated that PFMT before holmium laser enucleation of the prostate promotes early recovery of continence [54]. Other techniques, such as pilates, oscillating rod, and the combination of biofeedback with electrostimulation and whole-body vibration training, increase pelvic floor muscle strength and promote quick recovery of continence [55–58].

3.4.2.4. **Electrical stimulation.** An RCT of men receiving surface or intra-anal electrostimulation reported a significant reduction in UI and improvement in QoL, without any difference between treatment arms [59]. A Cochrane review on electrical stimulation in men with UI concluded that electrical stimulation enhances the effect of PFMT in the short term but not after 6 mo. Electrical stimulation was also more effective than sham stimulation at 6 mo, but not at 12 mo; however, there were more adverse effects including pain and discomfort with electrical stimulation [60].

3.4.2.5. **Posterior tibial nerve stimulation.** Electrical stimulation of the posterior tibial nerve (PTNS) stimulates the sacral micturition centre via the S2-S4 sacral nerve plexus. Stimulation is done either percutaneously using a fine needle, inserted above the medial aspect of the ankle (P-PTNS), or transcutaneously using surface electrodes (T-PTNS).

A noninferiority RCT comparing T-PTNS with P-PTNS reported significant improvements in daytime frequency, urgency, and UUI episodes from baseline at 12 wk, without any difference between treatment arms [61]. Among adverse events, mild pain and discomfort at the puncture site are frequently reported, while haematomas, swelling, leg tingling, and vasovagal reaction are uncommon.

### Table 2 – Diagnosis

<table>
<thead>
<tr>
<th>Summary of evidence</th>
<th>LE</th>
</tr>
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<tbody>
<tr>
<td>Validated specific symptom score questionnaires and voiding diaries assist in the screening for and categorisation of UI.</td>
<td>3</td>
</tr>
<tr>
<td>Pad test can be used to quantify the presence and severity of UI, as well as a patient’s response to treatment.</td>
<td>3</td>
</tr>
<tr>
<td>There is limited evidence that urodynamics and PVR affect treatment choice in men with uncomplicated UI.</td>
<td>3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Recommendations</th>
<th>Strength rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Take a complete medical history including symptoms and comorbidities, medications, and a focused physical examination in the evaluation of men with UI.</td>
<td>Strong</td>
</tr>
<tr>
<td>Use a validated symptom score questionnaire, bladder diary, and pad test to assess UI.</td>
<td>Strong</td>
</tr>
<tr>
<td>Measure PVR in the assessment of UI.</td>
<td>Strong</td>
</tr>
<tr>
<td>Perform urodynamics for UI when considering invasive treatment.</td>
<td>Weak</td>
</tr>
</tbody>
</table>

| LE = level of evidence; PVR = postvoid residual; UI = urinary incontinence. |

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been tested in several trials [64–69]. Four post hoc analyses of large RCTs on OAB treatment in mixed population, focusing on men without presumed BOO, reported significant improvement in urgency, frequency, and UI episodes but not urgency, International Prostate Symptom Score (IPSS) total, or QoL score compared with placebo [68]. A significantly greater treatment benefit was observed in the tolterodine ER plus tamsulosin group [68]. However, a further analysis showed that men with prostate-specific antigen levels of <1.3 ng/ml might benefit more from antimuscarinics [72].

Antimuscarinics can cause dry mouth (up to 16%), constipation (up to 4%), micturition difficulties (up to 2%), nasopharyngitis (up to 3%), and dizziness (up to 5%), which explains the high withdrawal rate. Antimuscarinics can impair cognitive functions and thus should be avoided in the elderly, as well as carry the theoretical risk of urinary retention and should be avoided in men with PVR >200 ml [66].

3.5.1.2. Beta-3 agonist. Mirabegron 50 mg is the first clinically available beta-3 agonist approved for OAB treatment. Its efficacy has been documented in both sexes. A phase 3 mixed-population trial (28% male population) reported that mirabegron improves QoL and patient-reported perception of their condition [73]. Another study including >1000 patients (30% male population) reported that the combination of mirabegron 25/50 mg and solifenacin 5/10 mg was superior to monotherapy or placebo in urgency improvement and QoL [74].

The effect of mirabegron add-on therapy to α1-blockers has been evaluated. An RCT of men with residual OAB symptoms after tamsulosin 0.2 mg monotherapy reported that add-on therapy improves OAB symptom score, storage subscore of the IPSS score, urgency and frequency episodes, as well as QoL compared with monotherapy [75]. A prospective analysis on 50 elderly men verified these findings [76]. Another RCT compared mirabegron 50 mg or fesoterodine 4 mg add-on therapy with solifenacin in men with residual OAB symptoms [77]. At 3 mo, fesoterodine was superior to mirabegron in OAB symptom score (−2.8 vs −1.5, p = 0.004), IPSS-QoL score (−1.5 vs −1.1, p = 0.04), and OAB symptom–urgency subscore score (−1.5 vs −0.9, p = 0.008). Fesoterodine was also superior in alleviating detrusor overactivity (52.6% vs 28.9%, p = 0.03).

Among common treatment-related adverse events are hypertension, UTIs, headache, and nasopharyngitis [78–80]. Mirabegron is contraindicated in patients with severe uncontrolled hypertension. Mirabegron does not affect urodynamic parameters compared with placebo and the overall change on PVR, which is small [81]. A pooled analysis of four trials showed that in older men (>65 yr), mirabegron was better tolerated than antimuscarinics [82]. The adherence to mirabegron was significantly longer (169 d) than to tolterodine (56 d) and other antimuscarinics (30–78 d; p < 0.0001).

3.5.2. Drugs for SUI

An SR of eight studies evaluating the efficacy of duloxetine in postprostatectomy SUI reported that duloxetine resulted in a mean dry rate of 58% (25–89%), mean improvement in pad number of 61% (12–100%), and mean improvement in 1-h pad weight of 68% (53–90%), at short-term follow-up (1–9 mo) [83]. However, mean adverse event rates were high, and treatment was discontinued in 38% of cases. The overall certainty of the evidence was low due to study heterogeneity and methodological limitations.

Recommendations for the pharmacological treatment of UI are provided in Table 4.
Table 4 – Pharmacological treatment

<table>
<thead>
<tr>
<th>Summary of evidence</th>
<th>LE</th>
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<tbody>
<tr>
<td>Antimuscarinic monotherapy can significantly improve urgency, UII, and increased daytime frequency.</td>
<td>1b</td>
</tr>
<tr>
<td>Mirabegron is superior to placebo and as efficacious as antimuscarinics for the improvement of UII.</td>
<td>1b</td>
</tr>
<tr>
<td>Duloxetine led to a short-term improvement in postprostatectomy SUI symptoms and QoL improvement; however, a significant proportion of men discontinued treatment.</td>
<td>1b</td>
</tr>
<tr>
<td>Recommendations</td>
<td>Strength rating</td>
</tr>
<tr>
<td>Offer antimuscarinics or mirabegron to adults with UIU who failed conservative treatment.</td>
<td>Strong</td>
</tr>
<tr>
<td>Offer duloxetine to men with SUI.</td>
<td>Weak</td>
</tr>
<tr>
<td>Inform patients about the possible adverse events of duloxetine and that its use is off label for this indication in Europe.</td>
<td>Strong</td>
</tr>
</tbody>
</table>

LE = level of evidence; QoL = quality of life; SUI = stress urinary incontinence; UIU = urge urinary incontinence.

3.6. Surgical treatment for SUI

3.6.1. Bulking agents

Urethral bulking agents are reserved for men with small-volume leak and for those unfit for more invasive treatments [84]. They work by adding bulk to the urethra, thus improving the coaptation of a damaged sphincter zone.

There is limited evidence to support the efficacy of bulking agents for PPI. Two SRs reported 26% short-term cure rate and dry rates between 0% and 83% [84,85]. An RCT compared their efficacy versus artificial urinary sphincter (AUS) and showed significant difference in continence rates favouring AUS implantation (72% vs 23%) [86]. A propensity score–matched analysis of bulking agents versus transobturator male sling (TILOOP male) reported failure-free rates of 15% versus 77%, and satisfaction rate of 3.8% versus 71% [87]. Transient dysuria and haematuria are frequently reported, but are self-resolving. The risk of urinary retention and the need for catheterisation are small [84,88]. Allergic reactions and migration to proximal and distal lymph nodes have been described [89–91].

3.6.2. Male slings

Male slings are positioned under the urethra and fixed by a retropubic or transobturator approach. They restore continence by urethral compression and urethral bulb repositioning [92,93]. Slings are classified as adjustable and nonadjustable based on whether the tension is adjusted during or after the procedure. The concept of autologous slings has recently been introduced. Only a few RCTs have assessed the effect of autologous vas deferens sling versus no sling and reported that continence rates were similar [94–96].

3.6.2.1. Nonadjustable slings. The most widely marketed nonadjustable male slings are the Advance, the Advance XP, and the transobturator compressive I-Stop TOMS. These slings are safe and improve continence, but many studies report that the predictors of failure are prior radiation, severity of incontinence, and previous surgeries [97–99].

In an SR of 24 prospective studies, the overall cure rate was reported to be 60% for sling and 56% for AUS, while the 24-h pad use was -3.3 and -3.8, respectively. Similar findings were reported by a network meta-analysis that showed comparable efficacy between slings and AUS [100]. A prospective multicentre cohort study, in men after AdVanceXP, demonstrated a durable result over time with a 57% cure rate, 25% improvement rate, and 17% failure rate. By contrast, continence rate deteriorates over time after transobturator I-Stop TOMS; it is reported to be 38% at 12 mo, 23% at 4 yr, and 15% at 5 yr [101].

The MASTER trial, a noninferiority RCT comparing incontinence rate after male sling or AUS, reported that 87% and 84%, respectively, were considered incontinent at 12 mo [102]. However, the authors used a very strict definition of incontinence. The subgroup analysis suggested that AUS is superior to slings in men with a greater degree of incontinence at baseline (pad weight >250 g) or for patients after previous radiotherapy.

Pain and wound infection are the most common complications after male sling insertion [103]. Chronic pain is observed in 1.3% of patients [103]. Transient voiding dysfunction, such as de novo urgency or urinary retention, occurs in 4.3–10.3%, while urethral erosion and explantation rates are low (0–0.4%) [104–108].

3.6.2.2. Adjustable slings. Three adjustable slings are commercially available: the Remeex, Argus, and ATOMS systems [109–111]. Any additional benefit is still questioned, since there is no robust evidence to support adjustability advantage. An SR of the ATOMS system reported 67% dry rate, 90% overall improvement, and 16% complications rate [111]. Another SR reported that ATOMS is superior to the ProACT device in dry rate (68% vs 55%), overall improvement (91% vs 80%), satisfaction rate (87% vs 56%), mean number of filing adjustments (2.4 vs 3.5), and postoperative pad use per day (1.1 vs 2.1) [112]. However, these studies were characterised by inconsistency in follow-up duration and in the definition of treatment outcomes [109,111,113–116]. The success rate of the Remeex system is reported to be 70% at 7-yr follow-up, with a low satisfaction rate (36%) due to the need for multiple readjustments [109,114]. The success rate of the Argus system has been reported at 17–93% [115,116].

Frequent complications include pain (chronic in 1.5% of men), urethral erosion (10%), and infection [115,116]. The explantation rate is 10–15.8% [97].

3.6.3. Compression devices

The compression devices are classified as circumferential and noncircumferential based on how they surround the urethra and exert the compressive effect.

3.6.3.1. Circumferential compressive devices. The AUS is the standard treatment for moderate-to-severe male SUI. Among the available systems, the three-component AMS 800 has the greatest level of evidence and the longest follow-up [117]. Evidence from an SR reported an overall cure rate of 56% and significant reduction in the number of daily pads (-3.75) [118]. The social continence rate (from zero to one pad daily) is estimated between 55% and 77% [119–121]. Studies with a follow-up of >15 yr reported a 77% continence rate and a 90% subjective satisfaction rate.
3.6.3.2 Noncircumferential compression device (ProACT). The ProACT system consists of two balloon devices that are introduced under fluoroscopic control transperineally on either side of the bladder neck, close to the vesicourethral anastomotic site. The balloons are inflated, and their volume can be adjusted postoperatively.

An SR and meta-analysis of 19 studies on ProACT reported a 60.2% dry rate, significant reduction of daily pads use (−3.1), and improved QoL scores [134]. A quasi-randomised trial comparing ProACT with male slings found similar improvements in continence rates (68% vs 65%) [135]. A subgroup analysis of patients with previous radiotherapy showed inferior outcomes (46% vs 68% success rate) and a higher rate of urethral erosion [136].

The most common complication during ProACT implantation is perforation of the bladder and/or urethra (5.3%) [137]. The overall revision rate is 22%, and typical causes are erosion (3.8%), device leaking (4.1%), and migration (6.5%) [134].

Recommendations for surgical treatment of SUI are provided in Table 5.

3.7. Surgical treatment for UUI

3.7.1. Bladder wall injection of botulinum Toxin A

Onabotulinum toxin A (BoNTA-A) inhibit the neurotransmitter release from cholinergic neurons [137]. BoNTA-A 100 U is licensed in Europe to treat OAB with persistent or refractory non-neurogenic UUI in adults [138,139]. Robust evidence supports the efficacy of BoNTA-A in idiopathic UUI; however, most studies include mixed or female predominant population.

An RCT randomised females and males to BoNTA-A 100 U intradetrusor injection or placebo [140]. Patients were included if they experienced at least three UUI episodes in a 3-d period and were inadequately managed by anticholinergics. Those receiving BoNTA-A reported a 50% reduction in UUI episodes per day and improvement of OAB symptoms. In addition, 23% of the patients in the BoNTA-A arm and 6.5% in the saline arm were completely dry. A network meta-analysis of 56 RCTs compared the efficacy of BoNTA-A, mirabegron, and anticholinergics in adults with idiopathic OAB, and reported improvement in incontinence episodes in the BoNTA-A 100 U arm and higher odds of achieving dryness compared with pharmacotherapy [141].

A pilot RCT, measuring the effect of BoNTA-A 200 U in men with OAB refractory to anticholinergics, persistent for at least 3 mo after surgery, demonstrated a significant improvement in daily frequency, QoL, and in International Consultation on Incontinence Questionnaire score compared with placebo [142]. A retrospective trial on BoNTA-A in 65 nonobstructed men with refractory OAB reported significant improvement in Urogenital Distress Inventory-6 (−4.2) and Incontinence Impact Questionnaire-7 (−6.0) scores, compared with baseline [143].

Urinary retention and UTIs are the most common adverse events after BoNTA-A injection. Other adverse events include haematuria, dysuria, and post-treatment pain [144]. The need for clean intermittent self-catheterisation is estimated at 7.5% after TURP, 4.2% after radical prostatectomy, and 29% in men without prior prostate surgery [145].
3.7.2. Sacral nerve stimulation (SNS; neuromodulation)

SNS delivers low-amplitude electrical impulses to the sacral nerve roots via an electrode, and by neural activity modulation, it stabilises bladder electrical activity through an unknown mechanism. An SR and meta-analysis compared the effectiveness of SNS with that of BoNTA-A and reported comparable efficacy at 6-month follow-up. The main complications after SNS are pain at the implant site (13–42%), lead migration (4.0–21%), leg or back pain (3.0–18%), and wound infection (5.7–6.7%). Surgical revision is required in 29–33% of patients due to device malfunction, battery, or device infection (5.7–6.7%). Surgical revision is required in 29–33% of patients due to device malfunction, battery, or device infection (5.7–6.7%).

3.7.3. Cystoplasty/urinary diversion

Augmentation cystoplasty involves the interposition of a detubularised bowel segment into the bivalved bladder aiming to increase bladder capacity and reduce OAB symptoms. Urinary diversion remains a reconstructive option for patients with intractable UI after multiple pelvic procedures, radiotherapy, or pelvic pathology leading to irreversible sphincteric incompetence or fistula formation. They are major urological operations that are utilised when other measures have failed.

A retrospective series on patients after cystoplasty reported 93% continence rate in non-neurogenic population and 78% in neurogenic population that could reach 90% when an AUS was implanted [147]. A small prospective mixed-gender trial reported high patient satisfaction rates with augmentation cystoplasty versus onabotA therapy [148].

Early postoperative complications include infection, bowel obstruction, bleeding, and cardiorespiratory complications. Long-term complications include metabolic disturbances (hyperchloremic metabolic acidosis), change in bowel habits, increased mucus production, stone formation, bladder perforation, and rarely bladder cancer [149]. After augmentation cystoplasty, the majority of patients will depend on self-catheterisation, while those with urinary conduit will depend on lifelong urine bags.

Recommendations for surgical treatment of UUI are provided in Table 6.

4. Conclusions

Non-neurogenic male UI comprises a broad subject area, much of which has been covered for the first time in the non-neurogenic male LUTS guidelines. This article provides an overview of the management pathway from general diagnostics in UI through conservative, pharmacological, and surgical treatment options.

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Acquisition of data: Schouten, Smith.

Analysis and interpretation of data: Gacci, Sakalis, Karavitakis, Cornu, Gratzke, Herrmann, Kyriazis, Malde, Mamoulisak, Rieken, Schouten, Smith, Speakman, Tikkinen, Gravas.

Drafting of the manuscript: Gacci, Sakalis, Karavitakis.

Critical revision of the manuscript for important intellectual content: Gacci, Sakalis, Karavitakis, Cornu, Gratzke, Herrmann, Kyriazis, Malde, Mamoulisak, Rieken, Schouten, Smith, Speakman, Tikkinen, Gravas.

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Supervision: Gacci.

Other: None.

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