Urinary Incontinence in Clinical Practice: What Every Clinician Should Know

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Objectives

- To review anatomy of the pelvic floor as it relates to the pathophysiology of urinary incontinence
- To understand the office evaluation of patients with urinary incontinence
- To appreciate the management options for urinary incontinence

Anatomy of Continence

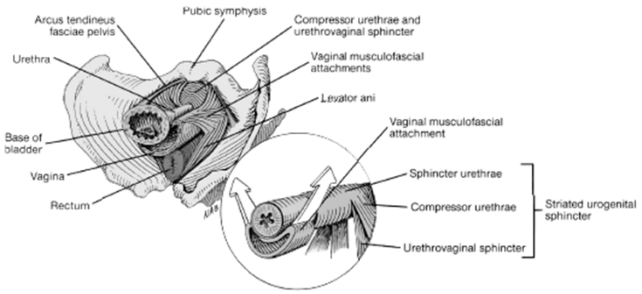
- **SNS- STORAGE of urine by relaxing detrusor, contracting the muscles in urethra bladder neck**
- **Somatic NS-innervates the external urethral sphincter and pelvic floor muscles- relaxation of these muscles is the first step in micturition**
- **PSNS- PEEING detrusor contraction, relaxation of smooth muscle of the urethra to facilitate voiding**

Anatomy of Continence

- **Increases in intra-abdominal pressure exerts force on pelvic organs**
- **Pressure is transmitted equally to the bladder and urethra**
- **Urethral pressure remains greater than bladder pressure**
- **This relationship changes with weak urethral support**

Anatomy of Continence

- **At rest, urethral resistance is generated by the interaction of:**
  - **Urethral smooth muscle**
  - **Urethral wall elasticity and vascularity**
  - **Periurethral striated muscle**
- **Each contributes ~1/3 of overall intraurethral pressure**



Urogynecology & Reconstructive Pelvic Surgery 5th Ed. 2021 Chpt 1, Fig 1.7

So why should you care about UI?

- **Impacts ~60% of adult women**
- **Incidence increases with increasing age**
- **Significant impacts on:**
  - **Quality of life**
  - **Sexual dysfunction**
  - **Medical morbidities**
  - **Increased mortality**
  - **Increased caregiver burden**

Berete et al BMC Geriatr 2022

Definitions

Urinary incontinence: Involuntary leakage of urine

- Most common causes: Stress (cough, laugh, sneeze) and urge (Gotta go- detrusor over activity)

Overactive bladder: Syndrome of urinary frequency (>7 voids/day) and sensory urgency ± incontinence (≥3 episodes/day considered severe)

- Neurogenic bladder: Neurologic etiology leading to detrusor overactivity (or hypocontractile bladder)- e.g. stroke, Parkinsons, Multiple Sclerosis, etc

Definitions

Prevalence:

- 25% of young women
- 44-57% of middle-aged and post-menopausal women
- 75% of older women
  - Accounts for 6% of nursing home admissions

Annual healthcare cost in U.S.

- $19.5 Billion

Kinchen et al. J Womens Health, 2007; Morrison et al.Value Health, 2006.

Types of Urinary Incontinence

- Stress urinary incontinence (SUI)
- Urgency urinary incontinence (UUI)
- Mixed urinary incontinence (SUI + UUI)
- Occult SUI (only occurs when prolapse reduced)
- Functional urinary incontinence (cognitive, mobility)
- Overflow urinary incontinence (2/2 chronic retention)
- Extra-urethral urinary incontinence (fistula!)
- Noctural enuresis (bedwetting)
- Insensible urinary incontinence (IDK)

Differential Diagnosis

Genitourinary Etiology

- Filling and storage disorders
  - Urodynamic stress incontinence
  - Detrusor overactivity (idiopathic)
  - Detrusor overactivity (neurogenic)
  - Mixed types
- Fistula
  - Vesical
  - Ureteral
  - Urethral
- Infectious
  - Urinary tract infection
  - Vaginitis
- Congenital
  - Ectopic ureter
  - Epispadias

Nongenitourinary Etiology

- Functional
  - Neurologic
  - Cognitive
  - Psychologic
  - Physical impairment
- Environmental
- Pharmacologic
- Metabolic

Mnemonic: DIAPPPERS

- Delirium
- Urinary tract infection/Urethritis
- Atrophic vaginitis
- Pharmacologic (Drug SE)
- Psychological
- Pregnancy
- Excess urine production
- Restricted mobility
- Stool impaction

ACOG Practice Bulletin #155, 2015

Office Evaluation of UI

History:

- **Incontinence symptoms**
- **Bladder storage**
- **Emptying**
- **Medical Hx**
  - Neurologic issues
- **Surgical Hx**
- **Ob Hx**
- **Medications**
- **Fluids consumed**

Table 9.1 Medications that Can Affect Lower Urinary Tract Functions

Type of Medication	Lower Urinary Tract Effects
Diuretics	Polyuria, frequency, urgency
Caffeine	Frequency, urgency
Alcohol	Sedation, impaired mobility, diuresis
Narcotic analgesics	Urinary retention, fecal impaction, sedation, delirium
Anticholinergic agents	Urinary retention, voiding difficulty
Antihistamines	Anticholinergic actions, sedation
Psychotropic agents	
Antidepressants	Anticholinergic actions, sedation
Antipsychotics	Anticholinergic actions, sedation
Sedatives/hypnotics	Sedation, muscle relaxation, confusion
Alpha-adrenergic blockers	Stress incontinence
Alpha-adrenergic agonists	Urinary retention, voiding difficulty
Calcium-channel blockers	Urinary retention, voiding difficulty

Urogynecology & Reconstructive Pelvic Surgery 5th Ed. 2021, Chpt 9, Table 9.1

Office Evaluation of UI

Physical Exam:

- **Pelvic exam**
  - Inspection of vulva
  - Cough Stress Test- check for leak, urethral hypermobility (>30 degree deviation from horizontal)
  - Speculum exam +/- Pelvic Organ Prolapse Quantification (POP-Q) exam
  - Bimanual

Office Evaluation of UI

Physical Exam continued:

- **Pelvic floor muscles:**
  - Strength (0-5/5)
  - Myalgia (Levators, obturators)
- **Neurologic exam:**
  - Sensation, motor
  - Anal wink, bulbocavernosus (S2-4)

Office Evaluation of UI

Get a urinalysis:

- **Dipstick on clean catch or straight cath specimen**
  - If + leukocytes and/or + nitrites → urine culture (UA not necessary!!!)
  - If blood but no LE or nitrites (or menses) → send for UA
    - If >3 RBC's/HPF→ AUA algorithm (renal imaging: CTU or renal U/S + cystoscopy)
- **Check a post-void residual: Bladder scan or straight cath**
  - <150cc= WNL

If it's still not clear…

History:

- **3-day bladder diary:**
  - **Fluid intake (what, how much)**
  - **Voiding patterns (#/day, #/overnight, volumes)**
  - **Leakage episodes (urge, stress)**
  - **Can use phenazopyridine to help differentiate leaks**
- **Don't forget to provide patient with a hat for voided volumes**

IUGA
international urogynecological association

Bladder Diary
Chart

Date	Drink		Urine		Leakage		
Time	Type	How much (mls)	Volume of Urine (mls)	How Urgent 0-3 3= most urgent	Leakage with Urgency	Leakage with activites	Pad change

International Urogynecologic Society; YourPelvicFloor.org

If it's still not clear…

Office simple cystometry:

- **Voided volume, PVR**
- **Sensation: First sensation, first desire, strong desire, max capacity**
- **Involuntary detrusor contractions**
- **Cough stress test (at capacity)**

Urodynamic testing can be performed by urogynecology

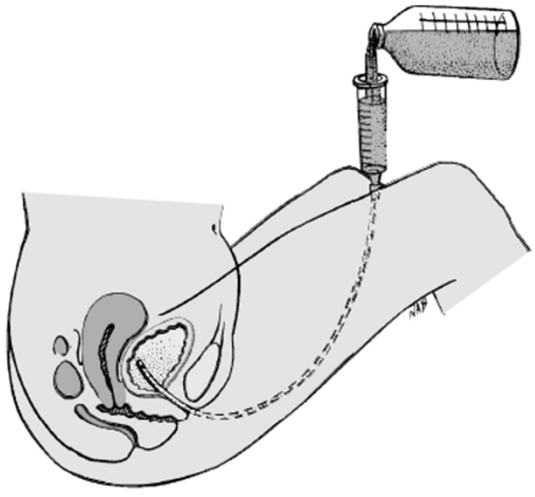


FIGURE 9.3 Office evaluation of bladder filling function. In sitting or standing position with a catheter in the bladder, the bladder is filled by gravity by pouring sterile water into the syringe.

Urogynecology & Reconstructive Pelvic Surgery 2021, Chpt 9 Fig 9.3

OAB/UUI

Epidemiology of OAB

- **NOBLE study of adults >18yo**
  - **17% reported OAB symptoms**
  - **Women more likely to have "OAB-wet"**
- **EpiLUTS study of adults >40 years**
  - **43% of women report OAB symptoms at least "sometimes"**
- **Prevalence/severity increase with age, but other measures of frailty may be important**

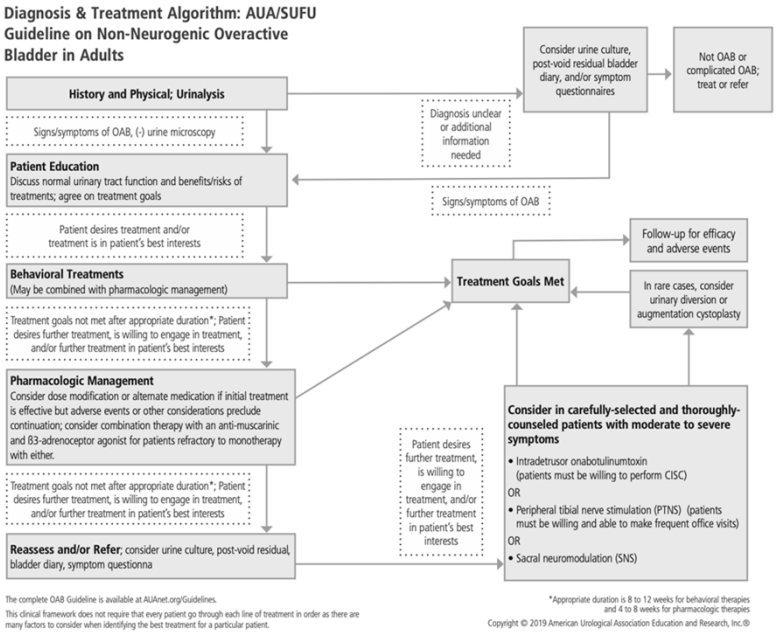
Stewart WF et al World J Urol 2003; Milsom I et al, Urology 2012; Suskin AM et al Urology

Other OAB considerations

Evaluations:

- **Mini-mental state exam**
- **Ability to perform ADLs**
- **Ambulation: Do they use an aid? Are they a fall risk?**
- **LE edema/diuretic use**
- **Diabetes: Glycemic control/medications**
- **Overall frailty**

Diagnosis & Treatment Algorithm



AUA/SUFU Guideline 2024

Behavioral Treatments

- **Should be first line management (moderate-quality evidence)**
- **These include:**
  - **Drinking to thirst (</=68oz fluid/day)**
  - **Avoiding bladder irritants (coffee, alcohol)**
  - **Urge suppression techniques (distraction, quick flicks, belly breathing)**
  - **Cutting back fluids 2-3 hours before bed (for nocturia)**
  - **Bladder training**

Behavioral Treatments

- **Can be as effective or more effective than anti-muscarinics for:**
  - **Reducing UI episodes**
  - **Improving frequency/urgency, nocturia**
  - **Improiving QOL**
- **25% reduction in fluid intake can improve frequency/urgency**
- **Bladder training/PFME can improve symptoms by 50-80%**

Dugan et al PM&R 2013

Behavioral Treatments

Other options to consider:

- **Ensure using CPAP**
- **Lower extremity elevation in evenings**
- **Compression stockings**
- **Timing of diuretics (or adding diuretic in PM for nocturia)**
- **Bedside commode**
- **Timed voiding**
- **Purewick?**

Pharmacologic Management

Two classes:

- **Anti-muscarinics (Anti-cholinergics)**
  - **Non-selective, receptors throughout body**
  - **M2 most prevalent (80%), but M3 most active in the bladder (20-30%)**
  - **Anti-sposmodic effect on detrusor muscle→ increases capacity and delays desire to void**
- **Beta-3-Adrenergics**
  - **Act on Beta-3-receptors releasing NE**
  - **Increases urethral outlet resistance and promotes bladder muscle relaxation**

Antimuscarinics

- **Oxybutynin (Ditropan): Tertiary amine with additional effects of myotrophic relaxation and local anesthesia (M3:M1 selective)**
  - A/w most cognitive effects (highest somnolence)
  - Transdermal has lowest rate of dry mouth (also OTC!)
- **Tolterodine (Detrol): Tertiary amine with M3 affinity**
- **Trospium (Sanctura): Quaternary amine (limited BBB penetration)**
  - Lowest rates of dry mouth

Antimuscarinics

- **Solifencin (Vesicare): M3:M2 selective**
- **Darifenacin (Enablex): Most highly M3 selective**
- **Festoterodine (Toviaz): Converted to 5-HydroxyMethylTolterodine**

No one anticholinergic has been shown to be superior to others; just different side effect profiles

Antimuscarinics

Side effects:

- **Dry mouth 10-60% (MCC for discontinuation)**
- **Constipation 3-10%**
- **Dry eyes**
- **Can also cause dyspepsia due to slowed emptying**
  - Careful with KCl use can increase risk of gastritis and higher absorption

Antimuscarinics

- **Antimuscarinics reduce urgency leaks by ~2 and frequency episodes by ~2**
  - 40% improvement is typically seen
  - Chance of becoming dry with medications ~10%
- **ER formulations have less dry mouth than IR (oxybutynin, tropsium, and tolerodine)**
- **<½ will ever refill anticholinergic meds**
- **Bladder botox is more cost-effective than anticholinergics**

Anticholinergic medications

- **30-50% of older adults take at least 1 AC medication**
- **Known to have cognitive adverse effects including confusion and memory loss**
- **Decline in cognitive function and mild cognitive impairment a/w increased risk of dementia**

Anticholinergic medications

Many medications have anticholinergic effects:

- Antihistamines
- Anti-Parkinson medications
- Opioids
- Inhaled bronchodilators
- Anti-emetics
- Muscle relaxants
- Psychotropic drugs
- And more! UpToDate Anticholinergic medications

Concern with anticholinergics

- **JAMA, n=284,000 patients ≥55 years**
  - **~1500 practices in England (database study)**
  - **No Parkinsons or dementia during enrollment**
  - **Cases: diagnosed during dementia during follow-up**
  - **Controls: Matched 5:1 for age and sex**
  - **Exposure: Cumulative AC drug exposure prescribed in 1-11 years prior to diagnosis**
  - **AOR for bladder antimuscarinics= 1.65 (CI 1.56-1.75)**
- **American Urogynecologic Society recommends avoidance of these medications in individuals ≥70 years old**

Coupland et al JAMA 2019; AUGS Clinical Consensus Statement 2020

Beta-3 Adrenergics

Mirabegron (Myrbetriq): Dosed 25mg or 50mg daily

- **Side effects:**
  - **HTN (uncontrolled HTN is CI for prescribing)**
  - **Nasopharyngitis**
  - **UTI (due to some level of retention)**
  - **Headache, dry mouth**
  - **Has vasoconstrictive effects**
- **Should not be prescribed for women on tamoxifen or beta-blockers d/t CYP effects**

Beta-3 Adrenergics

Vibegron (Gemtessa): Dosed 75mg daily

- **Differences from mirabegron:**
  - No warning for HTN
  - Does not have CYP effects
  - No generic
- **Similarities: Has vasoconstrictive effects**
  - Nasopharyngitis
  - UTI (due to some level of retention)
  - Headache, dry mouth

Getting meds covered…

Good idea to advise your patients that we may not get an affordable med on the first prescription

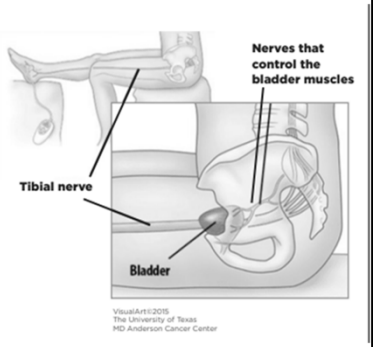
- **All antimuscarinics are generic**
  - **Can use GoodRx or CostPlusDrugs**
- **Mirabegron is generic but not currently covered by these plans**
  - **Some Medicare plans cover brand (Myrbetriq- need to DAW)**
- **Vibegron is not yet generic**
  - **Can use coupon program through manufacturer if privately insured**

Procedural options

- Posterior tibial nerve stimulation (PTNS)
- Implantable Tibial Neuromodulation
- Sacroneuromodulation (SNM)
- Intradetrusor botox

Posterior Tibial Nerve Stimulation

- Stimulates S2-4 via tibial n
- Qwk x12 weeks, then maintenance Q3-6w
  - No objective difference between Tolterodine but improved patient global assessment; other studies say better than meds
  - Over 50% improvement; but not as good as SNM/Botox
  - PTNS vs Tolterodine: Subjectively PTNS better; Objectively no difference; PTNS better than sham



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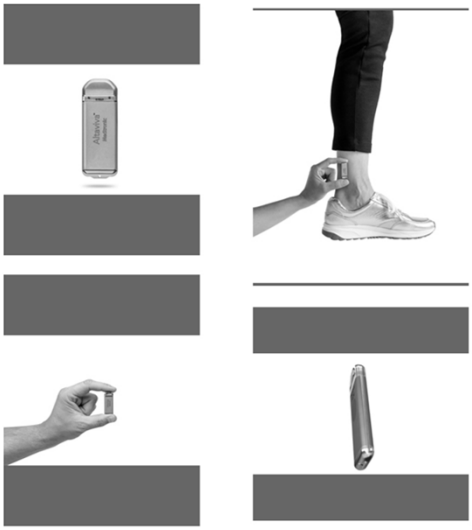
Implantable Tibial Neuromodulation

- **FDA approved in Sept 2025!!**
- **Approximately ½ length of stick of gum**
- **15-year battery lifespan**
- **Recharging takes 30 minutes**
- **MRI compatible**
- **Implanted in the office under local**



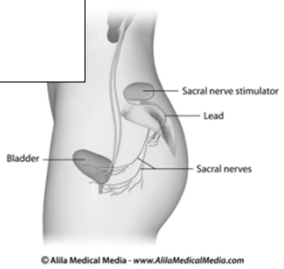
Images courtesy of Medtronic

Sacroneuromodulation

- **Lead placed through S3 foramen**
- **Blocks abnormal afferent impulses**
  - Perf… …age 2 (place…
  - Nee… …uring trial perio…
  - Can do PNE (peripheral nerve eval) which is like a stage 1, done in the office, with a temporary lead→ proceed with combo 1 & 2

FDA approved for OAB, UUI, idiopathic incomplete bladder emptying and FI!

Great for combo UUI/FI patients



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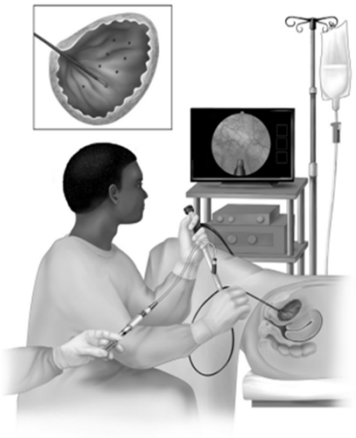
Sacroneuromodulation

- 80% of patients achieved continence or >50% improvement in their main incontinence sx after SNS
- Revision 3-16%; infection <5%
- Batteries last 10-15 years, now MRI compatible
- Smaller rechargeable option available as well

Intradetrusor Botox

- Botox prevents release of Ach from the nerve terminals (SNAP/SNARE complex) by cleaving a protein on the receptor in the nerve ending; decrease sx; increase capacity
- Redose Q5-10mo
- 6% cath rate with 100u
- UTI's: 20-40%
- 2/3 are continent; 60-90% have positive clinical response



Amundsen et al JAMA 2016; American Urogynecologic Society VoicesForPFD.org

Intradetrusor Botox

- **25% will refuse second injection**
- **Botox contraindicated in myasthenia gravis and ALS (peripheral motor neuropathy)**
- **Botox at 2 yrs more cost effective than SNM but at 5y SNM was more cost effective**
- **ABC trial (Anticholinergic vs Botox)- mean reduction of UI was ~3 (started at 5 leaks/day)**
  - **More patients were dry**

Visco et al NEJM 2012

SUI

SUI Management

Non-surgical

- Behavioral/lifestyle modifications
  - Weight loss
  - Fluid management
  - Bladder training
- PFME/PFPT
- Bladder neck support
  - Incontinence pessary, Vaginal insert
  - Vaginal E2

Surgical

- Mid-urethral slings
- Pubovaginal sling
- Retropubic colposuspension
- Urethral bulking injection*

Weight loss

- RCT comparing a 6-month weight loss program vs structured education program in overweight and obese women
- Moderate amount of weight loss (8% of baseline weight) showed a reduction in weekly incontinence episodes:
  - 47% in overweight patients
  - 28% in obese patients
- Obesity also diminishes efficacy of mid-urethral slings (BMI >40)

Subak et al. N Engl J Med 2009

Behavioral Modifications

Fluid management

- **Recommend reduction in excessive fluid intake**
- **No more than 68oz per day**

Bladder training

- **Timed voiding**
- **Aims to increase the time interval between voiding by use of a mandatory self-adjusted schedule**
- **Effective in patients with SUI or UUI**

Wallace et al. Cochrane Review. 2004

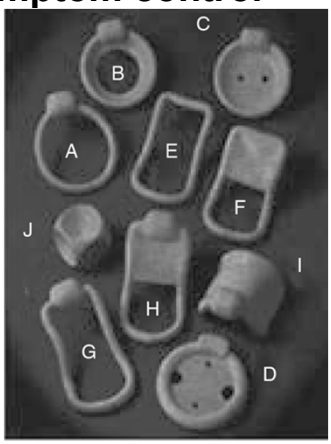
Pelvic Floor Muscle Exercises/PT

- **Aims at strengthening the urethral sphincter and levator ani muscles**
- **Alone or augmented with bladder training, biofeedback, or electrical stimulation**
- **Optimal regimen has yet to be determined**
  - **10-15 contractions, 2-10 seconds, 3x/day**
  - **Efficacy demonstrated with 30-50 daily contractions**
- **E-stim alone has never been shown to be superior than well done PFME= no need to buy $$ devices**

Pessaries

Ring with knob, Incontinence dish +/- support

- Option for patients looking for more immediate symptom control than what is provided by behavioral-PT
- May improve symptoms, but objective evidence regarding effectiveness has not been reported

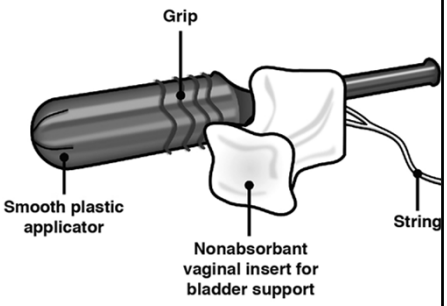


Urogynecology & Reconstructive Pelvic Surgery, 5th Ed. 2021, Chpt 14 Fig 14.6

Vaginal Inserts

Poise impressa inserts

- Similar to tampon, disposable
- Fitting kit
- Can be purchased OTC in the incontinence product aisle
- Can be good option for younger women who prefer not to use a pessary
- Costly (vs pessary), better for PRN use



Urogynecology & Reconstructive Pelvic Surgery 5th Ed. 2021, Chpt 14 Fig 14.5

Estrogen

Systemic HRT

- **Systemic estrogen +/- progesterone does not appear to be effective**
- **Women who are continent have a higher incidence of developing incontinence on estrogen**
- **Women who were incontinent had a higher incidence of worsening incontinence**

Hendrix et al. JAMA 2005; Cody et al. Cochrane Review. 2012

Estrogen

Vaginal estrogen

- **Increases the concentration of alpha- adrenergic receptors in the urethra and bladder improving vascularity of the periurethral increases thickness of the urethral epithelium**
- **Locally administered may be beneficial (and likely won't hurt!)**

Hendrix et al. JAMA 2005; Cody et al. Cochrane Review. 2012

Pharmacotherapy?

- **Currently no FDA approved medication for SUI**
- **Duloxetine**
  - **Serotonin (5-HT) and norepinephrine (NE) reuptake inhibitor → promotes urine storage**
  - **Mixed reports on efficacy**
  - **Not recommended**

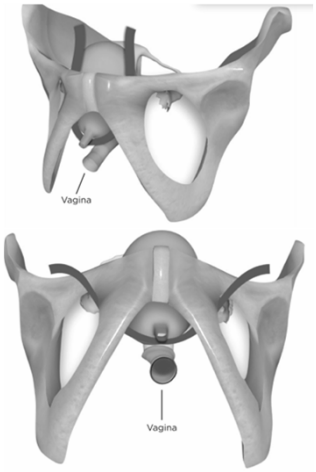
Surgery

- **Surgery is indicated for appropriately counseled women with SUI who have insufficient treatment control after conservative treatment**
- **Surgery is an appropriate 1st line treatment in appropriately counseled women who decline conservative treatment**

Labrie et al. N Engl J Med. 2013

Mid-urethral Slings

- **Mid-urethral sling: most common primary surgical treatment for SUI in women**
- **Types:**
  - **Retropubic**
  - **Transobturator**
  - **Single incision or Mini-sling**



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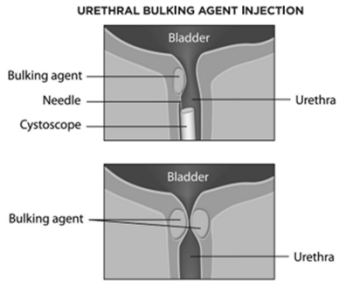
Mid-urethral Slings

- **Retropubic MUS and TOT MUS are comparable in terms of efficacy and patient satisfaction**
- **Richter et al. TOMUS trial, N=597**
  - **Multicenter, randomized controlled equivalence trial comparing TVT and TOT**
  - **Similar rates subjective and objective success (~80% significantly improved or dry)**
  - **Differences in complications**

Richter et al. N Engl J Med. 2010

Urethral Bulking

- **Injection of bulking agent into the periurethral tissue of bladder neck/proximal urethra**
- **Goal: Increase urethral resistance**
- **Agent: Bulkamid product, 97% water/2.5% polyacrylamide gel**
- **Approach: Peri- or <u>transurethral</u>**
- **5-minute procedure under sedation**
- **60-70% dry or significantly improved**
- **85% still satisfied with result at 1 year**
- **At 7 years, success in over 2/3***



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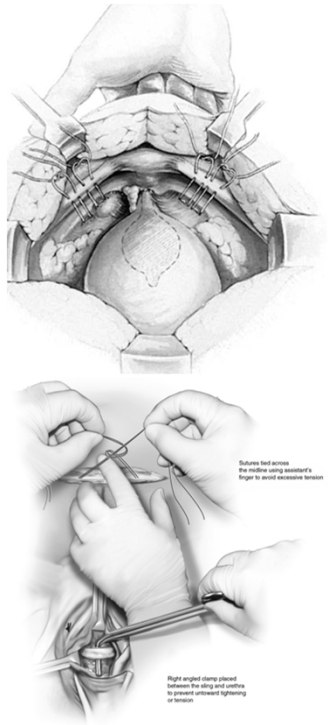
Urethral Bulking

- **Appropriate for:**
  - Women who wish to avoid mesh or surgical downtime
  - Those with recurrent or persistent SUI after surgery
  - Women with SUI without urethral mobility (ISD)
  - Older women with comorbidities
- **Shortcomings**
  - Recurrent SUI
  - Need for repeat injections
  - Less effective than other procedures

Other Surgical Procedures

- **Burch colposuspension**
  - Largely replaced by mid-urethral sling
- **Autologous fascial bladder neck sling**
  - Reserved for:
    - Severe SUI with a nonmobile, fixed urethra
    - Concomitant urethral reconstructive procedures
    - Complications from previously placed mesh

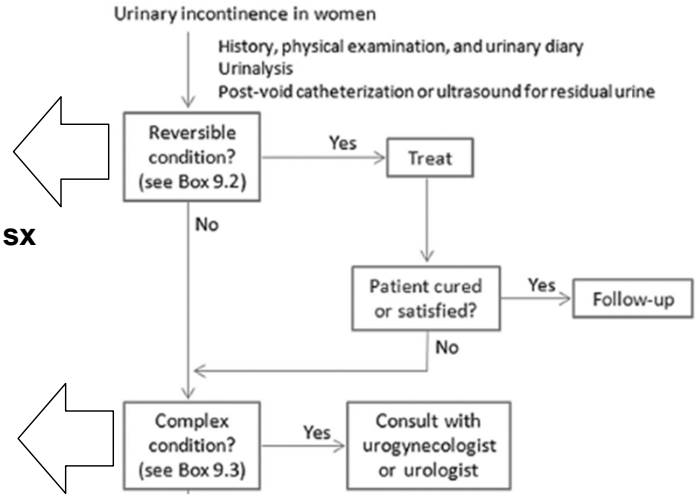


Urogynecology & Reconstructive Pelvic Surgery 5th Ed. 2021, Chpt 15 Fig 15.2 (top); Chpt 16 Fig 16.6 (bottom)

In Summary: Office Evaluation

DIAPPPERS

- **Lack of correlation btwn sx & exam**
- **Previous surgery**
- **Voiding dysfunction**
- **H/o XRT**
- **POP (≥Stage 2)**
- **Neurologic condition**
- **Severe or continuous incontinence**
- **Failure to improve with treatment**



Urogynecology & Reconstructive Pelvic Surgery 4th Ed. 2014, Chpt 9 Fig 9.4

In Summary: Office Management

- **Behavioral and diet/lifestyle modifications can be a helpful starting place for any patient with UI**
- **Can consider PFME/pelvic floor PT referral which has demonstrated efficacy for both SUI and UUI/OAB**
- **For OAB/UUI, medication management is often where I start (in addition to recommending behavioral modifications) and beta-3's are better tolerated, but not more effective than anticholinergics**
- **For SUI, you can recommend over-the-counter vaginal inserts**
- **If you aren't sure- feel free to refer to urogynecology!**

Conclusions

- **Majority of UI work-up can be performed during a routine office visit**
- **A variety of providers play an important role in the diagnosis and management of UI- if you ask, patients will often tell**
- **You can give a general overview of what your patients can expect at a visit with a urogynecologist or start basic workup/treatment for OAB/UUI and SUI for patients interested in nonsurgical management**

Conclusions

- **Most UI can be managed conservatively**
- **When this fails- consider referral to Urogyn for evaluation of surgical management of SUI or third line therapy for UUI**
  - Consider procedural therapies for patients who fail/cannot tolerate medication management for UUI
- **Urogyn's can also help with a multitude other PFD's including surgical management of pelvic organ prolapse, fecal incontinence, vulvovaginal pain disorders, fistula, UTIs, IC/BPS, and many more!**