

# CANADIAN UNDERGRADUATE UROLOGY CURRICULUM



Pediatric Urology

# A Message from CanUUC

This educational material is intended to supplement medical student knowledge on urological health and medical practices. We are committed to promoting inclusion across all our materials. We acknowledge that some language used within this content may include terminology from source materials and research studies, which has been maintained to reflect the scientific context in which information was gathered.

Wherever possible, we aim to use language that is respectful of all individuals, recognizing gender diversity, variations in sex characteristics, and the importance of inclusive terminology.

# Objectives

1. Define and describe the treatment of phimosis, paraphimosis and balanitis
2. Outline the basic management of nocturnal enuresis
3. Outline the investigation and management of a febrile pediatric UTI
4. List the common causes of antenatal hydronephrosis and collecting system abnormalities
5. Define cryptorchidism and hypospadias
6. Be aware of the diagnosis and management of pediatric scrotal conditions

# History

- **Age**
- **Presenting complaint**
- **History**
- **Medications and allergies**
- **PMHx**
  - Antenatal ultrasound
  - UTIs
- **Elimination History**
  - Voiding frequency
  - Holding maneuvers
  - Incontinence (day and night)
  - Bowel function (hard stool, infrequent stooling, straining, painful, clogging toilet, encoporesis)
- **Fluid intake**
- **Family History**
  - Childhood UTIs
  - Nocturnal enuresis
  - Congenital anomalies of the Kidney and Urinary Tract (CAKUT) - Cystic kidney disease renal agenesis, kidney obstruction, Vesicoureteral reflux (VUR)
  - Hypospadias and cryptorchidism

# Physical Examination

## Abdominal Exam

- Masses
- Pain
- Palpable bladder or stool

## Genitourinary Exam

- Rash
- Labial adhesions
- Urethral prolapse
- Ureterocele prolapse
- Urethral opening (location)
- Foreskin (phimosis vs retractable)
- Testicular position
- Testicular/inguinal masses

## Back Exam

- sacral dimples
- hairy patches
- vascular malformations
- skin tag
- lipoma
- asymmetric gluteal cleft

## Observe their voiding

## Measure post-void residual

# Phimosis, Paraphimosis and Balanitis

# Phimosis

- Narrowing of the opening of the prepuce



# Foreskin Care

- **Physiologic phimosis:** an asymptomatic, non-retractile foreskin; incidence ~50% children with foreskin in first grade.
- Suggest to parents
  - Normal cleaning: daily bath or shower by soaking. Do not retract forcefully. The child can retract themselves when old enough to do so
  - Teach children to pull back foreskin to void
  - Daily bathing (rather than showers) can reduce foreskin inflammation; use petroleum jelly for irritation as needed
- Treatment only necessary for phimosis causing infection, difficulty voiding and/or pain (including painful erections)

# Physiologic Phimosis

No scars, no bleeding, symmetric eversion of soft, supple skin



# Physiologic Phimosis

- Important to differentiate from pathologic phimosis
- If asymptomatic: NO TREATMENT
- Forceful retraction → bleeding → scar → more adhesions → need for treatment

# Pathological Phimosis

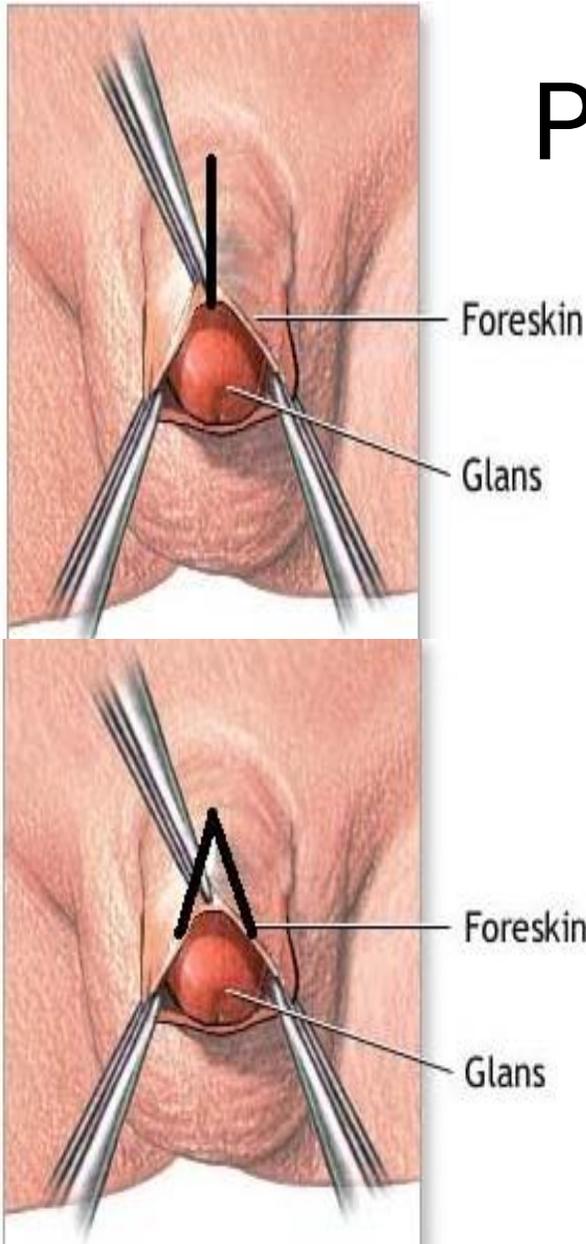
Distinguishing features:

- History of cracking and bleeding with retraction
- Indurated, scarred, whitened skin at tip of prepuce
- Narrowest part is most distal
- Painful erections
- Recurrent infections

This entity requires intervention



# Pathologic Phimosis: Treatment



## 1. Corticosteroid cream – first line

- Randomized study results = 70-85% ( F/U 18 mo.)
- Must use strong or moderately strong steroid (betamethasone valerate 0.1%) for 2 month course, applied to narrowest area of the foreskin

## 2. Dorsal Slit – incising the “top” of the foreskin

## 3. Circumcision – indicated for obvious scar of foreskin

# Phimosis: Circumcision

**There is no absolute medical indication for circumcision in the neonatal period**

- Relative indications: anomaly of urinary tract and/or recurrent infections
- Cultural indications may play a factor

**Potential medical advantages**

- Decreased incidence of urinary tract infections in the first year of life
- Prevent phimosis
- Prevent balanoposthitis (infection of the glans penis)
- Decreased incidence of penile cancer
- May correlate with decreased incidence of sexually transmitted diseases

# Circumcision

## Method for newborns:

- Gomco clamp
- Plastibell clamp
- Mogen clamp
- Surgical
- Not government-funded, paid by patient

## For older children:

- Surgically
- Under general anesthetic

## Complications (0.2-0.5%)

- Bleeding
- Injury to penis
- Skin issues
  - » Take off too much
  - » Leave on too much
  - » Skin bridges
  - » Inclusion cysts
  - » Penile curvature
  - » Urethrocutaneous fistula
- Long term
  - » Meatal stenosis

# Paraphimosis

Painful constriction of the glans penis by the foreskin which has been retracted behind the corona



# Paraphimosis: Treatment

Needs to be treated emergently

- Local anesthetic/sedation
- Manual pressure or wrap with Coban to reduce edema
- ? Hypertonic saline
- Manual reduction
  - “fingers over thumbs”
- Dorsal slit
- Circumcision



# Balanitis

inflammation of the glans penis



# Balanitis: Symptoms

- Erythema (localized)
- Edema
- Purulent discharge
- Fever? ->UTI?
- Dysuria

# Balanoposthitis

Inflammation affecting the glans penis and prepuce



<https://sti.bmj.com/content/66/4/251>

# Balanoposthitis: Symptoms

- Redness and inflammation of the glans and prepuce
- Swelling of the foreskin and glans
- Pain, discomfort, itching or irritation
- Discharge from under the prepuce, sometimes with an unpleasant odor
- Difficulty retracting the foreskin (in cases where it is usually retractable)
- Pain or burning sensation during urination
- Sensitivity to touch

# Balanitis: Treatment

- Topical antibiotic (fucidin, polysporin etc)
- Oral Antibiotics for severe cases (skin coverage)
- Topical Steroids
- Occasionally antifungal
- Do not retract the foreskin
- Warm water soaks twice daily

# Nocturnal Enuresis (NE)



# Nocturnal Enuresis (NE)

- Night-time bedwetting
- Primary or secondary
- Monosymptomatic or Non-monosymptomatic (i.e. also have daytime voiding symptoms)
- More common in males
- Most children reach night-time continence by 5 years old
  - 23% of 5 year olds have nocturnal enuresis
  - 20% of 7 year olds
  - 4% of 10 year olds
  - 1-2% of adolescents
- Secondary enuresis accounts for 20% of cases

# Primary vs Secondary NE

	<b>Primary Enuresis</b>	<b>Secondary Enuresis</b>
<b>Definition</b>	Child has never achieved 6 months of dryness	Previously dry for 6+ months, then bedwetting resumes
<b>Common Causes</b>	Developmental delay, genetic factors, maturational lag	Stress, UTIs, diabetes, sleep disorders, constipation, neurological issues
<b>Prevalence</b>	More common; often resolves with age	Less common; onset typically indicates new underlying issue
<b>Pathology</b>	Usually not pathological	More likely pathological, especially if sudden onset
<b>Red Flags</b>	Persistent beyond age 7–10 without improvement	Daytime incontinence, polyuria/polydipsia, dysuria, constipation or fecal incontinence, neurological signs (ie: leg weakness)

# Nocturnal Enuresis: Bed-wedding

**Monosymptomatic primary nocturnal enuresis is usually a functional disorder**

## **Work-up:**

- Voiding log
- Snoring? Rule out obstructive sleep apnea
- Rule out constipation
- Physical exam usually normal
- Urinalysis (rule out UTI)

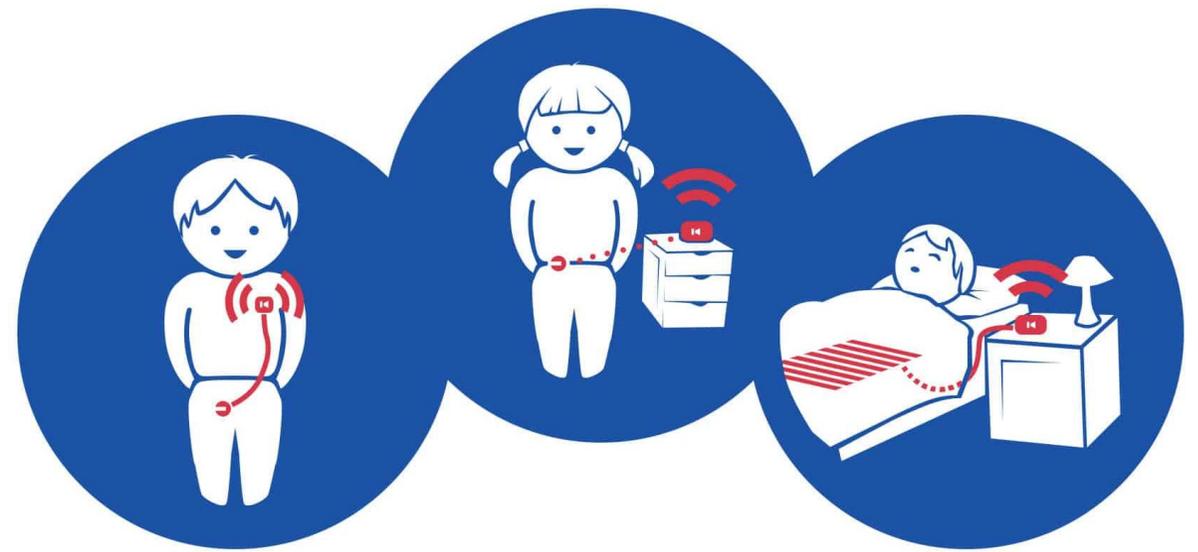


# Nocturnal Enuresis: Pathogenesis

- Delayed maturation of CNS
- Reduced functional capacity
- Deep sleepers
- Reduced renal concentration
- Emotional, physical or sexual trauma
- Sensory processing difficulties

# Nocturnal Enuresis: Treatment

- **Reassurance** of high incidence of NE and high rate of spontaneous resolution (15% annually)
- **Bed alarm**
  - Minimum 4-month trial
  - More effective than pharmacologic options
  - 70% average response during the treatment, 50% relapse



# Nocturnal Enuresis: Treatment with DDVAP

- **Pharmacologic**
  - Decreases urine output
  - Taken at night
- **DDAVP (desmopressin) monotherapy**
  - First pharmacological choice for treating NE
- **DDAVP with anticholinergic**
  - Effective for children who no longer respond or have partial responses to desmopressin monotherapy
  - Anticholinergic agent does not increase the risk of adverse events

# Nocturnal Enuresis: Treatment with Tricyclic Anti-depressants (TCAs)

- Both anticholinergic and alpha-adrenergic effects
- Good for short-term
- Not first line management
- Less effective than alarms
- Average one fewer wet night per week
- Potential serious side effects (sedation, cardiovascular etc.); rarely used

# Urinary Tract Infections (UTIs)

# Urinary Tract Infection (UTI): Presentation

## **Young children**

- Febrile
- Vomiting
- Decreased appetite
- Lethargy

## **Older children**

- Febrile (implies pyelonephritis)
- Dysuria
- Frequency, new or worsening                      incontinence
- Abdominal pain

# Urinary Tract Infection: Investigation

## History and physical

- Voiding and bowel history
- Family history

## Urine

- Ideally cath specimen in non-toilet trained children and urinalysis to confirm inflammatory response to infection
- Bag (PUC-pediatric urine collection) specimens are not ideal! Close to 90% false positive rate

## Radiology

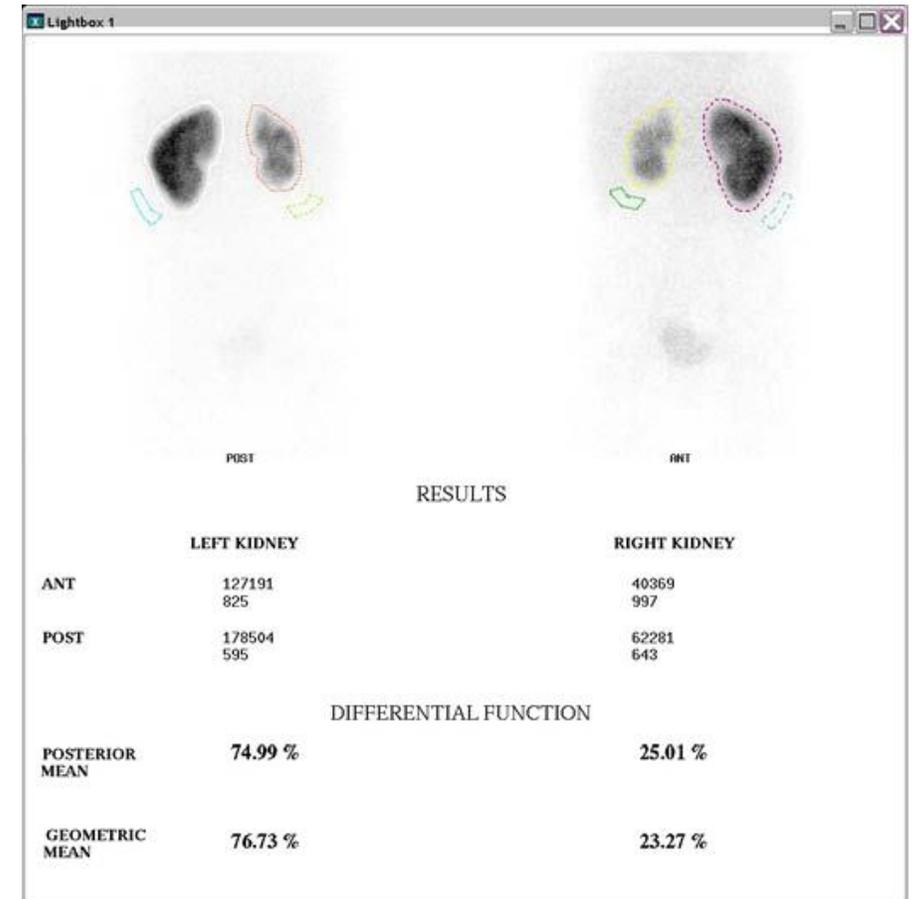
- Febrile UTI in a child under 2 years, or recurrent febrile UTI in any child
  - Renal/Bladder Ultrasound
  - Cystogram (if US is abnormal OR recurrent febrile UTI)
  - DMSA can document a pyelonephritis/scars

# Urinary Tract Infection: Treatment

**Lower tract:** short course of antibiotic

**Upper tract** (fever, back pain, nausea and vomiting):

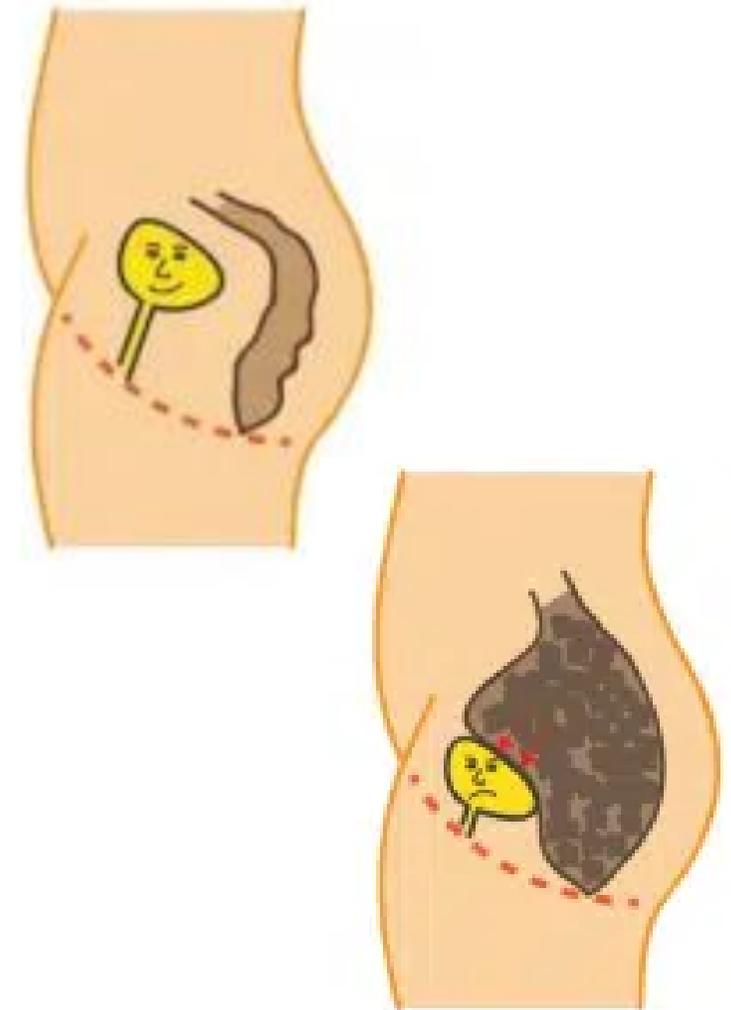
- 2-week antibiotic course
- Admission if very ill
- Quick treatment decreases chances of scarring



DMSA renal scan showing low function and multiple scars of the right kidney

# Recurrent UTIs: Treatment

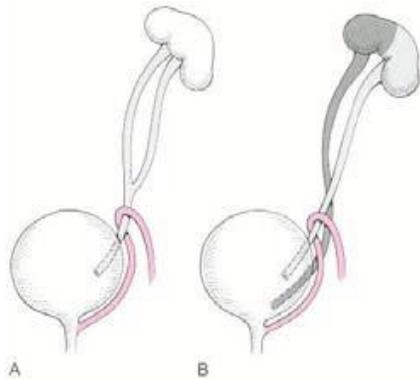
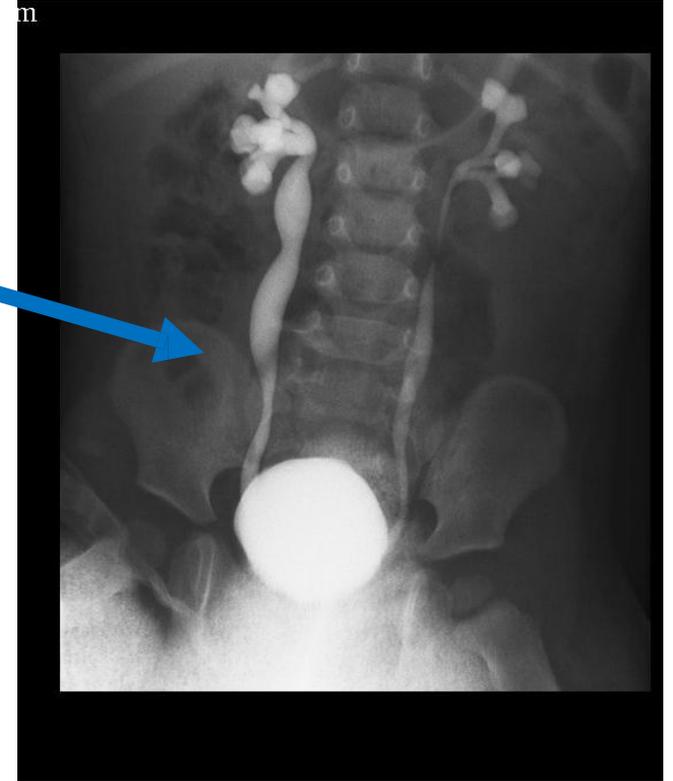
- “Drink more, pee more, poop more”
- Improve voiding patterns
  - Timed voiding (q2h)
  - Double Void
  - Improve emptying with pelvic floor physiotherapy
- Increase water
- Treat constipation - Stool softener
- Antibiotic Prophylaxis
- Treat anatomic abnormality
- Circumcision for intact foreskin



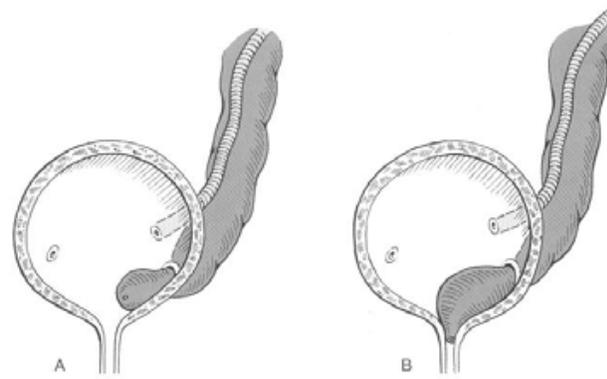
# Hydronephrosis and Collecting System Abnormalities

# Collecting System Abnormalities

- **Vesicoureteral Reflux**
- **Obstruction**
  - Uteropelvic (UPJ) Obstruction
  - Uterovesical (UVJ) Obstruction
- **Duplication**



Weigert-Meyer Law



Ureterocele

# UPJ Obstruction

## **Cause:**

- Congenital stricture or adynamic segment
- Crossing vessel

## **Presentation:**

- Antenatal hydronephrosis
- Intermittent severe flank pain with nausea and vomiting
- Urinary Tract Infection
- Renal calculi

# UPJ Obstruction: Investigation and Management

## **Investigations**

- Ultrasound
- MAG3 Renal Scan with Lasix to assess function and drainage

## **Asymptomatic**

- Observe with serial US and renal scans
- Operate if low initial function (<40%) or drop in function over time (10%)
- Operate if worsening of hydronephrosis

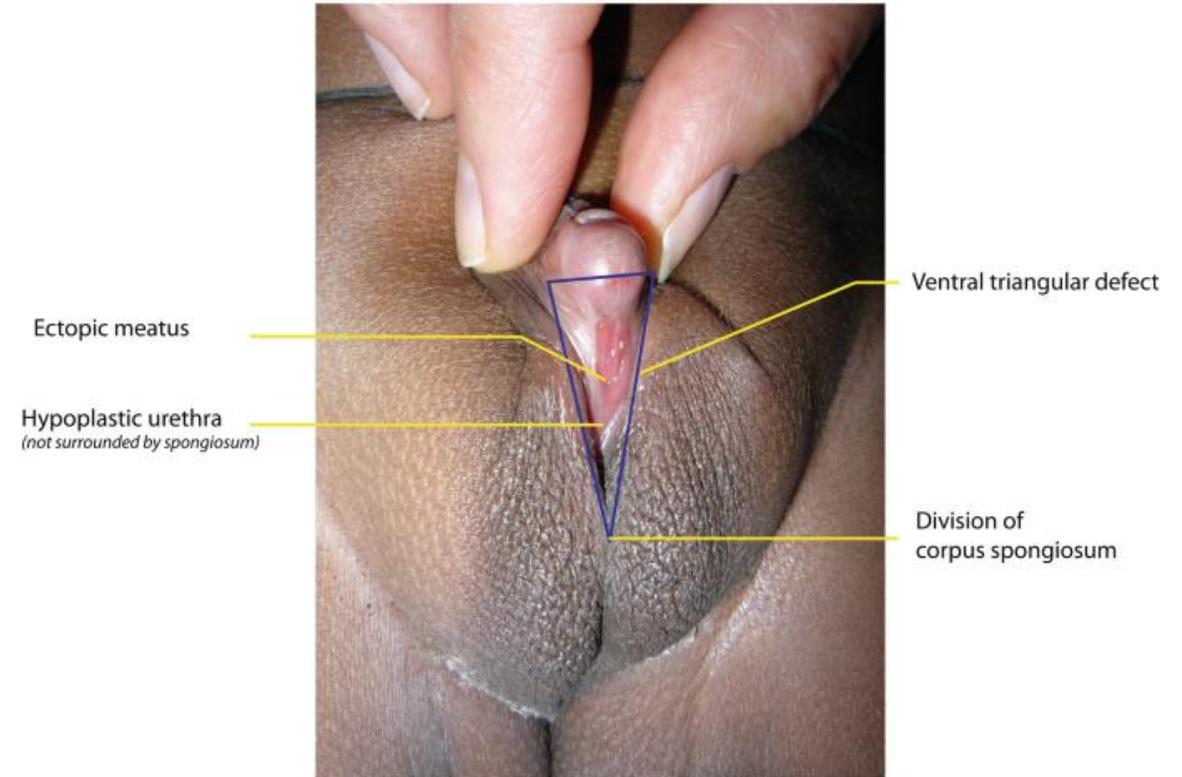
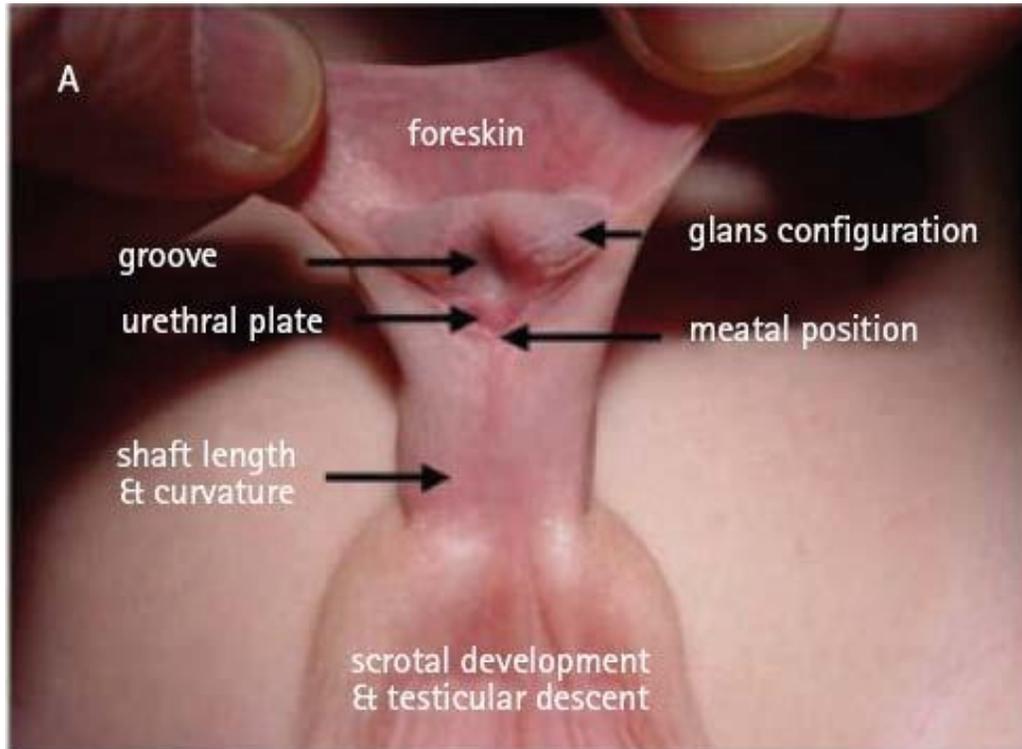
## **Symptomatic** (pain, stones, infection)

- Operate

# Hypospadias

# Hypospadias

Ventral position of urinary meatus dorsal hooded foreskin possible ventral curvature



# Hypospadias: Epidemiology

- **Most common penile congenital malformation**
- **2nd most common congenital disorder in males after cryptorchidism**
- **Incidence: 1/125 male births**
- **Associations**
  - Cryptorchidism (9.3% of patients with hypospadias)
    - » Incidence of chromosomal abnormality higher with proximal hypo and undescended testes (22%); needs endocrinology and genetics evaluation
    - » Inguinal hernias (9%)

# Hypospadias: Risk Factors

## **Endocrine**

- Disruption in the synthetic biopathway of androgens
- May be a delay in the maturation of the hypothalamic- pituitary-axis

## **Genetic**

- Familial rate 7%

## **Environmental**

- Endocrine disrupters in the environment may be responsible for the increase in incidence

## **Maternal**

- Maternal progestin exposure may increase likelihood of hypospadias
- Placental insufficiency
- Some studies show a marked increase in hypospadias in IVF deliveries

# Hypospadias: Investigation

## **Simple distal hypospadias**

- No evaluation

## **Proximal hypospadias + one or bilateral impalpable testicles**

- Evaluation for differences in sexual development
  - Electrolytes
  - Karyotype
  - 17 hydroxyprogesterone
  - Abdominal ultrasound

# Hypospadias: Treatment

- **Referral before 6 months of age**
- **Surgery usually between age 1 and school age**
- **Distal hypospadias**
  - Surgery mostly for cosmetics (controversial; can delay until child can consent for themselves)
  - Sometimes for urinary function
- **Proximal hypospadias**
  - Treatment for urinary, reproductive and sexual function
  - Higher risk of complications

# Pediatric Scrotal Conditions

# Scrotal Conditions: Testicular Pain

## □ Causes:

- Torsed appendix
- Epididymitis
- Testicular Torsion
- Hernia

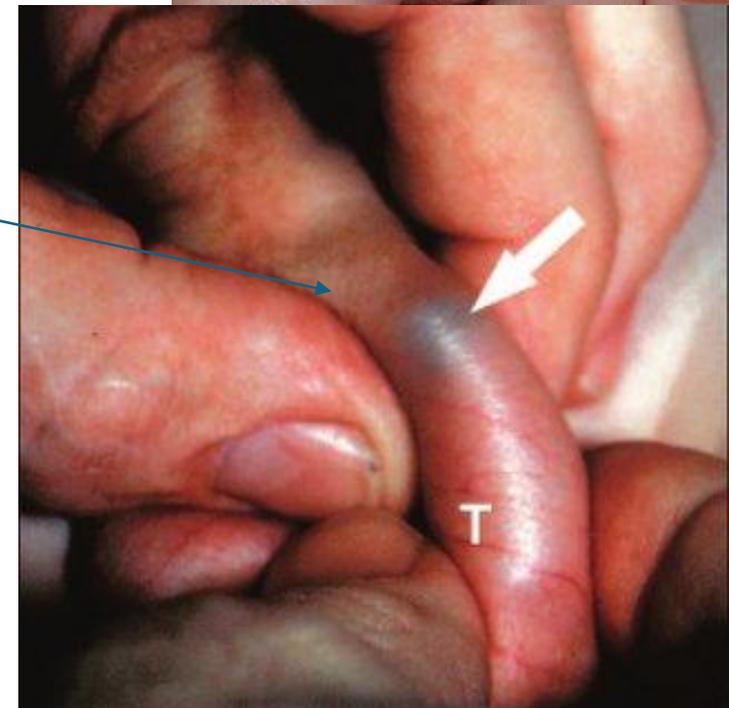
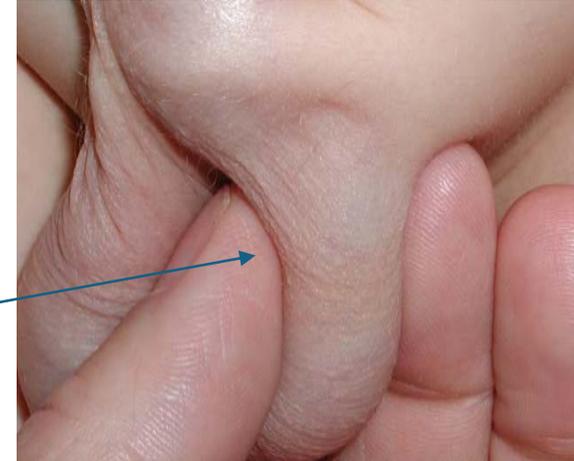
# Scrotal Conditions: Torsion of Appendix Testes

## ❑ Symptoms/Signs

- Pre adolescent
- Pinpoint tenderness
- Blue dot sign
- Over time can cause local inflammation which looks like epididymitis on ultrasound

## ❑ Treatment

- Rest, scrotal support, NSAIDS



# Scrotal Conditions: Epididymitis

- **Adolescent and older**
- **Gradual onset**
- **Tender superior portion**
- **Investigations:**
  - U/A
  - Urine culture
  - Sexual history
  - Possible ultrasound to r/o torsion

# Scrotal Conditions: Testicular Torsion

## Symptoms:

- Adolescent (not always)
- Severe pain (sometimes abdominal not scrotal)
- Sudden onset
- Presents with abdominal pain and no scrotal pain in 20%
- Nausea and vomiting

**All adolescent boys presenting with abdominal pain should have a scrotal exam to rule out testicular torsion.**

## Examination:

- Testes tender, swollen and firm on palpation
- Abnormal lie to the testicle and/or high-riding testes
- Absence of cremaster reflex

**“If it looks like a torsion go right to the O.R.”**

- Ideally fix within 6 hours (50% of testes not salvaged at 6 hours)

# TWIST Score

**Table.** The Testicular Workup for Ischemia and Suspected Torsion (TWIST) scoring and risk stratification system.

<b>TWIST Score (original Barbosa et al. scoring system)</b>	
Testicular swelling (two points)	Score 0-2 Low risk
Hard testis (two points)	Score 3-4 Intermediate risk
Absent cremasteric reflex (one point)	Score 5-7 High risk
Nausea or vomiting (one point)	
High riding testis (one point)	

→ Observation

→ Scrotal Ultrasound

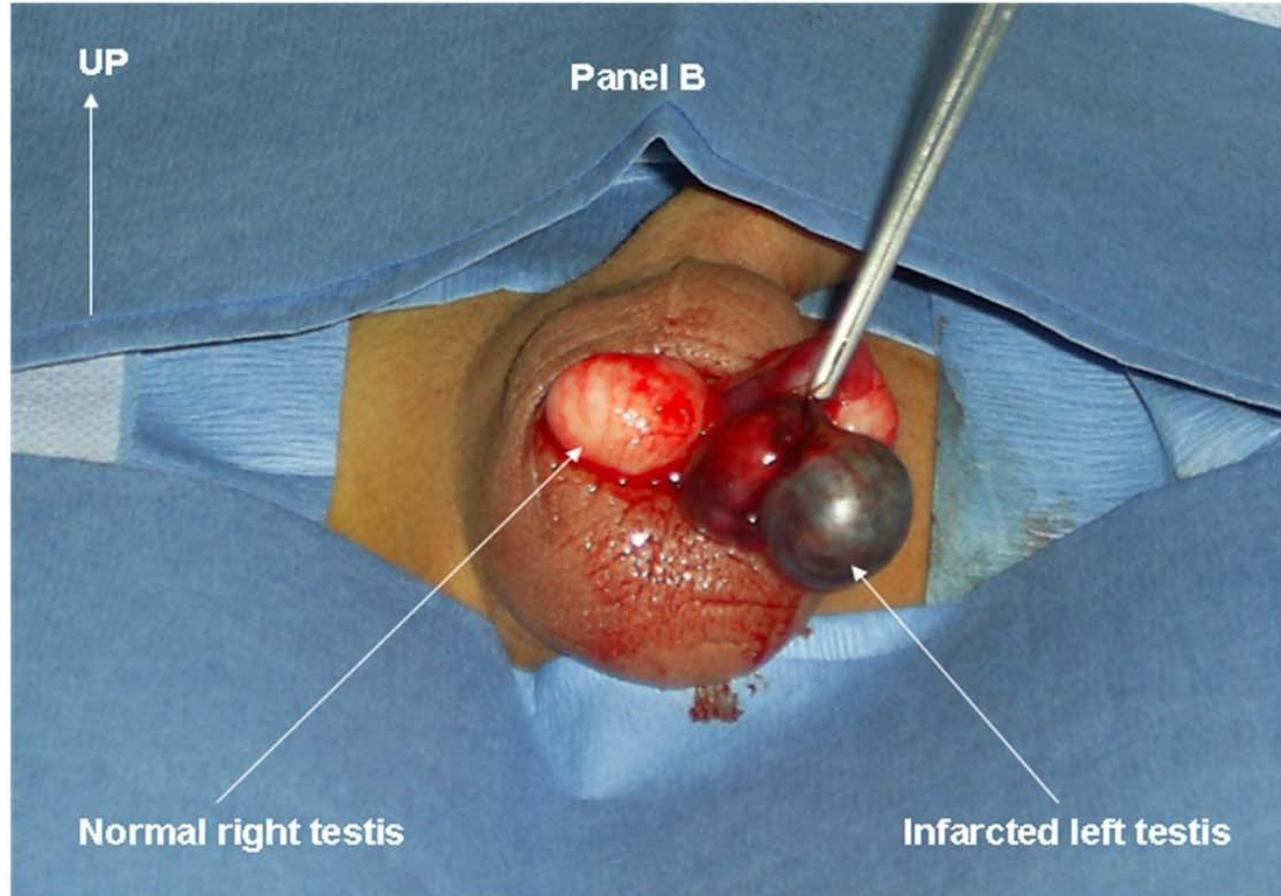
→ Surgical Exploration

# Torsion: Investigation

**\*\*\*If it looks like torsion go straight to the OR\*\*\***

- **Urinalysis and culture**
  - If normal, unlikely to be epididymitis
- **Urgent Scrotal Ultrasound**

# Torsion: Scrotal Exploration



# Scrotal Conditions: Undescended Testicles (Cryptorchidism)

- The most common birth abnormality involving the male genitalia (0.8% incidence at 6 months)
- If spontaneous descent occurs it will descend in first 3 months of life (except premature infants)
  - If undescended at 3 months should refer to peds urologists
- Retractable testicle is a normally descended testicle that is pulled out of the scrotum by an overactive cremasteric reflex

# Undescended Testes: Complications

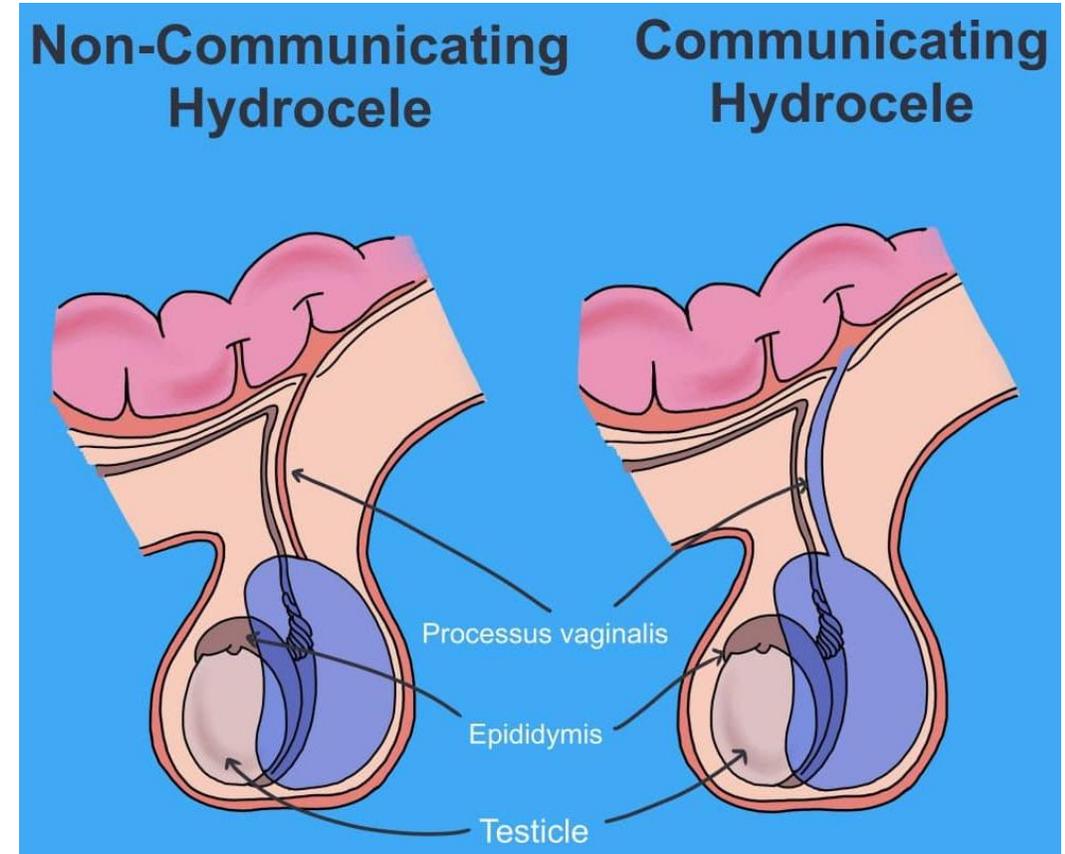
- **Inguinal hernia**
- **Increased risk for torsion**
- **Infertility**
  - Only increased risk if **bilateral** undescended testes
- **4-10x increased risk of testicular cancer**
  - Absolute risk of 12–33 per 100 000
  - Incidence 4 per 100 000 in Canada

# Undescended Testes: Treatment

- Orchidopexy – placement of testicle in scrotum
- May improve fertility
- Easier to monitor for malignancy
- Surgical correction between 6-18 months

# Scrotal Conditions: Hydrocele

- **Communicating hydrocele**
  - Persistence of a patent processus vaginalis
  - Accumulation of fluid around the testicle, will fluctuate in size
  - Treatment:
    - » Often will close in first year of life
    - » Period of observation then surgery if remains greater than 1 year of age
- **Non-communicating hydrocele**
  - Rare in children
  - Usually a result of inflammation



# Important Points

- **History and Physical**
  - Take a history on voiding and bowel habits
  - UTI history ask about fever and symptoms of upper tract
  - **If testicle is not down after 3 months, refer to peds urologist**
- **With hypospadias and impalpable testicle(s), consider differences in sexual development**
- **Possible torsion – needs to be fixed within 6 hours**