urine incontinence

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Definition of Urinary Incontinence

“ The involuntary loss of urine which is objectively demonstrable and a social or hygienic problem.”

* The International Continence Society

Risk Factors for Urinary Incontinence

1. General Risk Factors (All Types)

- Age → risk increases with older age due to weaker muscles and changes in bladder function.
- Female sex → higher prevalence due to shorter urethra and effects of pregnancy/childbirth.
- Obesity → ↑ intra-abdominal pressure strains bladder and pelvic floor.
- Chronic cough → e.g., from COPD or smoking → ↑ stress on pelvic floor.
- Constipation → straining can weaken pelvic muscles.
- Medications → diuretics, sedatives, alpha-blockers (affect sphincter or bladd

Prevalence of Incontinence in Women

According to the World Health Organization (WHO), urinary incontinence (UI) is a prevalent condition among women, especially in older age groups. The prevalence varies based on age, living environment, and other factors.

Prevalence of Urinary Incontinence in Women

- **Community-Dwelling Women Aged 60 and Older: Approximately 62.8% of women aged 60 years and older experience urinary incontinence.**
- **Women in Nursing Homes: The prevalence increases to 79.7% among women residing in nursing homes.**
- **Postmenopausal Women: A study found that 46% of postmenopausal women reported experiencing urinary incontinence.**

These numbers are staggering, but they are not random. They are the direct result of specific, well-understood physiological changes that occur with age. Let's now look at the 'why' behind these statistics.

Understanding the Physiology: How Aging Affects Bladder Function

The aging process introduces several key changes that disrupt normal bladder function:

· 1. Decreased Bladder Capacity & Elasticity

· The Change: The bladder wall becomes less flexible and more rigid, like an old balloon. It cannot stretch to hold as much urine.

· The Result: A feeling of fullness occurs much sooner, leading to more frequent and urgent urination

.2. Weakened Muscles → Reduced Flow Rate

· The Change: The detrusor muscle (which pushes urine out) and the pelvic floor muscles (which support the bladder and urethra) lose strength.

· The Result: This leads to a weaker, slower urine stream and often incomplete emptying of the bladder, which increases the risk of infections.

· 3. Reduced Voiding Volume

· The Change: This is a direct consequence of #1 and #2.

· The Result: Because the bladder can't hold as much (decreased capacity) and may not empty fully (weakened muscles), the amount of urine passed each time is smaller.

4. Increased Urine Production at Night (Nocturnal Polyuria)

· The Change: The body's circadian rhythm of hormone production changes. Older adults may produce less of the hormone (vasopressin) that concentrates urine at night, leading to more urine production while sleeping.

· The Result: The kidneys produce more urine overnight, which can overwhelm a bladder that already has a reduced capacity, contributing significantly to nocturia (night-time urination) and nocturnal enuresis (bed-wetting)V

Reversible causes of UI

Urinary incontinence is not always a permanent condition. Many factors can cause or worsen UI, and they are often treatable. Addressing these should always be the first step in management.

The Primary Reversible Causes (DIAPERS Mnemonic)

· D - Delirium / Dementia: Acute confusion disrupts brain-bladder signals.
· R - Restricted Mobility: Arthritis, injury, or weakness preventing timely bathroom access.
· I - Infection: UTI irritation causes urgency and urge incontinence.
· P - Pharmacology: Diuretics, sedatives, anticholinergics, and antihypertensives can all induce or worsen UI.
· I - Impaction: Severe constipation (fecal impaction) presses on the bladder, reducing capacity and obstructing flow.
· E - Endocrine / Metabolic: High blood sugar (e.g., uncontrolled diabetes) causes excessive urine production.

Addressing these causes can significantly improve or even completely resolve symptoms.

· This assessment is fast, cost-effective, and avoids unnecessary treatments.
· Always rule these out first before proceeding to complex managemen

Classifying the Types of Urinary Incontinence

Urinary incontinence can be fundamentally divided into two major categories based on the origin of the symptom:

1. Urethral Causes (Most Common): Leakage occurs through the urethra due to dysfunction of the bladder and/or urethral closure mechanism.

2. Extra-Urethral Causes (Rare): Leakage occurs from a source other than the urethra, often due to an anatomical abnormality

Urethral incontinence

★ Stress incontinence ★ Urge incontinence ★ Overflow incontinence

Stress incontinence

Definition:
Involuntary leakage of urine that occurs with sneezing, coughing, laughing, or anytime an increase in intra-abdominal pressure exceeds urethral sphincter closure mechanisms.
Stress incontinence may be provoked by minimal or no activity when there is severe sphincter dysfunction.

Causes:

- **Damage of the nerve supply of the pelvic floor, urethral sphincter, and pelvic floor muscles during vaginal delivery**
  - **(Prolonged second stage, large babies, and instrumental deliveries cause the most damage)**
-
- **Atrophy due to menopause**
- **Chronic increase in intra-abdominal pressure (cough, obesity, constipation, …)**
- **Congenital collagen diseases**

Urinary Incontinence – Case scenario 1

- 36 years old female patient, has 5 kids, presented to your clinic complaining of passage of urine when she cough.
- Type of urinary incontinence:
  - Stress incontinence
- Pathophysiology of this condition:
  - Urethral hypermobility secondary to multiparity (i.e., damage of the pelvic floor muscle levator ani and/or the S2–S4 nerve roots)
  - Increase in intraabdominal pressure (e.g., from laughing, sneezing, coughing, exercising) → ↑ pressure within the bladder → bladder pressure > urethral sphincter resistance to urinary flow
- Mention other types of incontinence:
  - Urgency incontinence, Mixed, Overflow, Functional, Continuou

Urge incontinence

Urethral Causes: Patients typically have involuntary leakage of urine accompanied by urgency. Women may have increased daytime frequency and nocturia. Common triggers include running water, hand washing, and cold weather exposure. The condition is caused by detrusor overactivity.

Case Study: Urge Incontinence

Patient: A 78-year-old male living independently.

Presenting Scenario: While washing dishes at the kitchen sink, the patient hears the sound of running water. This instantly triggers an irresistible urge to urinate, resulting in a complete involuntary loss of bladder before he can reach the bathroom.

Key Features:

· Complete bladder emptying
· Trigger: Auditory stimulus (running water)
· Common in: Age-related bladder hypersensitivity

Overflow incontinence

Characteristics: Involuntary, continuous urinary leakage or dribbling, incomplete bladder emptying
Causes: Impaired detrusor contractility or bladder outlet obstruction (rare in women)
If bladder is over-distended:

- **Increase in intra-abdominal pressure can force urine past urethral sphincter, causing stress incontinence**
- **Bladder over-distention may provoke uninhibited detrusor contraction, leading to incontinence**

Case Scenario – Overflow Incontinence

Patient: 70-year-old male, history of benign prostatic hyperplasia (BPH) and type 2 diabetes, presented to your clinic
Complaint: Continuous dribbling of urine, feeling of incomplete bladder emptying, and nocturia.

Causes of Urethral Incontinence:

In older women, **physiologic changes** in the lower urinary tract can cause incontinence, including **involuntary detrusor contractions or overactivity**, **decreased detrusor contractility**, **low estrogen levels**, and **decreased urethral closure pressure**.

Other causes include:

- **Interstitial cystitis** (painful bladder syndrome)
- **Pelvic organ prolapse** (**cystocele**)
- **Neurologic disorders:** stroke, multiple sclerosis, Parkinson disease, disc herniation, spinal cord injury
- **Systemic conditions:** diabetes mellitus (overflow incontinence, poor urinary stream due to autonomic neuropathy)
- **Cancers**
- **Drugs:** A1 blockers, ACE inhibitors (dry cough / retention – overflow incontinence), A1 agonists (retention – overflow incontinence)

Extraurthral incontinence

❖Definition: The observation of urine leakage through channels other than the urethra.

❖Congenital

o Bladder exstrophy and ectopic ureter

❖Fistula

o Abnormal opening between the urinary tract and the outside

o It has obstetric and gynecological causes such as obstructed labor, malignancy and radiotherapy

Basic Evaluation of Urinary Incontinence

History

Patient's urinary symptoms (volume, onset of incontinence, timing, ,severity, hesitancy, precipitating triggers, nocturia, intermittent or slow stream incomplete emptying, continuous urine leakage, and straining to void).

Severity of symptoms & degree of bother and effect on quality of life.

Past Medical & Surgical History

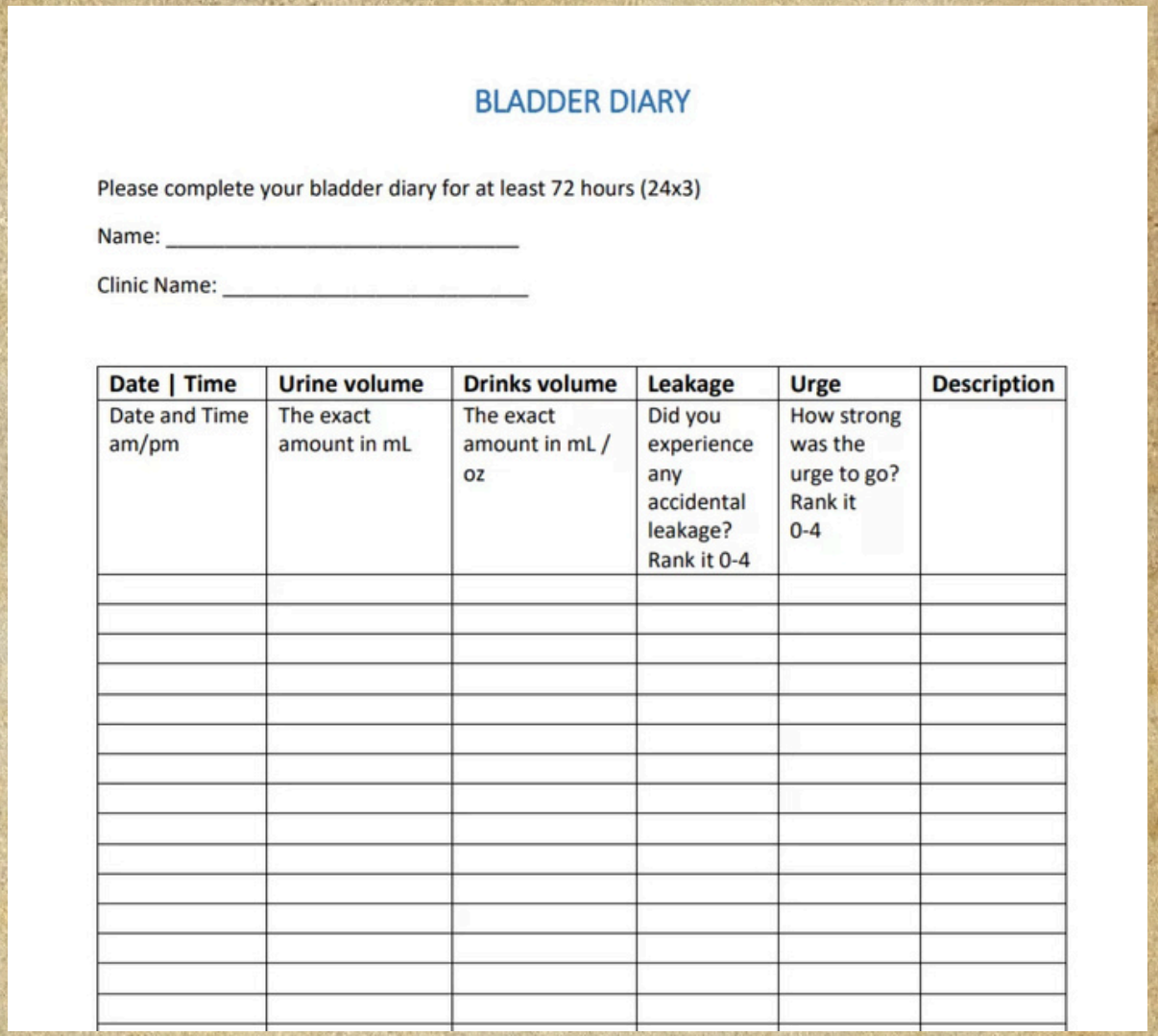
Neurological conditions (stroke, Parkinson's, MS, spinal injury), obstetric/gynecological history ,urological history (prostate disease/surgery),(pregnancies, vaginal deliveries, hysterectomy) chronic illnesses (diabetes, heart failure).

Medications

Diuretics, alpha-blockers, ACE inhibitors, anticholinergics, sedatives.

Fluid intake (amount, type – caffeine, alcohol), use of pads, bowel habits (constipation).

Voiding (bladder) diaries
Frequency- volume bladder charts are
useful for assessing incontinenc
frequency, severity, and volume of urine loss during incontinent. episodes



BLADDER DIARY

Please complete your bladder diary for at least 72 hours (24x3)

Name: _____

Clinic Name: _____

Date | Time	Urine volume	Drinks volume	Leakage	Urge	Description
Date and Time am/pm	The exact amount in mL	The exact amount in mL / oz	Did you experience any accidental leakage? Rank it 0-4	How strong was the urge to go? Rank it 0-4	

If there is indications to evaluate for underlying serious causes or potentially reversible conditions .

Alarm symptoms on history include

- sudden onset of incontinence (infection or stones).
- the presence of abdominal or pelvic pain.
- Hematuria (infection or cancer).
- changes in gait or new lower extremity weakness, cardiopulmonary or neurologic symptoms.
- mental status changes.

Physical examination

General Examination

Vital signs: blood pressure, pulse, weight (obesity = risk factor).
General neurological status

Abdominal Examination

Palpation for
Bladder distension (urinary retention)
Pelvic/abdominal masses (e.g., uterine fibroid, ovarian

Pelvic Examination (in females)

Inspect external genitalia for atrophy, inflammation, lesionss.
pelvic floor muscle tone by digital exam.
Check for pelvic organ prolapse (cystocele, rectocele, uterine prolapse).

Rectal Examination

Assess anal sphincter tone.
Check for fecal impaction.
In males: evaluate prostate.

Neurological exam

The neurological exam in urinary incontinence focuses on S2–S4 and the lower limbs → to determine whether incontinence is due to a neurogenic bladder

Bladder stress test

a simple clinical test used to confirm stress urinary incontinence by checking for urine leakage .from the urethra during coughing or straining with a full bladder

Postvoid residual volume (PVR) — In general, a PVR of < 50 mL is considered adequate emptying, and a PVR > 200 mL is considered inadequate and suggestive of either detrusor weakness or bladder outlet obstruction.

Urinalysis, urine culture if indicated.

BUN, creatinine, fasting glucose.

Office Evaluation of Urinary Incontinence

- Identify presence of UI
- Assess for reversible causes and treat
- If UI persistent, determine type and initiate treatment
- Identify patient who needs further evaluation and referral

Referral Criteria

Recurrent urinary tract infections.

Hematuria

Elevated postvoid residual or other evidence of possible obstruction.

Recent gynecological or urological surgery or pelvic radiation.

Failed treatment of stress or urge UI.

Treatment Options

1.Behavioral

2. Pharmacological

3. Functional Electrical Stimulation

4. Surgery

Behavioral Treatments for urinary Incontinence

Behavioral interventions are considered first-line treatment for many types of urinary incontinenc as they are safe, non-invasive, and often effective without the need for medications or surgery.

Lifestyle Modifications

Reduce bladder irritants: caffeine, alcohol, carbonated drinks. Maintain optimal fluid intake: avoid both overhydration and dehydration. Weight loss in overweight/obese patients, as excess abdominal pressure worsens leakage. Smoking cessation: reduces chronic cough and pelvic strain

Scheduled Voiding (Timed Voiding)

Patients void according to a fixed schedule (e.g., every 2–3 hours) regardless of urge. This is especially useful in patients with cognitive impairment or limited awareness of bladder sensations

Bladder Training

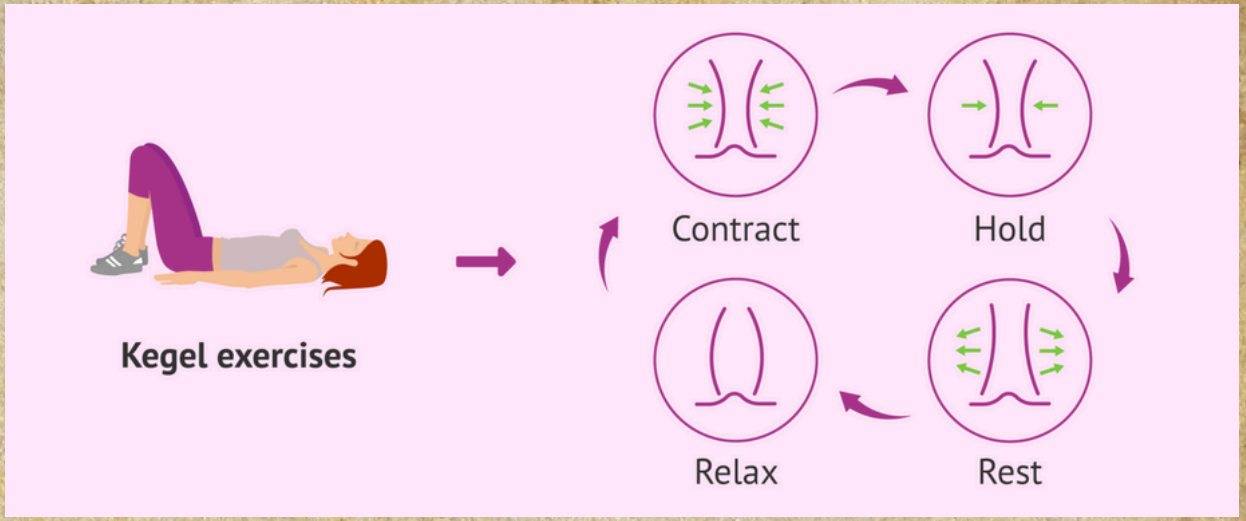
Patients are instructed to gradually increase the interval between voids. For example, they may start voiding every 90 minutes, then extend to every 2 hours, and so on. This helps increase bladder capacity and reduce urgency/frequency episodes.

Pelvic Floor Muscle Training (PFMT / Kegel Exercises)

Focuses on strengthening the pelvic floor muscles .
Technique: patients contract the pelvic floor muscles for 5–10 seconds, then relax .
Repeated several times daily

Effective in stress urinary incontinence and also provides support for mixed cases.

Isolation of the pelvic muscles
Avoidance of abdominal, buttock or thigh muscle contractions



Medical treatment for UI

Phenylpropanolamine (PPA) in Stress Urinary Incontinence

Drug Class & Mechanism

Class: Sympathomimetic amine (α-adrenergic agonist).

Action:

Stimulates α1-adrenergic receptors in the urethral smooth muscle.

Increases bladder neck and urethral sphincter tone.

Reduces urine leakage during activities that increase intra-abdominal pressure (cough, sneeze, exercise).

Adverse Effects

Cardiovascular: Hypertension, palpitations, tachycardia.

CNS: Anxiety, insomnia, tremor

Serious risk: Increased incidence of hemorrhagic stroke

Withdrawn from the U.S. market in 2000.

.No longer recommended in Europe and many other countries

Duloxetine

Drug Class & Mechanism

.Class: Serotonin–Norepinephrine Reuptake Inhibitor (SNRI)

:Mechanism

Inhibits reuptake of serotonin (5-HT) and norepinephrine (NE) in the Onuf's nucleus of the .sacral spinal cord

:This increases activation of pudendal motor neurons, leading to

.contraction of external urethral sphincter ↑

Improved urethral closure during stress events (cough, laugh, sneeze)

..Dosage 40 mg twice daily

Adverse Effects

.Common: Nausea, dry mouth, constipation, fatigue, insomnia, dizziness

Serious: Suicidality (especially in young patients), liver toxicity, serotonin syndrome (if .(combined with other serotonergic drugs

.High discontinuation rate due to side effects (up to 20–30%)

Estrogen

Estrogen receptors are present in the urethra, bladder, vagina, and pelvic floor muscles.

→ After menopause, estrogen deficiency

Urethral mucosal atrophy

.blood flow and thickness of urethral epithelium ↓

.Weaker periurethral connective tissue

.Vaginal atrophy and dryness → worsens symptoms

,This can contribute to stress and urge incontinence

Combined study with Phenylpropanolamine suggested improvement in combination

Topical estrogen:

.Improves urogenital atrophy (dryness, irritation, dyspareunia)

.May help with mild stress incontinence

.Can reduce urgency and frequency in some women

.Improves efficacy of pelvic floor muscle training
Indicated mainly in postmenopausal women with:

.Urogenital atrophy

.Mild stress or urge incontinence, especially if combined with pelvic floor therapy

Surgery and procedures
for stress incontinence

Indications

:Mainly for stress urinary incontinence (SUI) when

Conservative measures (pelvic floor training, lifestyle changes)
.have failed

.Patient has significant impact on quality of life

Suitable for women who are fit for surgery

A. Mid-Urethral Sling Procedures (Gold Standard)

:Types

.TVT (Tension-free Vaginal Tape, retropubic)

.TOT (Transobturator Tape)

-Mechanism: A synthetic mesh sling is placed under the mid-urethra to provide support during ↑ intra .abdominal pressure

.Success rate: 80–90%

.Complications: Mesh erosion, voiding dysfunction, bladder perforation

B. Burch Colposuspension

.Approach: Open or laparoscopic

Mechanism: Sutures placed at paraurethral vaginal tissue → anchored to Cooper's .ligament → elevates bladder neck

.Indications: Used when sling not possible or during concomitant pelvic surgery

.Complications: Voiding dysfunction, pelvic organ prolapse (later)

C. Urethral Bulking Agents

Mechanism: Injection of bulking material (e.g., collagen, silicone particles) around urethra → increases .resistance

.Advantage: Minimally invasive, outpatient

.Limitation: Less durable, often requires repeat injections

.Best for: Elderly, frail, or high-risk surgical patients

D. Vaginal Pessary

.Supports the urethrovesical junction

Prevents downward movement of the urethra during activities that ↑ intra-abdominal pressure .(cough, sneeze, exercise)

.Restores the urethral angle, improving continence

Medical Treatment of Overactive Bladder

Non-Pharmacologic (before meds)

.Bladder training

.Timed voiding

.Pelvic floor muscle training

.Fluid and caffeine management

.If these fail → pharmacologic therapy

Pharmacologic Options

A. Antimuscarinic Agents (First-line drugs)

.Examples: Oxybutynin, Tolterodine, Solifenacin, Darifenacin, Trospium

Mechanism: Block M2/M3 muscarinic receptors in the bladder → reduce involuntary detrusor .contractions → ↑ bladder capacity

Oxybutynin IR 2.5-5 mg bid-qid

Ditropan XL 5-20 mg daily

Oxytrol patch TDS 3.9 mg 2x/wk

Tolterodine tartrate IR 1-2 mg bid

Detrol LA 2-4 mg daily

B. β3-Adrenergic Agonists

.Example: Mirabegron

.Mechanism: Stimulates β3 receptors in bladder detrusor → relaxation → ↑ bladder capacity

.Advantages: Similar efficacy to antimuscarinics, better tolerated (less dry mouth/constipation)

.Adverse effects: Hypertension, tachycardia, headache

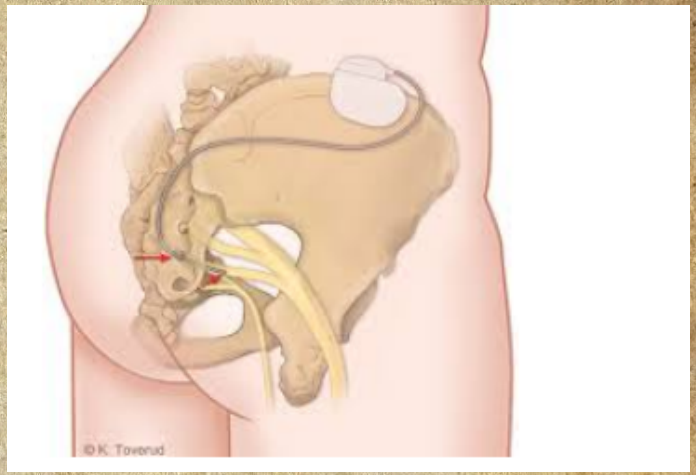
.Use: Good alternative in elderly or when antimuscarinics not tolerated

Antimuscarinic + β3-agonist (e.g., solifenacin + mirabegron).

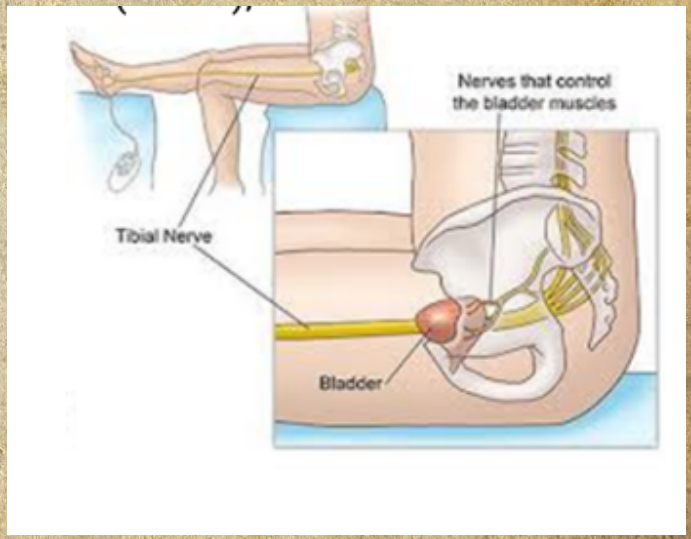
Used when single drug not effective

Surgery and procedures for overactive bladder

I1. Sacral Neuromodulation (Sacral Nerve Stimulation)
Mechanism:
Electrical stimulation of sacral nerves (usually S3).
Modulates bladder reflexes → reduces urgency, frequency, urge incontinence.
Indications: Refractory OAB, urge incontinence..



2. Posterior Tibial Nerve Stimulation (PTNS)
Mechanism: Electrical stimulation of tibial nerve → modulates sacral plexus and bladder reflexes.
Indications: Mild to moderate refractory OAB.

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