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, 28th edition
- Campbell – Walsh Urology, 12th edition
- Urology Secrets, Martin and Andrew, 1st Indian edition
- [www.clinicalkey.com](http://www.clinicalkey.com)
Stricture Urethra

- Definition
- Anatomy of stricture
- Etiology
- Patho-physiological effects on urinary tract
- Clinical presentations
- Investigations
- Treatment
- Complications
Sagital 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 out side 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)

Increased voiding pressure leads to intravasation of urine in glands of Littre forming microabceses 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 intra vasation 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

Sacculations  Bladder changes  Upper tract 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?
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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
• Uroflomometry
• 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
- Suitable for type A stricture
- Patient put on CSIC programme
- Dilatation programme at periodic interval & maintained at 6 monthly or yearly

(metallic bougie dilatation causes shearing force)
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 (quartey)
- 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 treatment 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?
• 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