Classification and treatment of urinary incontinence in females

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Micturition Reflex

Spinal Cord
- Sacral ~ S2 & S3
- Micturition Center

Train for Voluntary Control

BRAIN ~ Pons

Pontine Storage Center

Pontine Micturition Center

Stretch Receptors

- Increased Parasympathetic
- Decreased Sympathetic

Decreased Motor Nerve Stimulation

Contract

Relax

Relax
Classification of urinary incontinence

• Stress incontinence
• Urgency incontinence
• Overflow incontinence
• Other contributing factors / conditions
Stress incontinence 1

• Involuntary leakage of urine that occurs with increase in intraabdominal pressure in the absence of a bladder contraction
• No urge to urinate prior to the leakage

Mechanisms

1. **Urethral hypermobility**: insufficient support of the pelvic floor musculature and vaginal connective tissue to the urethra and bladder neck.

Causes: loss of connective tissue and / or muscular strength due to chronic pressure (chronic cough, obesity), trauma due to child birth

2. **Intrinsic sphincter deficiency**
Stress incontinence 2

• Involuntary leakage of urine that occurs with increase in intraabdominal pressure in the absence of a bladder contraction
• No urge to urinate prior to the leakage

Mechanisms
1. **Urethral hypermobility**
2. **Intrinsic sphincter deficiency:** loss of intrinsic urethral mucosal and muscular tone that keeps the urethra closed.

Causes: neuromuscular damage due to multiple pelvic or incontinence surgeries

Treatment: improving urethral blood flow with vaginal estrogen and increasing urethral coaptation with pelvic muscle exercise or surgery. Worse surgical outcomes
Urgency incontinence

• Urge to void immediately preceding or accompanied by involuntary leakage of urine.

Mechanisms
• Detrusor overactivity
• Secondary to: neurologic disorders (spinal cord injuries), bladder abnormalities, increased or altered bladder microbiome, idiopathic
Mixed incontinence

Women with symptoms of both
Stress incontinence and
Urgency incontinence
Overflow incontinence 1

• Loss of urine with no warning or triggers
• Presents with continuous urinary leakage or dribbling in the setting of incomplete bladder emptying. Associated symptoms can include: weak or intermittent urinary stream, hesitancy, frequency and nocturia mechanisms

1. Detrusor underactivity

Causes: age, chronic or severe acute sustained overdistension of the bladder, fibrosis, low estrogen state, peripheral neuropathy (DM, B12 deficiency, alcoholism), spinal cord damage (MS, spinal stenosis)

2. Bladder outlet obstruction
Overflow incontinence 2

• Presents with continuous urinary leakage or dribbling in the setting of incomplete bladder emptying. Associated symptoms can include: weak or intermittent urinary stream, hesitancy, frequency and nocturia mechanisms

1. Detrusor underactivity
2. Bladder outlet obstruction

Causes: external compression of the urethra, advanced pelvic organ prolapse, overcorrection of the urethra from prior pelvic floor surgery, external masses or tumors at the level of the bladder outlet, urethral stricture, Fowler's syndrome
Other contributing factors / conditions

• Genitourinary syndrome of menopause/vaginal atrophy
• Urinary tract infection
• Urogenital fistulas, urethral diverticula, ectopic ureters
• Systemic causes:
  - Neurologic disorders: spinal cord disorders, stroke, Parkinson, diabetic autonomic neuropathy
  - Cancer: bladder, invasive cervical cancer
• Potentially reversible causes: medications, alcohol, caffeine, stool impaction/constipation
• Cognitive impairment
Evaluation

• history
• Classifying the type of incontinence
• Identifying underlying conditions
• Identifying reversible causes
1. During the last three months, have you leaked urine (even a small amount)?
   □ Yes  □ No
   
   Questionnaire completed

2. During the last three months, did you leak urine:
   (Check all that apply)
   □ a. When you were performing some physical activity, such as coughing, sneezing, lifting, or exercise?
   □ b. When you had the urge or the feeling that you needed to empty your bladder, but you could not get to the toilet fast enough?
   □ c. Without physical activity and without a sense of urgency?

3. During the last three months, did you leak urine most often:
   (Check only one)
   □ a. When you were performing some physical activity, such as coughing, sneezing, lifting, or exercise?
   □ b. When you had the urge or the feeling that you needed to empty your bladder, but you could not get to the toilet fast enough?
   □ c. Without physical activity and without a sense of urgency?
   □ d. About equally as often with physical activity as with a sense of urgency?

Definitions of type of urinary incontinence are based on responses to question 3:

<table>
<thead>
<tr>
<th>Response to question 3</th>
<th>Type of incontinence</th>
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<tbody>
<tr>
<td>a. Most often with physical activity</td>
<td>Stress only or stress predominant</td>
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<tr>
<td>b. Most often with the urge to empty the bladder</td>
<td>Urge only or urge predominant</td>
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<tr>
<td>c. Without physical activity or sense of urgency</td>
<td>Other cause only or other cause predominant</td>
</tr>
<tr>
<td>d. About equally with physical activity and sense of urgency</td>
<td>Mixed</td>
</tr>
</tbody>
</table>
Systemic symptoms

- Fever, dysuria, pelvic pain, hematuria
- Lifelong or sudden onset
- Associated abdominal/pelvic pain
- Changes in gait
- Mental status
- Cardiopulmonary or neurologic symptoms
- Recurrent UTIs
- Advanced pelvic organ prolapse
- Bowel function
medications

- Antihistamines, decongestants
- Analgesic and sedative
- Anticholinergic
- Cardiology
- Psychotropic
- Skeletal muscle relaxants
- Oral Estrogens (HRT): increased urinary incontinence
- Alcohol: decreased contractility
- Caffeine: increased contractility or rate of emptying
Treatment of urinary incontinence in females

A. Pads and protective garments
B. Modifying contributory factors such as medical conditions and medications
C. Life style modification
  ✓ weight loss
  ✓ dietary changes
  ✓ constipation
  ✓ Smoking cessation
D. Pelvic floor muscle (kegel) exercise supplemental modalities
1. Supervised pelvic floor therapy
2. Vaginal weighted cones, eggs, balls
Treatment of urinary incontinence in females

3. biofeedback
Treatment of urinary incontinence in females

E. Bladder training
Treatment of urinary incontinence in females

F. Topical vaginal estrogen: for peri or postmenopausal women with either stress or urgency incontinence and vaginal atrophy due to genitourinary syndrome of menopause

Tab estradiol 10 mcg twice weekly ??? (systemic HT may worsen urinary incontinence)

Conjugated estrogen cream 0.5 gr twice weekly

Estradiol ring every 3 months
Treatment of stress urinary incontinence in females

• If initial treatments are not sufficient
  ✓ devices: pessaries
  ✓ Pharmacotherapy: Duloxetine
  ✓ Other medications: imipramine, phenylpropanolamine
  ✓ Surgery
  ✓ Other specialty treatments
Devices

• Most common: pessaries
• Typical materials: silicone or plastic
• As an adjunct or substitute for pelvic muscle exercises
• Overall patient satisfaction: 50% at one year
• Useful for patients who have stress incontinence with specific situations
• Advantages: potential for long term use and avoidance of surgery, inexpensive, well tolerated, safe
Mechanism of action of vaginal pessaries for SUI

• Improved urethral function
• Increase in functional urethral length
• Increase in functional urethral closure pressure
• Absence of urethral obstruction to flow
• Resolution of detrusor instability
• Reduction in the straining Q-tip angle
• Decreased posterior urethra vesical angle
• Elevation of bladder neck
Efficacy of pessary

• For SUI: supporting data are limited
  ➢ pessary might be better than placebo
Compared with other treatments:
  ➢ pelvic floor muscle training
Clinical applications

• Clinical setting where pessary use should be considered:
  ➢ post preference for nonsurgical treatment
  ➢ presence of severe medical comorbidities... poor surgical candidate
  ➢ Need to delay surgery for several weeks or months
  ➢ recurrent POP or SUI and patient preference for avoidance of repeat surgery
Contraindications of pessary

- Local infection
- Exposed foreign body (such vaginal mesh)
- Latex sensitivity (for inflatoball pessary)
- Noncompliance with follow up
- Sexually active women who are unable to remove and reinsert the pessary
Treatment of stress urinary incontinence in females
Pharmacotherapy

Duloxetine
Serotonin- norepinephrine reuptake inhibitor
Potential adverse effects: one in three
Depression
Treatment of stress urinary incontinence in females
Other specialty treatments

• Transurethral radiofrequency collagen denaturation
• Intravesical balloon device
• Urethral bulking agent
• Electroacupuncture
• Pulsed magnetic stimulation
Transvaginal laser therapy for stress urinary incontinence

- The evidence on transvaginal laser therapy for stress urinary incontinence does not show any short-term safety concerns.
- Evidence on long-term safety and efficacy is inadequate in quality and quantity.
- Transvaginal laser therapy for stress urinary incontinence is done as an outpatient procedure and can be done without anesthesia.
- A laser-probe device is inserted into the vagina to apply laser energy to the vaginal wall.
- The laser causes a controlled thermal injury, which is claimed to promote tissue remodeling and the production of new collagen.
Transvaginal laser therapy for stress urinary incontinence

- Treatment typically consists of 3 sessions (1-5) at 4 to 6 weeks apart.
- The aim is to improve the support to the bladder and reduce the symptoms of stress urinary incontinence.
- There are different types of lasers used for this procedure, including CO2 and erbium-doped yttrium aluminium garnet (Er:YAG) lasers.
- The type of laser and the energy level used have different tissue penetration and can cause different types of thermal injury.
- Some of the evidence suggests that outcomes are better in premenopausal women.
Laser therapy for urinary incontinence and pelvic organ prolapse: a systematic review

Thirty-one studies recruiting 1530 adult women met the inclusion criteria. All studies showed significant improvement either on UI, POP or both; however the heterogeneity of laser settings, application and outcome measures was huge. Only one study was a randomised controlled trial, two studies were controlled cohort studies. All three were on UI and used standardised validated tools. The risk of bias in the randomised controlled trial was low on all seven domains; the controlled studies had a serious risk of bias. No major adverse events were reported. Mild pain and burning sensation were the most commonly described adverse events.

All studies on vaginal and/or urethral laser application for POP and UI report improvement, but the quality of studies needs to be improved.
RF therapy for stress urinary incontinence

- Radiofrequency is a diathermic process generated by the radiation of an electromagnetic spectrum,
- Resulting in an immediate retraction of existing collagen and subsequent activation of fibroblasts causing neocollagenesis
- In studies using radiofrequency to treat SUI, a therapeutic response of 50% was shown
- Inserting the probe in the intra urethral or intravaginal region. This technique is minimally invasive.
- It presented a rate of adverse or side effect of 0.9% to 9.5%, and the need for antibiotic prophylaxis, oral sedation, local anesthesia, while increasing the risk of urinary tract infections and its costs.
Treatment of mixed incontinence in females

• Both stress and urgency

1. Life style modification, pelvic floor muscle exercises, and bladder training

2. If not effective: then treated based on their predominant symptoms

3. If not effective: surgical treatments
Treatment of overflow incontinence

• Can mimic stress, urgency, or mixed UI
• Symptoms: involuntary, intermittent or continuous urinary leakage with no warning or sensation, dribbling, and incomplete bladder emptying

Detrusor underactivity

Chronic urinary retention
Treatment of overflow incontinence

• Detrusor underactivity
  ➢ Limited specific treatment
  ➢ Reversible causes??? Stopping medications that impair detrusor contractility and /or result in increased urethral tone or – by treating constipation

• Chronic urinary retention
Treatment of overflow incontinence

• Detrusor underactivity
• Chronic urinary retention
  ➢ Prior spinal cord injury: clean intermittent catheterization
    Suprapubic catheterization or urinary diversion
  ➢ Idiopathic or neurogenic underactivity: sacral nerve stimulation
  ➢ Detrusor underactivity: clean intermittent catheterization
Treatment of urgency urinary incontinence / overactive bladder in females

- Conservative treatments
  - if ineffective
- medications
Treatment of urgency incontinence / overactive bladder in females

• Overactive bladder: urinary urgency, frequency, and nocturia with or without incontinence, which is treated in a similar manner to urgency incontinence.

• Begin treatment of urgency incontinence, mixed urinary incontinence, or overactive bladder with the same conservative measures that are used for other types of incontinence (life style modifications, ....) if ineffective: pharmacotherapy
Treatment of urgency incontinence / overactive bladder in females
first tier: exercises, life style, and complementary therapies

1. Initial treatment:
   • modifying contributory medical and lifestyle factors
   • Kegel
   • Bladder training
   • Treating vaginal atrophy

2. Complementary therapy:
   • Hypnotherapy ???
   • Acupuncture ???
Treatment of urgency incontinence / overactive bladder in females
second tier: pharmacotherapies

1. Antimuscarinic agents
2. Beta adrenergic therapy
Antimuscarinic agents

- Modest benefit over placebo (49%)
- Increasing bladder capacity and Decreasing urgency through blockade of muscarine receptor stimulation by acetylcholine during bladder storage

1. Darifenacin
2. Fesoterodine
3. Oxybutynin
4. Solifenacin
5. Tolterodine
6. Trospium
7. Propiverine
Antimuscarinic agents

- Start with lowest dose
- 2 weeks
- Titrate up as needed with insufficient response and minimal side effects
- Immediate release VS. extended release
- Follow up after 4 to 6 weeks to assess response and determine if a change in medication is necessary
- May cause urinary retention: postvoid residual
Antimuscarinic agents adverse drug effects

• Rate: 1-6%
• Contraindication: uncontrolled tachyarrhythmias, myasthenia gravis, gastric retention, narrow angle glaucoma
• No suitable for patients with dementia
• Urinary retention, dry mouth, constipation, blurred vision for near objects, tachycardia, drowsiness, decreased cognitive function
Antimuscarinic agents subsequent pharmacotherapy

- 4-6 weeks and maybe 12 weeks for full efficacy
- Change to different antimuscarinic, change in class (mirabegron), or combination
- After trying 2 medications, another type of therapy is offered
- Immediate release VS. extended release
Antimuscarinic agents
oxybutynin

**Immediate release:** tablet 5 mg
- Starting dose: 5 mg BID or TDS
- Maximum dose: 5 mg QID

**Extended release:** tablet 5, 10, 15 mg
- Starting dose: 5-10 mg daily
- Maximum dose: 30 mg daily
- Transdermal gel & patch
Antimuscarinic agent
sulifenacin

• Tab 5, 10 mg
• Starting dose: 5 mg daily
• Maximum dose: 10 mg daily
Antimuscarinic agents

• قرص اکسی بوتينین كلرايد 5 ميلي گرم
• سوليفناسين 5 و 10، يوريناسين 5 و 10، وزيكر 5 و 10، ويسول 5 و 10
mirabegron

- Beta 3 adrenoceptor agonist, selective beta receptor stimulation of detrusor muscle
- Initial or different choice
- Similar efficacy to antimuscarinic agents
- Better tolerated to antimuscarinic agents
- Started at 25 mg daily
- Can be increased to 50 mg daily after 2 to 4 weeks
mirabegron

• Follow-up visit in 4 to six weeks or with new symptoms
• PVR
• Less dry mouth and constipation
• Patients with severe or uncontrolled hypertension should not take
Combination therapy

• Antimuscarinic and beta 3 agonist together
• Persistent symptoms who are unable to increase dose secondary to side effects or dose limit
• Efficacy is more than monotherapy
Treatment of urgency incontinence / overactive bladder in females
third Tier: procedures and other therapies

• Botulinum toxin
• Percutaneous tibial nerve stimulation
• Sacral neuromodulation
• surgery