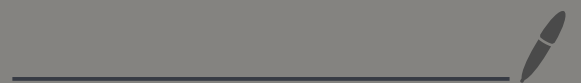


Urethra And Penis



Surgical Anatomy

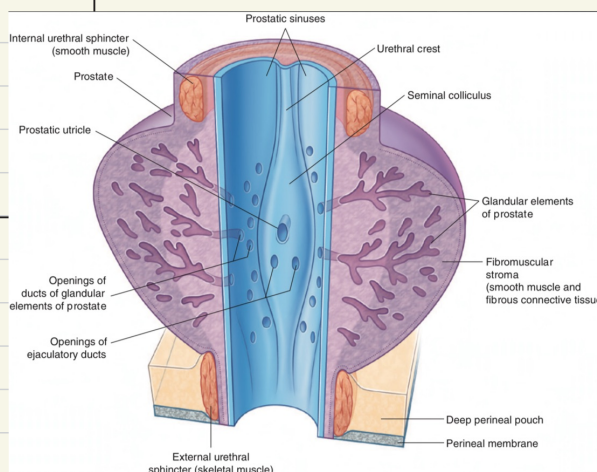
- Female urethra
 - 3-4 cms
 - Skene's Glands - Para urethral mucous glands - Homologous to Prostate.

- Male Urethra
 - 18-21 cm

- 4 parts
 - Prostatic (Crescent shape) → due to urethral crest
 - Membranous (urethra penetrates pelvic floor)
 - Bulbar (membranous to penoscrotal junction)
 - Penile (flattened anteroposteriorly, distends when filled with fluid.)
- Proximal urethra
- Distal Urethra

- **Verumontanum** - Small hillock of tissue indented at crown by a pit called Utricle masculinus.
 - ↳ Marks proximal extent of external urethral sphincter.

- Longest part - penile
- Shortest part - membranous
- Narrowest portion - External urinary meatus
- Most distensible Prostatic
- Least distensible - membranous



→ Prostatic part of male urethra

Precursor	Derivative (male)	Derivative(female)
Mesonephric (Wolffian) duct	• Ureter, pelvis, calyces and collecting ducts • Trigone of bladder • Ductus deferens, epididymis, seminal vesicle, ejaculatory duct • Appendix of the epididymis (remnant)	• Ureter, pelvis, calyces and collecting ducts • Trigone of bladder • Gartner's duct (remnant)
Mesonephric tubules	• Ductuli efferentes • Paradidymis (remnant)	• Epoophoron (remnant) • Paroophoron (remnant)
Paramesonephric (Mullerian) duct	• Prostatic utricle • Appendix of the testis (remnant)	• Uterine tubes, uterus, upper part of the vagina
Urogenital sinus	• Majority of the bladder and urethra • Prostate (except dorsal wall)	• Majority of the bladder & urethra, • Lower part of the vagina (from sino-vaginal bulbs)
Genital (urethral) folds	• Ventral aspect of the penis	• Labia minora
Genital tubercle	• Penis body and glans, urethra in glans	• Clitoris
Genital swellings	• Scrotum and scrotal raphe	• Labia majora

• Internal Urethral orifice Position: (i) at Birth : At level of upper border of pubic symphysis
(ii) In adult : 3-4 cm behind lower part of pubic symphysis.

• External Urethral Sphincter • Composed of circular striated muscle.
• Innervation: Pudendal nerve [S₂, S₃, S₄]
↓
Arise from Onuf's Nucleus located in Lamina IX.

Posterior Urethral Valves

	• Seen in male (1 in 5000-8000 live ♂) • Membranes with a small posterior slit. • Function as flap valves └ obstructive to antegrade urine flow └ catheter can be easily passed retrogradely.
• <u>Youngs Classification</u>	• <u>Type 1-</u> • Most common • Mucosal folds just distal to verumontanum. • <u>Type 2</u> • Rare • Vertical fold b/w verumontanum and proximal prostatic urethra. • <u>Type 3 - Cobb's Collar</u> • Circular diaphragm with central opening in membranous urethra. • Below verumontanum. • Due to abnormal canalisation of urogenital membrane.
• <u>C/F</u>	• Dribbling of urine • Recurrent UTI • Uremia • May cause renal failure
• <u>Dx</u>	• Antenatal / Post natal USG. • Micturating Cystourethrogram └ Key hole defect seen.
• <u>Mx</u>	• Initially- Drainage by feeding tube [preferred over Foley's] • <u>Definitive</u> - Cystoscopic Fulguration of valves [can be done only if serum creatinine is $\uparrow$] • If S. creat is raised - Vesicostomy (temporary) • Lifelong Supportive treatment for dilated urinary tract & recurrent UTIs.

Urethral Trauma

	Proximal injury [Prostatic Membranous]	Distal Injury [Bulbar (m/c) Penile]
	• Secondary to pelvic fracture • Present with deep perineal haematoma. • There can be urinary extravasation but restricted to upper 1/3 of thigh. ↳ Because of Holden's line • Vermooten's sign - (on digital rectal exam) High Riding prostate / Floating prostate	• Straddle injury ↳ Urethra directly compressed against a hard structure • Haematoma involving Scrotum & Penis ↳ Butterfly Haematoma.
• C/F	• Inability to pass urine • Blood at the tip of meatus.	
• Dx	• IOC - Retrograde urethrogram. [Dye spillage seen]	
• Mx	• Emergency Mx - Suprapubic catheterisation. + analgesics + antibiotics. • Definitive Mx - management of urethral stricture [Fibrosis occurs at site of injury and forms stricture]	
• <u>Complications</u> (Trauma)	1) Urethral Disruption injury 2) Urinary incontinence 3) Erectile dysfunction 4) Urine extravasation	

Urethral Strictures

• Causes

- a) Inflammatory [Secondary to urethritis
Secondary to BXO (balanitis xerotica obliterans)
- b) Traumatic [Bulbar urethral injury (m/c)
Pelvic fracture
- c) Iatrogenic — Secondary to
 - Urethral instrumentation / Catheterisation / TURP
 - Radical Prostatectomy
 - Radiotherapy for Prostate Ca.
- d) Idiopathic.

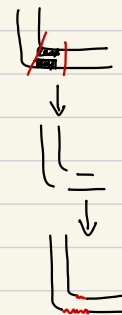
Mx

• Short Segment Stricture (<2cm)

Incomplete

Optic Internal urethrotomy (OIU) /
Visual Internal urethrotomy (VIU)
[Cut made at 12'o clock to
release stricture]
(40-50% cure rates)

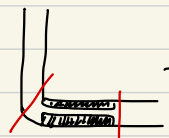
Complete



Cut the part
with Stricture

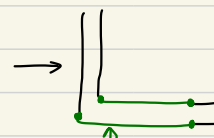
↓
Perform end to end
anastomosis.

• Long Segment Stricture [complete / Incomplete] - Urethroplasty



Cut the portion
with stricture

=



Graft to bridge the gap

• Grafts used -

1) Buccal mucosal (Best)

Barbagli Technique

2) Penile foreskin.

Hypospadias

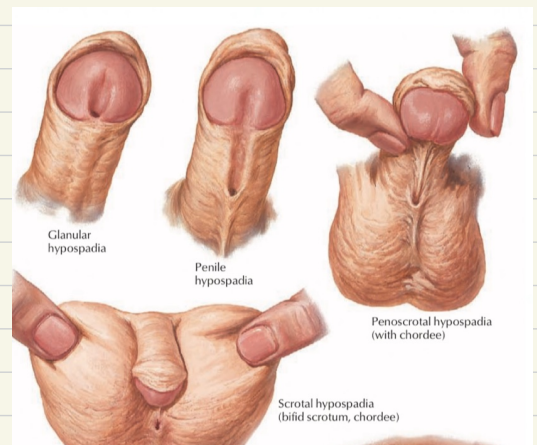
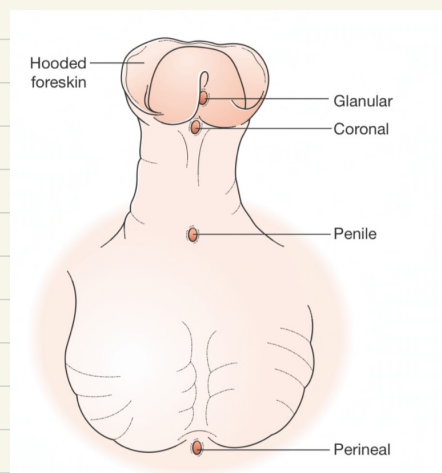
(1 in 200-300 ♂ live births)

- Urethral opening is ventrally placed.
 - **Most common congenital urogenital anomaly** (1 in 450 live births)
 - Can be associated with undescended testis & Micropenis.
- Types
- **Glanular** - M/c & mildest type.
(meatus on glans)
 - Sub-coronal
 - Coronal
(Junction of underside of glans & body of penis)
 - Distal Penile
 - Mid shaft
 - Proximal shaft
 - Peno scrotal
 - Scrotal
 - Perineal (worst prognosis)

Distal

Mid

Proximal



- C/F
 - Downward directed stream of urine
 - Difficulty during intercourse.
 - Hooded Prepuce
 - Chordee - downward bending of penis (severity rises with proximity of hypospadias)

• Mx

- Surgery - Foreskin is used for reconstruction.
↳ Hence, circumcision is avoided before repair.

- Time of surgery - 6-12 month (before 18 months)

• Principles of Repair
(sequential)

1. Chordee Correction - Orthoplasty



2. Reposition urethral opening & Tubularise urethra - Urethroplasty



3. Glans reconstruction - Glanuloplasty



4. Skin cover - Scrotoplasty.

- Distal Hypospadias - Done in single stage

Repairs

- Mathieu
- Magpi [Meatal advancement & granuloplasty]
- Mustarde

- Mid Hypospadias - Can be done in single stage / 2 stage.

- Tubularized incised plate repair (TIP) (m/c)
- Snodgrass

- Proximal Hypospadias - Two stage repairs.

- Thiersch Duplay
- Dennis Brown

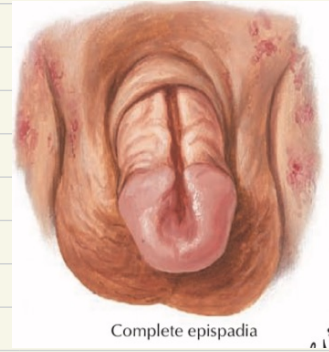
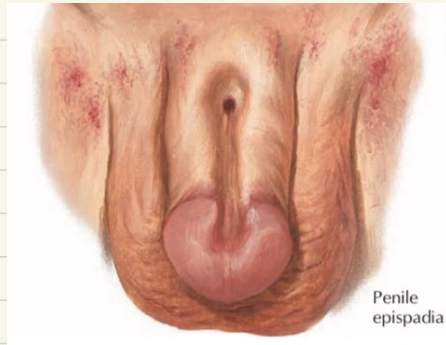
- Complications of Repair -

- Urethrocutaneous fistula
- Meatal stenosis
- Stricture formation
- Recurrence of Chordee

* Preputioplasty & frenuloplasty use Heineke mikulicz principle.

Epispadias

- Very Rare
- Urethral opening on dorsum of penis
- Upward curvature of erect penis



• ECTOPIA VESICAE

BLADDER EXTROPHY

- There is deficient abdominal wall below umbilicus.
- Anterior bladder wall is deficient.
- Pubic diastasis present
 ↳ Sx - Iliac osteotomy

- Males $\begin{cases} \text{Undescended testis} \\ \text{congenital inguinal hernia} \end{cases}$

- Female - Bifid clitoris

Mx

- Multiple surgeries to repair.
- Bad prognosis

• URETHRAL CARUNCLE

- Common in elderly women.
- Presents as soft, Raspberry like, pedunculated, granulomatous mass
- Attached to Posterior Urethral wall near external meatus.
- Highly vascular → Bleeding is common

C/F - ↑ frequency of micturition
Pain after micturition.

Mx - Excision & Diathermy coagulation at base of stalk.

• FOWLER SYNDROME

- Seen in females with PCOS.
- Abnormal myotonic discharge in striated urethral sphincter.

• C/F - Urinary retention

• Dx - By electromyography.

• Mx - Sacral Neuromodulation
(Urethral dilatation is ineffective)

Phimosis

SP8

	• Inability to retract foreskin. • Physiological adhesion present in children └ Start going away by 2 years. └ But can persist till 6 years. • <u>True Phimosis</u> - There is scarring of prepuce such that it will not retract without fissuring foreskin.
• <u>Phimosis in Boys</u>	May cause • Ballooning of foreskin during micturition • Balanoposthitis - Inflammation of foreskin and glans
• <u>Phimosis in Adults</u>	As a result of • Balanitis • Posthitis - Inflammation of foreskin • Balanitis xerotica obliterans (BXO) (Lichen sclerosus et atrophicus)
• <u>Management</u>	Management is required when - a) If the inability to retract foreskin persist > 6 year. - or b) There is symptomatic Phimosis └ Difficulty in passing urine └ Ballooning of foreskin └ Recurrent UTI └ Balanoposthitis └ Difficulty during intercourse └ Hydronephrosis Surgery - Circumcision.
• <u>Paraphimosis</u>	• Inability to return retracted foreskin. • Venous / Lymphatic return from distal foreskin & glans is obstructed → swelling <u>MX</u> - Icebags + Gentle Compression + Hyaluronidase → for swelling use xylocaine jelly & try to return retracted foreskin. ↳ fails → Circumcision. • Emergency - Dorsal slit of prepuce

★ BXO - Foreskin becomes thickened and forms constricting bands (cicatrix) that prevents retraction.
may also effect

- └ glans - causes meatal stenosis
- └ urethra - causes stricture

Circumcision

→ AO

• Indications

- Religious (m/c)
- Phimosis
- Paraphimosis
- BXO
- Early Ca of prepuce / glans penis
- Recurrent Balanitis / Balanoposthitis

* Recent evidences suggest it prevents spread of HIV.

* In adults, { Splitting of tight frenulum
Inability to retract foreskin for intercourse.

• Contraindication

Hypospadias

• Techniques

1) Gomco clamp method

2) Plastibell (Hollister) technique-

(i) foreskin freed & retracted

(ii) Plastibell device is slipped into place over glans.

(iii) foreskin is ligated over groove of the bell & redundant foreskin is cut away.

3) Adult Circumcision- Dorsal Slit Method

(i) Prepuce held with artery forceps [1, 5, 7, 11 o'clock]

(ii) Prepuce separated from glans & mid dorsal slit made.

(iii) Frenular artery secured by figure of 8 stitch.

(iv) Preputial layers trimmed in a line parallel to corona.

(v) Suture with absorbable sutures (catgut).



* Monopolar diathermy must be avoided.

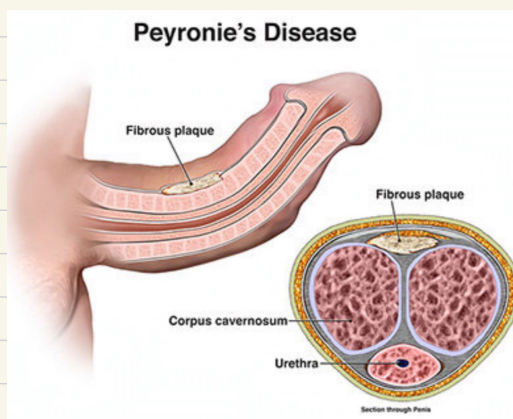
4) Guillotine method

• Complications

- Bleeding (frenular artery)
- Pain
- Infection
- Chordee
- Stricture urethra near external meatus in children.

Peyronie's Disease

- Deposition of calcific plaques in corpora cavernosa.
 - ↓
 - Bending of penis (more pronounced in erect penis)
 - ↳ Dorsal bending (towards abdomen)
- Causes
 - Idiopathic
 - Ig G4 mediated
 - Can occur secondary to trivial trauma
 - ↳ Microhaemorrhages in corpora cavernosa
 - ↳ calcification.
 - Active Phase (18-24 months)
 - ↓
 - Bend keeps on increasing
 - ↓
 - Stabilises later.
 - Self limiting in most patients.
 - Dx - • Clinical
 - CT/MRI
 - Mx - • Ca channel blockers
 - If progressive → Nesbitt's procedure
 - ↓
 - Non absorbable sutures on the opposite side of bend.



★★ Marion's disease - Hypertrophy of internal sphincter leads to bladder outlet obstruction.

Priapism

- Prolonged erection of penis (more than 4 hrs).
- If erection > 6 hrs Irreversible damage to penis.

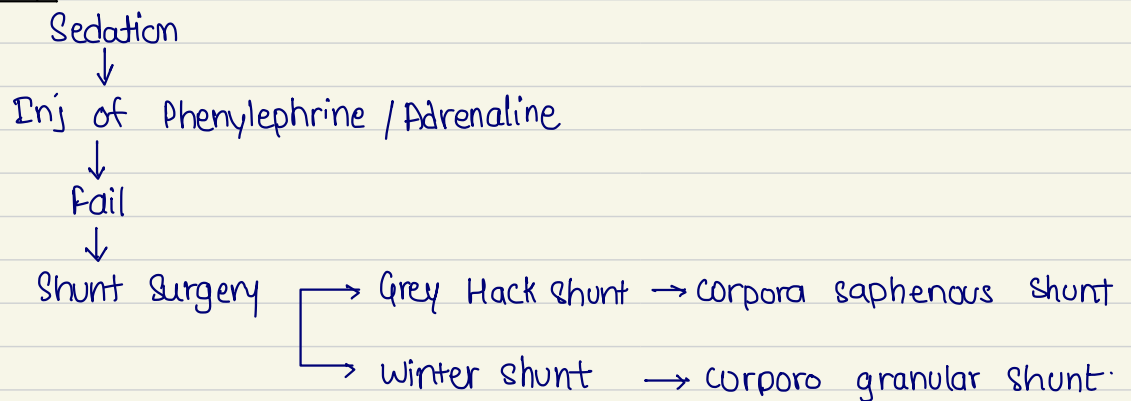
High flow Priapism

- ↑ blood flow
- Causes
 - Secondary to trauma
 - Secondary to spinal injury
 - Secondary to papaverine inj.
 - Fistula b/w artery & sinusoidal space
- Painless
- Penile Blood gas Analysis - Oxygenated

Low flow/ Ischemic (m/c)

- In children suffering from
 - leukemia
 - Lymphoma
 - Sickle cell
- Venous outflow obstruction.
- Can also occur due to
 - Papaverine inj.
 - Antipsychotics.
- BGA - deoxygenated blood
- Painful (Glans & corpus spongiosum not involved)
- Dx - Penile Angiography.

Mx



* In sickle cell disease, Stuttering or Intermittent priapism is seen

Fracture shaft Penis

- | | |
|--------------|--|
| | <ul style="list-style-type: none">• Tear in Corpora Cavernosa• Secondary to trauma to erect penis (usually during intercourse) |
| • <u>C/E</u> | <ul style="list-style-type: none">• Popping/Cracking sound heard during intercourse• Immediate loss of erection following sound.• Haematoma around penis till person reaches hospital.
 ↳ Egg Plant Deformity of the Penis. |
| • <u>Mx</u> | <ul style="list-style-type: none">• Evacuate the haematoma.• Surgical Repair of Corpora Cavernosa. |

Penile Cancers

~~Premalignant Conditions~~ SAD / Asked in LAQ	• Bowen's Disease - Reddish papules over shaft of penis • Erythroplasia of Queyrat - Reddish papule over glans • Genital warts - Caused by HPV (16 & 18) • Balanitis Xerotica obliterans - Can cause Scarring & Phimosis • Leukoplakia
• <u>Pathology</u>	• Squamous cell carcinoma Gene mutated - p53 <u>Buschke Lowenstein tumor</u> • Slow growing • Grows outwards • Caused by HPV • No metastasis • Good Prognosis Mx - Excision
• <u>C/F</u>	• Foul smelling Ulcer of proliferative growth over Penis • Inguinal lymph node swelling (50%) [Mostly due to infections]
• <u>Dx</u>	Incisional Biopsy
• <u>Staging</u>	MRI [TNM staging Jackson staging • T₁ - Skin • T₂ - Corpora • T₃ - Urethra • T₄ - Adjacent structures

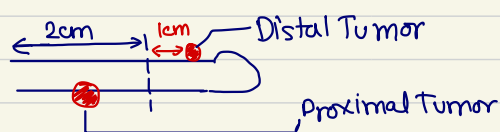
- Management
 - Bowen's dis / Erythroplasia of queyrat
 - Topical 5-fluorouracil cream
 - CO₂ LASER ablation.

- Early Ca - Involves Only glans → Glansectomy

- Surgery

- a) Primary Tumor

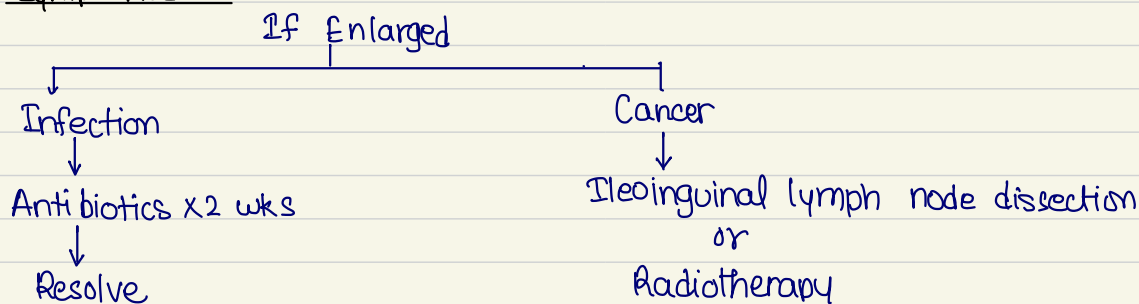
1 cm margin is kept



- Partial Penectomy - If ≥ 2 cm residual penis left after leaving 1 cm margin.
(Done generally in Distal Tumors).

- Total Amputation of penis - If < 2 cm residual length of penis left. (Generally for Proximal tumors)
+ Formation of Perineal Urethrostomy

- b) Lymph Nodes



- If not enlarged. - Sentinel lymph node Biopsy

- Chemotherapy - 5-fluorouracil
Cisplatin } Metastatic disease.

★ Most important prognostic factor $\Rightarrow$ Inguinal lymph Node status.

★ M/C cause of mortality $\Rightarrow$ Erosion of femoral/Iliac vessels due to involved lymph nodes.