Urinary Retention (UR)

**Definition:**
- Inability or failure to empty the bladder completely.
- Either Acute or Chronic
- Criteria –
  - Post-void residual (PVR) volume > 75 to 100 cc
  - Elderly patients > 150 to 200 cc
  - Should be based on 2 separate readings
- Prevalence rises with age
  - Men – from enlargement of prostate gland
  - Onset of neurologic conditions (e.g. diabetes).
Urinary Retention (UR)

Chronic UR
- Ongoing, gradual inability to void
- Takes months to develop
- Bladder becomes used to being stretched
- Patients:
  - Adapt to the condition
  - Void through abdominal straining
  - May not be aware of it.
- Severe UR can expand the bladder to 2,000-3,000 mL

Anatomy & Physiology of the GU Tract

Components of the urinary tract:
- 2 kidneys, 2 ureters, (upper);
- Bladder, internal & external sphincter, urethra (lower).

FEMALE
- Kidneys
- Ureters
- Bladder
- Urinary sphincter
- Prostate
- Urethra

MALE

Bladder- Detrusor Muscle

The adult urinary bladder is a
- Referred to as “the detrusor muscle”
- Hollow muscular sac
- Located in the pelvic region.
- Due to anatomical relationship of bladder to other organs (bowel and uterus), enlargement (or prolapse) of these organs can compromise the bladder’s ability to empty completely.

Three layers comprise the structure of the bladder.
- Innermost layer is a mucosal layer.
- Second, muscular layer of the bladder is a highly elastic structure comprised of interlaced smooth muscle layers collectively known as the detrusor.
- Third and most external layer of the bladder is connective tissue.

Bladder- Detrusor Muscle

- Trigone -
  - Triangular floor of the bladder (referred to as bladder neck) through which the ureters enter and the urethra exits.
  - Uretovesical (UV) junction –
    - Site where ureters enter the bladder
    - Muscular one-way opening
    - Ureters enter the bladder in such a way that contraction of the bladder seals the ureter off during voiding
    - Prevents urine from back flowing into the ureters and kidneys.

Urethra

- Small muscular tube that leads from the floor or neck of the bladder to the outside of the body.
  - Female urethra - 1.5 inches long
    - Extends from the bladder to the external orifice in the vestibule
    - Directed obliquely, downward and forward
  - Male urethra - 8 inches long
    - Presents a double curve in the ordinary relaxed state of the penis
    - Divided into three portions:
      - Prostatic
      - Membranous
      - Cavernous
**Urinary Retention—When the Bladder Won’t Empty**

### Urinary Sphincters

- **2 Sphincters**
  - **Internal**
  - **External**
- Involved in the voiding process
- Normally contracted or maintained in a closed position and need stimulation to open.

### Urinary Sphincters

- **Internal sphincter**
  - Not a distinct structure, but an elastic mechanism formed by bladder muscle fibers that pass around the most proximal portion of the urethra as it exits the bladder.
  - Under involuntary or autonomic control.
  - Keeps the bladder neck closed during bladder filling thus maintaining continence.

### Urinary Sphincters

- **External sphincter**
  - Lies below the internal sphincter
  - Well-defined ring of skeletal muscle surrounding the urethra as it passes through the pelvic floor.
  - Provides voluntary control of voiding.
    - Voluntarily relaxed to facilitate emptying, or
    - Voluntarily contracted to prevent urinary leakage with increases in abdominal pressure.

### Anatomy of the Pelvic Floor

- Consists of supportive tissues
- Extend from the pubic bone to the posterior structures of the pelvis and sacrum
- Three supportive structures:
  - Endopelvic fascia (combination of collagen and elastin smooth muscle)
  - Levator ani (provides primary, flexible support for pelvic viscera)
  - Perineal membrane/anal sphincter

### Neurotransmitters

- **Acetylcholine (Ach)** stimulates bladder contraction
- **Norepinephrine (2 receptors)**
  - Beta-adrenergic receptors found in the bladder body
    - Inhibit detrusor contractions
    - Promotes bladder filling and storage.
  - Alpha-adrenergic receptors in the bladder neck
    - Cause smooth muscle contraction
    - Stimulate contraction of the external sphincter.

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Urinary Retention—When the Bladder Won’t Empty

**Mechanism of Micturition**

1. Normal bladder cycle
   - Voiding
   - Detrusor muscle relaxes
   - Cystometrogram (CMG)  
   - Normal voiding cycle

2. Normal bladder cycle
   - Bladder fills
   - Detrusor muscle contracts
   - Bladder empties
   - Cystometrogram (CMG)

**Neurogenic bladder disorders resulting from central nervous system (CNS) lesions**

- Congenital anomalies
  - Spina bifida
  - Myelomeningocele
  - Spinal dysraphism
  - Dermoid cyst or fistula of the sacral cord

**Types of Neurogenic Bladder**

1. Hyper-reflexic (spastic) bladder or detrusor hyper-reflexia

- Referred to as “upper motor neuron bladder”
- Injury above the level of the sacral (S2 to S4) reflex voiding center.
- Voiding reflex is intact, but hyperactive as normal inhibiting influence of the cerebral centers is blocked at level of the spinal lesion.
- Inability to sense bladder filling and inhibit emptying.
- Complaint of UI.
- Detrusor sphincter dysynergia can occur resulting in incomplete bladder emptying.

**Spinal Cord Injury**

**Children**

**Striated External Sphincter Dyssynergia**

- Most common form.
- Treatment:
  - Timed voiding
  - Voiding diary
  - Timer or watch
  - Treat constipation if present
  - Biofeedback therapy to coach the patient into relaxing the pelvic floor.
- Only if these less invasive means of treatment fail, would one proceed to these remaining options, usually following a carefully performed videourodynamics assessment.
  - Intermittent catheterization
  - Cystoscopy and direct injection of botulinum toxin (Botox) into striated external sphincter

**Types of Neurogenic Bladder**

1. Hyper-reflexic (spastic) bladder or detrusor hyper-reflexia (cont)

- Cerebral cortex lesions result of
  - CVA-stroke
  - Brain tumor
  - Head injury
  - Multiple sclerosis
- Elderly - age changes in the brain result in impairment of function in a high percentage. Cortical damage impairs the ability to inhibit the sacral voiding reflex efficiently.
- Bladder sensation is retained, urgency is felt but inhibiting signal is weak or absent leading to urge incontinence (OAB).
- Term “unstable bladder” can be used to describe an uninhibited bladder of neurogenic or idiopathic origin.
Urinary Retention—When the Bladder Won’t Empty

Types of Neurogenic Bladder
(1) Hyper-reflexic (spastic) bladder or detrusor hyper-reflexia (cont)
- Evaluation
  - Urodynamic studies
- Treatment
  - Anticholinergic medication
  - Intermittent catheterization.

Types of Neurogenic Bladder
(2) Areflexic or lower motor neuron bladder
- Injury occurs at the sacral voiding center itself.
- Results in a flaccid bladder—
  - no awareness of bladder filling is present
  - Unable to initiate a void
  - Urinary retention often results.
- Frequently seen after acute spinal cord injury due to the phenomenon of spinal shock.

Types of Neurogenic Bladder
(2) Areflexic or lower motor neuron bladder (cont)
- Treatment
  - Intermittent catheterization
  - Cholinergic agents (probanthine) - to stimulate bladder muscle contractions

Types of Neurogenic Bladder
(3) Sensory and/or Motor Paralytic Bladder
- Causes
  - Detrusor-sphincter-dyssynergia
  - BPH
  - Prostatitis
  - Prostate cancer treatment (e.g. seeds)
  - Urethral stricture
  - Severe constipation/fecal impaction

Types of Neurogenic Bladder
(3) Sensory and/or Motor Paralytic Bladder
- Treatment
  - Bladder training program which encourages regular toileting
  - Intermittent catheterization
  - Cholinergic medication

Types of Neurogenic Bladder
(4) Urethral Obstruction
- Evaluation
- Treatment

Types of Neurogenic Bladder
(4) Urethral Obstruction
Urinary Retention-When the Bladder Won't Empty

**Urinary Retention Assessment**

- Urinary symptoms:
  - Dribbling after voiding
  - Urinating in small quantities
  - Difficulty initiating urination (hesitancy)
  - Straining or bearing down to void?
  - Feeling of incomplete bladder emptying (returns to bathroom 5 to 10 minutes after urinating to completely empty bladder)
  - Frequency of urination
  - Nocturia (number of times at night awakens to go to the bathroom)
  - Intense desire to urinate
  - Lower abdominal pain
  - Diaphoresis, an elevated BP secondary to impaired renal function (seen in acute UR)
  - Neurologic injury - may experience minimal or no pain.

- Other possible symptoms - nocturnal enuresis, urge or stress incontinence, constant incontinence or incontinence at rest.
- Determine previous urologic problems such as UTI and outlet obstructive symptomatology.
- Recent injury or trauma that could have affected the spinal cord
  - Compression due to trauma, tumor
  - Anatomic defects including spinal stenosis or herniated disc.

**Urinary Retention Pertinent Medical History**

- Neurologic diseases that may lead to urinary retention include:
  - Diabetes mellitus
  - Multiple sclerosis
  - Spina bifida
  - Syphilis
  - Guillain-Barre syndrome
  - Genital herpes.
- In many of these cases, onset of a neurogenic bladder may be gradual and subtle.

**Physical Examination Abdomen**

- Palpation reveals a mid-line mass extending upward from the suprapubic area. (e.g. enlarged bladder)
- Percussion (dull sound, representing fluid) of the suprapubic area
  - Dullness of the bladder to the level of the umbilicus indicates at least 500 mL of urine in the bladder
  - Bladders containing 1,000 mL or more extend well above the umbilicus.

**Physical Examination Neurologic**

- Gait disorders
- Numbness tingling and/or weakness, particularly in a stocking and glove distribution
- Diminished or increased deep tendon reflex's
- Babinski or Hoffman's
- Anal "wink"
- Bulbocavernous reflexes
Urinary Retention—When the Bladder Won’t Empty

Treatments

1. Voiding Maneuvers
2. Intermittent Catheterization (IC)
3. Drug Therapy

Voiding Maneuvers

Techniques to stimulate complete bladder emptying.
1. A “trigger” can initiate a bladder contraction.
   - Common method is called “suprapubic tapping”
     - Drumming the abdomen overlying the bladder rapidly 7 or 8 times, stop 3 seconds, and repeat.
     - Application of rhythmic tapping to produce summation effect on the tension receptors in the bladder wall and activation of the reflex arc via the afferent discharges
   - Other trigger mechanisms include:
     - pulling pubic hairs
     - stroking abdomen or inner thigh
     - digital anal stimulation.

Voiding Maneuvers (cont)

Techniques to help stimulate complete bladder emptying.
2. Double voiding
   - Involves urinating twice during each trip to the bathroom to reduce residual urine volumes.
   - Instruct patient to
     - Urinate
     - Remain on the toilet or stand up
     - Attempt to urinate again after a rest period of several minutes.

Voiding Maneuvers (cont)

Techniques to help stimulate complete bladder emptying.
3. Crede Maneuvers –
   - Means of direct manual compression to empty an atonic or flaccid bladder
   - Press firmly with one hand (or both hands) directly into the abdomen over the bladder.
   - Can facilitate urination if sphincter mechanism is not in spasm

Treatment

Intermittent Catheterization (IC)

Definition:
- Referred to as “in and out” or straight catheterization
- Insertion of a catheter into the bladder to allow for drainage
- Removed after drainage

Advantages:
- Minimizes episodes of overdistention of bladder
- Frequent, regular bladder emptying prevents infection

Techniques:
- Sterile Intermittent Catheterization (SIC or IC)
  - Entire catheterization is sterile
  - New catheter each catheterization
- Clean Intermittent Self-catheterization (CIC or CISC)
  - Performed by patient in the home
  - Reuses catheters for 7 days
- 2007 – New Policy (VA & Medicare) on single-use catheters
Urinary Retention—When the Bladder Won’t Empty

Intermittent Catheterization (IC) Common Problems

- Bacteriuria - 50%
  - Rarely leads to urinary tract infections.
  - Usually asymptomatic
  - Should not be treated with antibiotics.

- Urinary tract infections - 10 to 15%
  - More prevalent in patients who have higher residual urine volumes at the time of catheterization.
  - Chronic pyelonephritis is rare.
  - Long-term antibiotic prophylaxis is undesirable
  - Associated with the emergence of resistant bacterial strains.

- Swelling of the urethra and epididymitis due to urethral and bladder inflammation
- Scrotal abscess are seen in men

- Bladder stones - occur in patients who perform CIC long term.
  - Stones have been shown to grow around introduced pubic hairs.
  - Compliance esp. in a young person.

- Urethral Damage - men - similar to the problems seen with indwelling catheterization
  - Urethritis, inflammation of the urethral meatus due to frequent insertion of catheters.
  - Urethral stricture - urethral inflammatory response to repeated catheterizations.
    - Risk increases with the number of years of IC.
    - Difficulty with insertion sign of the presence of a urethral stricture.
  - Creation of a false passage
    - Persisting urethral strictures.
    - False passage occurs from trauma to the urethra at site of the external sphincter.

- Several different types of catheters.
- Clinician (nurse) who instructs the patient usually makes the catheter choice.
- Should have a checklist when teaching patient so all areas are covered.
Urinary Retention—When the Bladder Won’t Empty

**Interruption Catheterization (IC) Types of Catheter**

- Preferred catheter used for IC are clear or of polyvinyl material (PVC – polyvinyl chloride).
- Red rubber catheter
  - More flexible
  - Some patients find them more difficult to insert
  - Contain latex - concern allergies
- Catheters fall into two main groups:
  - Require lubrication to be applied before insertion
  - Coating provides lubrication when water is applied.

**Types of Catheters**

- **Straight catheters**
  - PVC, silicone or rubber catheters that have 2 eyes at the tip that allow for urine drainage.
  - Length is either 5 inches (for women) or 12 inches (for men).

**Catheter tip configurations**

- **Straight**
  - Olive, coude tip catheter for women to help in identifying urinary meatus

**Types of Catheters - Coated**

- Coated catheters
  - Outer layer coated with antibacterial agent (e.g. nitrofurazone)
  - May produce local antibacterial activity.

**Types of Catheters**

- **Closed systems that provide sterile catheterization.**
- **System is 100% latex-free**
- **Uses a pre-lubricated catheter.**
- **Catheter passes through a special guide mechanism at the top of the pocket.**
  - Guide provides 2 main benefits:
    - Keeps the catheter straight as it is advanced
    - When squeezed, prevents the catheter from slipping during insertion.
  - Urine drains into the bag.
  - System may decrease chances of infection.
Intermittent Self-Catheterization (ISC) Schedule

- Based on the urine volume - general rule should not exceed 400 to 500 mls.
- Record amount of urine drained from the bladder.
- Voiding should be attempted before catheterization if appropriate.
- Catheterization is performed 3 to 4 times per day based on patient’s output.

Intermittent Catheterization New Policy

- VA
  - Follow manufacturers instructions for “single-use” catheters
- Medicare – catheter for each catheterization
  - One catheter and an individual packet of lubricant

Drug Therapy

- Alpha Blockers
  - Open bladder neck
  - Decrease size of prostate
- Anticholinergics
  - Used in patients with urgency and frequency
- Intravesical agents

Alpha Blockers Help the Bladder Empty

Relax smooth muscles in the bladder neck and prostate
- Tamsulosin: Flomax - 0.4 – 0.8 mg daily - HS
- Alfuzosin: Uroxatral - 10mg daily - HS

- Improvement in symptom scores run at around 50-60%
- Improvement can take anything from 2 wks to 4 mos to be noticeable to the patient

Distribution of Cholinergic and Adrenergic Receptors

Drugs for Urgency, Frequency and Urge Incontinence

Blocks bladder contraction by relaxing the bladder muscles

- Oral
  - Oxybutynin
    - Ditropan® — 5 mg tablet (BID-TID)
    - Ditropan XL® — 5, 10, 15 mg (QD)
  - Tolterodine
    - Detrol® — 1, 2 mg (BID)
    - Detrol® LA — 2, 4 mg (QD)
  - Trospium (Sanctura®) — 60 mg QD: 20 mg (BID)
  - Solifenacin (VESIcare®) — 5, 10 mg (QD)
  - Darifenacin (Enablex®) — 7.5, 15 mg (QD)
- Transdermal
  - Oxybutynin (OXYTROL®) — 3.9 mg twice a week
Thank you for your attention.

Special thanks to Coloplast for support of this program and for use of the product pictures.