URINARY INCONTINENCE 101

REVIEW OF CAUSES, EVALUATION, AND TREATMENTS
Female Urinary Incontinence

Definition

- International Continence Society defines *urinary incontinence* as the involuntary loss of urine which is severe enough to be a social or hygienic problem, and which is objectively demonstrable.
Urinary Incontinence

Types

Stress incontinence
Urgency incontinence (overactive bladder)
Mixed incontinence
Overflow incontinence
Bypass of anatomic continence mechanism
Functional / Transient incontinence (DIAPPERS)
Female Urinary Incontinence

Overflow Incontinence (OI)

- Involuntary urine loss associated with an overdistended bladder caused by chronic urinary retention secondary to either:
  - **Bladder outlet obstruction** (mechanical)
  - **Impaired detrusor contractility** (bladder atony)
  - **Impaired sensation** (neurologic-autonomic or peripheral neuropathy)
  - **Drugs**- anticholinergics, Ca++ channel blockers, α, β agonists, radiation fibrosis
Female Urinary Incontinence
Bypass of anatomic continence mechanism

- Fistula
  - Vesicovaginal
  - Urethrovaginal
  - Vesicouterine
- Diverticulum- urethral
- Mesh complications
- Ectopic ureters
  - Urethra
  - Vagina
  - Cervix/uterus
- Epispadias (incomplete midline fusion of genitals)
  (less common and characterized by “continuous leakage”)

Female Urinary Incontinence
Transient/Reversible Causes

- Delirium/Dementia (prompted voiding)
- Infection (topical estrogen)
- Atrophy (topical estrogen)
- Pharmacology (psychotropics)
- Psychological (OCD, severe depression)
- Endocrine (glucose control, polydipsia)
- Restricted mobility (bedside commode)
- Stool impaction (colon laxatives, enemas)
Stress Urinary Incontinence (SUI)

- Involuntary loss of urine with increases in intra-abdominal pressure (cough, strain, lifting, running)
- Dx made when urine loss from urethra seen with valsalva
- Two types of SUI
  - Hypermobility of urethrovvesicle junction
  - Intrinsic Sphincteric Deficiency (ISD)= impaired urethral function-intrinsically low pressure urethra
ISD
Intrinsic Sphincteric Deficiency

- Inability of urethra to occlude
- Causes: trauma, aging, atrophy, neuromuscular changes
- May occur without increases in intra-abdominal pressures
- MUCP < 20 cm H₂O; VLPP < 50 cm H₂O
- Elderly, fixed urethra, prior procedures
A

INTRAPARTUM INJURY

- Levator Ani Muscle Tears
- Connective Tissue Breakage and Tears
- Pudendal/Pelvic Nerve Denervation

B

CHRONIC FACTORS:

- Denervation of Pudendal/Pelvic Nerves
- Aging
- Hypoestrogenic State

Loss of Levator Ani Muscle Tone (active support loss)

Connective Tissue Failure (passive support loss)

Loss of Intrinsic Urethral Sphincter Muscle Tone

Intrinsic Urethral Failure

STRESS URINARY INCONTINENCE
Urgency Urinary Incontinence (UUI)

Overactive Bladder Function

- Disorder of urine storage phase characterized by involuntary detrusor contractions (detrusor overactivity, unstable bladder)
- Characterized by urgency / frequency, small volume voids
- Bladder contracts spontaneously or with provocation during filling
- Neurologic disorders commonly associated with Neurogenic DO, detrusor sphincter dyssynergia - stroke, dementia, MS, brain tumor, Parkinson disease (neurogenic bladder)
OAB Terminology

- Urgency
- Frequency
- Nocturia
- Urgency Urinary Incontinence
- OAB Syndrome
US adult population

16.5% of US adults have OAB

63% Dry
21.2 million (10.5% of the adult population)

37% Wet
12.2 million (6.1% of the adult population)
OAB

Detrusor Overactivity

- **Neurogenic Detrusor Overactivity**
  - Associated with known neurologic disease
  - Detrusor hyperreflexia- old terminology

- **Idiopathic Detrusor Overactivity**
  - Most common type - 90%
  - No specific cause found
Idiopathic Detrusor Overactivity

- No specific cause (90% of OAB / DO)
- Non neurologic
- Behavioral (high volume intake, irritants, constipation)
- Obstruction of bladder outlet (severe POP)
- Aging
Mixed Incontinence (MUI)

- Stress and Urge together
- Larger volumes of urine loss and more episodes /week
- Incontinence continuum
  - 100% SUI -------------SUI/UUI-------------100% UUI
Urinary Incontinence
Major types in the neurologically intact female
- Stress incontinence (SUI)
- Urgency incontinence (UUI)
- Mixed incontinence (MUI)

Overflow incontinence (OI)
Bypass of anatomic continence mechanism
Functional / Transient incontinence (DIAPPERS)
EVALUATION
INCONTINENCE EVALUATION MINIMUM

1. H+P
2. URINALYSIS (UA)
3. POST VOID RESIDUAL VOLUME (PVRV) --
   ----if surgery planned
If considering invasive surgical therapy

- Assess Post void residual volume (PVRV) – Expert opinion
- May perform multi-channel UDS in patients with stress incontinence (Grade C) - to confirm or refute dx, not to predict outcome
- Should assess urethral function
- If prolapse - perform stress testing with prolapse reduction
Urinary Incontinence - Evaluation

- History
  - History alone is a poor predictor of the type of incontinence. There is no set of questions that can adequately distinguish the types of incontinence
  - severity/impact on QOL /pt. expectations
  - modifiable risk factors (smoking, obesity)
  - reversible causes (DIAPPERS)
  - Previous surgeries
Strain angle/Q tip test for urethral hypermobility

> 30°
Urinary Incontinence - Evaluation

- UA
  - Negative predictive value – 97% (neg dipstick reliably rules out infection)
  - Culture if positive or suspicious
Urinary Incontinence - Evaluation

- Post-void residual volume
  - Normal < 100 ml  Abnormal > 200 ml
  - Measured by straight cath or bladder scan U/S immediately after void
Urinary Incontinence - Evaluation

- Physical exam
  - Stress test (supine, sitting, standing)
  - Neurologic exam (LE strength, sensation, DTRs, clitoral anal wink reflex, Babinski)
  - Inspection for atrophy, effect or prior surgery and palpation for masses, diverticulum, etc.
Incontinence Neuromuscular Examination

- Observe: ambulation, gait, spine deformity, joint immobility / limitations, general coordination, tremors, frailness, etc......
Urinary Incontinence Evaluation

- Additional Tests
  - Bladder diary
  - Simple cystometrogram
  - Multi-channel urodynamic studies
Gives information concerning patient’s voiding volumes, habits, fluid consumption, functional capacity, leakage episodes, nocturia, cognitive status.
Urinary Incontinence - Evaluation

- Voiding diary
  - voided volumes (250 ml/void)
  - intake volume (1,500 ml/day)
  - frequency (6 X / day)
  - nocturia (1-3X)
  - # incontinence episodes / day
Which patients should have complex urodynamic studies?

- Mixed incontinence
- Severe POP beyond hymen
- Elevated PVR volume
- Urge incontinence-refractory to conservation Rx
- Failed previous surgery for incontinence
- Suspicion of ISD (fixed urethra, +EBST)
- Voiding dysfunction
- Continuous incontinence/Severe incontinence
- Neurologic disorders
- Decreased bladder capacity
- Bladder pain syndrome with urge frequency refractory to Rx
- History of pelvic radiation
- Nocturnal enuresis refractory to therapy
A randomized trial of urodynamic testing before stress-incontinence surgery


BACKGROUND:

Urodynamic studies are commonly performed in women before surgery for stress urinary incontinence, but there is no good evidence that they improve outcomes.

METHODS:

We performed a multicenter, randomized, noninferiority trial involving women with uncomplicated, demonstrable stress urinary incontinence to compare outcomes after preoperative office evaluation and urodynamic tests or evaluation only. The primary outcome was treatment success at 12 months, defined as a reduction in the score on the Urogenital Distress Inventory of 70% or more and a response of "much better" or "very much better" on the Patient Global Impression of Improvement. The predetermined noninferiority margin was 11 percentage points.

RESULTS:

A total of 630 women were randomly assigned to undergo office evaluation with urodynamic tests or evaluation only (315 per group); the proportion in whom treatment was successful was 76.9% in the urodynamic-testing group versus 77.2% in the evaluation-only group (difference, -0.3 percentage points; 95% confidence interval, -7.5 to 6.9), which was consistent with noninferiority. There were no significant between-group differences in secondary measures of incontinence severity, quality of life, patient satisfaction, rates of positive provocative stress tests, voiding dysfunction, or adverse events. Women who underwent urodynamic tests were significantly less likely to receive a diagnosis of overactive bladder and more likely to receive a diagnosis of voiding-phase dysfunction, but these changes did not lead to significant between-group differences in treatment selection or outcomes.

CONCLUSIONS:

For women with uncomplicated, demonstrable stress urinary incontinence, preoperative office evaluation alone was not inferior to evaluation with urodynamic testing for outcomes at 1 year. (Funded by the National Institute of Diabetes and Digestive and Kidney Diseases and the Eunice Kennedy Shriver National Institute of Child Health and Human Development; ClinicalTrials.gov number, NCT00803959.).
REVIEW  Q. A 28 yo woman complains of having to void every 1-2 hours during the day (voiding diary confirms 75ml average voided volume) with leakage from sudden urge and with running and exercise. She has a positive supine stress test with 300ml in the bladder and a PVRV of 15 ml. Her diagnosis is:

- A. urgency incontinence
- B. stress incontinence
- C. Overflow incontinence
- D. mixed incontinence
- E. Athletes incontinence
A surgical procedure is being contemplated for a 55yo woman with multiple sclerosis who had previous “bladder lift”. Which of the following is the least important part of the evaluation.

- A. History - ascertain what her previous operation was
- B. Urinalysis or urine culture
- C. Post void residual volume
- D. Physical exam - cough stress test and evaluate urethra
- E. Multichannel urodynamic evaluation
- F. Office screening cystoscopy
Non Surgical INCONTINENCE THERAPY
Non surgical therapy: Primary options

**STRESS INCONTINENCE**
- PFM Exercises
- Vaginal devices
- Bladder training
- Weight loss
- Smoking cessation

**URGENCY INCONTINENCE**
- Anti-muscarinic therapy
- Behavioral therapy
  - Timed voiding
  - Urge suppression
- Physical therapy
Pessary for SUI

- Requires willing, motivated patient
- Is helpful therapy in 25 – 30%
- Requires ongoing maintenance
3 Surgical therapies for stress urinary incontinence

- 1. Slings
  - synthetic midurethral sling (retropubic, transobturator, mini slings)
  - Pubovaginal (bladder neck) sling (autologous, allo/xeno)
- 2. retropubic urethropexy (MMK, Burch)
- 3. urethral bulking agents (Collagen, Coaptite™, Silicone/Macroplastique™)
Retro-pubic Urethropexy / Colposuspension
Marshall-Marchetti-Krantz 1949
Burch 1961

- Permanent suture
- 2-3 per side
- Double purchase into full thickness of muscularis of anterior vaginal wall (pubocervical fascia)
- MMK-attach to cartilaginous periosteum of median raphe
- Burch- attach to Cooper’s ligament
- Tanagho modification 1976
- Routine obliteration of cul de sac recommended to reduce enterocele formation 7.6% (Burch 1967)- unconfirmed if this reduces recurrent prolapse
MUS (retropubic pass) & TOMUS (transobturator pass)
What is the difference?

Trocar passage through retro-pubic space

Lower risk of bladder, nerve, vascular, and intra-abdominal viscera injury with trocar passage
From Muir, Tulikangas, Paraiso, & Walters: The relationship of tension-free vaginal tape insertion and the vascular anatomy

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Periurethral Bulking
Urethral Bulking

- **Indications**
  - Elderly (intact cognition)
  - ISD
  - Short urethra
  - Fixed urethra

- **Materials**
  - Collagen (Contigen)
  - Calcium Hydroxylapatite (Coaptite)
  - Non-reactive Carbon particles-pyrolytic zirconium oxide beads (Durasphere)
  - Silicone (Macroplastique)

- **Cure**
  - 60-90% at 6-12mo, 50% at 2yr

- **Re-injections required**

- **Irritative voiding** 10-40%
Therapies for stress incontinence

SUMMARY

- MUS is most effective treatment (80-85%)
- Pessary helpful in 25%
- Pelvic floor muscle training is effective - if sustained – (1/2 will go to surgery)
- Medications are NOT effective
- Urethral bulking injections - for severe refractory ISD
Overactive Bladder Therapy

- First line
  - 1. Lifestyle modification / Behavioral
  - 2. Pelvic floor muscle exercises/biofeedback/ FES

- Second line
  - Medications

- Third line
  - 1. Sacral neuromodulation (InterStim™)
  - 2. Intradetrusor Onabotulinum toxin A injection

- Fourth line
  - Radical surgery (bladder augmentation, cystectomy + diversion)- rare
Lifestyle / Behavioral Modifications

- Correct constipation
- Urge suppression techniques
- Timed voiding
- Fluid management
- Diuretic management
- Weight loss
- Glycemic control (diabetics)
Non surgical therapy for incontinence
Pelvic floor muscle training (PFMT)

- For Urgency Urinary Incontinence (UUI)
  - PFM contractions inhibit detrusor contractions
  - Improves UUI in combination with behavioral therapies
• Office procedure
• Topical bladder anesthetic
• 100–300 units
• 10 units/mL
• 10–30 injection sites
• Trigone sparing to prevent reflux
• Adding methylene blue allows for identification of previously injected sites
Risks:
urinary tract infection 20-40%
urinary retention 5-30% (clean self cath)
Repeat injections (9 mo)
1/5 patients will fail conservative therapy for OAB

- Sacral nerve stimulation = sacral neuromodulation = InterStim®
- Is an electrode placed through the 3rd sacral foramen (with or without fluoroscopy)
- With a test phase of 3-14 days before long-term implant
- Success defined as > 50% improvement in urgency / urge incontinence episodes or <8 voids per day.
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A 85 yo woman who complains of always leaking urine with minimal exertion after a synthetic “mini sling”, has an immobile urethra had UDS with stable detrusor to fill and VLPPs of < 60 cm H2O and UPPs < 20 cm H2O. Her diagnosis and best treatment is:

A. Mixed incontinence: retropubic MUS
B. Neurogenic bladder: Sacral neuromodulation (InterStim)
C. Stress incontinence: retropubic urethropexy
D. Urgency incontinence: intravesicle Botox injection
E. Intrinsic Sphincteric Deficiency (ISD): Urethral bulking
F. Vesico-vaginal fistula secondary to sling: pessary
Effective treatments for Stress Urinary Incontinence (SUI) include.

- A. Vaginal pessary
- B. Retropubic urethropexy (MMK, Burch)
- C. Synthetic mid-urethral sling
- D. Anterior colporrhaphy (cystocele repair)
- E. A, B, and C
- F. All of the above
REVIEW – TREATMENTS FOR INCONTINENCE

- 48 yo P2 (170 lbs), non smoker complains of leakage with exercise daily, soaking thick pad. This is worse since robotic total hysterectomy 6 mo ago. She reports 40 lb. weight loss in last year has not helped. She does not complain of urgency or frequency. Exam finds NEGATIVE standing stress test after 300ml fill and no detrusor activity noted. No diverticulum is palpable. There is extreme hypermobility UVJ (Qtip 75 deg deflection). PVRV 150ml. 3 day Voiding diary finds 12 voids/24 hr. No nocturia. Voided volumes 250 -800ml. 4,000ml average daily voided volume.

- The next best option for her is:
  - A. pelvic floor muscle therapy
  - B. Midurethral sling
  - C. Vaginal continence pessary trial
  - D. Methylene blue bladder instillation / tampon test
  - E. Reduce fluid intake by 25%
  - F. Trial of oxybutynin
The End