

Neurogenic Bladder

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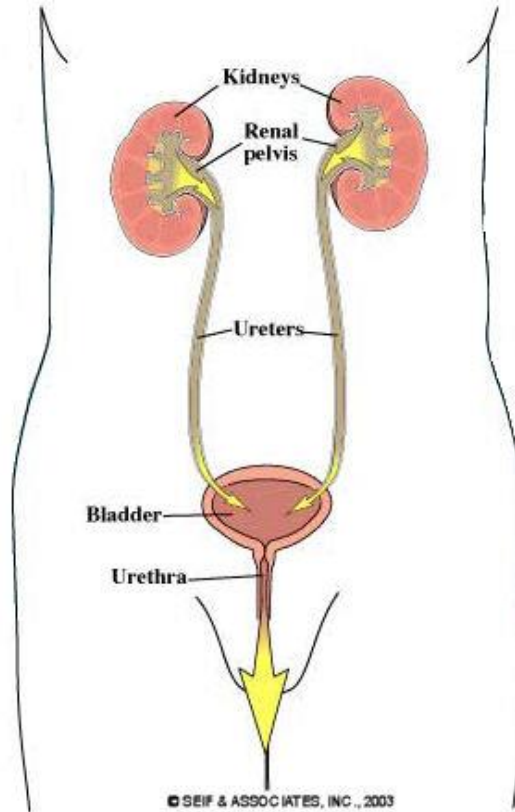
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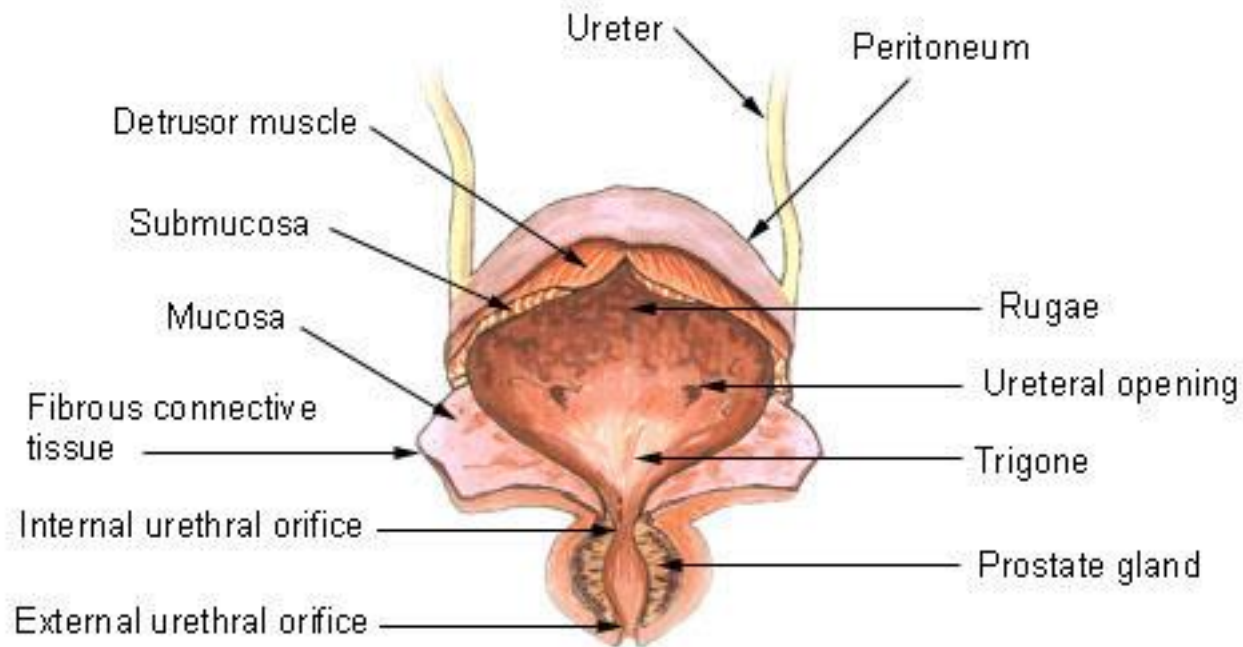
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Urinary Tract



The Urinary Bladder

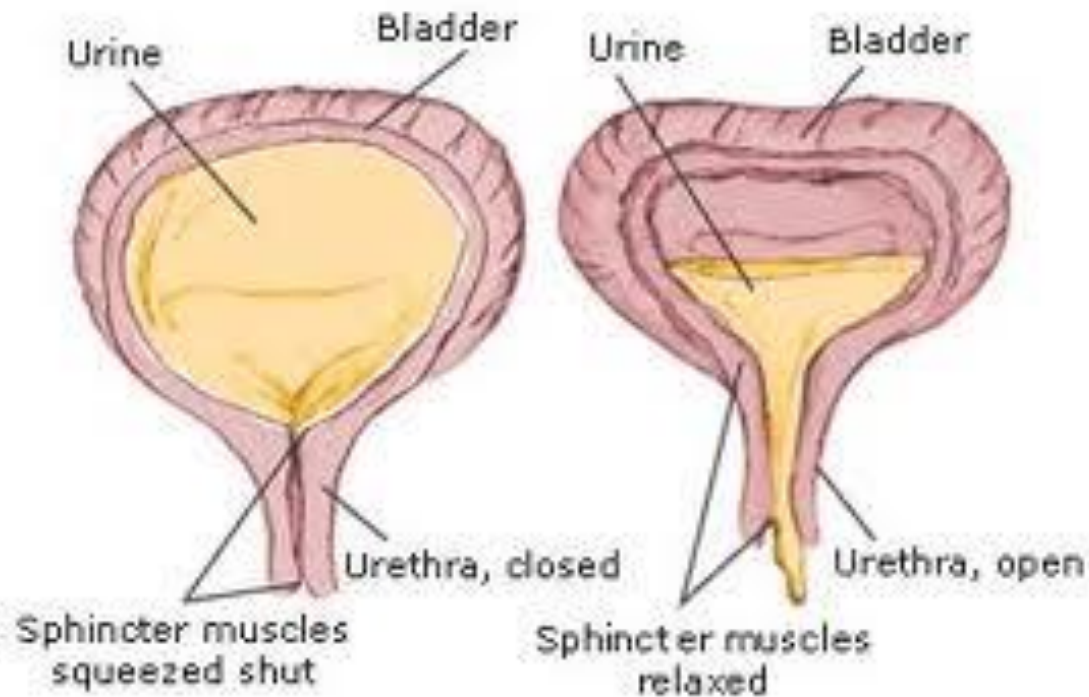
Urinary Bladder



Normal Bladder Function

- Allows bladder filling with little or no change in pressure
- Without involuntary contractions
- Control of emptying (continence)
- Phases
 - Storage Phase
 - Voiding Phase

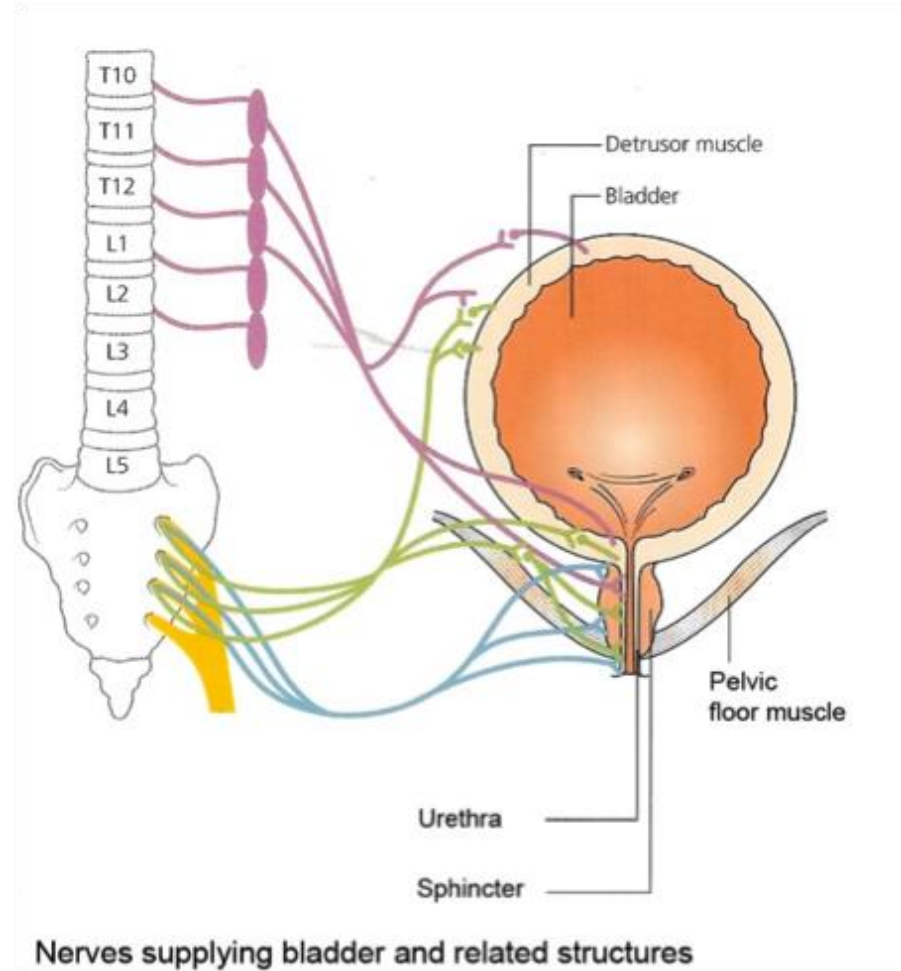
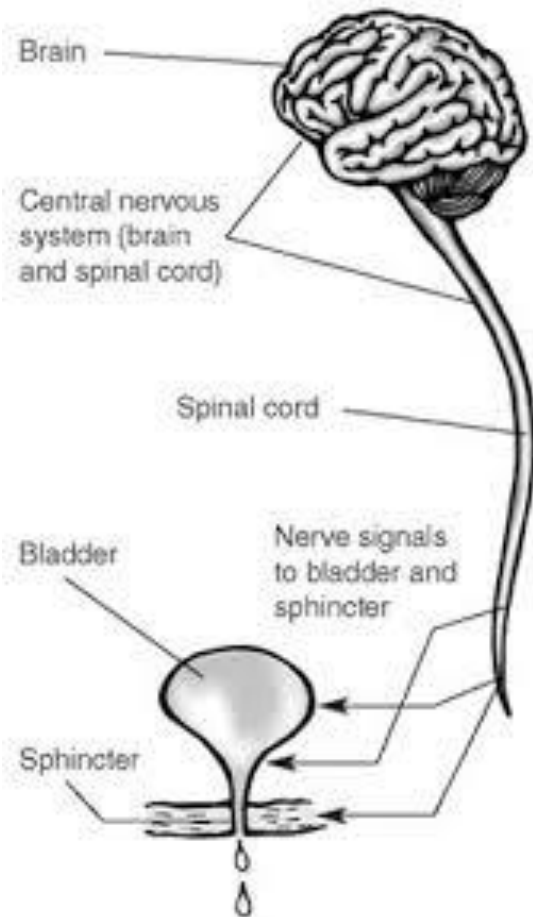
Normal Bladder Function



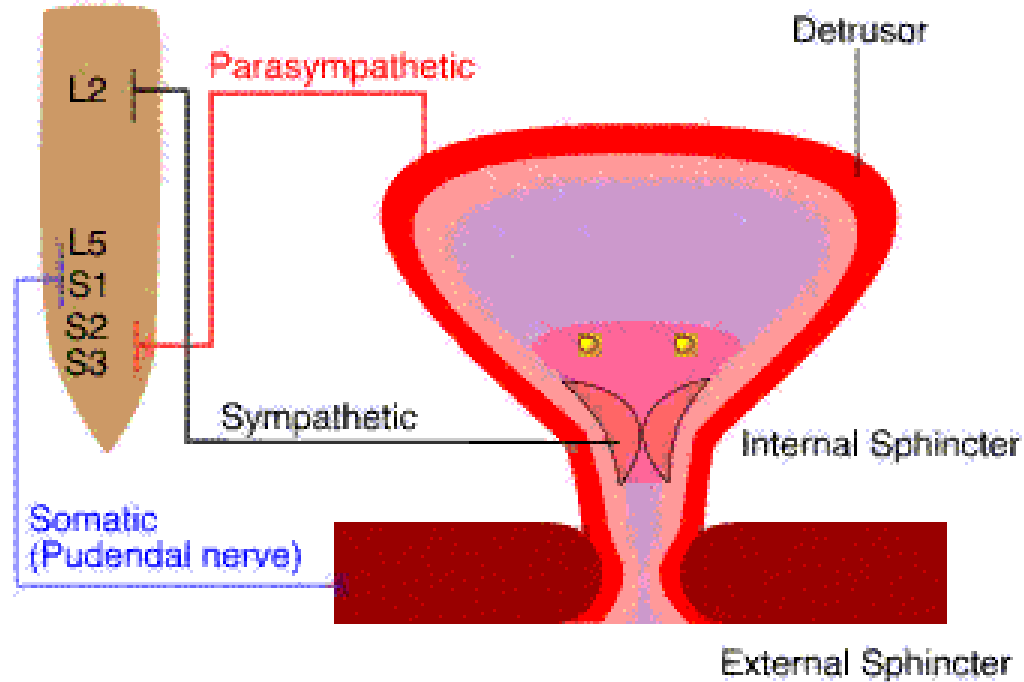
Neurogenic Bladder

- Neurogenic bladder is dysfunction of the bladder (lower urinary tract) due to neurologic problem
- Not a static condition; often changes over time
- Impairments in storage/filling and voiding
- Problems
 - High pressures → hydronephrosis
 - Uninhibited contractions → leaks
 - Low leak point pressure → incontinence
 - Impaired emptying → infection
- Management goals
 - Preserve renal function
 - Prevent infection
 - Achieve socially acceptable urinary continence
- Management
 - Surveillance
 - Clean Intermittent Catheterization
 - Medication
 - Surgery

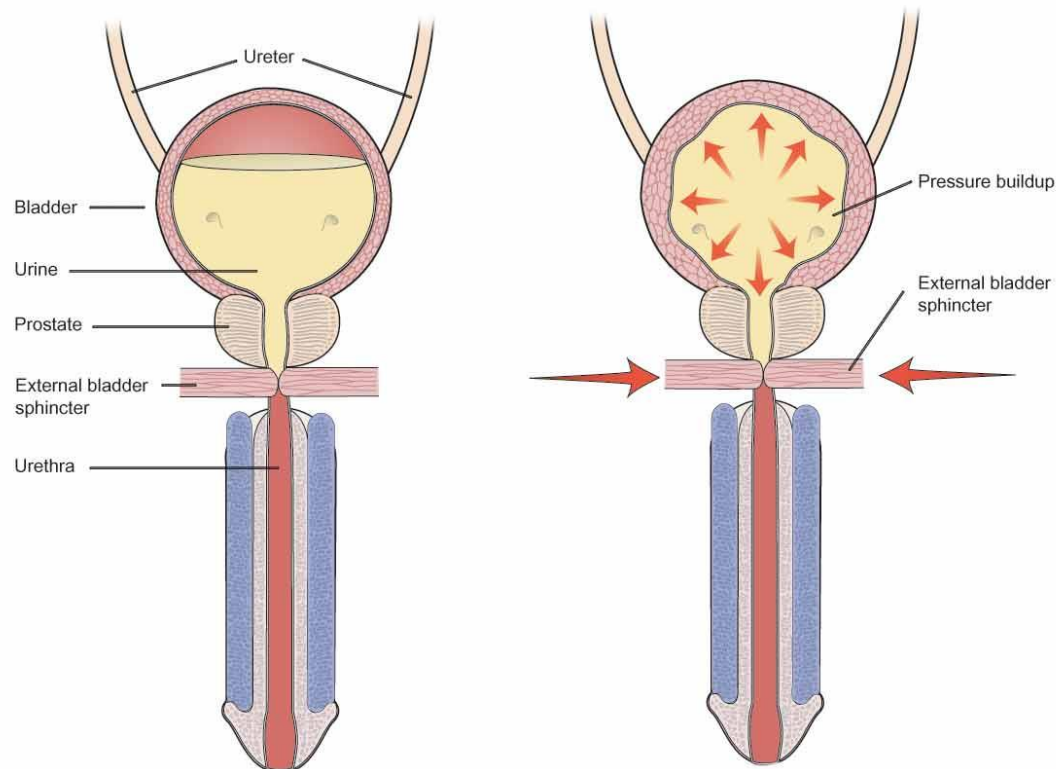
Neurogenic Bladder (neuropathic bladder)



Nervous System Control of the Bladder

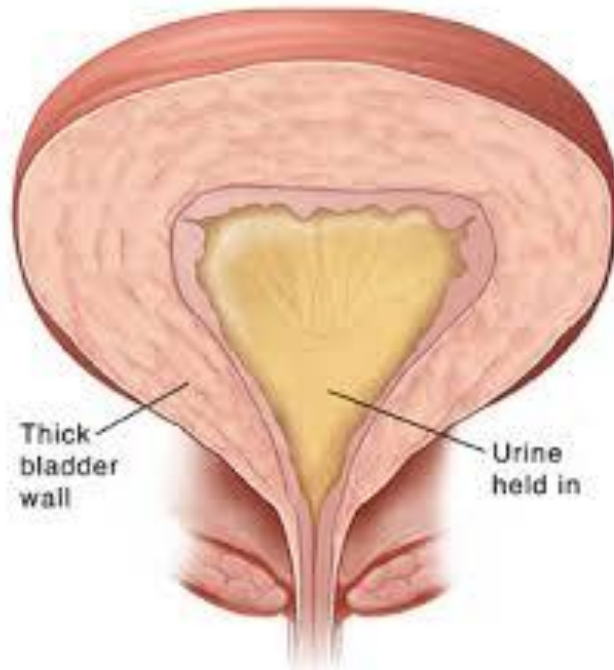


Bladder-Sphincter Dysnergia (Detrusor-Sphincter-Dysynergia or DSD)

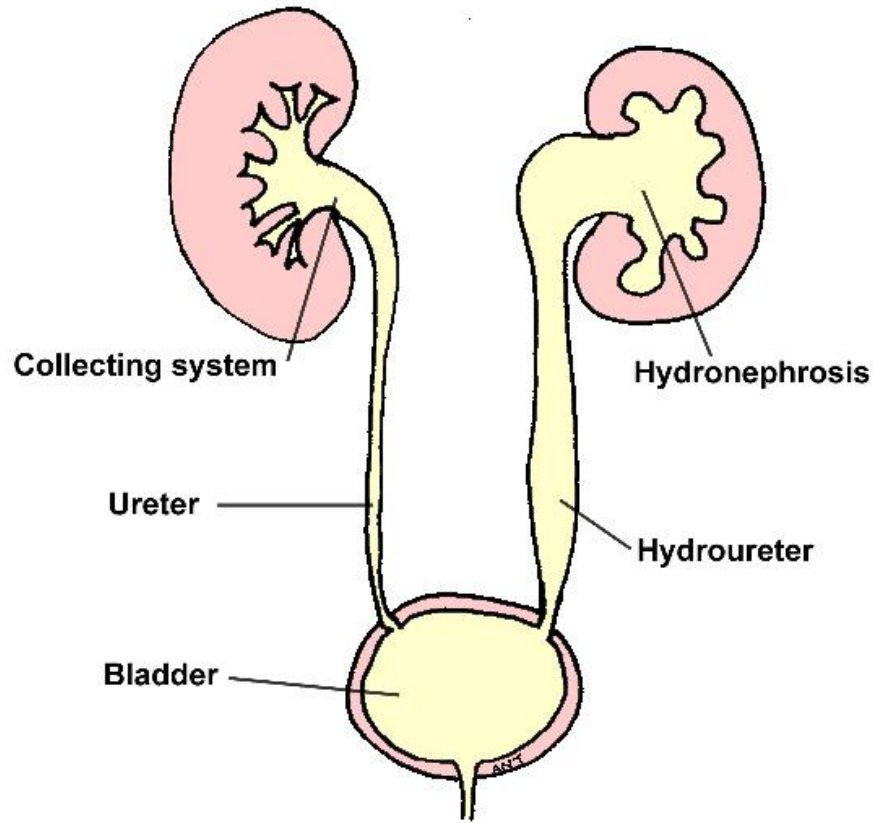


Bladder Sphincter Dysnergia

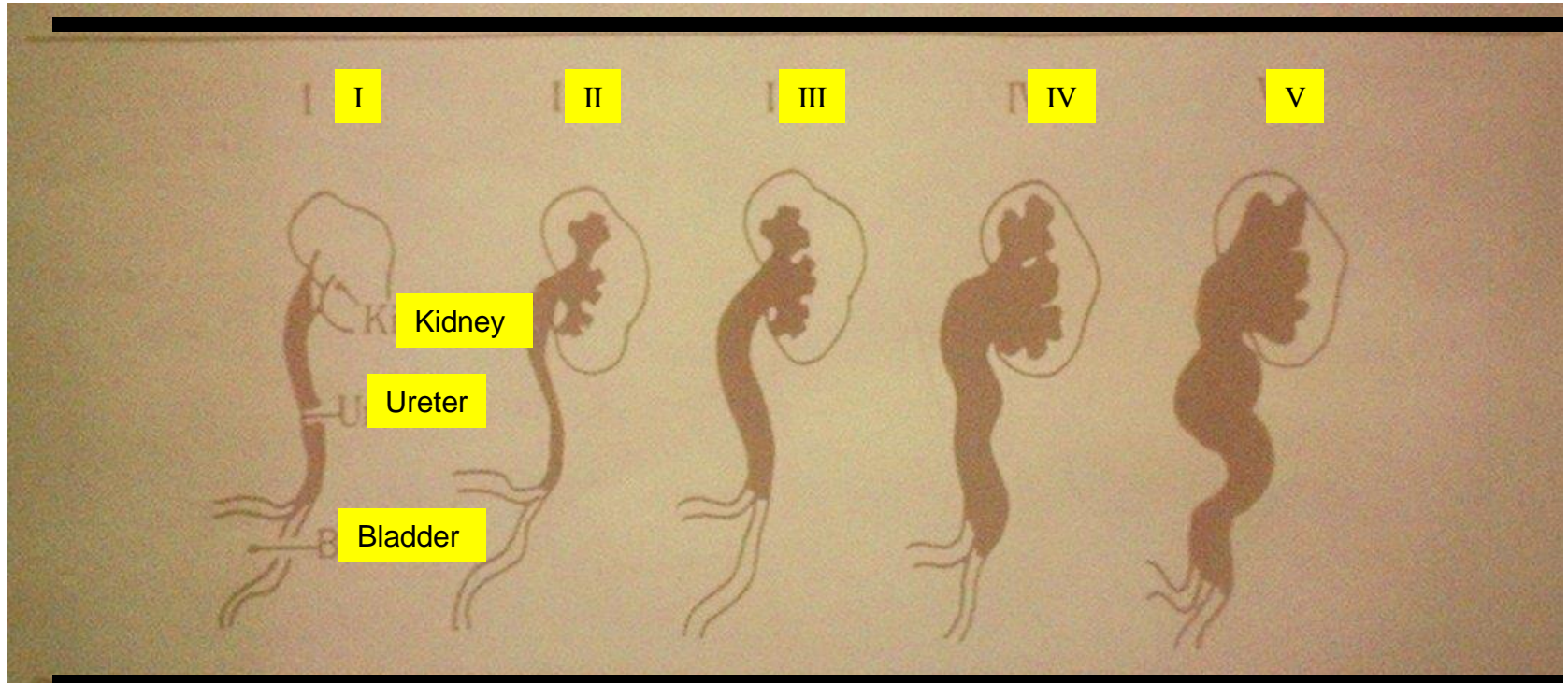
Bladder Wall Thickening



Dilatation of the Upper Urinary Tract



Vesicoureteral Reflux



Grades of reflux. Adapted from "Medical Versus Surgical Treatment of Primary Vesicoureteral Reflux" by S. Borkowski, 1981, *Pediatrics*, 67, p. 396, Reproduced by permission of *Pediatrics*.

Surveillance

- Urodynamic studies (UDS) = cystometrogram
- Voiding cystourethrogram (VCUG)
- Kidney (Renal) & Bladder Ultrasound
- Nuclear medicine studies
- Labs
 - Basic metabolic panel
 - Cystatin C
 - Urine analysis
 - Urine culture

Treatment

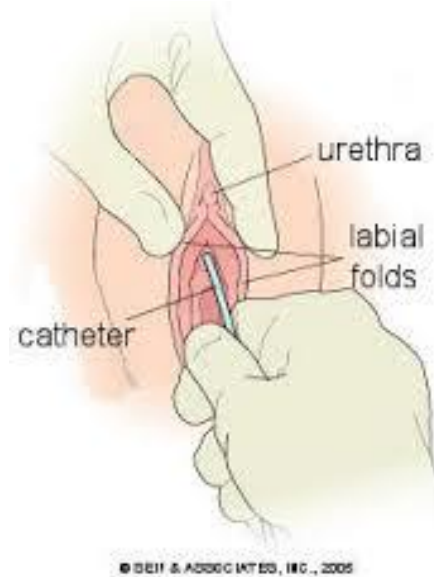
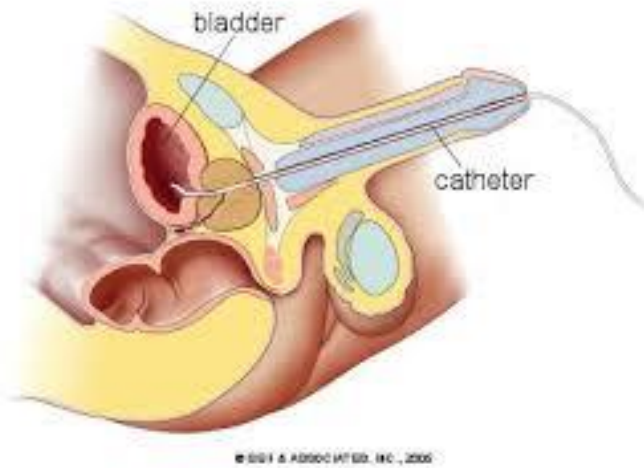
- Anti-cholinergic medications
 - Oxybutynin (Ditropan, Oxytrol)
 - Tolterodine (Detrol)
 - Others: Levsin, Vesicare
- Intermittent Catheterization
- Surgery
- Biofeedback
- Botox injection, Deflux injections

Intermittent Catheterization

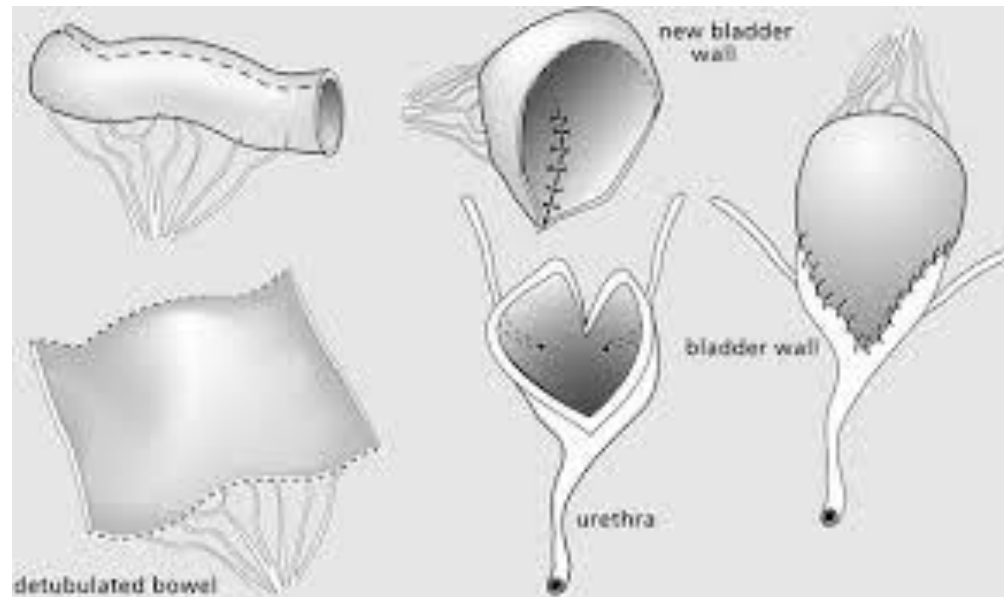


Intermittent catheterization

Male vs Female Catheterization



Bladder Augmentation (augmentation cystoplasty)



Mitrofanoff Continent Stoma

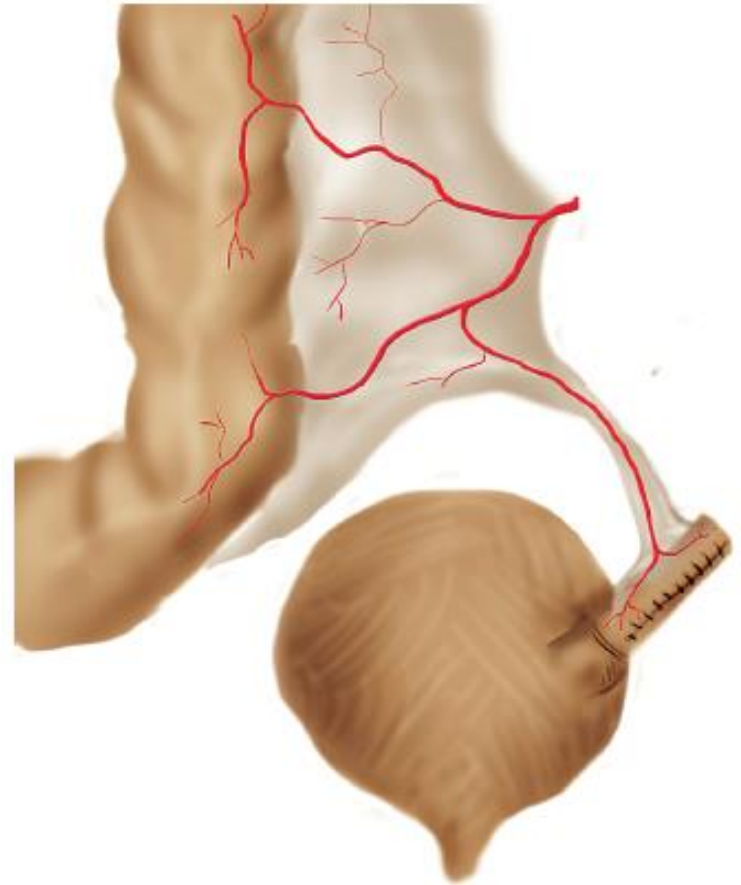
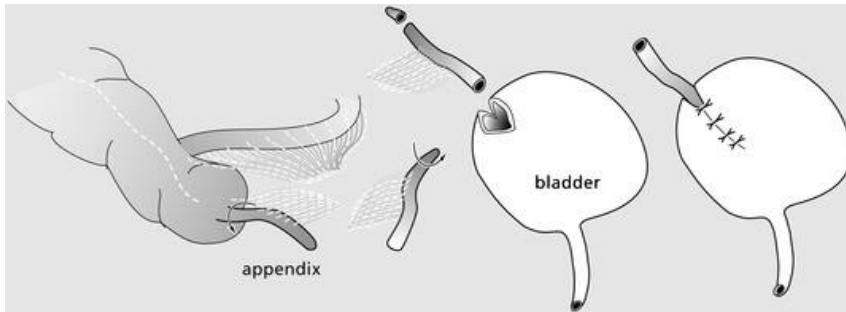


Figure 2 – Anastomosis of newly build tube on the superior part of the postero-lateral junction of the bladder.

Mitrofanoff Catheterized



Approach to Newborns/Infants

- NICU
 - Kidney & Bladder Ultrasound (dilatation, anomalies)
 - Voiding cystourethrogram (vesicoureteral reflux, bladder emptying)
 - Begin catheterization every 4 hours and wean to keep volumes below 20 mL
- First 3 months
 - Urodynamic studies (safe vs hostile bladder)
 - Leak-point pressure (<40 mm Hg is safe, protects the kidneys, but may make continence more challenging)
 - Uninhibited contractions
 - Detrusor-Sphincter Dyssynergia (DSD)
 - Compliance and capacity
- Proactive approach
 - Do catheterization regularly and start anticholinergic medication to relax bladder
 - In long run, this approach may
 - Increase bladder capacity,
 - Decrease deterioration of bladder and upper urinary tract,
 - Make acceptance of CIC and training easier
- Reactive approach (wait until problems develop)
 - Less work.
 - Less invasive.
 - Allows a child to demonstrate function.
 - Catheterization may not be needed.

Approach to Early Childhood

- Ultrasound every 6 months
- Labs yearly
- ? Urodynamic studies yearly
- Vigilance for infection
- Catheterization if needed due to hostile bladder or proactive approach

Approach to Children (3-10)

- Focus on continence
 - Need for catheterization
 - Is catheterization effective
 - Meds
- Continue to do surveillance
 - Ultrasound yearly
 - Labs yearly

Approach to Adolescents

- Evaluate bladder management
 - Infections
 - Dilatation
 - Continence
- Develop independence in performing bladder management regimen
- Consider surgery