Stress Incontinence
Mechanism, Prevention, and Treatment

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Objectives

- To understand the mechanisms of stress urinary incontinence
- To recognize risk factors and preventative strategies
- To perform the appropriate evaluation for stress incontinence
- To provide patients with evidence-based treatment options for stress urinary incontinence

The Basics

- Definition
  - Involuntary leakage of urine with increased abdominal pressure
- Incidence
  - Up to 35% of U.S. women
  - More common than HTN, DM, or depression
  - 1 of 10 most common chronic conditions in U.S. women
- Economic cost
  - Direct cost $12.4 billion annually
  - Greater than cost of breast, cervical, uterine, & ovarian cancers combined
Continence and Mechanism of SUI

- Lower urinary tract performs two functions
  - Storage of urine
  - Timely expulsion of urine
- Coordination of both central and peripheral nervous systems
- Requires normal function of:
  - Bladder wall
  - Detrusor muscle
  - Urethra
  - Pelvic floor musculature

Elements of Continence

- Simplistically – intraurethral pressure must be greater than intravesical pressure at rest and during stress conditions
Elements of Continence

- Urethral support
  - Anterior vaginal wall
  - Lateral attachments to the arcus tendineus fascia pelvis (ATFP)
  - Pubourethral ligaments insert at midurethra – augment suburethral support during strain

- Urethral Sphincter
  - Striated and somatic muscle

- Urethral Coaptation
  - Ability of urethral lumen to "seal"

- Levator Ani muscles
  - Pubococcygeus pulls pelvic floor up/into pelvic cavity

Stress incontinence after childbirth
A. is as common after Cesarean section as after vaginal delivery
B. is reported by more than 50% of women in the first decade after having a baby
C. can be prevented by instrumental delivery
D. may be related to pudendal nerve injury

Risk Factors

- Predisposing factors
- Pudendal nerve injury
- Diabetes
- Multiple births
- Prior pelvic surgery
- Age
- Obesity

- Stress dysfunction
- Urinary tract infection

- Abnormal bladder function
- Constipation
- Radiation therapy
- Medications
- Occupation

- Incontinence
- Transient
- Chronic
Risk Factors

- Aging - Unclear mechanism
- Loss of muscle tone
- Long-term effects of denervation injuries
- Changes in hormonal stimulation
- Pregnancy and childbirth
  - Both CS and VD
- Smoking
- Obesity: both UUI and SUI
- Prior pelvic surgery

Evaluation

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<th>Complicated</th>
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Table 1: Non-surgical findings for uncomplicated stress, overactive bladder, urinary incontinence.

Evaluation on Exam

- Demonstrate immediate SUI on cough stress test
  - Delayed urine loss may be cough-induced detrusor overactivity
  - Test sensitivity increased with full bladder (300 cc and standing)
- If testing remains negative, urodynamics recommended

Assess for urethral mobility

- Cotton swab test
  - Aa value on POPQ
- Ultrasound
- Palpation or visualization
  - PVR assessment: if >150 cc, consider bladder emptying studies
A 56-year-old P2 woman presents with stress urinary incontinence. She leaks with exercise every day and occasionally with coughing and laughing. On exam, the Aa value on POPQ is 0, PVR is 40 cc, and cough stress test was positive for leakage at 300 cc. Urinalysis was normal. You counsel her regarding her options and she desires surgical treatment.

True or False: Your next step in her management is to perform urodynamic studies.

A. True
B. False

Prevention: Pelvic Floor Exercises

- Single-center, RCT of 230 primigravid women with bladder neck mobility on ultrasound
- PFME with monthly PT visits starting at 20 wks vs. verbal advice
- 3 sets of 8 exercises (hold 6 sec; 2 min between sets) twice a day
- Outcome: subjective SUI at 3 months postpartum
- No difference in NSVD, VAVD, FAVD, or CS rates
- Subjective SUI rates: 13% PT group vs. 33% control (RR 0.59, CI 0.37-0.92), no difference in pad tests

Other studies have shown possible benefit with prenatal/postpartum PFMEs and PT.

Urodynamic Studies

- In the uncomplicated patient, simple answer is "No"
- Multicenter RCT of 630 women with uncomplicated SUI randomized to UDS vs. basic office exam prior to
- Subjective treatment success in 77% of both UDS and office exam groups (no significant difference)
- Conclusion: Preop office exam was non-inferior to UDS for outcomes at 1 year

Nonsurgical Treatments: Weight Loss

- 5-10% weight loss in pts with T2DM improves UI incidence and sx's in men and women
- Bariatric surgery and associated weight loss → improvement in UI, UUls, and SUI at 6 months
- PRIDE study – 2009 NEJM, 2010 JUrol
  - 338 overweight or obese women with at least 10 leakage episodes/wk enrolled in an 18-month weight loss program vs. structured education
  - At 12 months: avg 7.5% weight loss vs. 1.7%
  - 65% reduction in weekly SUI episodes at 12 months (47% for controls, p<0.001)

Weight loss is an effective strategy for SUI treatment
Nonsurgical Treatments: Medications

- Duloxetine
  - 2005 Cochrane review showed improvement in QoL
  - Small effect size of subjective cure, meta-analysis of objective outcome did not show any benefit
- Adrenergic drugs
  - 2005 Cochrane review of 22 trials, 1099 women
  - Pad counts/weights: better than placebo
  - >25% had adverse effects

Nonsurgical Treatments: Estrogen Therapy

- Clinical efficacy is controversial
- Systemic ERT worsened UI compared to placebo
  - 2012 Cochrane review of 17,642 women with UI
- Local ERT (topical use) showed some benefits
  - 2014 systematic review of 44 studies
  - Low-quality evidence showed improved max urethral pressures
  - Moderate-level evidence showed improved subjective SUI compared to placebo
  - PFMT superior to topical estrogen in one trial

Topical estrogen may be beneficial in treatment of SUI.

Nonsurgical Treatments: Pelvic Floor Muscle Exercises

- Pelvic floor muscle exercises
  - 2014 Cochrane review, 21 trials, 1281 women
  - 56% cure rate with PFMT (8x improvement from no treatment)
  - Long-term effectiveness needs to be studied

This is the most effective, first-line therapy.

- Vaginal cones
  - 2013 Cochrane review of 23 trials, 1800 women
  - Better than no treatment, no difference compared to PFME or electrostimulation

Nonsurgical Treatments: Vaginal Laser Therapy

- Systematic review: 13 studies (2017 Int Urogyn J)
- 818 SUI pts (no RCTs)
- Mild to severe SUI, some urodynamic findings
- Subjective outcomes: 12.5-46% cure at 6 months
- Range of objective measures: half had 50% reduction of pad weight at 6 months
- Adverse effects: few cases of mild pain, dysuria, irritation

Vaginal laser therapy may be a useful, minimally invasive approach for treating SUI. Cannot make firm conclusions.
Nonsurgical Treatments: Vaginal Inserts

- Poise Impressa Vaginal Inserts
  - Few studies
  - 60 women: 85% had ≥70% reduction in pad weight gain
  - Improved QoL and high satisfaction

- Incontinence rings/Pessaries
  - 2014 Cochrane review, 8 studies, 787 women
  - Different devices used making quantitative synthesis of data impossible
  - Inconclusive benefit

Surgical Treatments: Injectable Urethral Bulking

- Synthetic and biological materials
- Frequently used in recurrent SUI
- Induces coaptation of the urethral edges, increases urethral resistance
- Few that are currently available –
  - Silicone particles (Macroplastique)
  - Calcium Hydroxylapatite (Coaptite)
  - Porcine dermis (Permacol)
  - Glutaraldehyde cross-linked bovine collagen (Contigen)
- Success: 25-63% (~50%) at 12 months
- Adverse events: transient urinary retention, de novo urge, dysuria, hematuria

A 56-year-old P2 woman presents with stress urinary incontinence. She leaks with exercise every day and occasionally with coughing and laughing. On exam, the Aa value on POPQ is 0, PVR is 40 cc, and cough stress test was positive for leakage at 300 cc. Urinalysis was normal. You counsel her regarding her options.

Concerning sling operations for the treatment of stress incontinence, all of the following are true except:

A. They are accepted as first-line management
B. They result in voiding dysfunction in up to 16% of women
C. Synthetic materials can result in erosion
D. They have good long-term success rates
E. Tension-free vaginal tape is a minimally invasive procedure
### Surgical Treatments: Mid-urethral Slings

- 2017 Cochrane Review of 81 trials (12,113 women) undergoing retropubic (RP) and transobturator (TO) approaches
- Subjective cure
  - Up to 80% at 5 years
  - Similar long-term (>5 years) outcomes (RP 51-88%, TO 43-92%)
- Adverse events:
  - Similar mesh erosion rates: 2.1-2.4%
  - RP: voiding dysfunction, vascular/visceral injury, bladder perforation, suprapubic pain
  - TO: more likely to require repeat incontinence surgery, groin pain
- Longer term data still required

### Surgical Treatments: Single-Incision Slings (Mini-Slings)

- Effort to avoid major injury, groin pain, and hematomas
- TVT-Secur withdrawn from market by Gynecare, other are MiniArc, Ajust, Ophira, CureMesh
- 2017 Cochrane Review of 31 trials, 3290 women
- Higher incontinence rates after surgery (41% vs. 26% RP)
- No difference between other mini-slings and in-out or out-in TO slings
- Slightly lower groin/thigh pain, but not enough numbers

TVT-Secur is inferior to standard midurethral slings. There is not enough evidence to compare other mini-slings to RP or TO slings.

### Surgical Treatments: Open Retropubic Colposuspension

- 2017 Cochrane Review of 55 trials with 5417 women
- Overall cure with open procedure: 68-88%
- 22 trials comparing open RP colposuspension to suburethral slings (tradition, RP, and TO) → no difference at any time points
- Traditional (fascial) slings more effective at 1-5 years postop
- Lower risk of voiding dysfunction, higher risk of POP

Open retropubic colposuspension is effective for SUI, including long-term.

### Surgical Treatments: Laparoscopic Retropubic Colposuspension

- 2017 Cochrane review, 22 trials
- Open vs. Laparoscopic: no difference in patient-reported continence rates at short, medium, and long terms (but wide CI)
- Slings appear to have better objective outcomes at 1 year and same subjective cure at longer term
- Two paravaginal sutures on each side preferred
- Longer OR times and hospital stays than slings

Laparoscopic colposuspension appears to be as good as open colposuspension at 2 years. Vaginal slings appear to be superior to laparoscopic colposuspension.
Summary

- SUI is the involuntary leakage of urine with increased intraabdominal pressure
- Evaluation is simple
  - History
  - Exam: PVR, Urinalysis, Urethral mobility assessment, Cough stress test
- UDS may not be necessary
- Effective treatments include: PFMT, weight loss, vaginal inserts, urethral bulking, pubovaginal slings, midurethral slings, and retropubic colposuspensions

References