

Case Scenario

- 25 year old male presenting with thinning of urinary stream for 3 years
 - leakage of urine from peno-scrotal junction on ventral side for 3 month
 - Loss of appetite, hiccups, puffiness of face, less urination & vomiting for 1 month
 - urethral bleed after attempted urethral catheterization by a doctor 4 years ago.
1. What is probable diagnosis?
 2. What is sequence of events?
 3. How will you investigate?
 4. How will you treat?



Stricture Urethra

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Learning Objectives

- **Be able to understand etiopathology of stricture urethra**
- **Be able to suspect diagnosis based on clinical presentations**
- **Be able to confirm diagnosis**
- **Be able to prescribe correct treatment**
- **Be aware of complications**

Learning resource material

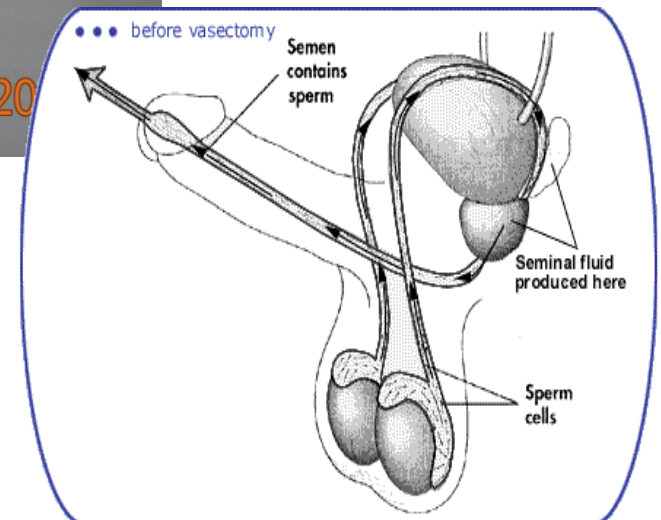
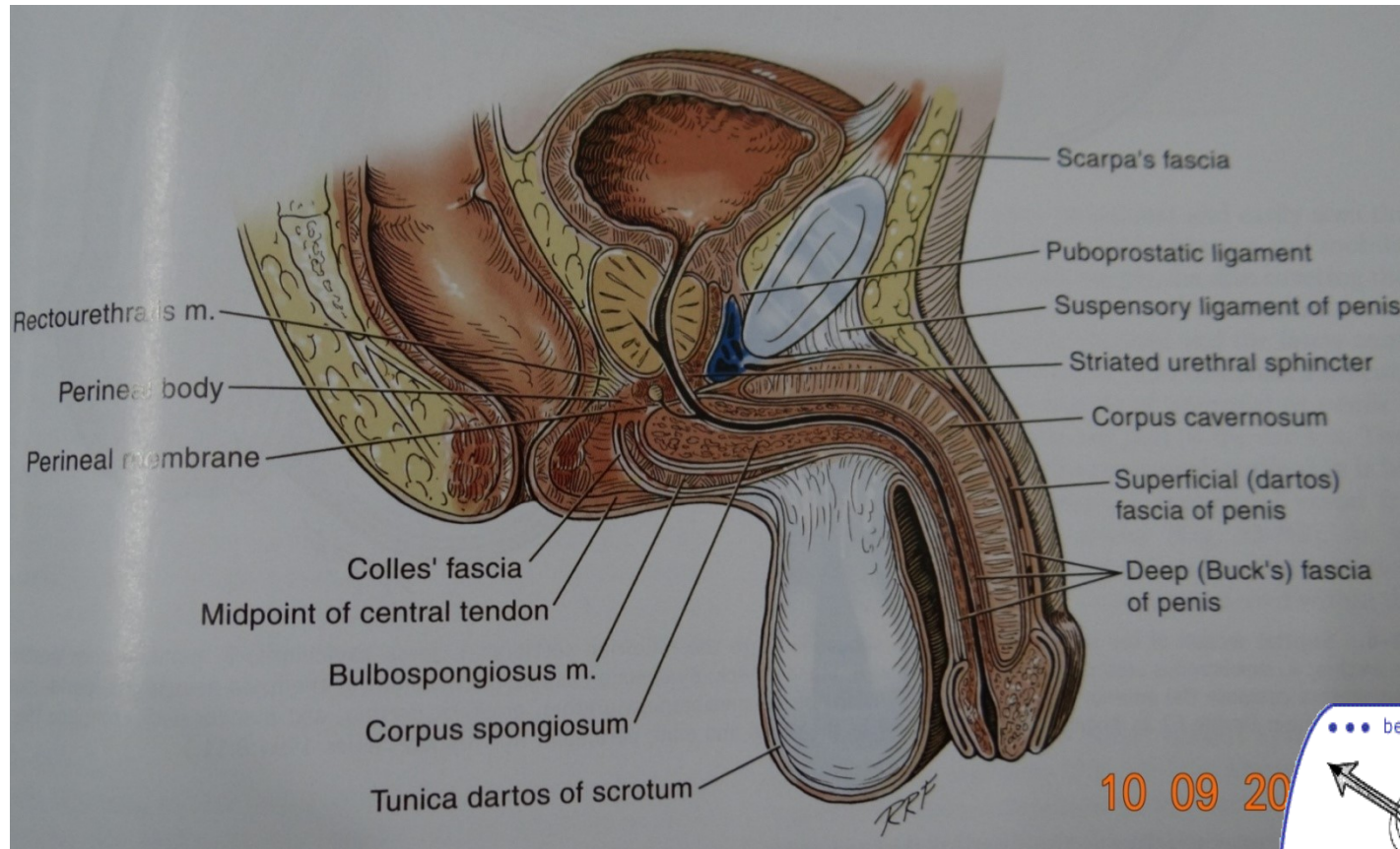
- **Baily and Love's Short practice of surgery, 28^h edition**
- **Campbell – Walsh Urology, 12th edition**
- **Urology Secrets, Martin and Andrew, 1st Indian edition**
- **www.clinicalkey.com**

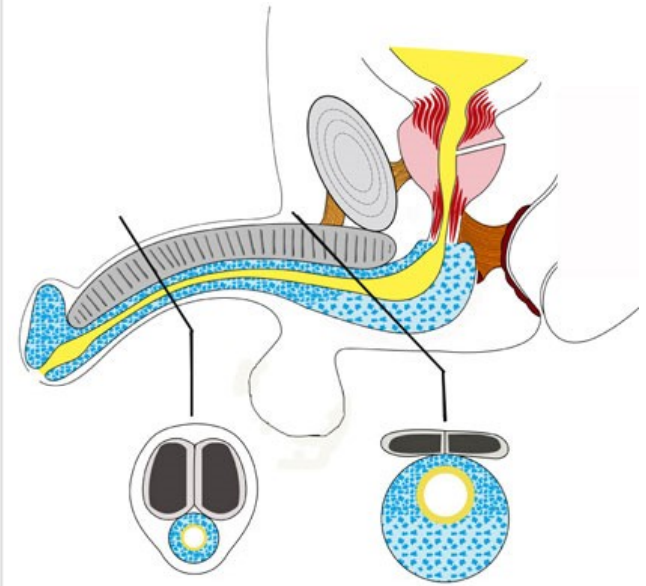
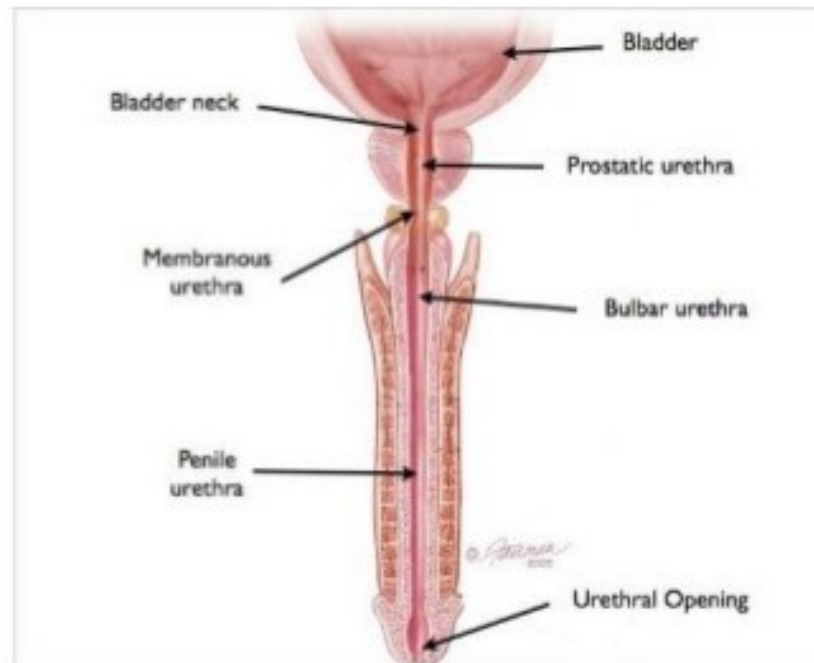


Stricture Urethra

- **Definition**
- **Anatomy of stricture**
- **Etiology**
- **Patho-physiological effects on urinary tract**
- **Clinical presentations**
- **Investigations**
- **Treatment**
- **Complications**

Sagittal section of pelvis





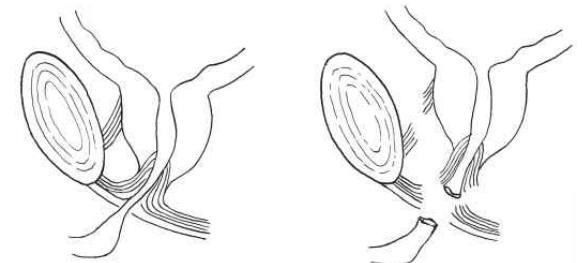
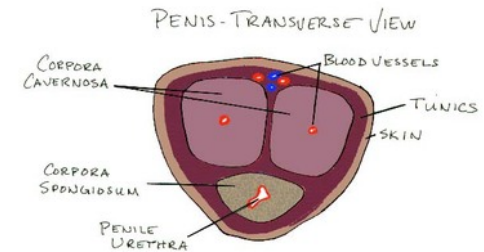
- Male urethra is divided by urogenital diaphragm into 2 segments:

1. Anterior (bulbar & penile)

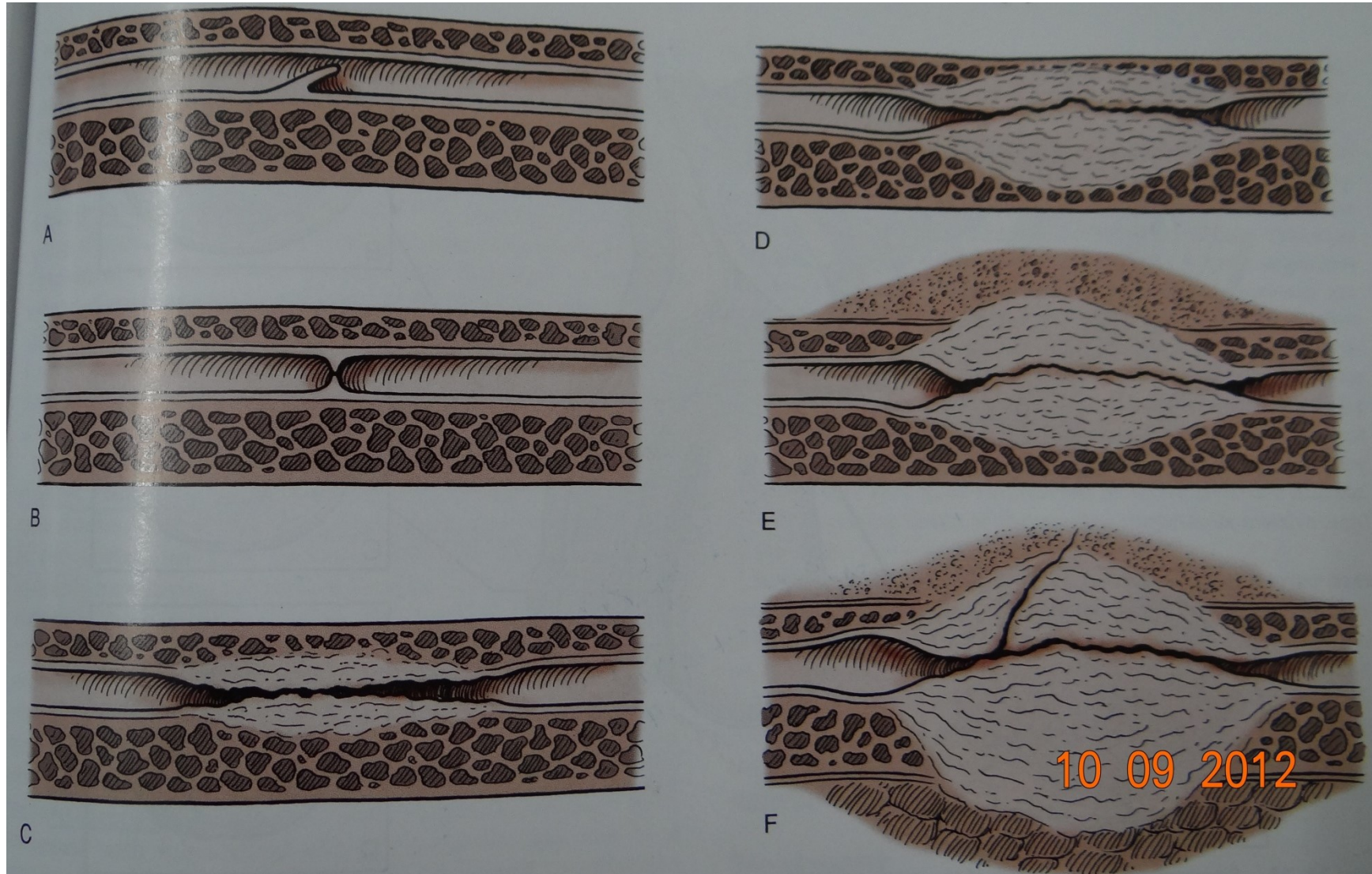
2. Posterior (membranous & prostatic)

Definition

- “Refers to anterior urethral disease resulting in narrowing of urethra due to scarring process involved in spongy erectile tissue of corpus spongiosum”
- By consensus of WHO conference - term stricture is limited to anterior urethra only
- Posterior “strictures” are distraction defects due to trauma with subsequent contracture



Anatomy of stricture



Anatomy of stricture

A – Mucosal fold

B – iris constriction

C – Full thickness involvement with minimal fibrosis of spongy tissue

D – Full thickness spongiofibrosis

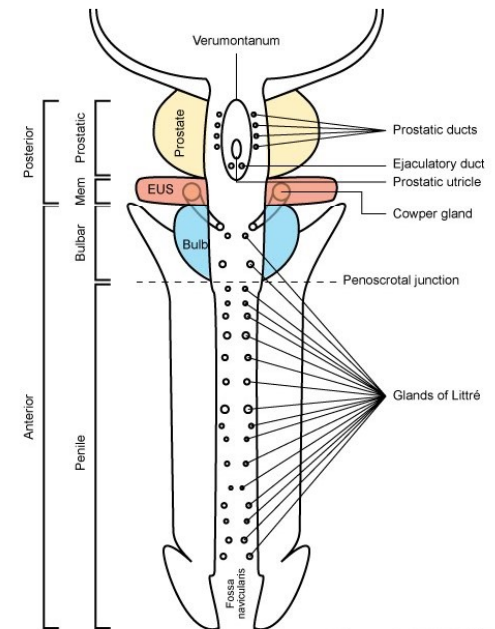
E – Inflammation and fibrosis involving tissue outside Corpus spongiosum

F – complex stricture complicated by fistula

Etiology

Any process that injures urethral epithelium and or corpus spongiosum which heals by scarring

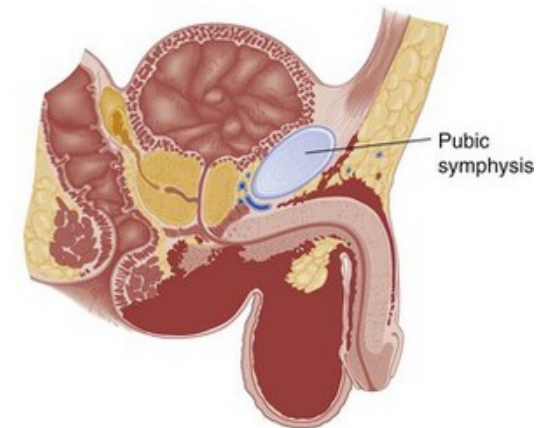
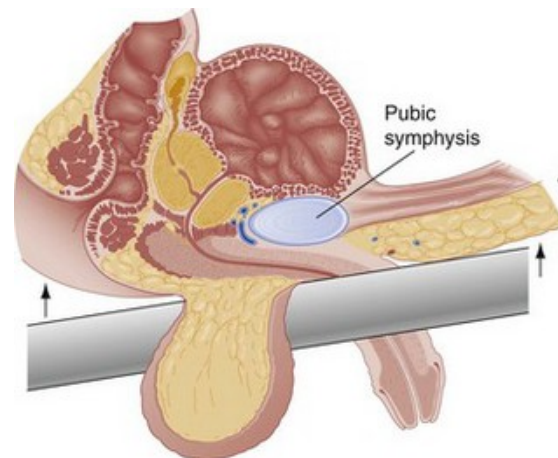
- Trauma – straddle injury
- Inflammation
- Iatrogenic
- Idiopathic
- Lichen sclerosus – BXO
(Balanitis Xerotica obliterans)



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Increased voiding pressure leads to intravasation of urine in glands of Littre forming microabscesses and dense scarring

Etiology - Straddle Injury



Etiology

Inflammation

- **Gonococcal** – not common now-a-days
- **Non specific urethritis by Chlamydia and ureplasma** – not much association with stricture

Iatrogenic –

- Catheterization leading to trauma or contact urethritis
- Instrumentation like - dilation, cystoscopy, ureteroscopy, TURP, TURBT

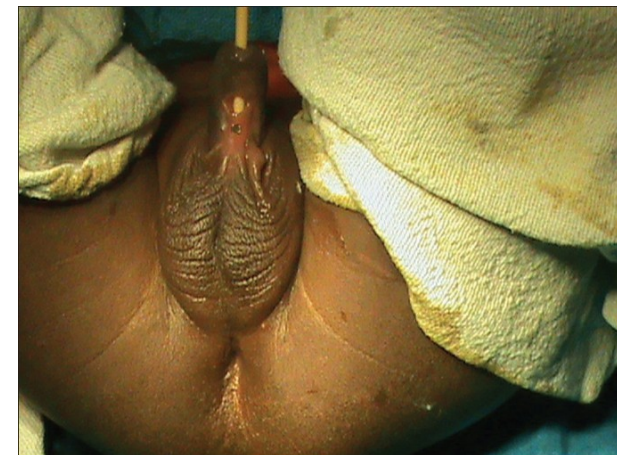
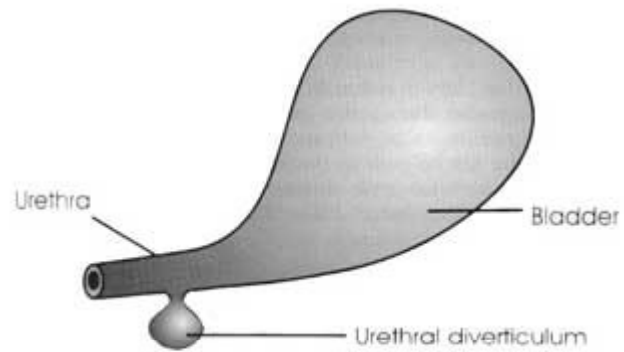
Lichen sclerosus



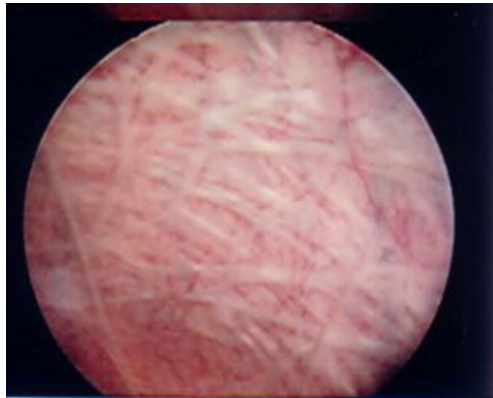
Lichen sclerosus

- **Previously popular as BXO**
- **Involves meatus & urethra upto fossa navicularis**
- **White, hard patches on prepuce and Glans**
- **More proximal stricture due to intravasation of urine in glands of Littre leading to microabscess & spongiofibrosis**

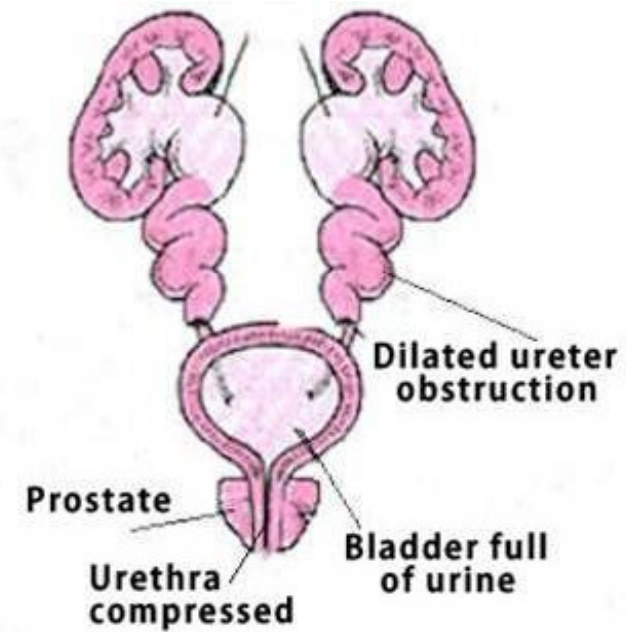
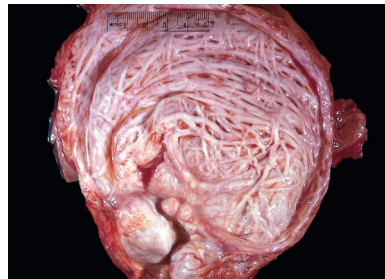
Pathological effects on Urinary system



Pathological effects on Urinary system



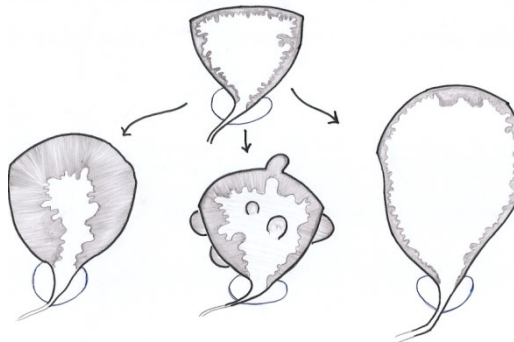
Trebeculations on Cystoscopy/Gross specimen



Upper tract changes



Sacculations



Bladder changes

Pathophysiological effects on urinary tract

Urethra –

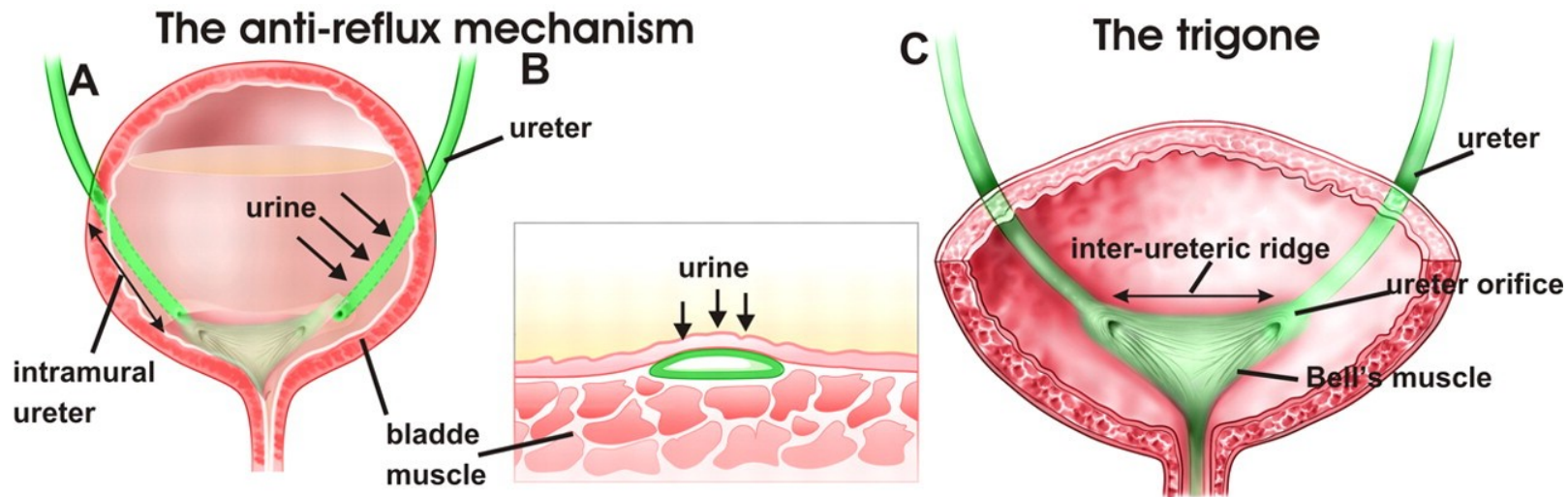
Proximal urethral dilatation → urethral diverticulum → Periurethral abscess → Urethral fistula

Bladder –

- **Compensated** – Hypertrophy of muscles - trabeculae seen as stretched strands on cystoscopy → cellules → Saccules → diverticula
- **Decompensated** – atony of bladder muscles

Ureter

- Derangements of uretero trigonal valve
- Back pressure during voiding
- Hydroureter
- Intra-mural ureter comes down due to trigonal hypertrophy



Patho-physiological effects – Kidney

Increased intra pelvic pressure

Caliceal dilatation

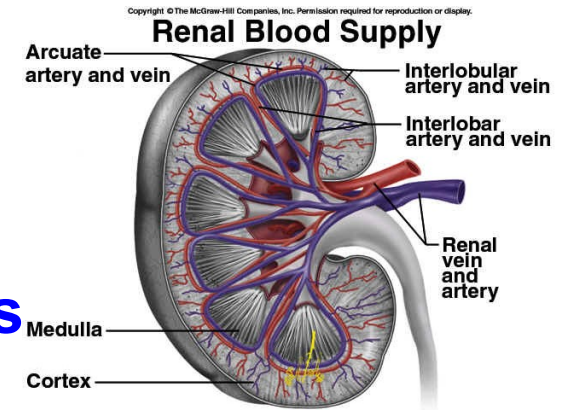
Pressure over renal cortex & pressure over arcuate vessels

Pressure atrophy

Ischemic cortical atrophy

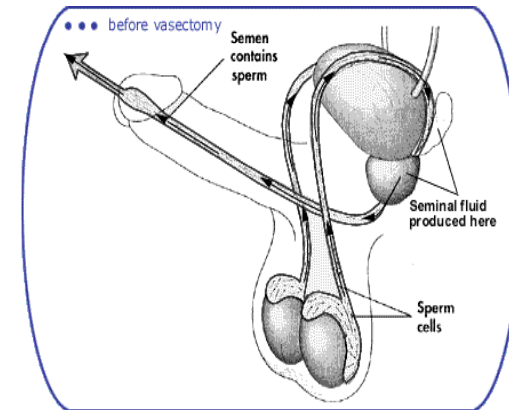
Thinning of cortex & Loss of glomeruli

Decreased GFR → Renal failure



Clinical presentations

- Obstructive voiding symptoms
- Dysuria
- Splaying of urinary stream in distal strictures
- UTI as prostatitis, cystitis
- Epididymo-orchitis
- Retention of urine
- Renal failure
- **O/E** – Induration of corpus spongiosum and urethra



Clinical features (contd.)

Obstructive urinary symptoms

- **Hesitency**
- **Intermittency**
- **Thinning of stream**
- **Sense of incomplete evacuation**
- **Post void dribbling**

Questions





Group activity

- **25 year old male presenting with thinning of urinary stream for 3 years**
 - **leakage of urine from peno-scrotal junction on ventral side for 3 month**
 - **Loss of appetite, hiccups, puffiness of face, less urination & vomiting for 1 month**
 - **urethral bleed after attempted urethral catheterization by a doctor 4 years ago.**
1. **What is probable diagnosis?**
 2. **What is sequence of events?**
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Investigations

Aim

- **To determine Location**
- **To determine Length**
- **To determine Depth**
- **To determine Density**
- **To know the effect of disease**
- **To objectively record urinary flow rate**

Investigations

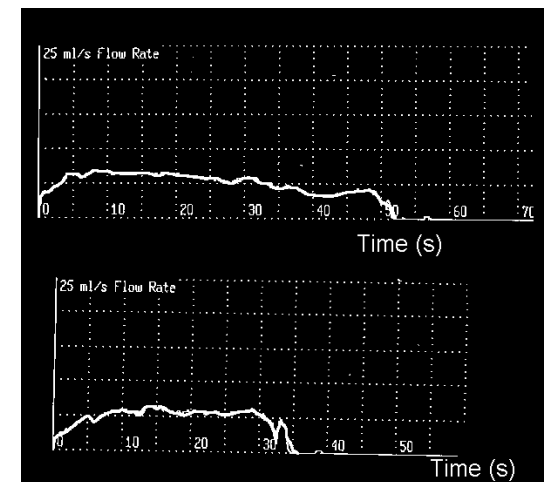
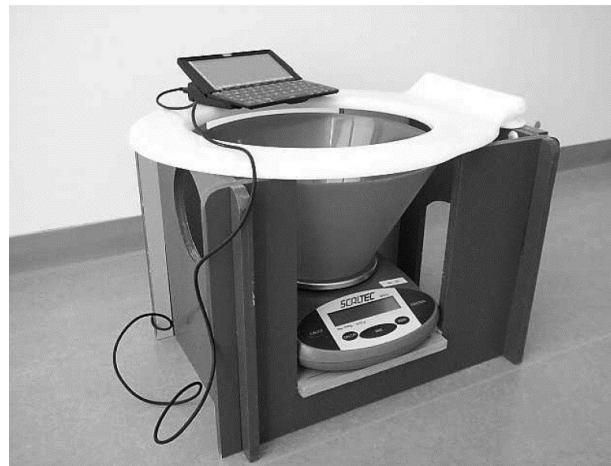
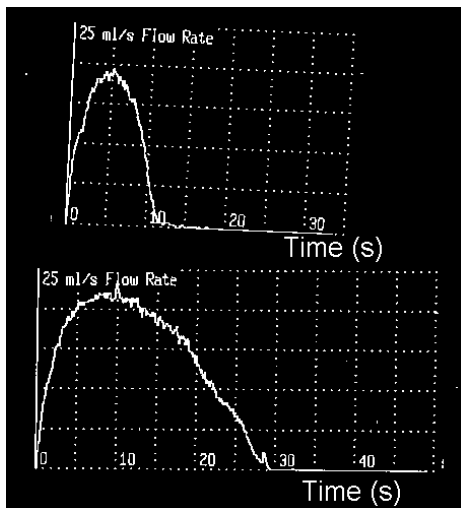
- **Urine analysis**
- **Urine C/S**
- **Urine for Gonococci**
- **Serum Urea / S. creatinine**
- **Uroflometry**
- **Radiography**
- **USG of abdomen**

Uroflowmetry

Normal range with 150 ml voiding volume

- **Peak flow rate (Q max) – 15-20 ml / sec**
- **Average flow rate – 12 ml / sec**

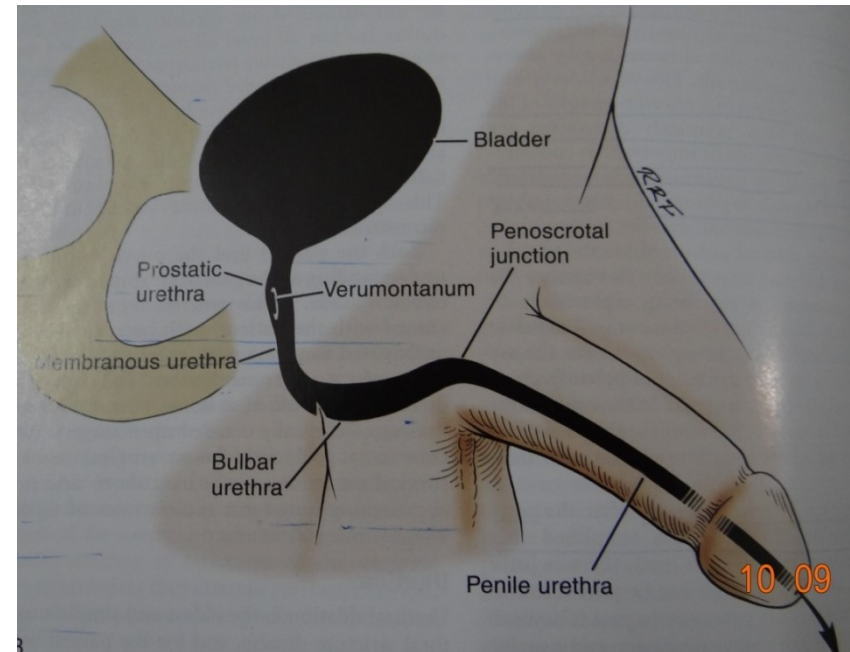
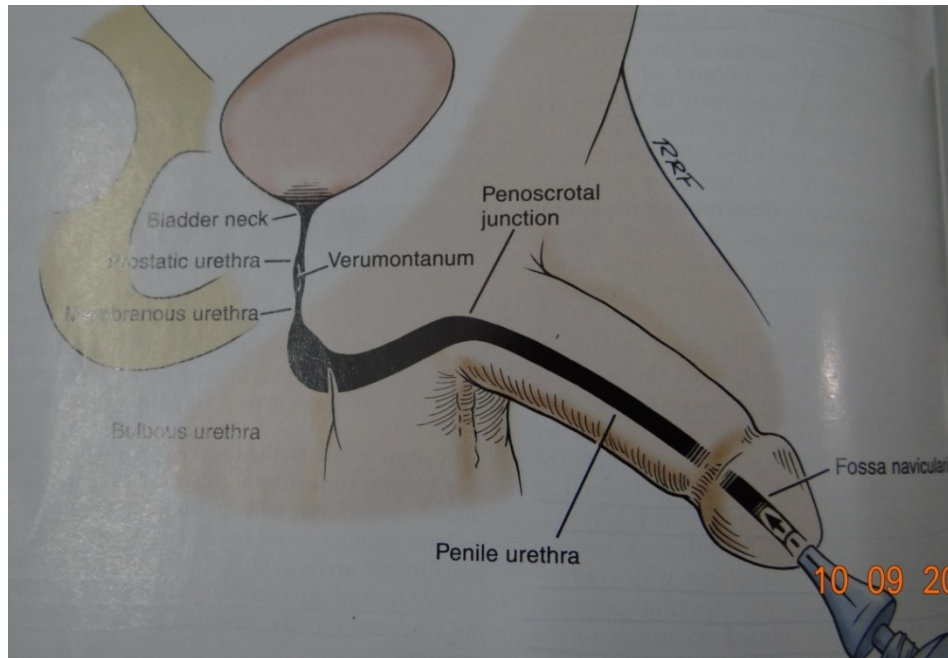
(Less than 7 ml / sec indicates definite obstruction)



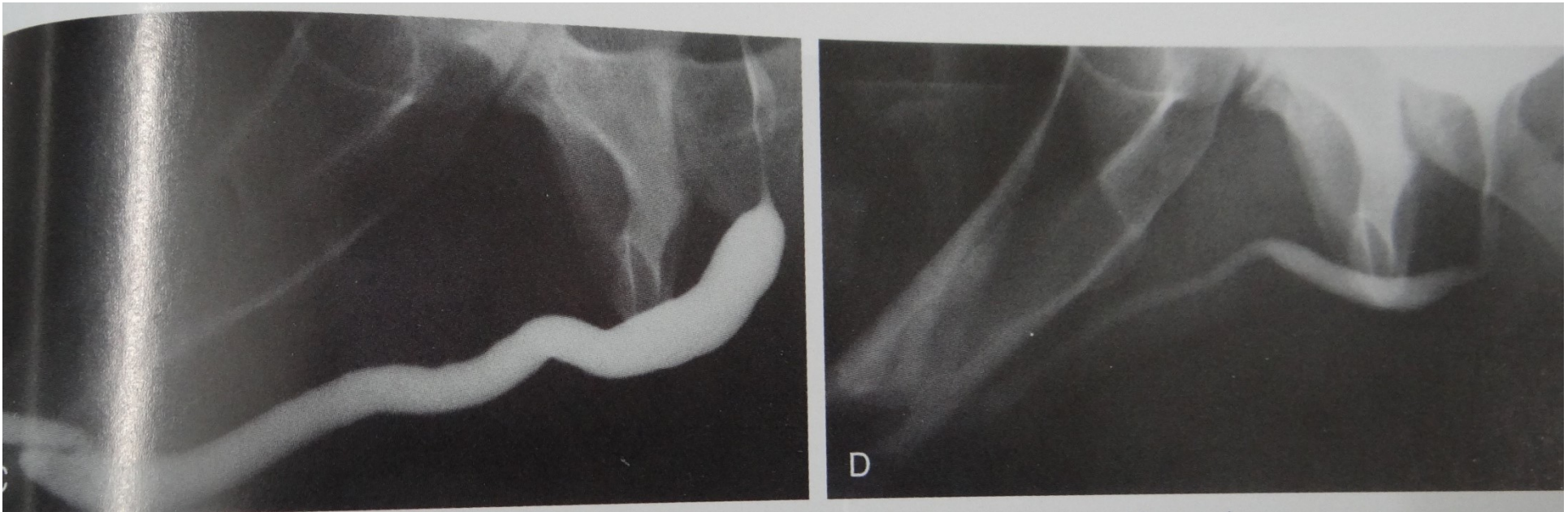
Investigations

- **Radiography –**
 - **Dynamic retrograde urethrogram**
 - **Dynamic voiding cystourethrogram**
(Dye used should be compatible with IV infusion)
- **Penile USG for stricture**
- **USG abdomen for PVRU and renal status**
- **Urethroscopy with flexible cystoscopy or pediatric cystoscopy**

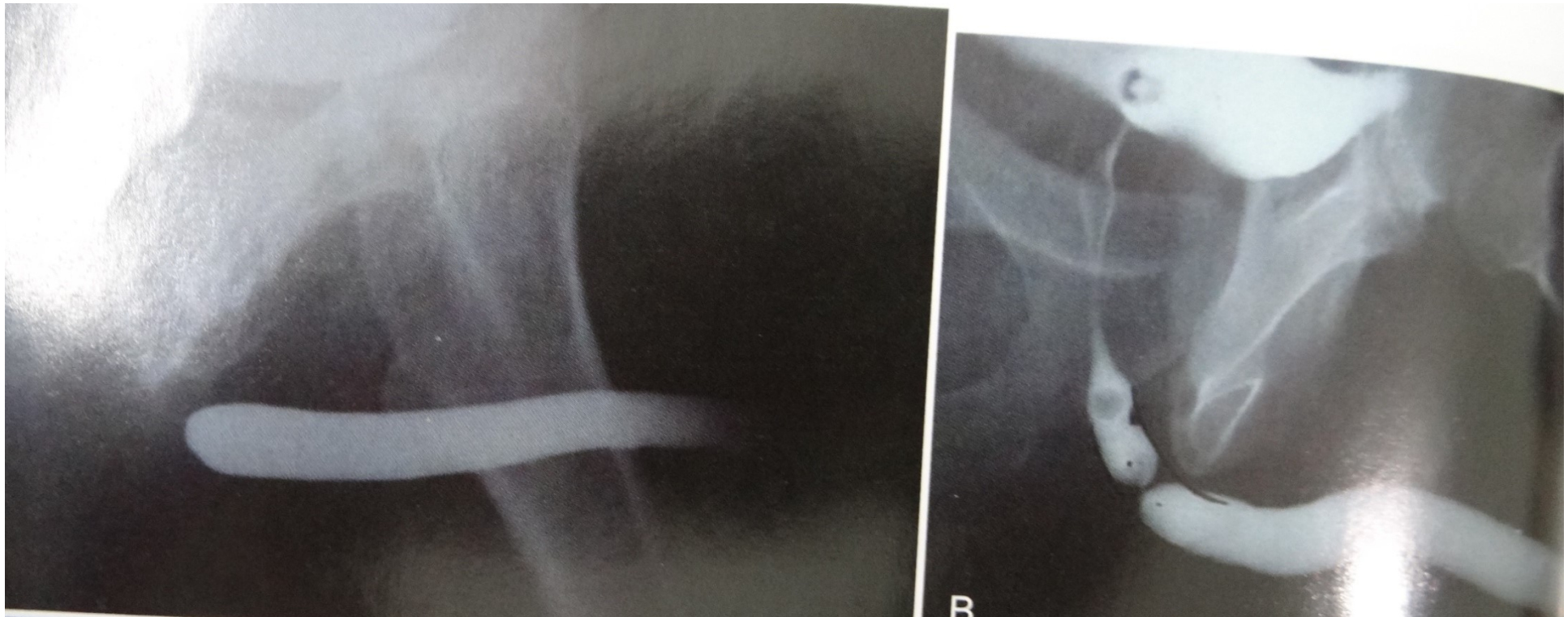
Dynamic Radiography of Urethra



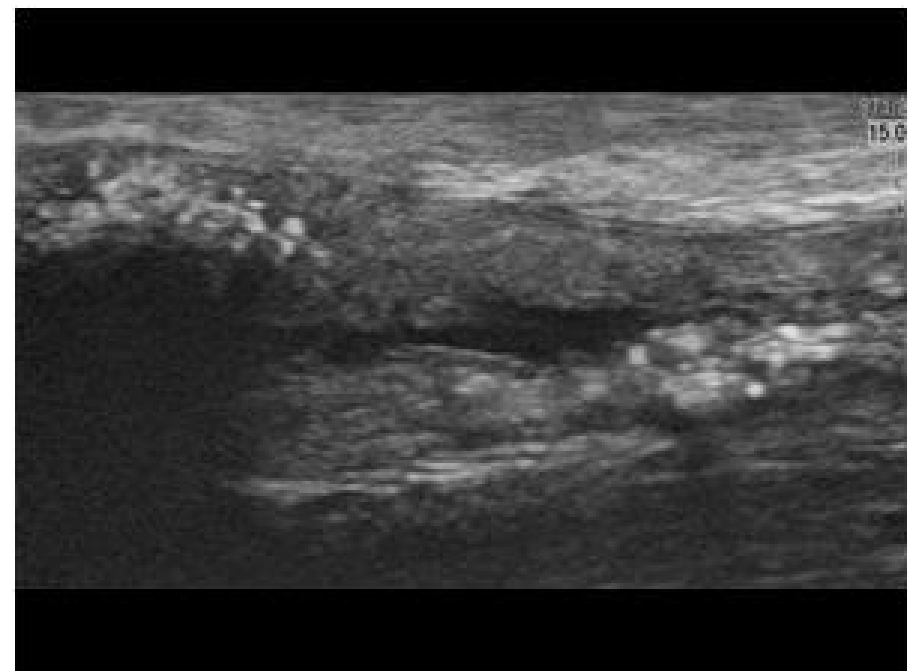
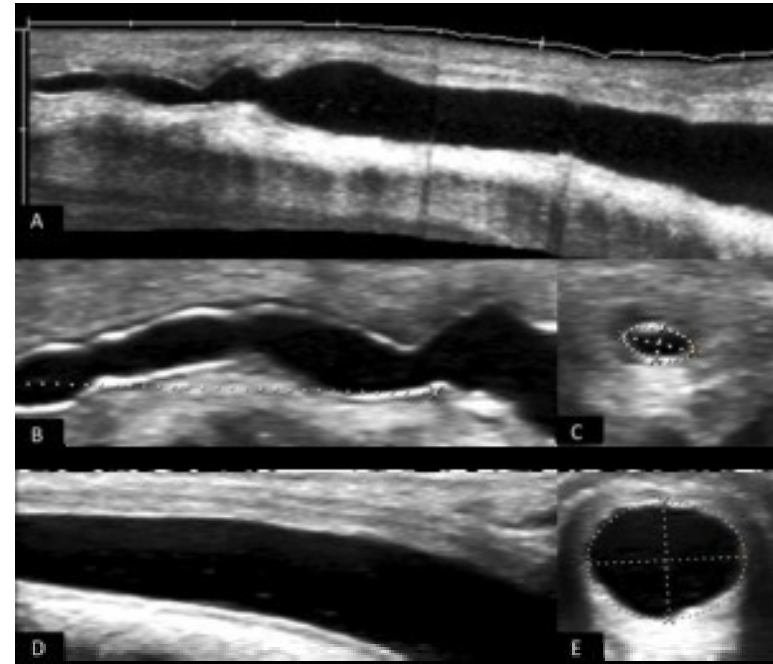
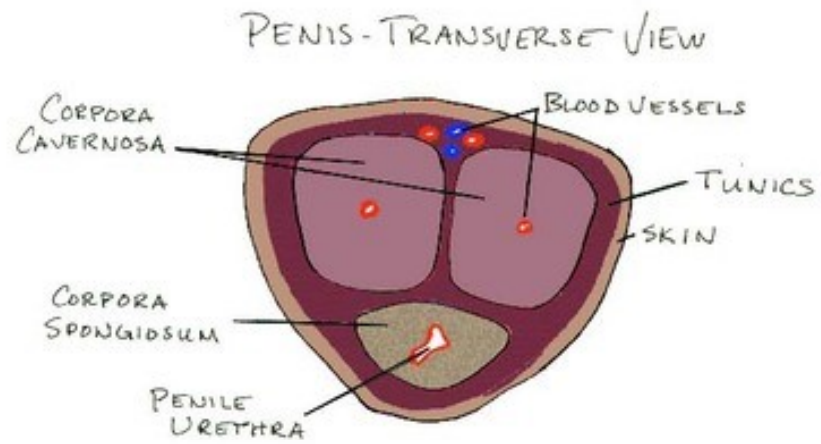
Normal Urethrogram



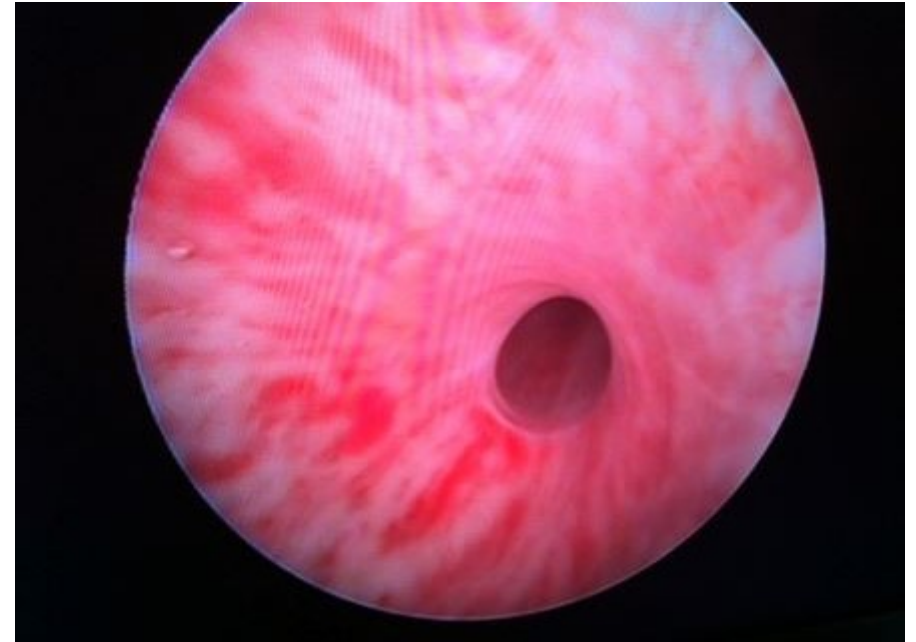
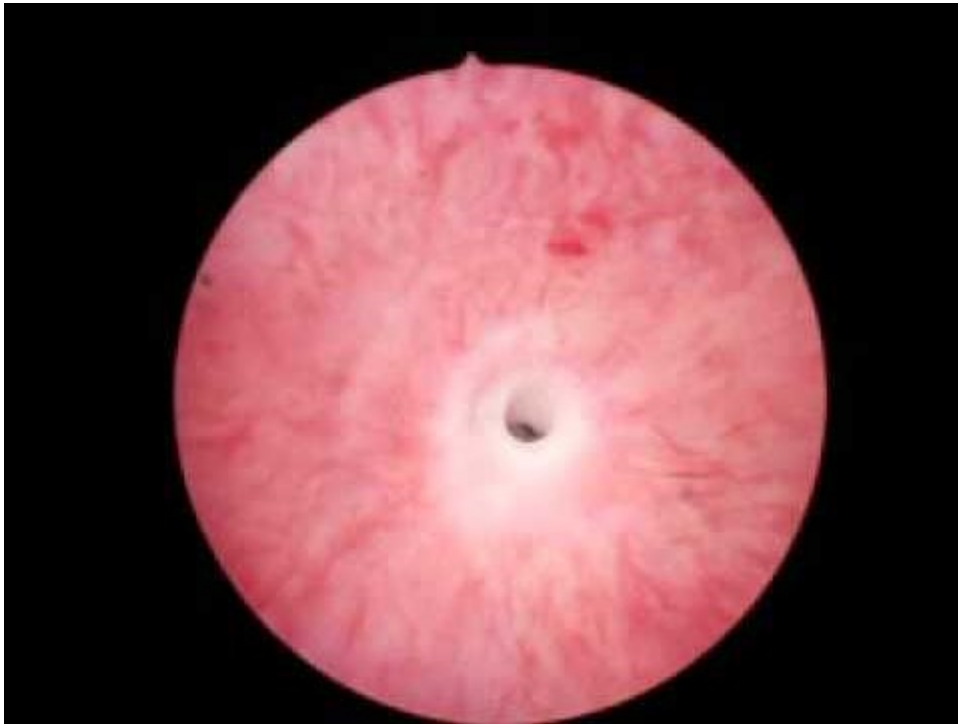
Stricture urethra



Penile USG



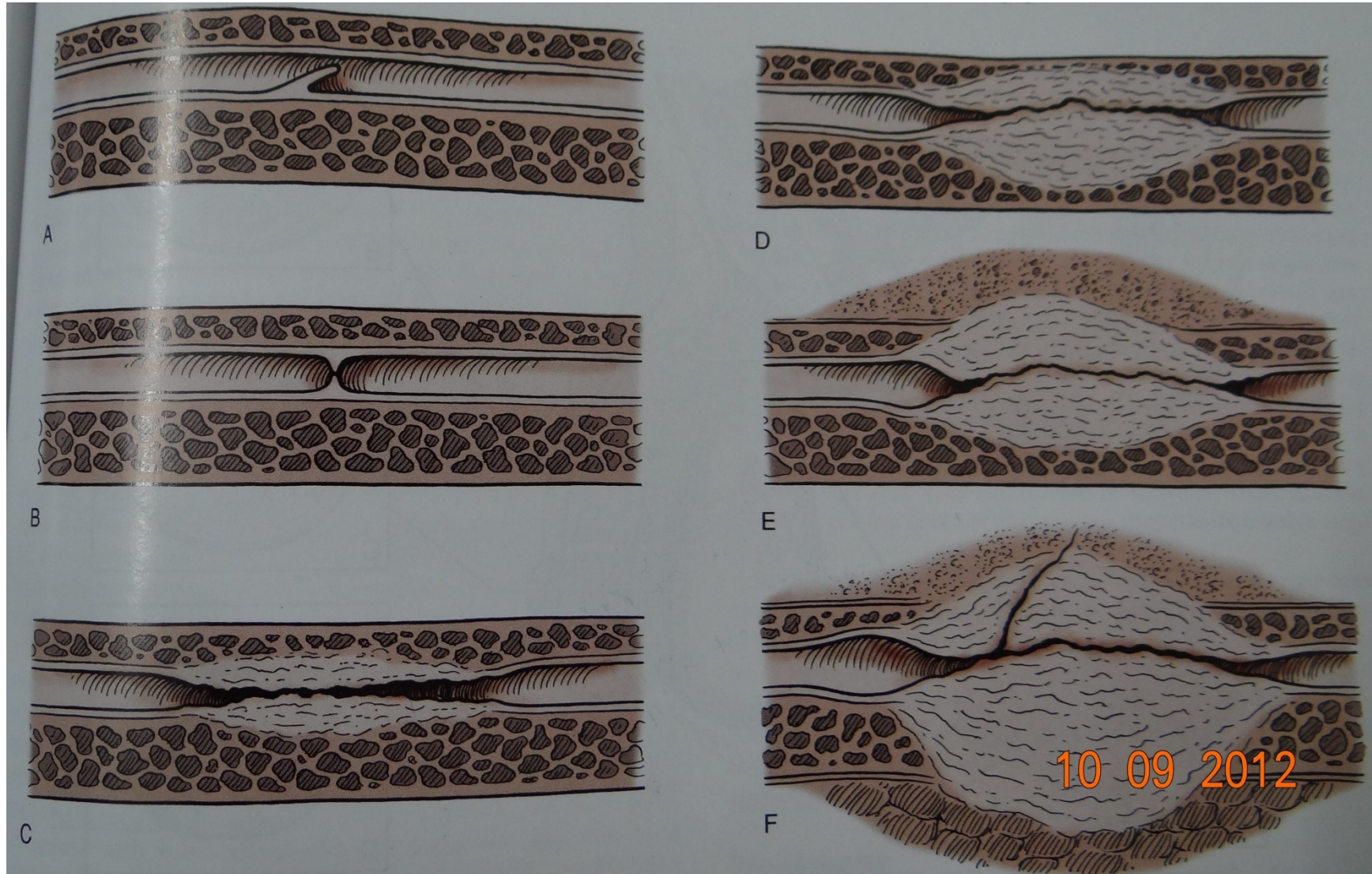
Urethroscopy



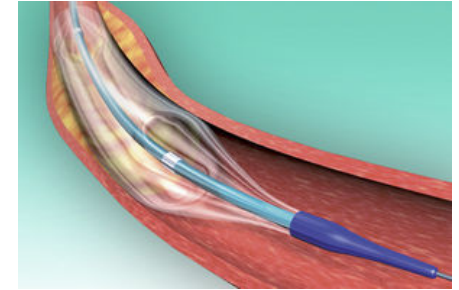
Treatment

- **Dilation**
- **Direct vision Internal urethrotomy (DVIU)**
- **Urethral stents after DVIU**
- **Laser urethrotomy**
- **Open reconstruction (urethroplasty) –**
 - **Excision & re-anastomosis**
 - **Patch graft**
 - **Flap urethroplasty**

Anatomy of stricture



Dilation



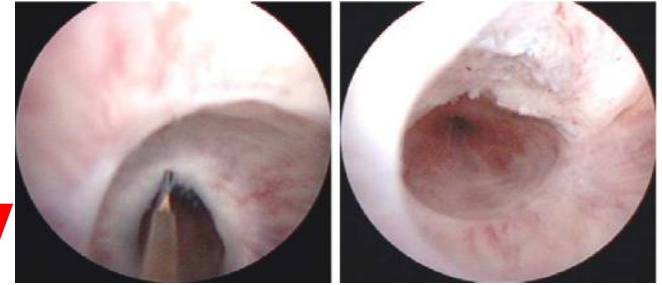
- Aim is stretching the scar without trauma
- Soft wire manipulated through stricture using flexible cystoscopy
- Subsequent passage of balloon dilating catheter
- Inflation of balloon exerts radial force thus leads less trauma

(metallic bougie dilatation causes shearing force)

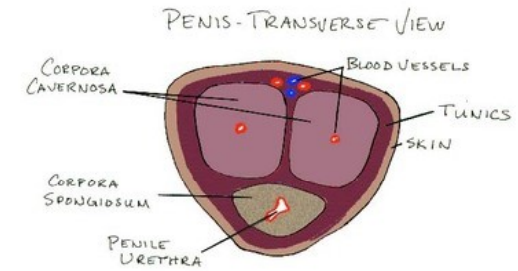
- Suitable for type A stricture
- Patient put on CSIC programme
- Dilatation programme at periodic interval & maintained at 6 monthly or yearly



Direct vision Internal urethrotomy



- Suitable for short stricture (1-1.5 cm) with minimal spongiofibrosis of type B & C
- Not suited in stricture with dense spongiofibrosis
- Cold knife cut made at 12 O'clock
- Alternatively cut between 10-2 O'clock are made due to dorsal position of urethra
- N. saline is used as irrigation fluid
- Catheter placed for 4-6 weeks or for five days

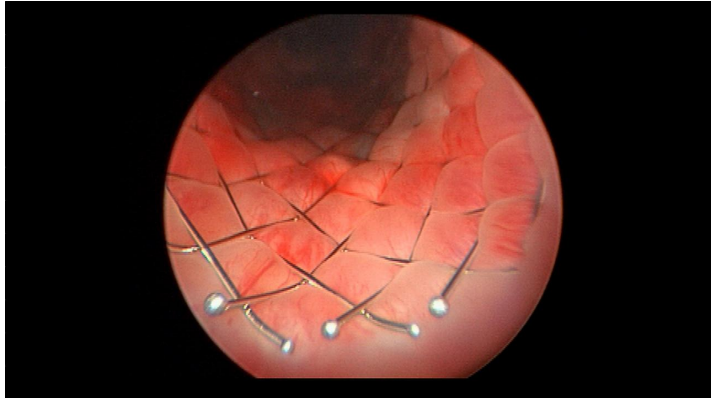
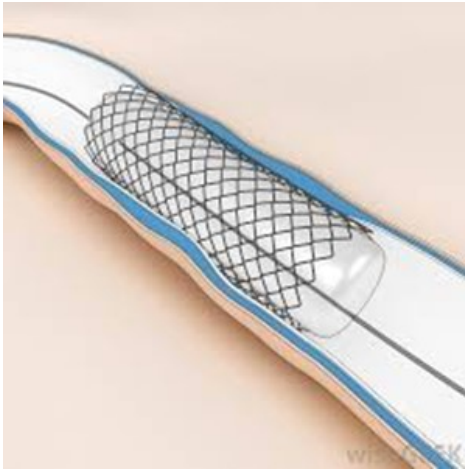
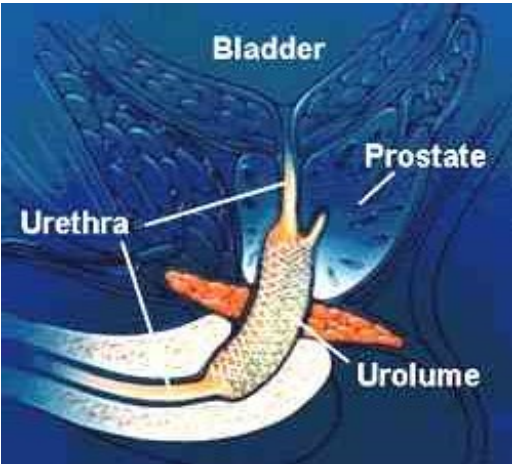
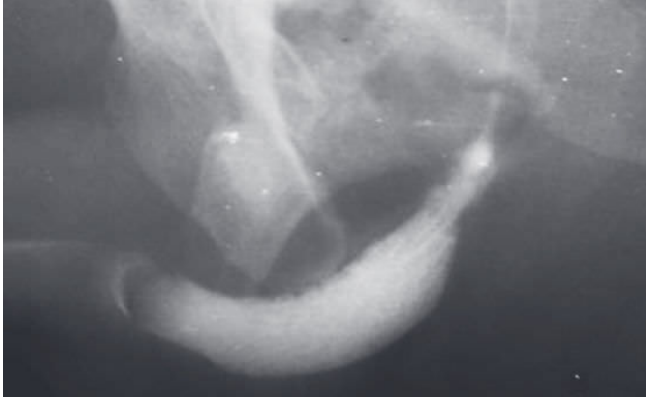
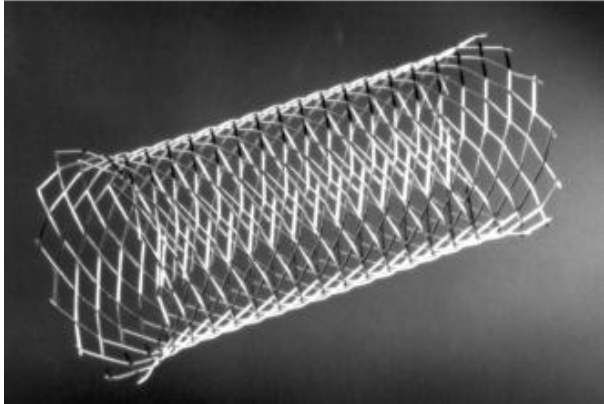




DVIU with Stents

- **Removable stents** – removed after 6-12 months (**Made of Nitinol**)
- **Permanently implantable** (urolume)
made of alloy which gets incorporated in urethral epithelium / C. spongiosum
(Placed only in bulbous urethra)

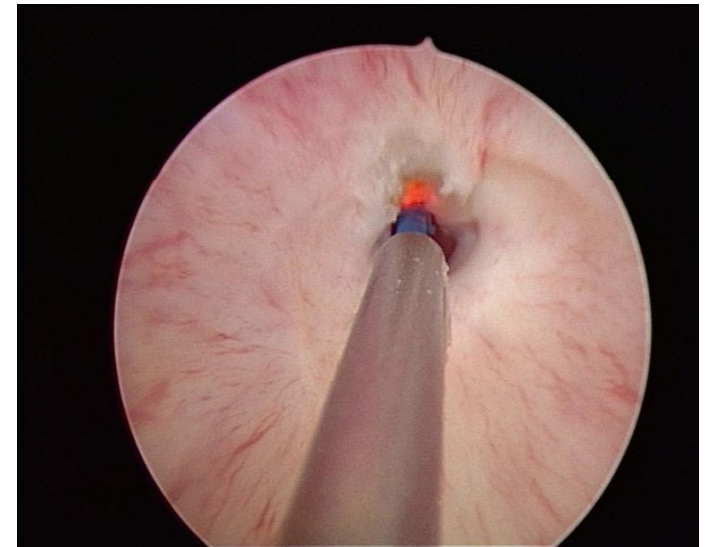
Urethral stents



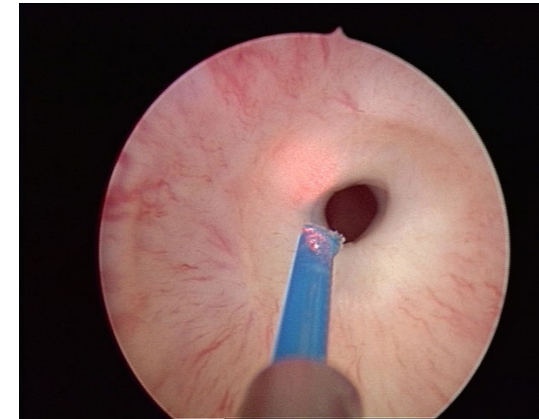
Laser urethrotomy

Ideal Laser –

- **Totally vaporises tissue**
- **Exhibits negligible peripheral tissue destruction**
- **Not absorbed by water**
- **Easily propagated along the fiber**



Laser urethrotomy



Various Laser used ...

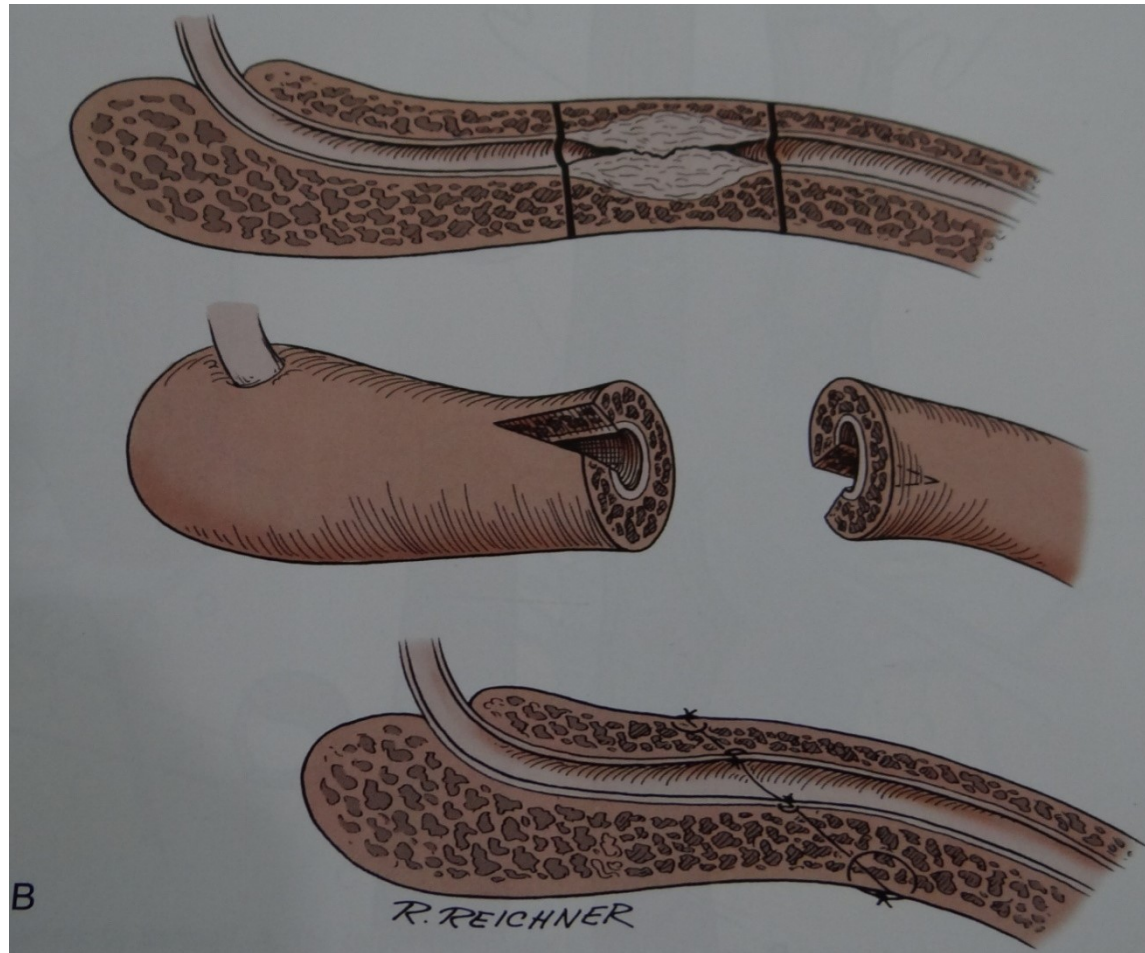
- **Co₂ Laser (with gas cystoscopy)**
- **Nd:YAG & Argon (both cause peripheral Tissue necrosis)**
- **KTP Laser – Less tissue penetration & used to produce Laser cuts**
- **Holmium Laser**
- **Excimer Laser – True vaporization Laser with little forward scatter or peripheral Tissue necrosis**
- **Holmium : Y AG Laser – both direct contact cutting & vaporization like KTP Laser with minimum forward scatter**

Open reconstruction -

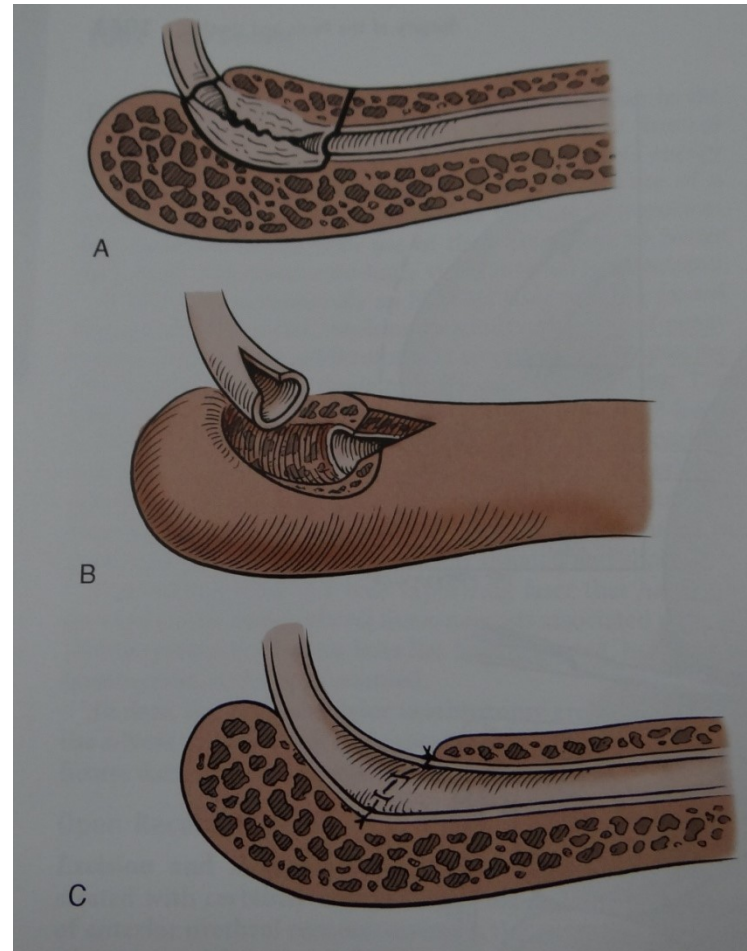
Excision and re-anastomosis

- **Most dependable technique for anterior urethral strictures**
- **Area of fibrosis is totally excised**
- **Urethral anastomosis tension free & widely spatulated**
- **Vigorous mobilization of spongiosum is needed**

Excision & end to end anastomosis



Excision & end to end anastomosis

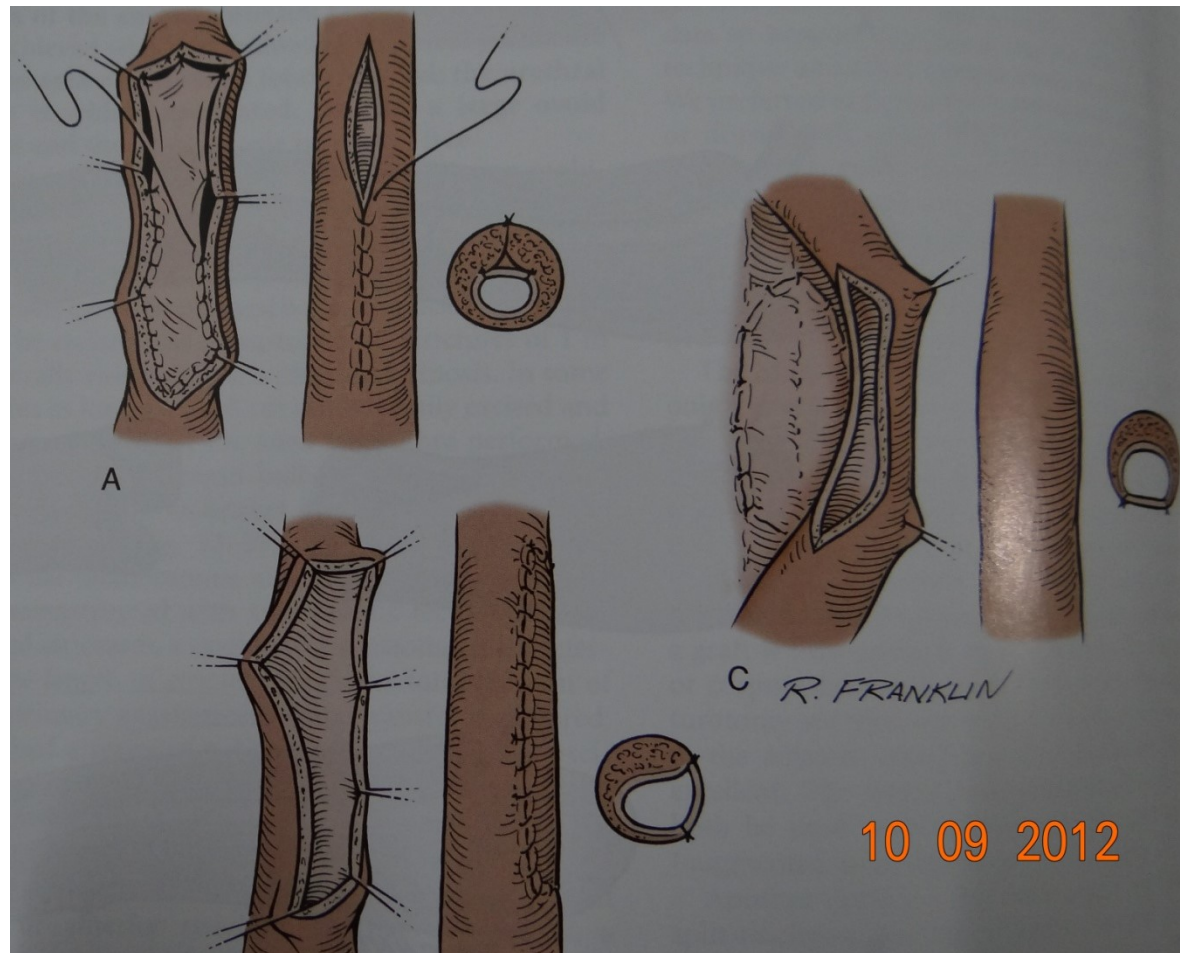


Open reconstruction- Patch grafts

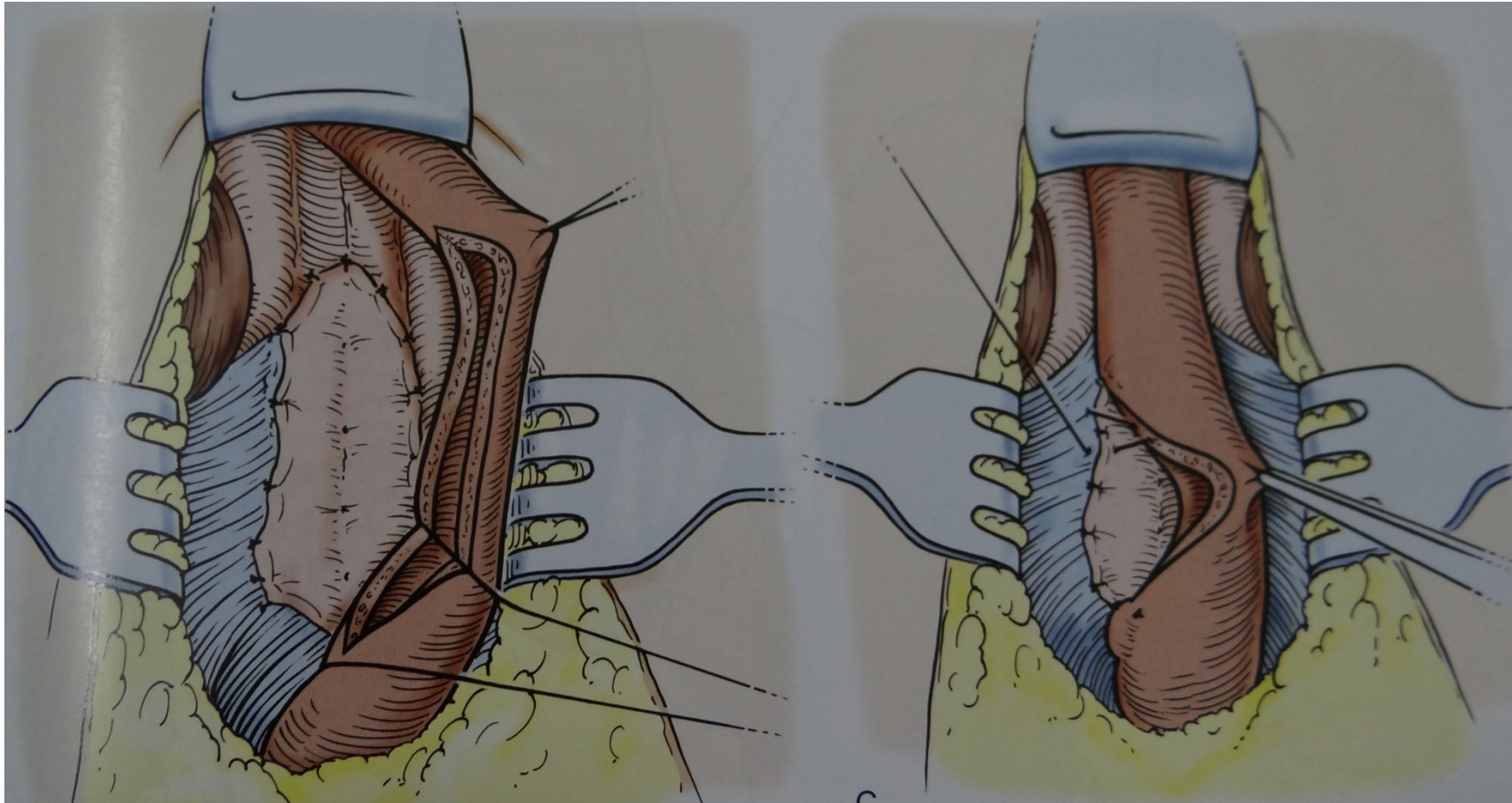
- Full thickness skin grafts
- Buccal mucosa grafts
- Bladder epithelial graft
- Rectal mucosa grafts

**Most successful in bulbous urethra
where urethra is covered by bulk of
ischio cavernosus muscle**

Open reconstruction- Patch grafts

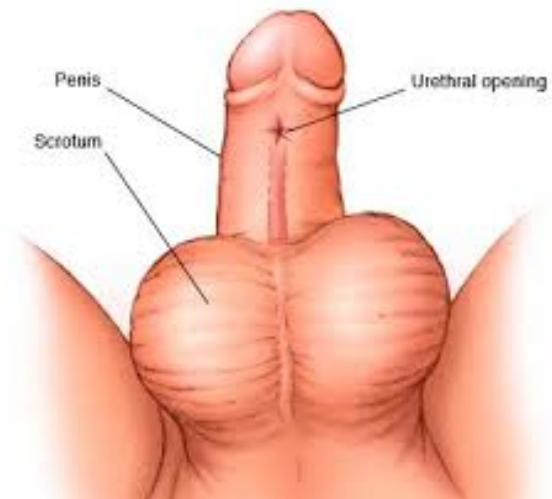


Open reconstruction- Patch grafts

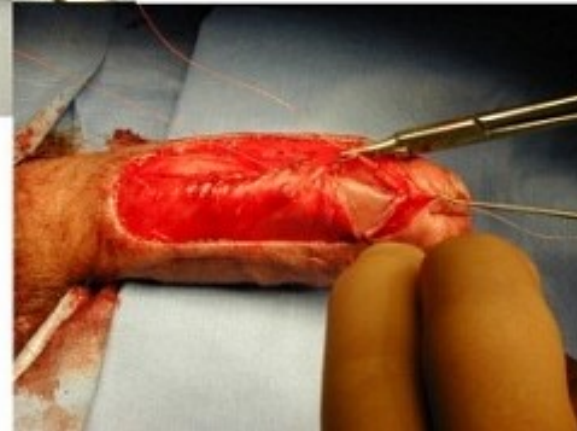
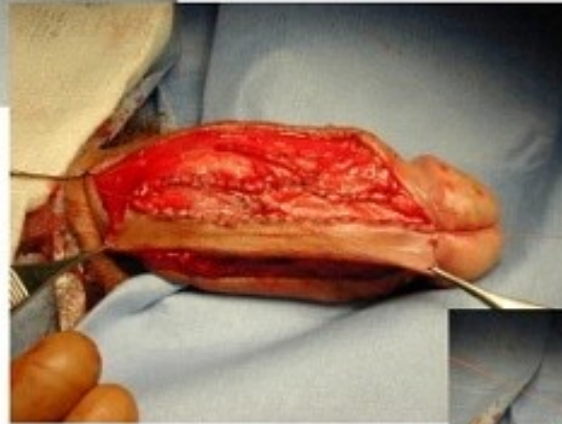
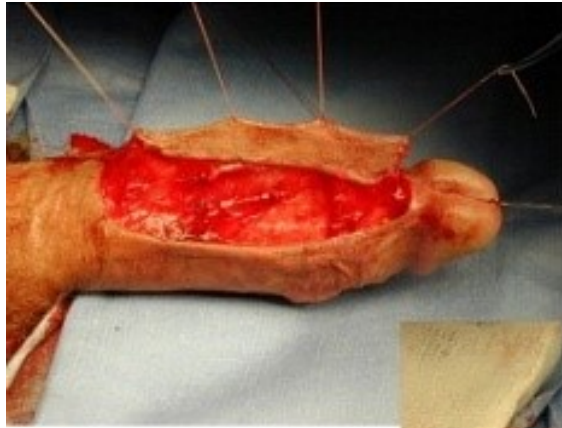


Open reconstruction – Flap urethroplasty

- **Ventral longitudinal skin island flap for pendulous urethra (orandi)**
- **Dorsal transverse island flap for throughout bulbous urethra (Duckett's)**
- **Ventral midline of penis on dartos fascia (quarthey)**
- **Hairless skin near inferior midline of scrotum – mobilized on lateral dartos fascia – used for bulbous urethra**



Orandi flap



Complications

- **Urinary retention**
- **Urethral diverticula**
- **Periurethral abscess**
- **Urethral fistula**
- **Bilateral hydronephrosis**
- **Recurrent urinary tract infection**
- **Urinary calculus**
- **Hernia, hemorrhoids or rectal prolapse due to straining**

Group activity



- **25 year old male presenting with obstructive voiding symptoms for 3 years**
- **Examination reveals indurated urethra**
- **How will you investigate?**



Group activity



- **25 yr old male presenting with obstructive voiding symptoms for 3 yrs**
- **Examination reveals indurated urethra**
- **Investigations show**
 1. **Type B stricture**
 2. **Short strictured segment**
 3. **Long strictured segment**
- **How will you treat each one?**



Questions



Interdisciplinary Linkage?

- **Surgery/Urology**
- **Nephrology**
- **Pathology/Microbiology**
- **Radiodiagnosis**
- **Anaesthesia**
- **Paramedics/nurses and health workers**

Feedback

- **From Teacher**
- **For teacher**