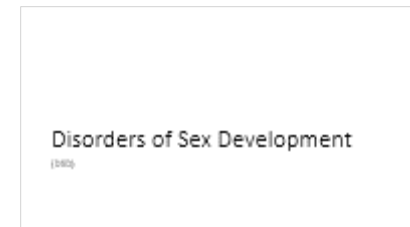
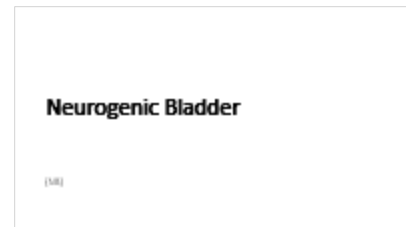
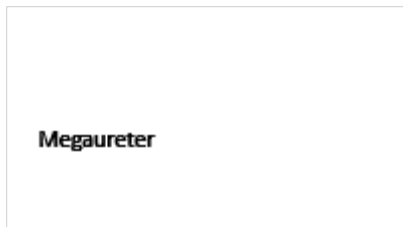
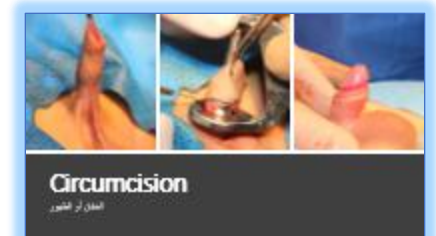
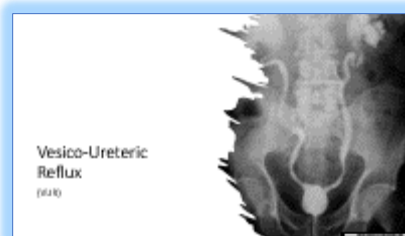
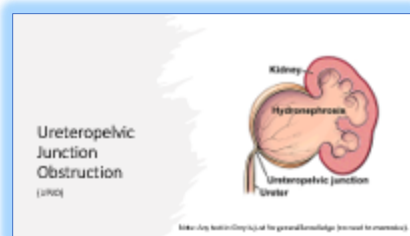
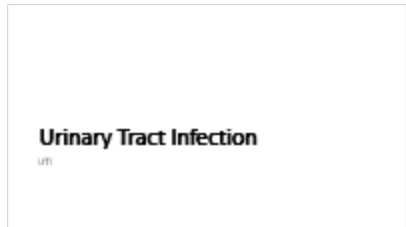


# Principles of Pediatric Urology

By Raed Al-Taher, M.D.



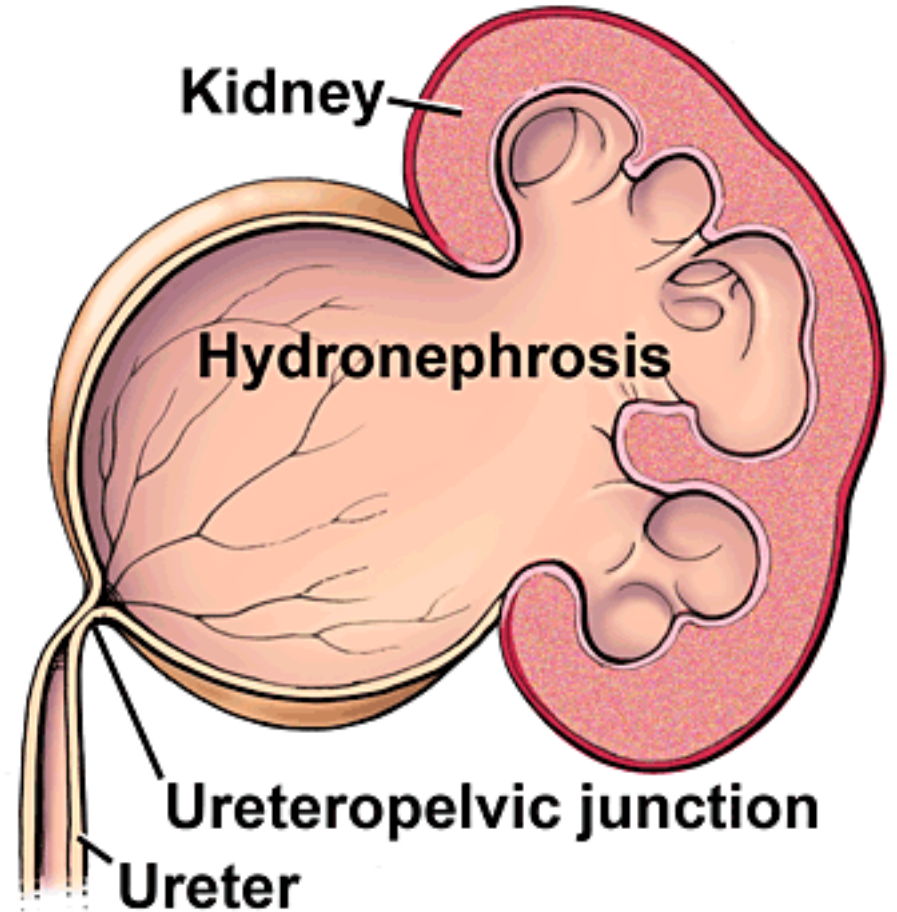
Topics in BLUE are the required ones



Edited by : Haya Khader

# Ureteropelvic Junction Obstruction

(UPJO)



Note: Any text in **Grey** is just for general knowledge (no need to memorize).

# Ureteropelvic Junction Obstruction (UPJO)

- M:F 2:1 | Lt:Rt 3:2 | bilateral 10–40%
- Most present as **HYDRONEPHROSIS** (HN) that is detected by **antenatal US**

# Antenatal US

- Society of Fetal Urology (SFU)
  - Grade 0 – normal kidney
  - Grade 1 – minimal pelvic dilation
  - Grade 2 – greater pelvic dilation without caliectasis
  - Grade 3 – caliectasis without cortical thinning
  - Grade 4 – HN with cortical thinning

# Etiology

- **Intrinsic**

- **Intrinsic narrowing**

- Rarely: mucosal valves, polyps, and true ureteric strictures

- **Extrinsic**

- Aberrant renal vessel (~30% of UPJ, an artery directly enters the lower pole of the kidney).
  - Kinking as a result of severe vesicoureteral reflux (VUR).

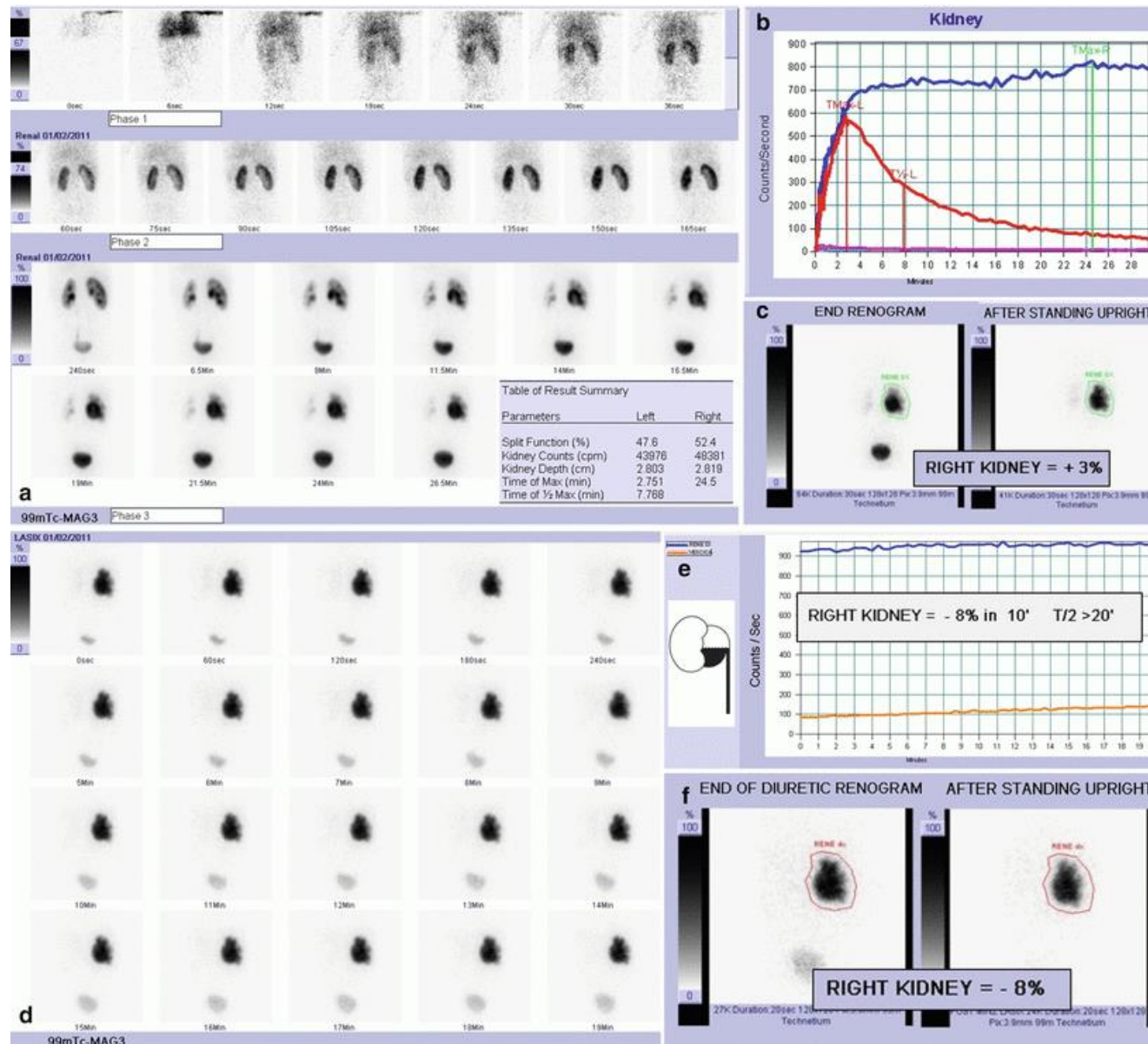
# Clinical Features

- Most are **asymptomatic** (detected via prenatal screening US)
- When symptomatic:
  - Flank or abdominal pain (~50%)
  - Palpable flank mass (~50%)
  - Hematuria
  - Recurrent UTIs (~30%)

# Investigations

- **Postnatal US**
  - The primary investigation tool for HN
  - Assesses kidney anatomy & AP diameter of renal pelvis
- **Renal radioisotope Scan**
  - MAG3 is the scan of choice, & shows:
    - Differential renal function
      - normally 50%:50%
      - acceptable down to 40%
      - needs intervention when <40%
    - Pelvic drainage curve
      - shows pelvic emptying ( $t_{1/2}$ ) after administration of furosemide
      - normally  $t_{1/2}$  <20 min
      - $t_{1/2}$  >20 min = significant obstruction → needs intervention
- **MCUG**
  - To rule out whether HN is due to VUR

$t_{1/2}$  = the time needed to drain half the urine amount from renal pelvis to the ureter



Obstructed kidney

Normal kidney

MAG-3 Dynamic  
Renal Nuclear Scan



# Treatment

- **Antenatally detected HN**
  - Conservative management (follow up)
  - Surgery (needed in <50% of cases) when any or all of the following:
    - Functional deterioration (<40%)
    - $T_{1/2} > 20$  minutes
    - Symptomatic
- **Surgery**
  - Open **OR** laparoscopic **pyeloplasty**:
    - Excision of the narrowed segment
    - Anastomosing ureter to the most dependent portion of the renal pelvis
    - Excision of redundant renal pelvis
- **Endourological pyeloplasty**
  - Use of balloon dilatations, percutaneous antegrade endopyelotomy, and retrograde ureteroscopic endopyelotomy.

# Vesico-Ureteric Reflux

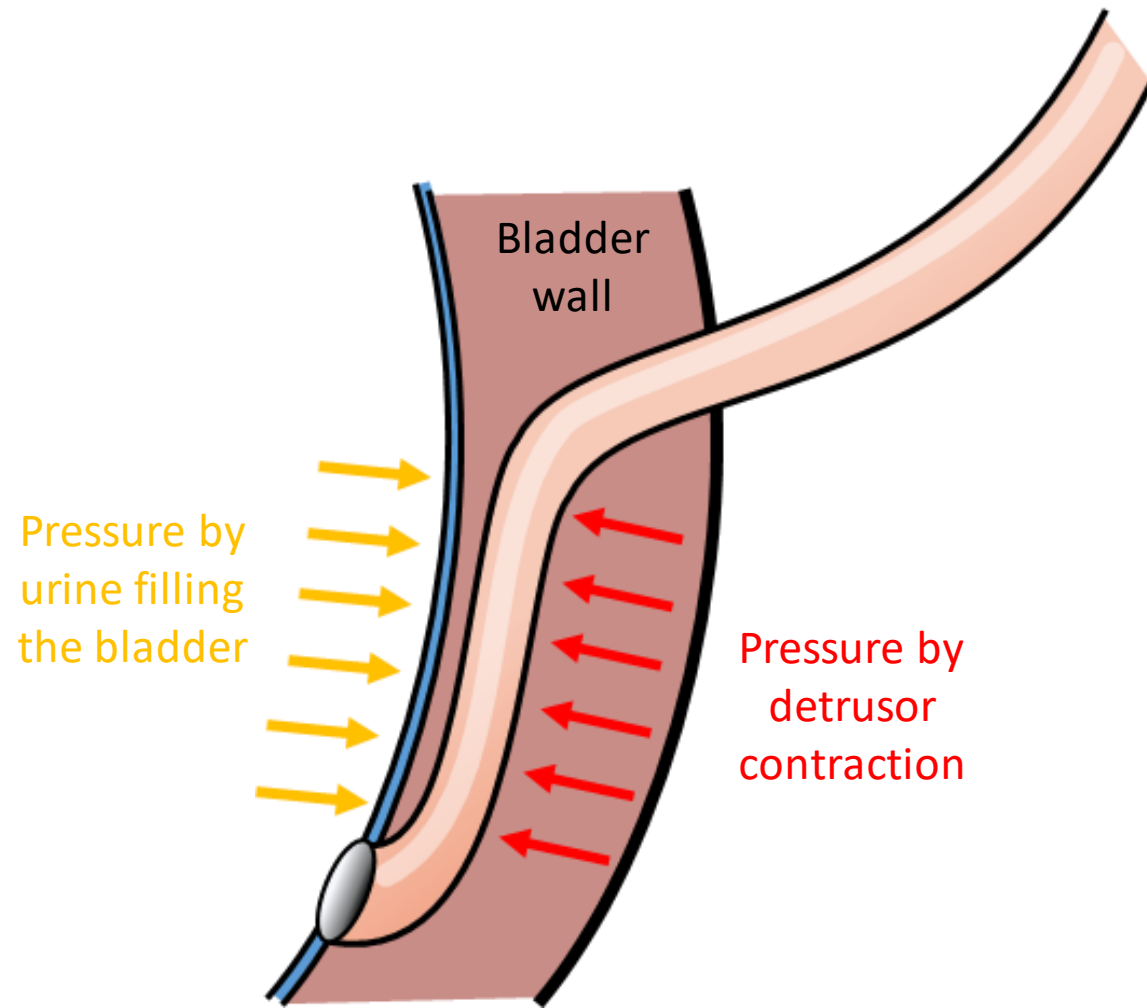
(VUR)



# Vesico-Ureteric Reflux (VUR)

- Female predominant
- Peak incidence at 3 years
- Familial incidence is 2–4% of all cases

# Normal ureteral submucosal tunnel

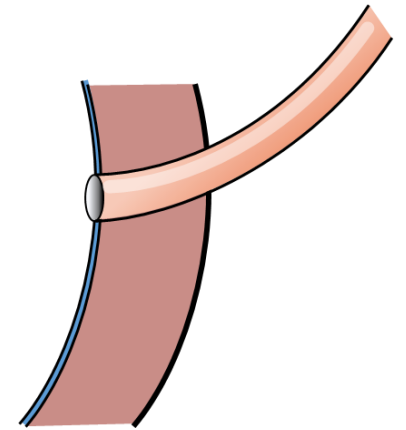


tunnel length : ureteral diameter → should be about 5:1 to prevent VUR

# Pathology

- **Primary VUR:**


- due to a **short ureteral submucosal tunnel** in the bladder wall



- **Secondary VUR:**

- due to either:
    - Posterior urethral valve (PUV)
    - Neurogenic bladder (NB)
    - Anterior urethral valves
    - Ureterocele
    - Bladder diverticula
    - Ectopic ureters associated with duplex system

# Clinical Features

- Symptoms of UTI | **recurrent UTIs**
  - **Renal scarring** (due to previous pyelonephritis – upper UTI)
  - Renal dysfunction
  - Hypertension
  - **Reduced somatic growth**
- 

# Investigations


- Urine analysis → r/o infection



- US → HUN (hydro-uretero-nephrosis)
  - DMSA nuclear scan → for renal scars and differential renal function
  - MCUG → for degree of VUR
- 
- Direct isotope cystography (DIC) → for follow-up scans

# MCUG | grading


I  
Lower ureter/s filled with contrast (without dilatation)



II  
All ureter/s filled with contrast (without dilatation)




III  
Dilated ureter and pelvicalyceal system + flat fornices.



IV  
More dilatation + convex fornices



V  
Tortuosity of ureters + complete blunting of fornices



complex calyx  
dilated ureter  
tortuous ureter



# Treatment

- **Low-grade reflux (I, II, & III):**
  - More likely to **resolve spontaneously** with age
  - Antibiotic **prophylaxis**
- +/- Subureteral submucosal injection of bulking agent
  - Results better for lower grades of reflux (>80% success)
  - Less successful in children with neurogenic bladder (NB)

# Surgical treatment

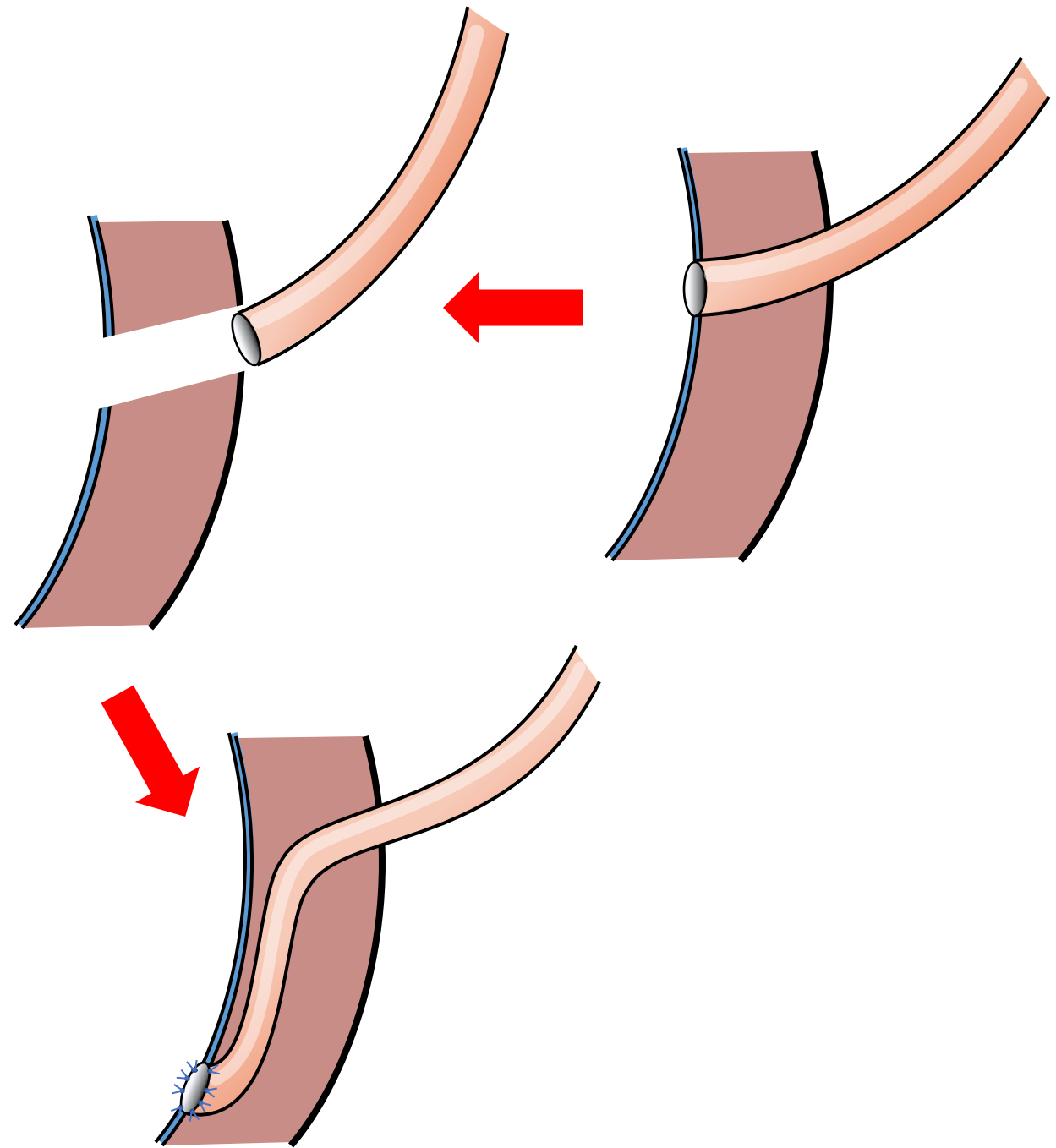
- **Indications:**

- Failure of chemoprophylaxis and/or submucosal injection therapy
- Deterioration of renal function &/or appearance of new scars
- Secondary VUR (due to ureterocele, duplex ureter, PUV, or neurogenic bladder)
- Higher grades VUR (IV, V)
- Hypertension
- Single kidney with higher grade of VUR
- Decrease in renal growth or somatic growth

# Surgical treatment

- **Reimplantation of ureters**

- Transtrigonal ureteric (Cohen) reimplantation [most common]
- Intravesical technique (Leadbetter–Politano)
- Extravesical detrusorraphy technique (Lich and Gregoir)
- ± Ureteric tapering or plication



# Surgical treatment

## Postoperative Management

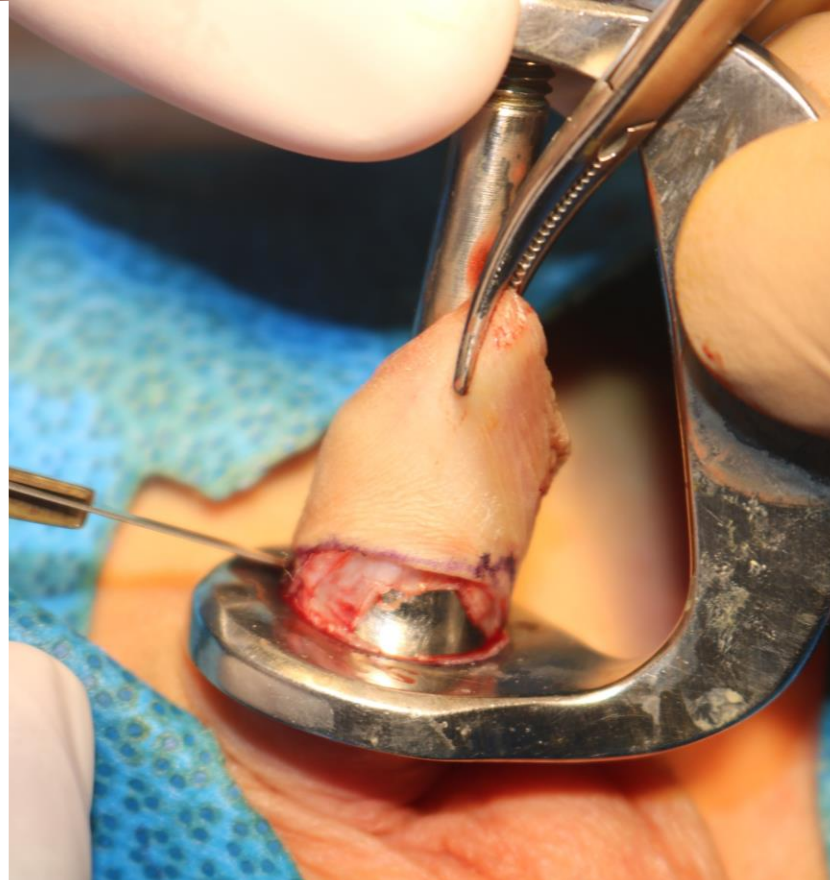
- Antibiotics for ~3 months
- Follow-up VCUG or DIC [Direct isotope cystography](#)

## Complications

- Persistent reflux
- Ureteric obstruction (devascularisation, kinking or torsion)
- Intravesical calculi
- Injury to the bowel, fallopian tubes and/or vas deferens

# Surgical treatment | Outcome

- success rate up to 98%
- corrects VUR..  
→ however, does not reverse scarring nor parenchymal damage



# Circumcision

الختان أو الطهور

# Natural History of Foreskin Separation

- **At birth:**

Foreskin (prepuce) is adherent to the glans (non-retractable) (physiological phimosis)

- **At 2–4 years:**

dissolution of adhesions → foreskin can retract

- **At 5 years:**

most boys should have normal foreskin retraction

# History

- An act of faith in both Jewish and Muslim religions:
  - Jewish: timing is important (8<sup>th</sup> day of life)
  - Muslims: timing is less important (tends to 1<sup>st</sup> 1-2 weeks of life)
- Not a necessary part of Christian faiths, though lots still encourage it.



# Indications

- Religious or ritual preference
- Pathological phimosis
- Paraphimosis
- Recurrent UTI with no known underlying cause

# Phimosis

- Foreskin is unable to be retracted to expose the glans.

## Types:

- Physiological phimosis (normal state in first years of life)
- Pathological phimosis:
  - **Primary:** true congenital phimosis with pin-hole meatus.
  - **Secondary to:**
    - Bacterial infection:
      - **balanitis** (inflammation of the glans)
      - **posthitis** (inflammation of the foreskin)
    - Balanitis xerotica obliterans (BXO)

# Phimosis | Management

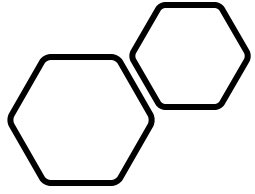
- **Conservative:**
  - Reassure, gentle self-retraction
  - Topical steroids (e.g., betamethasone 0.1%)
- **Surgical options:**
  - Circumcision
  - Preputial “stretch” or -plasty

# Paraphimosis

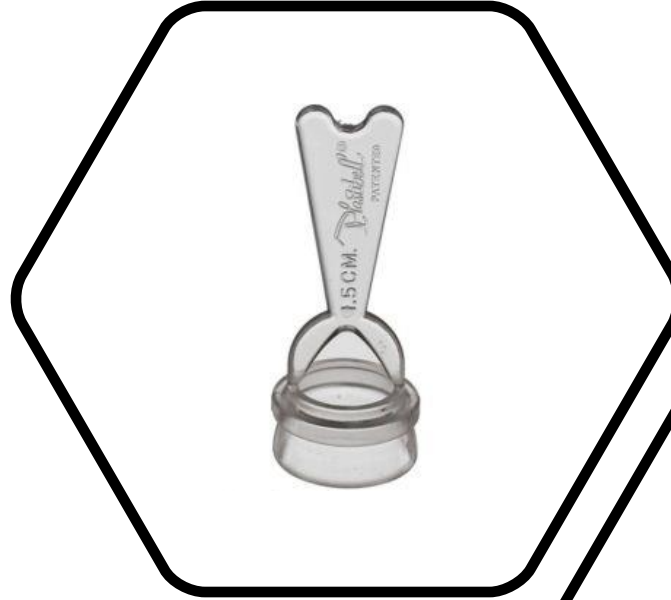
- Foreskin is able to be retracted but becomes stuck in that position
- resulting in distal congestion and edema of glans

# Paraphimosis | Management

- **A surgical emergency**
- **Manoeuvres can be done in ER:**
  - Compresses with ice or sugar (to reduce the swelling and allow protraction)
  - Multiple needle punctures (to allow fluid to be squeezed out)
- **if failed → send to OR**
  - dorsal slit of the tight band +/- circumcision (under GA)



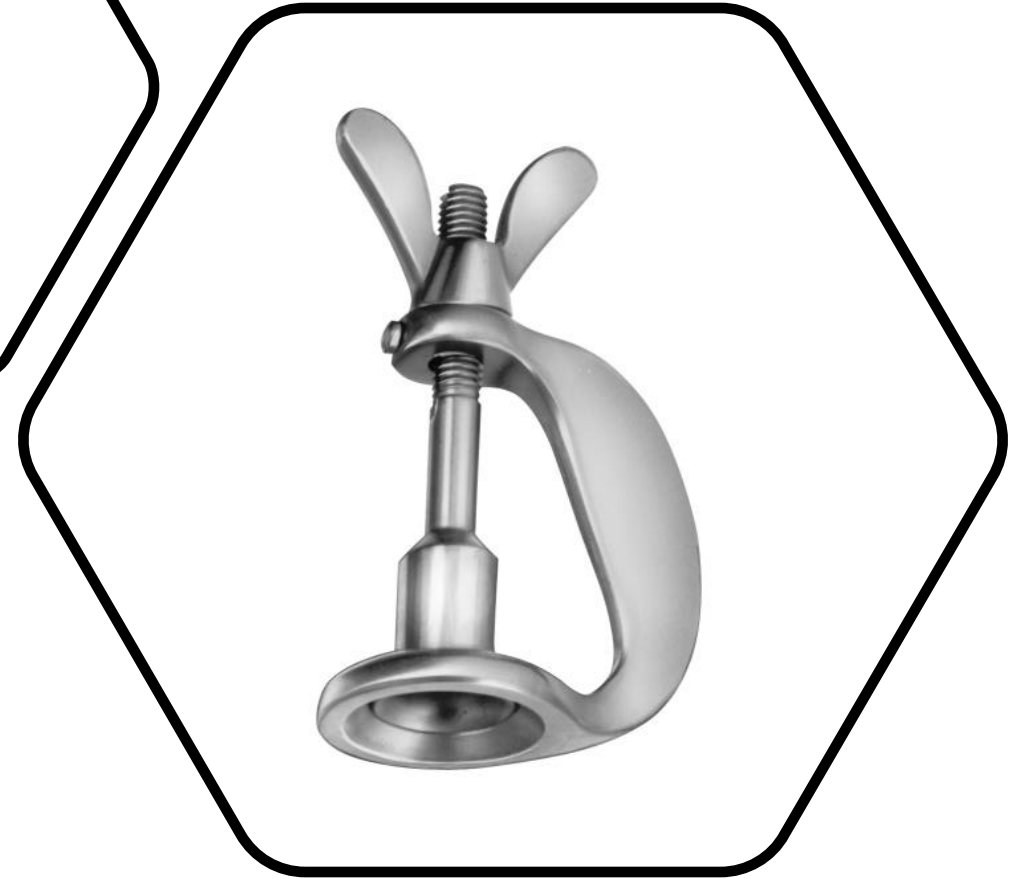
# Circumcision



## Surgical Freehand

## Surgical using specific clamps

- Plastibell® | Gomko clamp® | Winkelmann clamp® | Mogen clamp



# Circumcision

## Contraindications

- **Absolute:**

- Family history of bleeding disorders
- The newborn has known bleeding tendency/disorder, or pathological jaundice

- **Relative:**

- Hypospadias (as foreskin helps in the surgical repair of hypospadias)

a birth defect where the location of the opening of the urethra is not at the tip of the penis

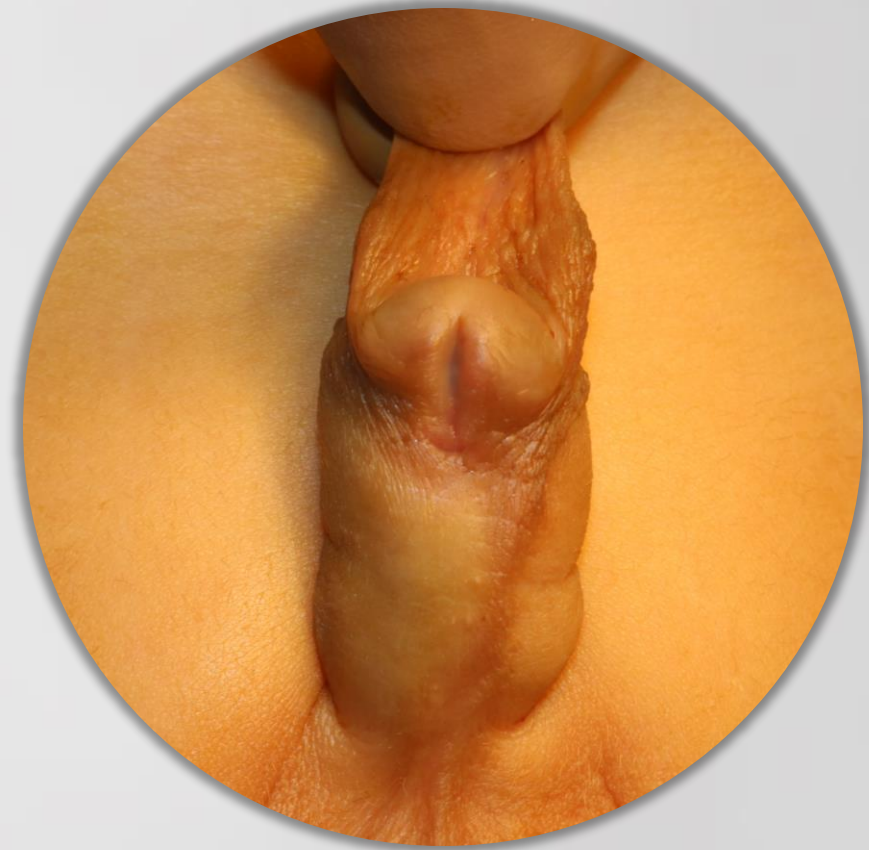
# Circumcision | Complications

- **Bleeding**
- Infection
- Meatal stenosis particular to neonatal circumcision
- Insufficient/excessive foreskin removed
- Adhesions, skin bridges, or inclusion cysts
- Entrapped penis or secondary phimosis
- Urethral injury (iatrogenic hypospadias)
- Necrosis of the penis (injudicious use of electrocautery to control bleeding)
- Amputation of the glans (partial or complete)
- **Death** (mainly due to unnoticed bleeding)



# Hypospadias

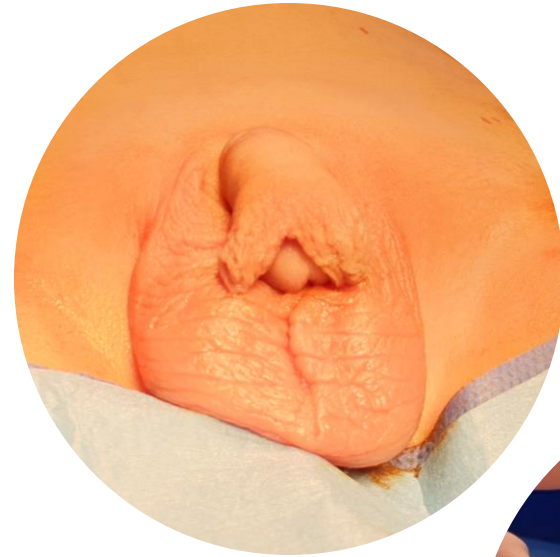
الإحليل التحتي أو الطهور الملائكي



# Definition

## A complex of..

- abnormal ventral urethral meatus
- dorsal hooded foreskin
- glans defect
- underdeveloped corpus spongiosum
- +/- phallic torsion
- +/- phallic ventral curvature (chordee)



# Incidence

- Usually isolated
- Can be part of the DSD spectrum
- **One in 300 live-births**

- Associated with:

- ↑ parity
- ↑ maternal age
- ↓ birth Wt
- +ve family history
- inguinal hernia & hydrocele (10%)
- undescended testes (8%)

# Etiology

## Genetic Factors

- Exact mode of inheritance is unknown
- Monozygotic twins (x8)
- +ve family history (8% fathers | 14% brothers)

## Endocrine Factors

- Deficient androgenic stimulation (production, conversion, or sensitivity)
- Increased maternal progesterone exposure (x5)

## Environmental Factors

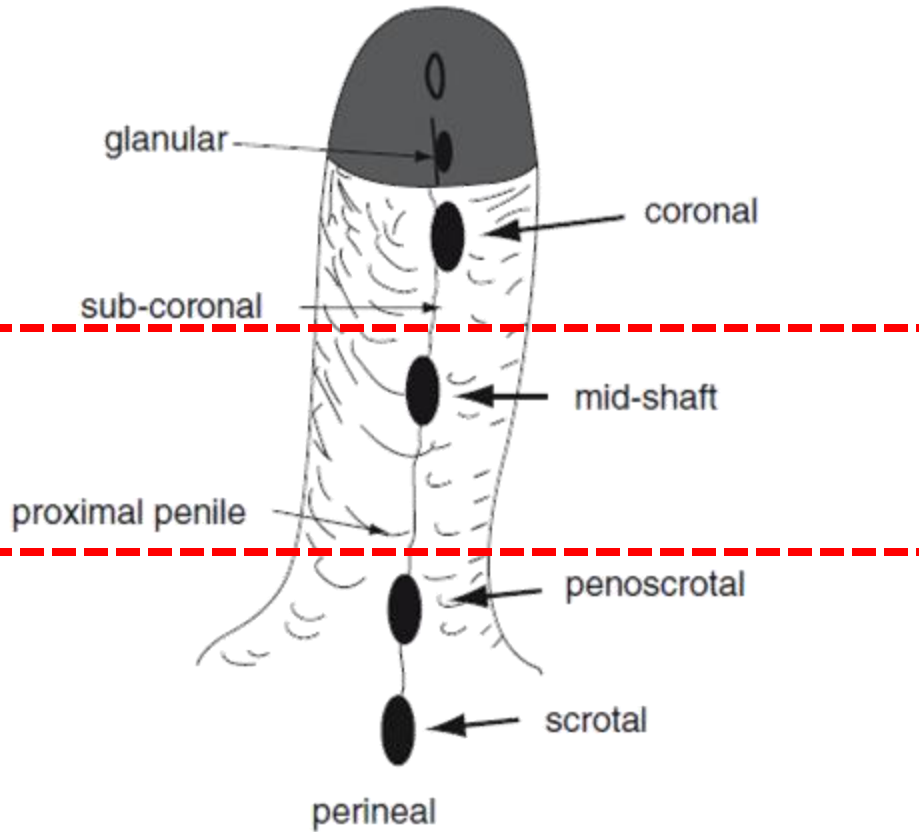
- Maternal exposure to estrogenic substances (in pesticides, milk, plastic linings of metal cans, and pharmaceuticals)

# Classification

**Distal** (50%)

**Middle** (30%)

**Proximal** (20%)



# Surgery

- **Best timing recommendation:**
  - before 18 months of age (minimizes psychological impact of genital surgery)
- **Hormone manipulation preoperative:**
  - penile size can be increased by..
    - weekly IM testosterone or hCG
    - or topical testosterone or DHT

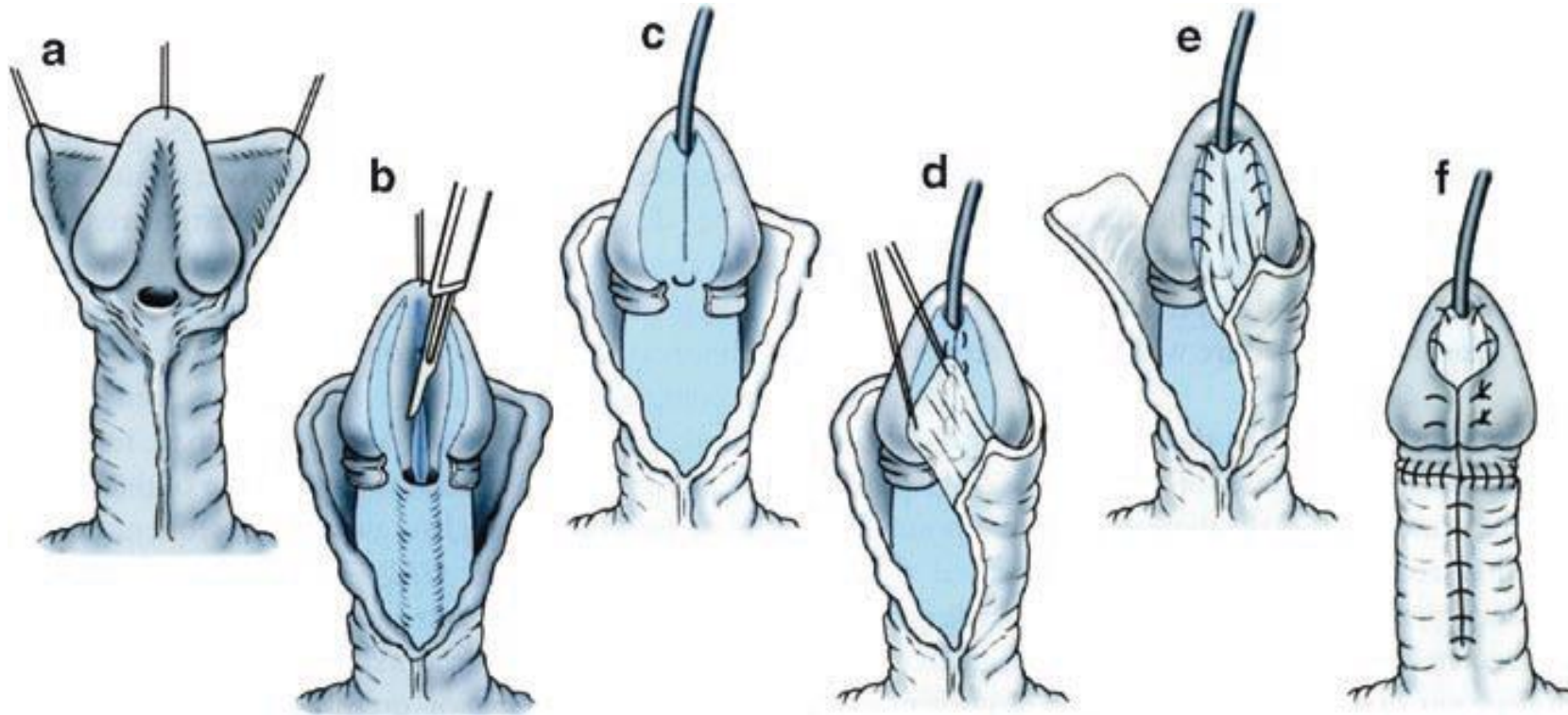
# Surgery

## Tube urethroplasty

urethral plate is tubularized to neourethra **[main step]**

+

- **Corpus spongiosoplasty:** deficient corpus spongiosum is compensated by fascia (preputial or dartos fascia) to support the neourethra
- **Straightening phalloplasty:** chordee is released
- **Glansplasty:** glans defect is corrected
- **Circumcision:** dorsal foreskin is removed
- **Phalloplasty:** phallic torsion is corrected



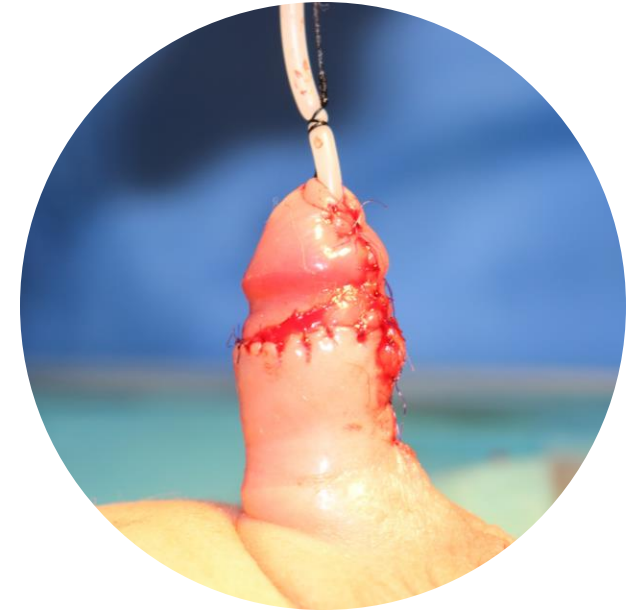
## Incised-plate tube urethroplasty “Snodgrass repair”

Adapted from Belman et al. (Belman AB, King LR, Kramer SA (eds) (2002) Clinical pediatric urology, 4th edn. Martin Dunitz, London, p 1077)



# Postoperative care

- Neourethra is protected for 1 week with a “stent”
- Simple analgesics
- Oral antibiotic



- **Early complications:**

- Bleeding
- Hematoma
- Infection
- Breakdown of repair

- **Late complications:**

- Meatal stenosis
- Urethrocutaneous fistula (UCF)
- Persistent chordee
- Urethral stricture
- Urethral diverticulum

Thank You