

# Urology Mini-OSCE Dossier

2023 edition



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# الملاحظات

- شامل لأسئلة سنوات حتى نهاية 2022
- الملف مرتب حسب المواضيع تحت كل موضوع فيه ملاحظات الدكاترة وأسئلة السنوات
- أسئلة السنوات المكررة تم جمعها بسؤال واحد ووضع عدد مرات تكرار السؤال في هامش أعلى الصفحة من جهة اليمين أو على يسار السؤال
- أي كتابة بصندوق يعتبر هامش للملاحظات
- معاني الألوان: **المهم**، **ملاحظات** أو **إضافات** أو **أسئلة من عندي**، **معلومات إضافية**
- الكلام الي بلغتكم فيه بدوسيه الأشعة قائم برضو على هذا الملف وأي الملفات ثانية اشتغلتها ويا ريت بس هبل
- تذكير ان هذا ملف فيه أهم الأشياء وليس ملف جامع مانع للمادة بالكامل



# Urology Introduction

Anatomy, signs and symptoms, investigations, imaging

# Anatomy

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- ❖ **Upper urinary tract:** Kidney + Ureter
- ❖ **Lower urinary tract:** Bladder + Urethra
- ❖ **Parts of the male urethra from anterior to posterior (من د. سامر الرواشدة):**
  - External urethral meatus → Fossa navicularis → penile (spongy) urethra → Bulbar urethra → Membranous urethra → Prostatic urethra → Preprostatic urethra → bladder neck → bladder
- ❖ **Clinical importance of the fossa navicularis:**
  - It's the widest part of the urethra (Foley's catheter is inserted through this area and inflated 1-2 ml).
  - Pathologies in this part (Urethral stricture, Urethral injury, Stenosis, Tumors).



# Signs and Symptoms of GUT

# 1. Abnormalities in urine volume, composition

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## ❖ Abnormalities in urine volume:

- **Polyuria:** The production of an abnormally large amount of urine. (> **3 liters** of urine in **24 hours**).
- **Oliguria:** The production of an abnormally small amount of urine. (< **400 mL** per **24 hours** in adults).
- **Anuria:** The failure of the kidneys to produce urine, usually a result of acute or chronic renal failure. (< **50 mL** per **24 hours**).
- **Nocturia:** Awakening 2 or more times at night to urinate.
- **Nocturnal polyuria:** a condition in which the rate of urine output is excessive only at night and total 24-hour output is within normal limits

سنوات (1)

## ❖ Abnormalities in urine composition:

- **Pneumaturia:** passing gas bubbles in the urine (Indicates bowel fistula)
- **Fecaluria:** passing feces in the urine (Indicates bowel fistula)
- **Hematuria:** the presence of RBCs in the urine
- **Proteinuria:** excess protein in urine (>2g/24h)

## 2. Abnormalities in urine color

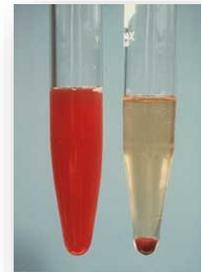
### ❖ Orange-brown:

- Conjugated Bilirubin
- Concentrated urine



### ❖ Red-Brown:

- Blood, myoglobin, free hemoglobin
- Drugs (ex. rifampin)



### ❖ Brown-Black:

- Conjugated Bilirubin



### ❖ Blue, Green:

- Drugs/Dyes (propofol, florescent, triamterene)



# 3. Hematuria

❖ **Definition:** The presence of RBCs in the urine

❖ **Classification:**

1. **According to quantity:**

- **Microscopic hematuria (dipstick):** can indicate glomerular damage
- **Macroscopic hematuria (gross hematuria):** Kidneys, upper and lower urinary tract

2. **According to the pain:**

- **Painful**
- **Painless:** Absent dysuria, suprapubic pain, and flank (loin) pain



Gross Hematuria



Dipstick urinalysis

# Hematuria

## ❖ Classification:

### 3. According to the timing:

- **Initial:** Suggest **urethral** damage
- **Midstream:** Suggest damage to **bladder**
- **Terminal:** Suggest damage to **bladder neck, prostate, or trigonal area**
- **Total:** Suggest damage to **bladder, ureters or kidneys**

### 4. According to the severity:

- **Mild:** Pink color
- **Moderate:** Fresh blood
- **Severe:** Clots

❖ **Gross painless hematuria** is the most common clinical finding in urinary tract cancer and should be evaluated with **cystoscopy**.

❖ CT scan before and after IV contrast is becoming the first-line radiological investigation of hematuria

# Hematuria – Clinical case

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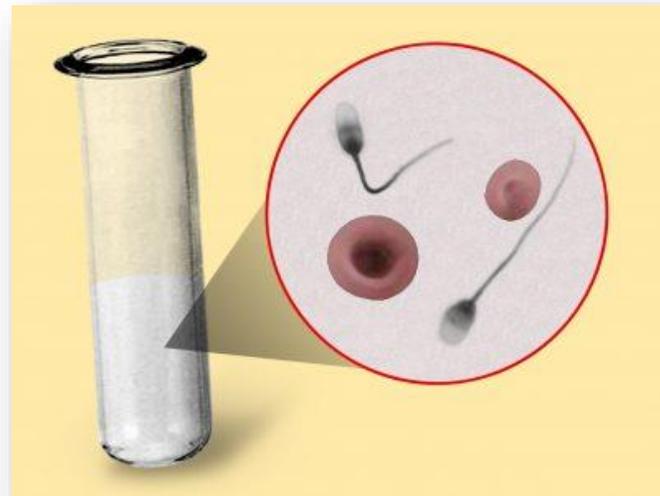
➤ A 65-year-old male patient presented to you complaining of red colored urine

❖ **What are the main questions in history that you will ask ?**

- Timing during voiding
- Associated pain

## 4. Hematospermia

- ❖ **Definition:** The presence of blood in the semen. Usually post sexual intercourse
- ❖ Hematospermia is benign in young males and usually indicates infection (Prostatitis) which resolves spontaneously after 2-3 weeks.
- ❖ In old aged men it indicates prostate cancer.



# 5. Lower Urinary Tract Symptoms

## Storage symptoms

### 1. Frequency:

- The need to void small quantities of urine frequently throughout the day and night

### 2. Urgency:

- A strong urge to void that due to involuntary contraction of the bladder

### 3. Dysuria:

- A sensation of pain or discomfort during micturition.

### 4. Nocturia

## Voiding symptoms

### 1. Hesitancy: سنوات (1)

- Difficulty to initiate urination

### 2. Poor stream

### 3. Prolonged terminal dribbling

### 4. Urinary retention

### 5. Straining to urinate:

- contracts abdominal muscles to initiate, maintain, and improve the urinary stream.

# 6. Urinary Incontinence

❖ **Definition:** involuntary leakage of urine

❖ **Types:**

- Overflow incontinence:** Involuntary urine leakage secondary to overfilling of the bladder from increased residual or chronic urinary retention  
(5 سنوات)
- Urgency urinary incontinence:** Involuntary urine leakage accompanied by or immediately preceded by urgency. (overactive bladder)  
(1 سنوات)
- Stress urinary incontinence:** Involuntary urine leakage associated with increased abdominal pressure. (bladder pressure exceed sphincter pressure)  
(1 سنوات)
- Mixed incontinence:** combination of stress and urge incontinence
- Functional incontinence:** loss of urine related to deficits of cognition and mobility
- Continuous incontinence:** associated with fistulas



# Urinary Incontinence – Case scenario 1

➤ 36 years old female patient, has 5 kids, presented to your clinic complaining of passage of urine when she cough.

## ❖ Type of urinary incontinence:

- Stress incontinence

## ❖ Pathophysiology of this condition:

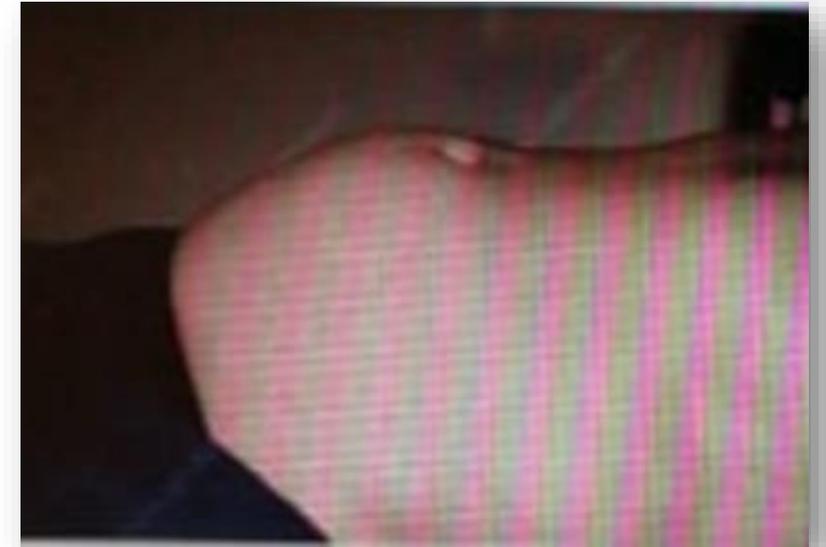
- Urethral hypermobility secondary to multiparity (i.e., damage of the pelvic floor muscle levator ani and/or the S2–S4 nerve roots)
- Increase in intraabdominal pressure (e.g., from laughing, sneezing, coughing, exercising) → ↑ pressure within the bladder → bladder pressure > urethral sphincter resistance to urinary flow

## ❖ Mention other types of incontinence:

- Urgency incontinence, Mixed, Overflow, Functional, Continuous

# Urinary Incontinence – Case scenario 2

➤ This photo showing suprapubic fullness for 70 years old male patient attend urology clinic complaining of inability to pass urine with episodes of urinary incontinence since more than 2 weeks.



## 1. What type of incontinence does this patient have?

- Overflow incontinence

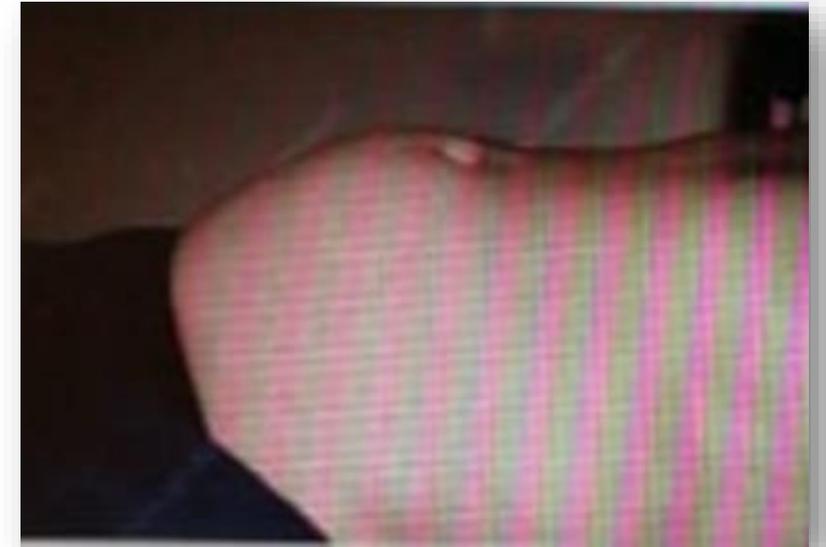
## 2. What is the most likely diagnosis ?

- Chronic urinary retention due to BPH

أول جاوب BPH لحالها

# Urinary Incontinence – Case scenario 2

➤ This photo showing suprapubic fullness for 70 years old male patient attend urology clinic complaining of inability to pass urine with episodes of urinary incontinence since more than 2 weeks.



### 3. Mention 3 differences between this case and acute retention

Acute urinary retention	Chronic urinary retention
Bladder capacity (400-500ml).	Bladder capacity (2-3L).
Painful.	Feeling of fullness (Painless).
Bladder is functioning.	Bladder atony (Neurogenic bladder).
No Reflux.	Renal impairment , Hydronephrosis & Reflux.

# Urinary Incontinence – Essay

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❖ **Urge incontinence primarily caused by:**

- overactive detrusor muscle

❖ **While stress incontinence occurs secondary to:**

- Increased intra-abdominal pressure

❖ **Best test to diagnose type of incontinence:**

- Cystometry

❖ **Best management of symptoms of detrusor failure:**

- Catheterization

❖ **Injury to the external sphincter causes what type of incontinence:**

- Stress UI

# 7. Urinary retention

❖ **Definition:** inability to completely empty the bladder

سنوات (1)

❖ **Etiology:** في كثير أسباب هذه أمثلة فقط

- Mechanical obstruction (outflow obstruction)
  - **Enlarged prostate:** BPH, Prostatic cancer, Acute prostatitis, etc.
  - **Urethral narrowing:** Urethral stricture, etc.
  - **Bladder neck obstruction:** bladder cancer, etc.
  - Urethral/bladder trauma
- Functional obstruction (bladder innervation)
  - Neurogenic bladder
  - Drug-induced urinary retention
- Infection

ملف الواجبات

❖ **Acute & chronic urine retention**

- **Acute urine retention:** painful inability to void urine with relief of pain following drainage of the bladder by catheterization
- **Chronic urine retention:** Failure to empty bladder despite maintaining an ability to urinate which result in elevated (PVR) urine volume

# Differences between acute and chronic retention

	Acute retention	Chronic retention
<b>Obstruction</b>	Complete	Partial
<b>Voiding</b>	Decreased (-)	Increased (+)
<b>Presence of anuria</b>	Anuria present	Anuria absent
<b>Pain</b>	Painful	Painless
<b>Onset</b>	Sudden	Gradual
<b>Suprapubic tenderness</b>	+	+/-
<b>Suprapubic mass</b>	Suprapubic mass absent	Suprapubic mass present
<b>Bladder volume</b>	Normal bladder volume	Increase bladder volume
<b>Drainage volume</b>	<800 ml	>800 ml
<b>Uremia</b>	-	+/-
<b>Hydronephrosis</b>	-	+
<b>Presentation time</b>	Medical emergency	Detrusor hypertrophy followed by atony (Late)



# Urinary retention – Case scenario 1

➤ 65 years old man came to your clinic with Foley's catheter due to incomplete emptying. He told you his symptom is extremely bothering him

## ❖ Other symptoms you would ask the patient:

- **Other voiding symptoms:** Hesitancy, Poor stream, Prolonged terminal dribbling, Straining to urinate
- **Storage symptoms:** Frequency, Urgency, Dysuria, Nocturia, Nocturnal polyuria
- Visible hematuria, suprapubic pain

## ❖ Causes (DDx): (رتبتهم من الأرجح للأقل احتمالا حسب رأيي)

- BPH, Prostate cancer, Neurogenic bladder, Drug-induced urinary retention, Urethral stricture, Bladder cancer, Acute prostatitis, UTI

## ❖ What tests you would like to order ?

- Urine analysis, Urine cytology, Serum creatinine, PSA, IV pyelogram (IVP), Urodynamic profile



# Urinary retention – Case scenario 2

- 78 years old male patient present to the clinic with catheter and bag of urine due to urinary incontinence. He said that he need toilet once every hour and told you that his symptom is extremely bothering him
- ❖ **Other symptoms you would ask the patient:**
  - **Other voiding symptoms:** Hesitancy, Poor stream, Prolonged terminal dribbling, Urinary retention, Straining to urinate
  - **Storage symptoms:** Frequency, Dysuria, Nocturia, Nocturnal polyuria
  - Visible hematuria, suprapubic pain
- ❖ **One examination you would like to do:** DRE
- ❖ **Simple investigation you would like to order:**
  - Urine analysis, Urine cytology, Serum creatinine, PSA, IV pyelogram (IVP)
- ❖ **What is your diagnosis ?** BPH



# Urinary retention – Case scenario 3

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➤ 50 years old female patient came to clinic with urinary incontinence.

## ❖ What should you ask her ?

- **Other voiding symptoms:** Hesitancy, Poor stream, Urinary retention, Straining to urinate
- **Storage symptoms:** Frequency, Urgency, Dysuria, Nocturia, Nocturnal polyuria
- Visible hematuria, suprapubic pain

# 8. Pain presentations

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## ❖ Renal angle pain:

- Dull ache between 12<sup>th</sup> rib and erector spine muscle on the side of the affected kidney
- **Causes:** Pyelonephritis

## ❖ Renal colic:

- Severe pain in the lumbar region due to ureteric obstruction; radiates to abdomen, groin, testes, and thigh
- **Causes:** Stone or tumor

## ❖ Ureteric colic:

- Spasmodic, severe, radiation path of renal colic; may be associated with vomiting, sweating.

## ❖ Suprapubic pain from bladder / urethra:

- Referred to lower abdomen, perineum and glans penis in males

# Mention 5 differences between renal and ureteric colic

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## Renal colic

- ❖ Vomiting absent
- ❖ Less sever pain
- ❖ Pseudo colic
- ❖ Treatment with antibiotic
- ❖ Most common cause is pyelonephritis

## Uretric colic

- ❖ Vomiting present
- ❖ Sever localized pain
- ❖ true colic
- ❖ Treatment with nephrostomy + double J catheter
- ❖ Most common cause is stone



# Investigations & Imaging

# Ways of urine sampling

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## 1. Voided Urine specimen

- A. Random specimen (for analysis)
- B. First morning specimen (analysis and microscopic)
- C. Midstream clean catch specimen (for culture and sensitivity testing)

## 2. Catheter collection specimen

- These specimens are obtained by investing a catheter or sterile flexible tube into bladder via urethra to withdraw urine
- When the patient is bedridden or can't urinate independently (ex. infants)

## 3. Suprapubic aspiration specimen

- This method is used when a bedridden patient can't be catheterized, or if a sterile specimen is required

# Voided Urine samples

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- ❖ **Vb1:** First 10 ml of urine, this represents:
  - Urethra
  - Acute prostatitis
- ❖ **Vb2:** Midstream urine, this represents:
  - Bladder
- ❖ **Vb3:** First 10 ml of urine after prostate massage, this represents:
  - Chronic prostatitis
- ❖ **EPS:** Expressed prostatic specimen, measured after prostate massage in chronic prostatitis

# Urological Investigations

## ❖ Dipstick testing:

- Basic diagnostic tool used to determine pathological changes in a patient's urine in standard urinalysis
- Contains: pH, protein, Blood, WBCs, Nitrite testing

Cloudy urine that is positive for **WBCs** and positive for **nitrite** is very likely to be **infected**.

## ❖ Urine microscopy:

- Contains: RBC morphology, Crystals, Casts

## ❖ Urine cytology:

- look for **abnormal cells** in the urine. It is used along with other tests and procedures to diagnose urinary tract **cancers**.
- It is most often used to diagnose **bladder cancer**, though it may also detect cancers of the **kidney, prostate, ureter** and **urethra**.
- It can **best** detect **larger and more-aggressive** urinary tract cancers, and might not detect small urinary tract cancers that grow more slowly

Urodynamic study	Target function to be evaluated	Indicated patients
1. Cystometry	storage function and sensation of the bladder during the filling phase	any incontinent subjects to be investigated for their dysfunctional conditions
2. Urethral pressure measurement	urethral closing forces	subjects suspected of urethral incompetence
3. Leak point pressure measurement A. Detrusor B. Abdominal	urethral competence against pressure generated in the bladder from detrusor or abdominal forces	subjects suspected of neurogenic lower urinary tract dysfunction (A) or urethral incompetence (B)
4. Uroflowmetry, Residual urine measurement	global voiding function	any incontinent subjects (residual) or those suspected of voiding dysfunction (uroflow)
5. Pressure-flow studies	detrusor contractility and bladder outlet obstruction during the voiding phase	subjects suspected of voiding dysfunction
6. Surface electromyography	coordinated relaxation of pelvic floor during the voiding phase	subjects suspected of dysfunctional or dyssynergic voiding
7. Videourodynamics	Simultaneous observation of the morphology and function of the lower urinary tract	subjects with suspected multifactorial etiologies for incontinence or anatomical abnormalities of the lower urinary tract
8. Ambulatory urodynamic monitoring	behavior of bladder (and urethra) and leakage mechanisms during activities of daily living	subjects suspected but not proven to have incontinence or detrusor overactivity on conventional investigations

# Mention 5 microscopic findings in urine analysis

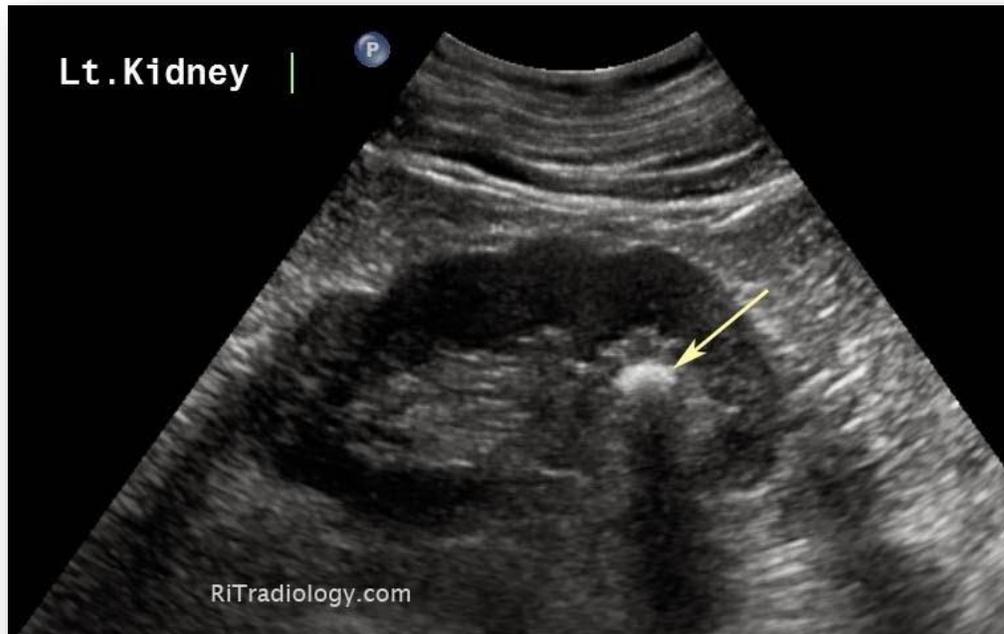
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- ❖ RBC
- ❖ Pus cells
- ❖ Crystals
- ❖ Casts
- ❖ Epithelial cells

# Imaging modalities of UG

## ❖ Ultrasound:

- Good images of the **kidneys** and the **bladder**
- Poor anatomical details of the ureter



**Longitudinal ultrasound** images of the left kidney show a stone (arrow) in the lower pole with posterior acoustic shadowing



**Hydronephrosis.** Urine in dilated calyces appears black (hypoechoic).

# KUB

- ❖ Needs preparation
- ❖ Detects stones (size & location)
- ❖ Not useful in case of radiolucent (uric acid), small stones (<3-4mm) or when the stones pass through the ureter as it lies over the sacrum
- ❖ The ability of KUB X-ray to visualize stones is dependent on the amount of overlying bowel gas

سنوات (5)

Abdominal x-ray	KUB
Low concentration of radiation	Higher concentration of radiation
No bowel preparation (Visual bowel gas)	Needs bowel preparation (Invisible bowel gas)
Symphysis pubis cannot be seen	Symphysis pubis is seen
Done in erect position	Done in supine position

# KUB

## ❖ What is the name of this radiological study ?

○ KUB

## ❖ How to track the course of the ureter ?

○ Along the tips of transverse processes of lumbar vertebrae

## ❖ Mention 3 differences between this study and abdominal x ray:



Abdominal x-ray	KUB
Low concentration of radiation	Higher concentration of radiation
No bowel preparation (Visual bowel gas)	Needs bowel preparation (Invisible bowel gas)
Symphysis pubis cannot be seen	Symphysis pubis is seen
Done in erect position	Done in supine position

# Intravenous pyelography (IVP)/(IVU)

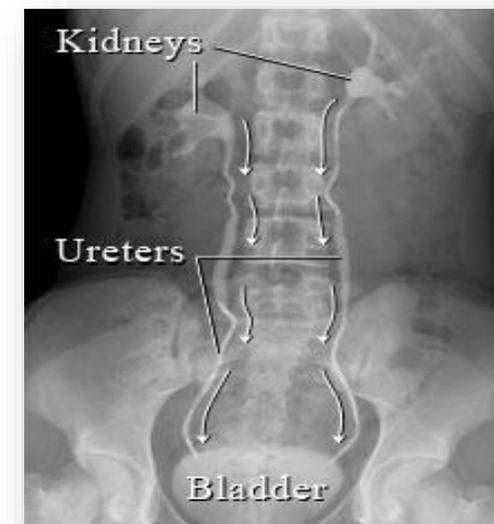
❖ A control film is obtained before contrast is given

❖ **Technique:**

- Intravascular contrast is administered followed by a series of X-rays of the kidneys, ureters, and bladder over the following 30 minutes or so, to image their anatomy and pathology, and to give some indication of renal function

❖ **Films and “phases” of IVP:**

- **Plain film:** This is used to look for calcification overlying the region of the kidneys, ureters, and bladder
- **Nephrogram phase:** This is the first phase of IVP; film is taken immediately following intravenous administration of contrast
- **Pyelogram phase:** As the contrast passes along the renal tubule (into the distal tubule) it is concentrated, As a consequence, the contrast medium is concentrated in the pelvicalyceal system, thus this pyelogram phase is much denser than the nephrogram phase



# Name 3 radiological abnormalities seen in this IVP

1. A left nonfunctioning kidney (no contrast excretion)
2. Right hydronephrosis
3. Filling defect in the bladder

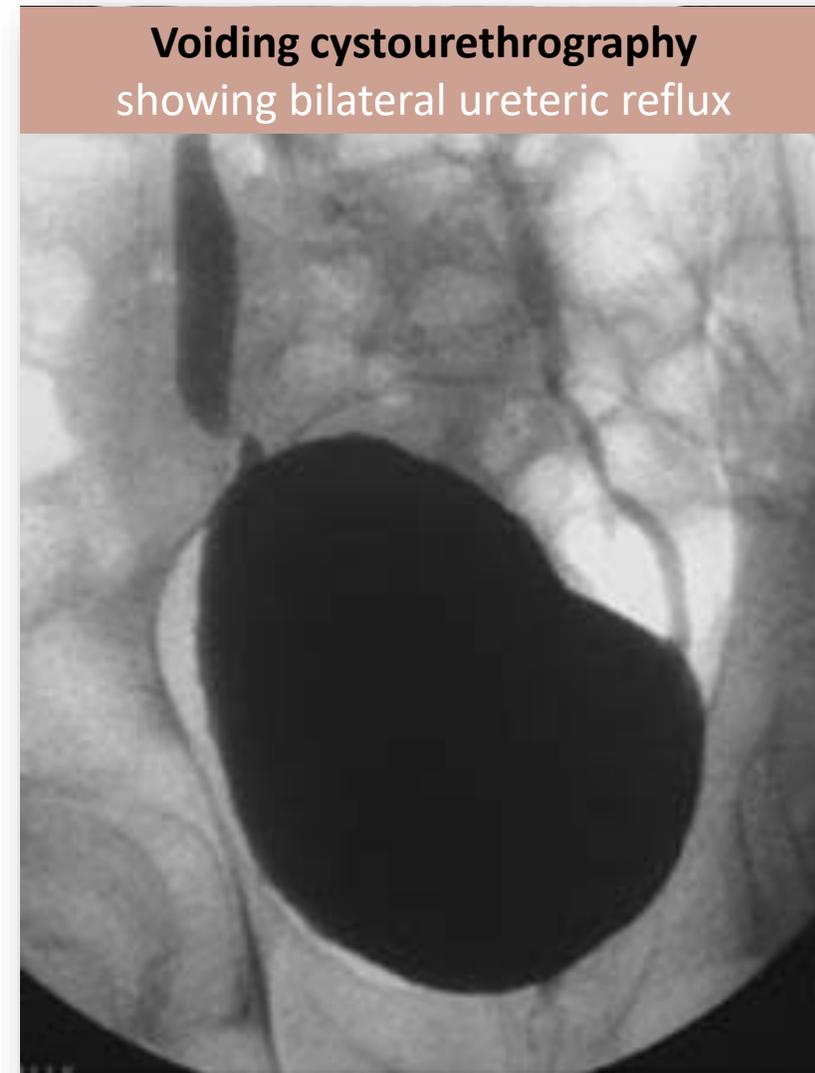


# Voiding cystourethrography (VCUG)

❖ Also known as micturating cystourethrogram (MCUG)

❖ **Uses:**

1. Identify **vesicoureteral reflux**,
2. Presence and site of obstruction in the outlet of bladder and within the urethra particularly in patients with **neuropathic bladder problems**



# Other urological contrast studies

## ❖ Cystography:

- **Technique:** This study consists of retrograde filling of the bladder, via a catheter, with contrast
- **Uses:** Identify vesicocolic and vesicovaginal **fistulae** and **bladder rupture** (extraperitoneal and intraperitoneal)

## ❖ Urethrography:

- **Technique:** Retrograde filling of the urethra with contrast
- **Uses:** the site and length of **urethral strictures**, and the presence, extent, and site of **urethral injury**

**Cystography** showed a communication between the bowel and bladder



**Urethrogram** showing a bulbar urethral stricture



# CT scan urological uses

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## ❖ Renal:

1. Investigation of **renal masses**
2. Staging of renal cancer (establishes local, nodal, and distant spread)
3. Assessment of stone size and location (**Without contrast**).
4. Detection and localization of site of intrarenal and perirenal collections of pus (pyonephrosis, perinephric abscess)
5. Staging (grading) of renal trauma
6. Determination of cause of hydronephrosis

## ❖ Ureters:

- Locates and measures size of ureteric stones

## ❖ Bladder:

- Bladder cancer staging (establishes local, nodal, and distant spread)

# Mention 5 advantage of using CT in renal ureteric colic

1. It's a noninvasive procedure
2. Rapid and easy procedure
3. Locates and measures size of ureteric stones
4. Some radiolucent stones can be seen on CT
5. Detection of hydronephrosis



الإجابات من عندي 😊 اهدلك أي حاجة وسلك نفسك

# Combined X-ray and CT scan questions are common

**Retrograde pyelography** on left collecting system shows moderate hydronephrosis and hydroureter with a tortuous change of ureter. The **arrows** indicate the site compressed by the prosthetic reservoir



**Axial CT**  
showing left ureteral stone

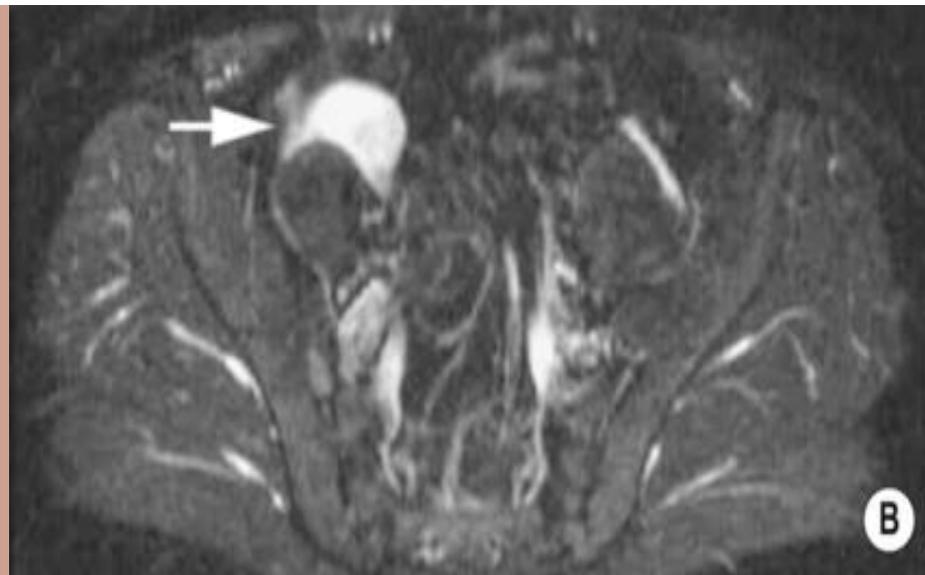
## ❖ Ureter on KUB:

- **Upper ureter:** from the Renal pelvis to the upper bony pelvis
- **Middle ureter:** from the Upper bony pelvis to the lower border of the lower bony pelvis
- **Lower ureter:** from the Lower bony pelvis to the Vesico-ureteral junction

# MRI urological uses

- ❖ Staging of pelvic cancer (bladder and prostate cancer) staging
- ❖ **Localization of undescended testes**
- ❖ Identification of ureteric stones, where ionizing radiation is best avoided (e.g., pregnant women with flank pain)

**Transverse  
MRI images**  
demonstrating  
**undescended  
testis** (arrows)  
within the pelvis



# DMSA Scan

❖ Tc-99m DMSA (2,3 dimercaptosuccinic acid) is a technetium radiopharmaceutical used in renal imaging to evaluate renal structure and morphology, particularly in pediatric imaging for detection of scarring and pyelonephritis.

سنوات (2)

❖ **Indications:** (Mention 2 indications) (Mention 5 uses of DMSA scan)

1. Detection and/or evaluation of a **renal scar**, especially in patients having vesicoureteric reflux (VUR)
2. Small or absent kidney
3. Ectopic kidneys
4. Evaluation of an occult duplex system
5. Characterization of certain renal masses
6. Evaluation of systemic hypertension especially young hypertensive and in cases of suspected vasculitis.
7. It is sometimes used as a test for the diagnosis of acute pyelonephritis



# Urinary catheterization

ركزوا على الأحمر معظم الباقي شرح

# Catheterization

❖ **Definition:** Flexible tube for draining urine from the bladder

❖ **Indications:**

○ **Diagnostic:**

1. Urine samples in pediatrics
2. Post-residual urine volume
3. Monitor urine output hourly
4. Contrast push (VCUG in VUR)
5. Ascending urethrogram

○ **Therapeutic:**

1. Bypass obstruction (Stricture, Cancer, BPH)

2. Intravesical instillation of chemotherapy or Immunotherapy
3. Post radical prostatectomy
4. Functional incontinence
5. Neurogenic bladder
6. Post-optical urethrostomy (Urethral stricture)
7. Bladder injury

# Catheterization

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## ❖ Complications:

1. Urinary tract infections
2. Trauma
3. Hematuria
4. Incontinence (If used for prolonged periods)
5. Bladder cancer (If used for prolonged periods)
6. Bladder stone due to crystallization (If used for prolonged periods)
7. Patulous urethra (Dilated urethra)
8. Acquired Hypospadias in males
9. Urethral stricture (Due to injury , infection ,Obstructed periurethral glands)

# Catheterization

## ❖ **Types of catheters:** (classification according to the site)

- External (condom) catheter
  - Consists of a soft plastic or rubber sheath, tubing, and a collection bag for the urine
  - The sheath is placed over the penis and the collection bag is attached to the leg
  - Collects urine when there is no need for catheter insertion
- Intermittent (Robinson's) catheter
- Indwelling
  - Urethral catheter
  - Suprapubic catheter
- Double J catheter (stents)



# Classification of catheters

## 1. According to the size:

- FR (French) or CH(charriere). It's number equal to the size (6-30 FR)
- 1mm = 3FR

## 2. According to the material:

- Latex, rubber, silicone, PVC
- Latex, rubber often chosen for short-term drainage; more risk for UTI
- Silicone catheters are indicated when there is rubber/latex sensitivity or allergy and are particularly suited for patients requiring a longer period of indwelling time

## 3. According to the coating:

- Various coatings on urethral catheters have been applied in an attempt to reduce urethral trauma and infection risks.

# Classification of catheters

سنوات (1)

## 4. According to the number of ways:

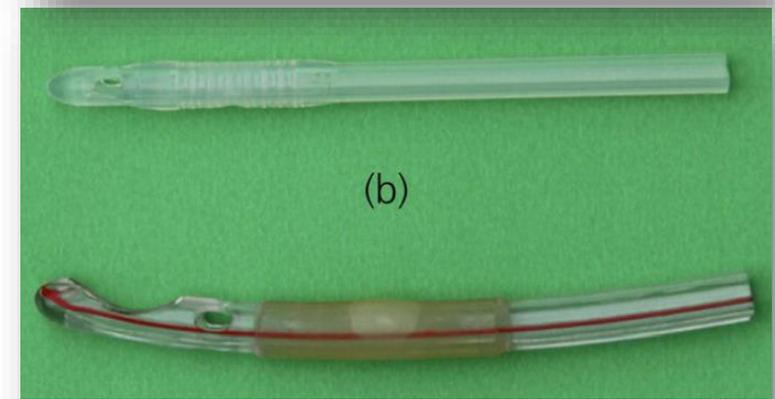
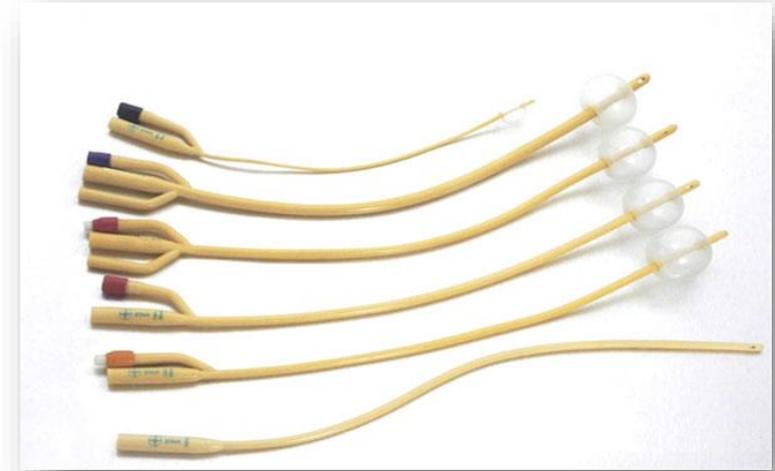
- One-way (Robinson's catheter)
- Two-way
- Three-way

## 5. According to the tip shape:

- Most catheters are designed with a blunt straight tip that is blind ending.
- Catheters with curved tips or with an end hole have specific utility in certain clinical scenarios

## 6. According to the duration of use:

- Intermittent catheter (Robinson's catheter)
- Indwelling catheter



Hematuria catheter has a wide opening near the tip to allow improve drainage of blood clots and debris.

# Intermittent (Robinson's) catheter

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- ❖ **Definition:** A thin, flexible tube that a person temporarily inserts into their bladder through the urethra.
- ❖ Used for Drainage or Instillation of drugs
- ❖ Once a person has emptied their bladder, they need to remove the catheter. It is necessary to remove the old catheter and insert a new one several times per day to empty the bladder, a healthcare provider will teach the person how to do this correctly.

## ❖ **Indications:**

1. Neurogenic bladder
2. Chronic retention
3. Female after gynecological surgery
4. Post-void residual volume measurement

- ❖ **Complications:** UTIs, Hematuria, Bladder stones, Urethral strictures

# Indwelling catheters

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- ❖ An indwelling catheter is similar to an intermittent catheter but remains in place for a period of days or weeks.
- ❖ One end of the indwelling catheter has a deflated balloon attached. A healthcare provider will insert this end into the bladder and then inflate the balloon with sterile water to hold the catheter in place.
- ❖ There are two main types of indwelling catheter :
  1. **Urethral catheter (Foley's catheter)**: flexible tube that is passed through the urethra and into the bladder.
  2. **Suprapubic catheter.**

# Two-Way Foley's Catheter

- ❖ The tube has two separated channels, running down its length
- ❖ One lumen is open at both ends and allows urine to drain out into a collection bag.
- ❖ The other lumen has a valve on the outside end and connects to a balloon at the tip; the balloon is inflated with sterile saline when it lies inside the bladder, in order to stop it from slipping out

## ❖ Indications of two-ways catheter:

1. Sterile urine sample
2. Urodynamic studies
3. Immobilized/comatose pts
4. Bladder drainage in urine retention



# Two-Way Foley's Catheter

## سنوات (3) ❖ What type of catheter is this?

- Two-way Foley's catheter

## سنوات (3) ❖ Mention 3 indications for two-way catheter ?

1. Acute & chronic retention
2. Sterile urine sample taking
3. Immobile/Comatose patient
4. Administration of drugs
5. Urodynamic study

## سنوات (1) ❖ Contraindications of catheterization

- Urethral injuries, Urethral infection, Pelvic fracture.



# Three-Way Foley's Catheter

- ❖ Has a third channel (in addition to the balloon inflation and drainage channels) that allows fluid to be run into the bladder at the same time as it is drained from the bladder.
- ❖ It's used For simultaneous irrigation in severe gross hematuria which prevents clot formation that can end with bladder distention and subsequent perforation.

## ❖ Indications of three-ways catheter :

1. After bladder/prostate surgery to wash out blood and to prevent clot formation
2. Gross hematuria
3. Endoscopic procedures
4. Bladder insufficiency



# Three-Way Foley's Catheter



**سنوات (5) ❖ What type of catheter is this?**

- Three-way Foley's catheter

**سنوات (1) ❖ This type is used commonly in which operation ?**

- TURP

**سنوات (3) ❖ Indications of three-way catheter**

1. Post Prostatic or bladder surgery
2. TURB
3. Hematuria
4. Bladder infection

**سنوات (2) ❖ Contraindications of catheterization**

- Urethral injuries, Urethral infection, Pelvic fracture.

# Three-Way Foley's Catheter

## ❖ What type of catheter is this?

- Three-way Foley's catheter

## ❖ Why do we use it in prostate cancer ?

- For irrigation (in bleeding)

## ❖ What is the best solution to use in this catheter ?

- Sterile water or normal saline



# Foley's (Urethral) Catheters

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## ❖ **Contraindications:** (2 & 3 ways)

- **Urethral injuries (absolute contraindication)**, occur in patients with multisystem injuries and pelvic fractures. (If this is suspected, one must perform a genital and rectal exam first, only the urologist have the right of 1 trial, as a GP NEVER do it on your own)

## ❖ **Complications:** (2 & 3 ways)

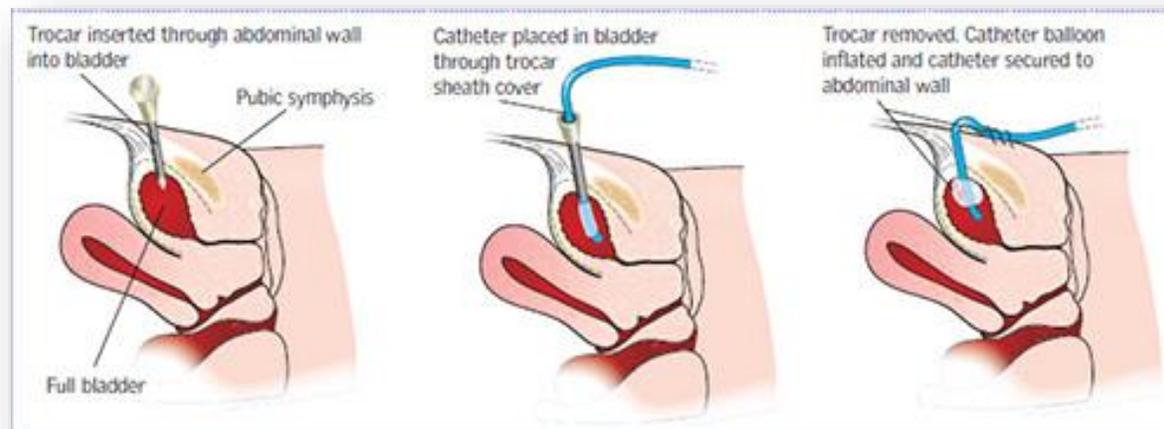
- Tissue trauma
- Infection. After 48 hours of catheterization, most catheters are colonized with bacteria, thus leading to possible bacteruria
- Renal inflammation, nephrocystolithiasis, and pyelonephritis if left in for prolonged periods

## ❖ **Steps to do if the balloon isn't deflating:**

- Cut the valve → More inflation → use of guide wire → U/S guided balloon puncture

# Suprapubic catheter

- ❖ Suprapubic catheter is a type of indwelling catheter
- ❖ The suprapubic catheter is inserted into the bladder through a surgical incision made in the abdominal wall, right above the pubic bone
- ❖ **Suprapubic aspiration:** procedure in which a needle is inserted into the bladder above the symphysis pubis to drain urine
- ❖ use a portable ultrasound device to identify the structures in the abdomen so the needle is not placed in bowel or other organs
- ❖ Successful placement of the suprapubic: urine begins to flow into the connected syringe



# Suprapubic catheter

## ❖ Indications:

1. Any child (regardless of age) who is unable to void on request, who requires a urine specimen for the diagnosis or exclusion of UTI.
2. Suprapubic aspirates are the gold standard for obtaining urine specimens for culture. It is a simple, safe, rapid and effective technique.
3. Failed urethral catheterization in urinary retention
4. Urethral injuries

## ❖ Contraindications:

1. Abdominal distension
2. Massive organomegaly
3. Bleeding diathesis
4. Bladder tumors
5. Infection at site of aspiration
6. Patients with lower midline incisions

## ❖ Complications:

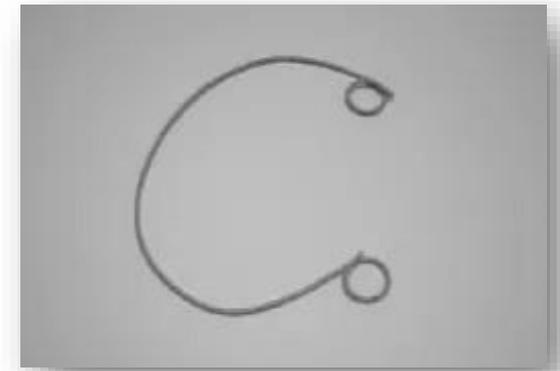
1. Macroscopic hematuria (infrequent, not usually clinically significant)
2. Bladder hematoma (rare)
3. Bladder hemorrhage (very rare)
4. Intestinal perforation (rare. not usually clinically significant)
5. Anaerobic bacteremia or abscess formation (very rare)

# Double J catheter

- ❖ A thin, hollow tube placed inside the ureter during surgery to ensure drainage of urine from the kidney into the bladder.
- ❖ J shaped curls are present at both ends to hold the tube in place and prevent migration.

## ❖ Indications:

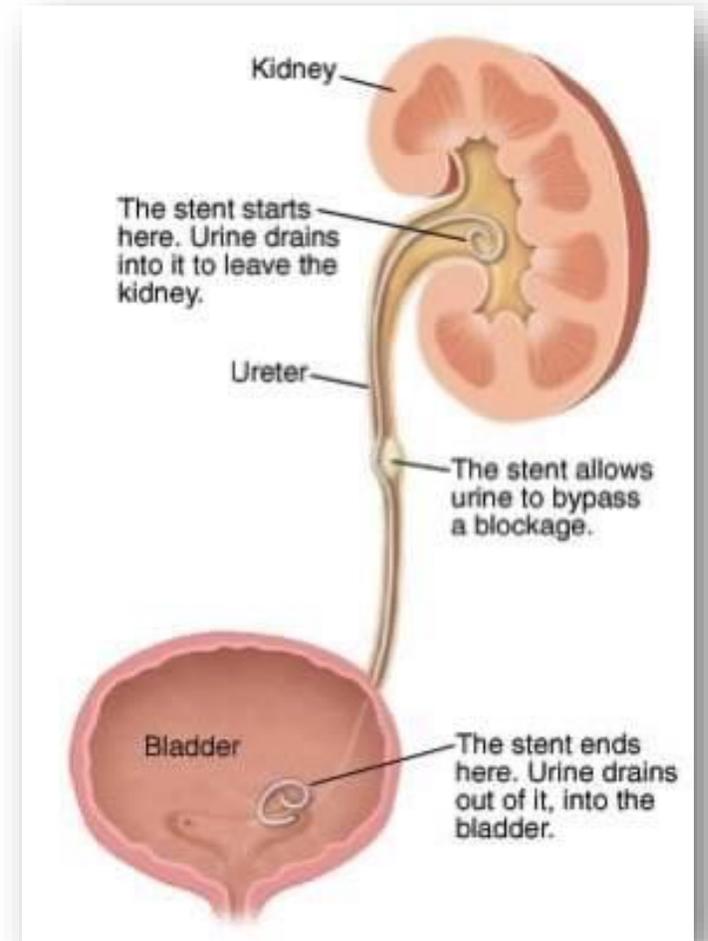
1. Ureteral Obstruction
2. post major surgeries , Ureteral injury
3. Ureteral strictures
4. To identify ureter during major surgeries
5. To decrease ureteric pain (pain resistance to analgesia)
6. Post intervention to the ureter due to Oedema
7. Before Extra corporal shockwave lithotripsy to prevent obstruction from stones more than 2 cm
8. Treatment of PUJ (junction between renal pelvis and ureter) obstruction
9. Renal failure due to obstruction



# Double J catheter

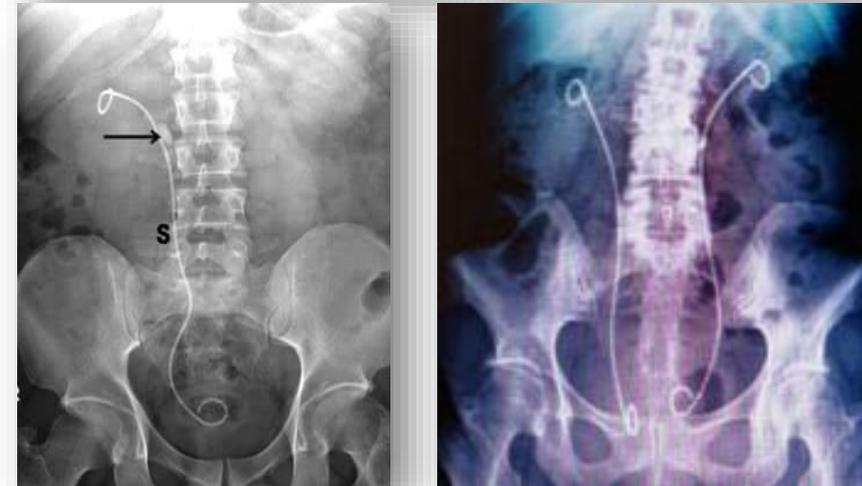
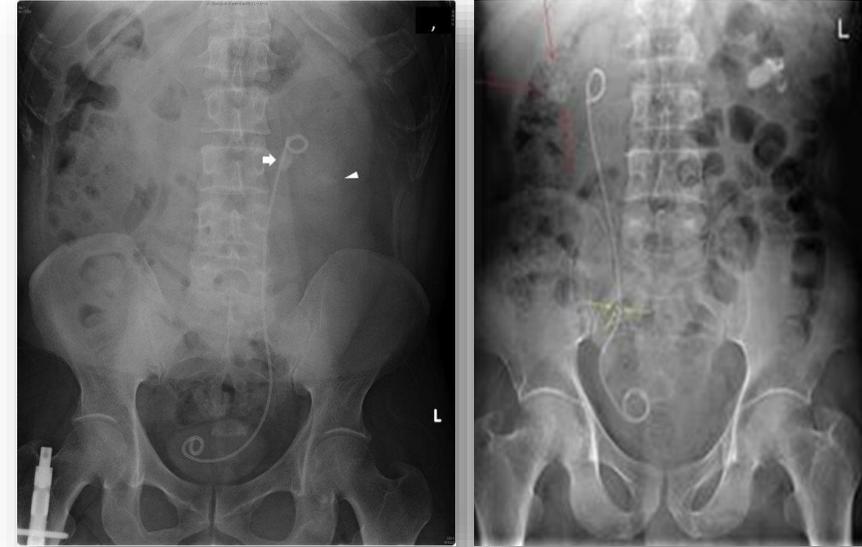
## ❖ Complications:

- Stent symptoms (suprapubic pain, lower urinary tract symptoms (frequency, urgency), hematuria, inability to work).
- Crustation & stones formation >3 months
- Ureter perforation during insertion
- Prolapse or migration
- Hematuria
- Infection
- Reflux



# Double J catheter (stent)

- ❖ **Name of this study:** KUB
- ❖ **Name of this procedure ?**
  - Double J catheter
- ❖ **The ways of insertions**
  1. Cystourethroscopy with retrograde insertion
  2. Percutaneous antegrade ureteral stenting
- ❖ **Mention 4 Indications:**
  1. Obstructive nephropathy
  2. Prophylactic pre-ESWL
  3. Post-traumatic ureteroscopy
  4. Following endopyelotomy
  5. Post renal transplant
  6. To identify ureter during major surgeries



# Urethral stricture

❖ Have the same presentation of BPH

❖ **Causes:**

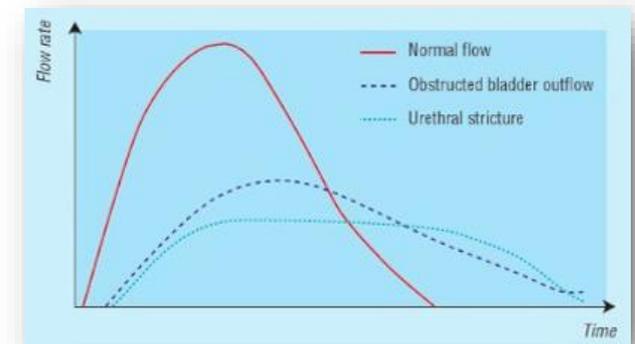
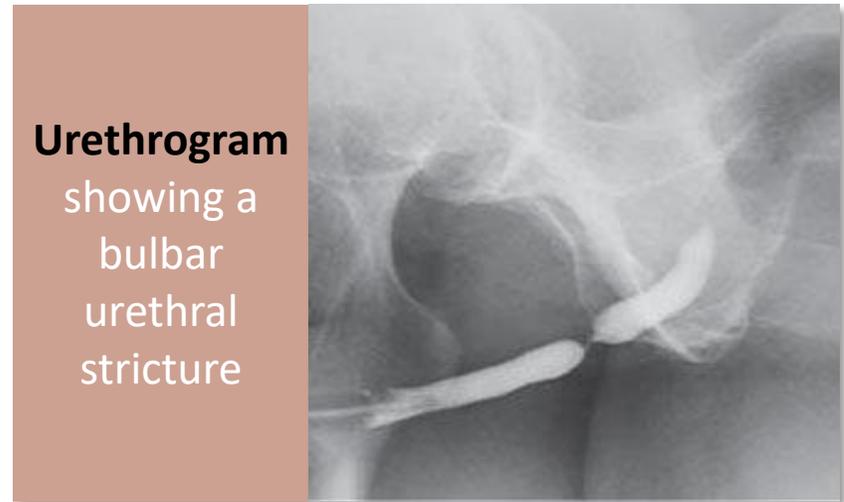
1. Instrumentation (most common)
2. Congenital causes
3. Inflammation
4. Malignancies
5. Trauma

❖ **Treatment:**

- Optical Urethrostomy (Cystoscopy) if short stricture
- Urethroplasty if severe-long stricture

❖ **Urine flowmetry:**

- In BPH: Bell shaped
- In Urethral stricture: Box shaped



# Urethral stricture

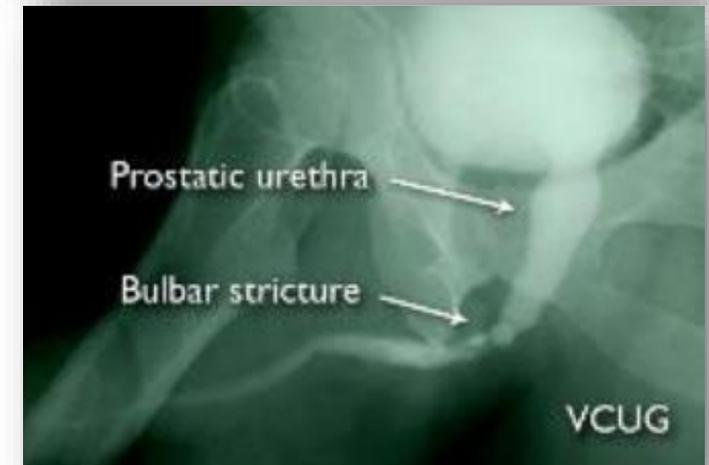
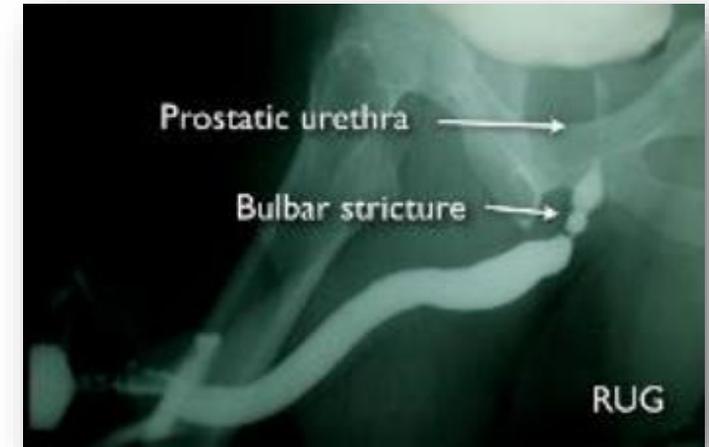
❖ Identify the parts of the urethra point with the arrow

❖ What is your diagnosis ?

- Urethral stricture

❖ Mention 3 causes of this condition:

1. Congenital
2. Iatrogenic
3. Infection
4. Trauma
5. Tumor
6. Stone





# Urethral stricture – Case scenario

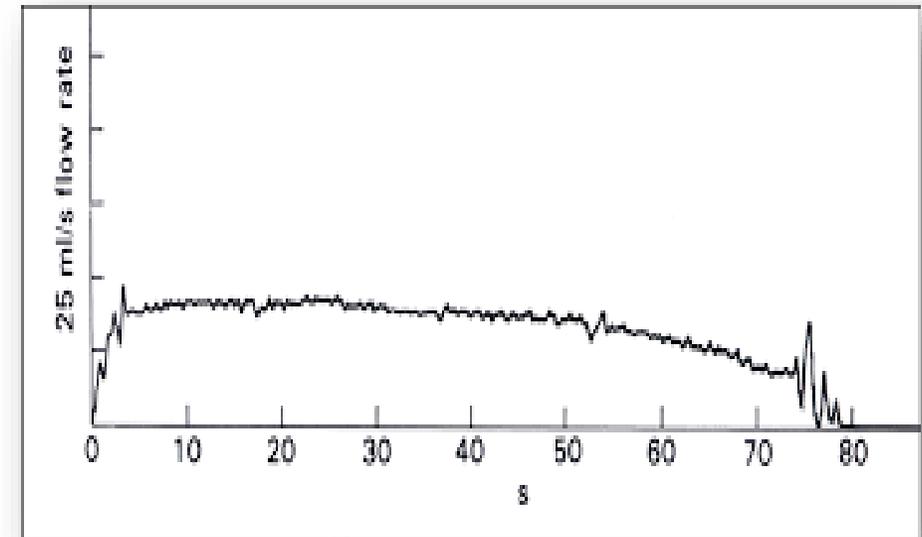
➤ 25 years old male patient, have history of car accident and multiple fractures 3 years ago presented with obstructive urinary symptoms, uroflowmetry showed box shaped graphy

## ❖ What is your diagnosis ?

- Urethral stricture

## ❖ Mention 3 causes of this condition:

1. Congenital
2. Iatrogenic
3. Infection
4. Trauma
5. Tumor
6. Stone



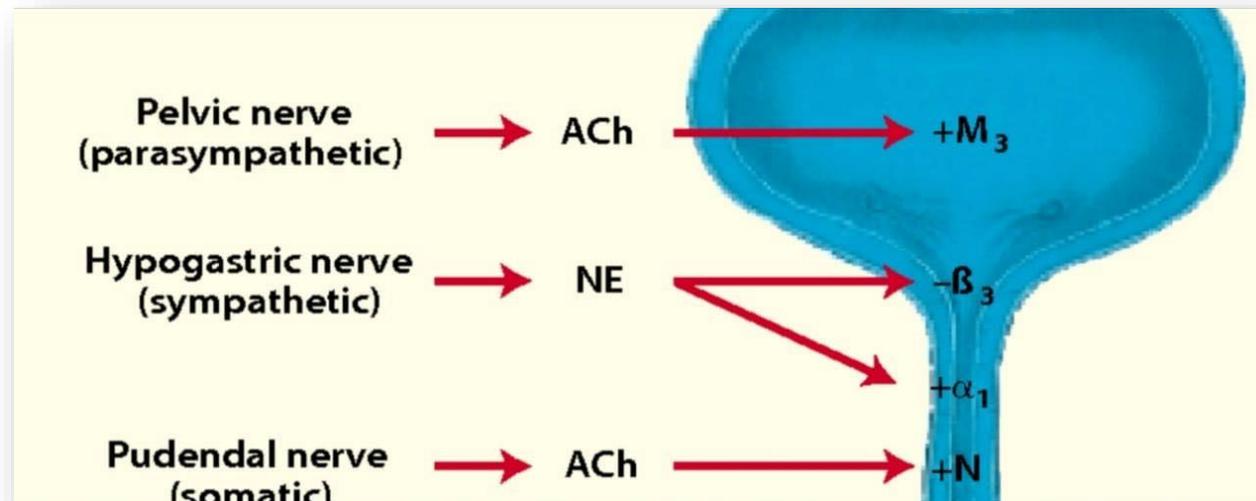
**Box shaped = Urethral stricture**



# Neurogenic Bladder

# Autonomic nerve supply of urinary bladder

- ❖ Sympathetic → Hypogastric nerve (T12-L2)
  - Relaxation of detrusor muscle promoting retention
- ❖ Parasympathetic → Pelvic nerve (S2-S4)
  - M2 receptors (More common and function in modulation of bladder function)
  - M3 receptors (Less common but responsible for contraction)
- ❖ Somatic → Pudendal nerve



# Micturition reflex – Centers

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- ❖ The micturition reflex describes the process of urination
- ❖ This is integrated via cortical, pontine, and spinal centers that act to inhibit urination until the bladder has been sufficiently distended, then promote voiding once that threshold has been reached
- ❖ **The sacral micturition center** is responsible for bladder contraction during the initiation of urination. Located in S2-S4 level; PS fibers travel from here within the pelvic nerves and stimulate M3 receptors in bladder wall (stimulating contraction of detrusor)
- ❖ **The pontine micturition center** coordinates relaxation of the external urethral sphincter with bladder contraction during voiding. This is located in the pontine reticular formation; the pons is able to manage continence and voiding via **the pontine storage center** and **the pontine micturition center** respectively
- ❖ **The medial frontal micturition center** in the cerebral cortex regulates the pontine and sacral micturition centers (Voluntary control)

# Micturition reflex – In action

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- ❖ When the bladder is still not full enough → no signal from stretch receptors is sent to the spinal, pontine → thus are inhibited by the storage center → decreased parasympathetic, increased sympathetic
- ❖ When the bladder is full → stretch receptors send stimulatory signal to the spinal, pontine and medial frontal micturition centers
- ❖ When the spinal and pontine micturition centers receives the signal → increase parasympathetic, decrease sympathetic, and decrease motor nerve stimulation (Micturition reflex)
- ❖ Medial frontal micturition center (voluntary control) can decide either to empty the bladder or to hold in the urine
  - If you decide to empty → the medial frontal micturition center stimulate the pontine micturition center allowing the micturition reflex to happen
  - If you decide to hold on → the medial frontal micturition center stimulate the pontine storage center inhibiting the micturition reflex from happening

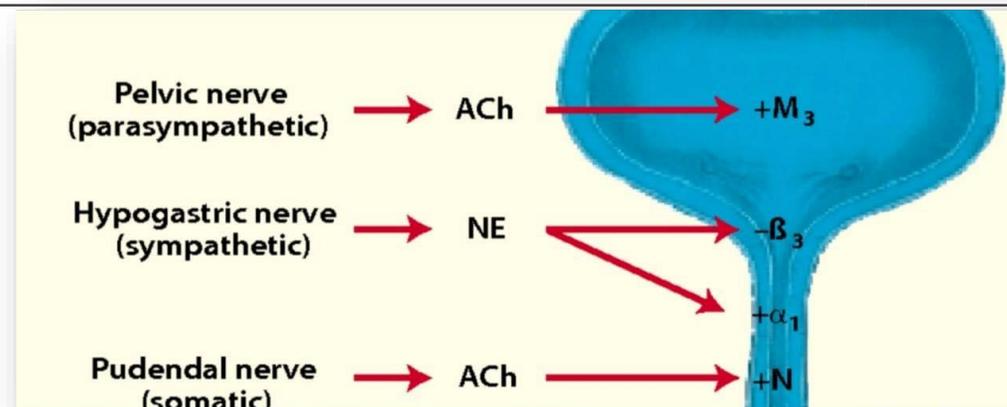
# Lesions causing neurogenic bladder

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1. Lesions **above the pontine** (ex. ACA strokes) → cut the communication between the medial frontal micturition center and the pontine micturition center → patient can't voluntarily control urination → when the bladder is full the micturition reflex will simultaneously occur → urgency incontinence + storage symptoms (frequency, nocturia)
2. Lesions **beneath the pontine** but above the sacral micturition center → bladder contraction occur without sphincter relaxation → voiding symptoms (weak stream, retention, hesitancy, dribbling)
3. Lesions **at the level of the sacral micturition central or to the lower neurons** → bladder can't contract → Weak bladder

# Autonomic drugs that affect the bladder

DRUGS	MECHANISM	APPLICATIONS
<b>1 Muscarinic antagonists</b> (eg, oxybutynin)	$\ominus$ $M_3$ receptor $\rightarrow$ relaxation of detrusor smooth muscle $\rightarrow$ $\downarrow$ detrusor overactivity	Urgency incontinence
<b>1 Muscarinic agonists</b> (eg, bethanechol)	$\oplus$ $M_3$ receptor $\rightarrow$ contraction of detrusor smooth muscle $\rightarrow$ $\uparrow$ bladder emptying	Urinary retention
<b>2 Sympathomimetics</b> (eg, mirabegron)	$\oplus$ $\beta_3$ receptor $\rightarrow$ relaxation of detrusor smooth muscle $\rightarrow$ $\uparrow$ bladder capacity	Urgency incontinence
<b>3 <math>\alpha_1</math>-blockers</b> (eg, tamsulosin)	$\ominus$ $\alpha_1$ -receptor $\rightarrow$ relaxation of smooth muscle (bladder neck, prostate) $\rightarrow$ $\downarrow$ urinary obstruction	BPH



# Summery

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## ❖ Lesions above the pontine (ex. ACA strokes):

- **Type of incontinence:** Urgency incontinence
- **Bladder & sphincter function:** Normal function (intact micturition reflex)
- **Treatment:** Antimuscarinics (ex. oxybutynin),  $\beta_3$  Agonists (ex. mirabegron)

## ❖ Lesions beneath the pontine but above the sacral micturition center:

- Commonly seen in **multiple sclerosis** and **spinal cord injury**
- **Type of incontinence:** Overflow incontinence
- **Bladder & sphincter function:** Simultaneous contractions of the detrusor muscle and involuntary activation of the urethral sphincter (spastic neurogenic bladder)
- **Treatment:**  $\alpha 1$ -blockers (ex. tamsulosin)

## ❖ Lesions at the level of the sacral micturition central or to the lower neurons:

- **Type of incontinence:** Overflow incontinence
- **Bladder & sphincter function:** Hypoactive bladder and weak sphincter (flaccid neurogenic bladder)
- **Treatment:** Muscarinic agonists (bethanechol)

# Neurogenic Bladder – Case scenario 1

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- Patient with spinal injury & quadriplegia cannot pass urine & has urinary incontinence
- ❖ **Diagnosis:** Spinal shock
- ❖ **Type of incontinence:**
  - overflow incontinence (bladder is hypoactive)
- ❖ **Predict bladder & sphincter function after 3 months**
  - Bladder becomes hyperactive + detrusor sphincter dyssynergia (DSD)
- ❖ **Define the neurogenic bladder:**
  - A term used to describe lower urinary tract dysfunction resulting from a neurologic disease or process

# Neurogenic Bladder – Case scenario 2

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➤ Patient present after car accident with incontinence:

❖ **Type of incontinence:**

- overflow incontinence (bladder is hypoactive)

❖ **Underlying causes of the incontinence**

- Spinal cord injury

❖ **Bladder function after 3 months**

- Overfunction

❖ Compliance describes the relationship between **volume** & **pressure**

❖ The spinal shock following severe injury to the spinal cord lasts **3 months**  
During this period, the bladder is **hypoactive (flaccid)**

# Neurogenic Bladder – Case scenario 3

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➤ A hemiparalytic female patient present to the clinic after 6 months of her offending event complaining of inability to hold urine and sudden urgencies to void immediately

❖ **Type of incontinence:**

- Urgency incontinence

❖ **Bladder & sphincter function:**

- Normal function (intact micturition reflex)

❖ **Treatment:**

- Antimuscarinics (ex. oxybutynin),  $\beta$ 3 Agonists (ex. mirabegron)

# MCQ – Tumescence is mediated by

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- ❖ Thoracic sympathetic
- ❖ Pelvic sympathetic
- ❖ Lumbar parasympathetic
- ❖ **Pelvic parasympathetic**
- ❖ Sacral somatic



# Urological Trauma



# Renal Trauma

# Indications for CT with IV contrast in renal injury

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1. Gross hematuria
2. **Microscopic** (>5 RBCs per high-powered field) or dipstick hematuria in a hypotensive patient (systolic blood pressure of <90 mmHg recorded at any time since the injury) **in hemodynamic non-stable patients.**
3. **History of rapid deceleration with evidence of multisystem trauma** (fall from a height, high-speed motor vehicle accident).
4. **Penetrating chest and abdominal wounds** (knives, bullets) with any degree of hematuria or suspicion of renal injury based on wound location
5. **Pediatrics with microscopic hematuria.**

**Hematuria after trauma is the most important indicator for UT injury**

# Staging of the renal injury

- ❖ **Grade I:** **Contusion** or non-expanding subcapsular hematoma, no laceration
- ❖ **Grade II:** Non-expanding perirenal hematoma, cortical laceration **<1cm** deep without urinary extravasation (cortex only)
- ❖ **Grade III:** Cortical laceration **>1cm** deep without urinary extravasation (extending through the cortex and into renal medulla)
- ❖ **Grade IV:** Laceration through corticomedullary junction into collecting system. Or vascular, segmental renal artery or vein injury with contained hematoma or partial vessel laceration or vessel thrombosis
- ❖ **Grade V:** **Shattered kidney** or renal pedicle avulsion

# Management summary of renal injury

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- ❖ **Grade 1 + 2 + 3 (Not reaching the pelvicalyceal system):** Conservative
- ❖ **Grade 4:** 50% are treated conservatively (If hemodynamic stable) and 50% are treated surgically
- ❖ **Grade 5:** Surgical exploration
  
- ❖ **Indications for surgical management include:**
  1. Penetrating trauma
  2. Exploration for associated injuries
  3. Expanding pulsatile retroperitoneal hematoma during laparotomy
  4. Grade IV injuries in hemodynamically unstable patient
  5. Grade V injuries



# Renal trauma – Case scenario

➤ Patient with renal trauma, gross hematuria, CT scan with 1.6 cm parenchymal laceration with no urine extravasation.

❖ **What was the indication for CT in this case ?**

- Gross hematuria

❖ **What is the stage of the renal injury?**

- Grade 3 (>1cm)

❖ **What is your management ?**

- Follow up, bed rest, resuscitation, no need for surgery

❖ **Mention 2 indications for surgery ?**

1. Exploration for associated injuries
2. Expanding pulsatile retroperitoneal hematoma during laparotomy
3. Penetrating trauma
4. Hemodynamic instability





# Renal trauma – Case scenario 2

➤ Patient with renal trauma, gross hematuria, CT scan with 1.6 cm parenchymal laceration with no urine extravasation.

## ❖ Define grade 3 renal trauma

- **Grade III:** Cortical laceration **>1cm** deep without urinary extravasation (extending through the cortex and into renal medulla)

## ❖ Mention 2 findings in the history of this patient that indicate renal bleeding ?

- Gross hematuria, hemodynamic instability

## ❖ What is the first line of investigations ?

- CT scan with contrast





# Ureteral trauma

# Ureteral injury

❖ **Most common cause:** iatrogenic

❖ **Urinalysis:**

- Hematuria (is the most important indicator urinary tract injury)

❖ **Imaging:**

- CT scan (1<sup>st</sup> choice), IVP (2<sup>nd</sup> choice)
- Retrograde pyelography, invasive; preceded by Cystoscopy to fill the contrast in the ureteric orifice
- Antegrade ureterography, in patients with Nephrostomy

Grade	Description of Injury
I	Contusion or hematoma
II	< 50% transection
III	> 50% transection
IV	Complete transection with < 2 cm devascularization
V	Avulsion with > 2 cm devascularization

❖ **Management:**

- **Grade 1 (Contusion):**
  - Mild: Ureteral stenting
  - Severe: Resection and anastomosis
- **Grade 2,3:**
  - Primary closure or Resection and anastomosis
- **Grade 4,5:**
  - Resection and anastomosis

# Ureteral injury

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## ❖ Complete transection Managements:

1. Ureteroureterostomy
  2. Ureteropyelostomy (If complete transection injury to upper ureter = Near pelvis)
  3. Ureterocalicostomy (If there was damage to the upper ureter and it cannot be anastomosed with the renal pelvis)
  4. Transureteroureterostomy (End to side anastomosis in Mid ureter injury)
  5. Ureteroneocystostomy
  6. Vesicopsoas hitch (Fixation of the bladder with psoas fascia)
  7. Boari bladder flap
- 5 + 6 + 7 are used in Lower Ureter injury



# Bladder trauma

# Bladder injury

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- ❖ **Causes:** Blunt, penetrating, iatrogenic trauma (Cystoscopy/TURPT)
- ❖ **Laboratory studies and Imaging studies:**
  - Macro/Microscopic hematuria (95%)
  - **Cystography (Contrast):** standard diagnostic procedure; most accurate.
    - How to know the site of extravasation?
      - **Intraperitoneal:** Contrast appears around the bowel
      - **Extraperitoneal:** Contrast appears around the bladder
  - **CT scan:** method of choice for evaluation of blunt or penetrating abdominal / pelvic injury

# Bladder injury

Type	Description
1	Bladder contusion
2	Intraperitoneal rupture (dome is most weak part of the bladder)
3	Interstitial bladder injury
4	Extraperitoneal rupture
4a	Simple
4b	Complex
5	Combined injury

# Treatment of bladder injury

- ❖ Emergency treatment of shock and hemorrhage
- ❖ Surgical treatment:
  - **Blunt injury:**
    - If it occurs through the posterior lateral wall:
      - Extraperitoneal leakage of urine
      - Treated by conservative management (Foley's catheter for 1-3 weeks).
    - If it occurs through the **dome** (Anterior):
      - Intraperitoneal leakage of urine.
      - Treated by laparotomy for Suturing.
  - **Penetrating injury:** surgical exploration and repair
  - The perivesical hematoma: should be left undisturbed to avoid introducing bacteria (Multiple abscesses)



# Bladder trauma – Case scenario 1

- Female patient RTA presented to ER complaining of abdominal pain, stable vital signs x-ray shows dilated bowel
- ❖ **What is your diagnosis ?**
  - Intrapertitoneal rupture of bladder
- ❖ **What is the grade of the trauma ?**
  - Grade 2
- ❖ **Treatment:** Open laparotomy





# Bladder trauma – Case scenario 2

➤ Scuba diving presented to ER complaining of abdominal pain, stable vital signs x-ray shows dilated bowel and air fluid level

❖ **What is your diagnosis ?**

○ Intrapertitoneal rupture of bladder

❖ **What is the grade of the trauma ?**

○ Grade 2

❖ **Treatment:** Open laparotomy





# Bladder trauma – Case scenario 3

➤ Car accident with right ileum fracture hematuria 75cc with picture of retrograde pyelogram

**What is your diagnosis ?**

- Intraperitoneal rupture of bladder

❖ **What is the grade of the trauma ?**

- Grade 2

❖ **What is the first investigation you should ?**

- Cystography

❖ **Treatment:** Open laparotomy

# Bladder trauma – Essay

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## ❖ What are the types of bladder injury ?

- Penetrating and blunt

## ❖ What the most specific radiological investigation ?

- Cystogram

## ❖ What is the most common urethral injury ?

- Fossa naviculars



# Urethral trauma

# Urethral injury

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## ❖ Male urethra anatomy:

1. **The posterior urethra:** Prostatic urethra and membranous urethra
2. **The anterior urethra:** Penile urethra and bulbar urethra

## 1. **Posterior urethral injury:**

- Membranous urethra injury in pelvic fractures.

## 2. **Anterior urethral injury:**

- Bulbar urethra injury in Straddle injury
- Penile urethra injury is usually due to iatrogenic injury from catheterization or manipulation

➤ **Note:** In retrograde urethrography, Foley's catheter is introduced at the fossa navicularis for contrast push but never introduce further in any urethral injury

# Signs and symptoms of urethral trauma

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1. Pain with voiding or inability to void
2. Blood at meatus/Blood at vaginal introitus
3. Perineal, scrotal, labial, penile ecchymosis and edema
4. Abnormal location of prostate on DRE  
high riding prostate or may appear to be absent
5. Blood on DRE or vaginal examination
6. Hematuria although not specific but hematuria on a first voided specimen may indicate injury
7. Hematoma or swelling

# Management of urethral injury

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## ❖ Anterior urethral injury

### ○ Blunt trauma:

- **Partial tears:** suprapubic cystostomy to divert urine away from site of injury, and this is maintained for 4 weeks to allow healing
- **Complete tear:** end to end anastomosis

### ○ Open injury:

- Surgical exploration and repair

## ❖ Posterior urethral injury

### ○ Partial tear: cystostomy

### ○ Complete tear: urethroplasty later on

➤ **Urine diversion in both patterns of injury (Suprapubic catheter) should be done**

➤ **Last modality of treatment: Buccal-mucosal graft**

# Urethral injury – Case scenario 1

## ❖ Which study do we use in this case ?

- Retrograde urethrography

## ❖ Why not use foleys catheter ?

- Risk for complications





# Urinary tract infection

# Urinary tract infection

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- ❖ **Most common pathogen of UTI:** *E.coli*
- ❖ **Most common mode of infection:** **Ascending** from the periurethral, vaginal and fecal flora
- ❖ **Upper tract infection:**
  - Pyelonephritis (acute/chronic) mostly diagnosed clinically, Ureteritis
  - **Symptoms:**
    1. Symptoms of lower UTI
    2. Fever, Flank pain, CVA tenderness, Fatigue/malaise, Nausea and vomiting
- ❖ **Lower tract infection:**
  - Cystitis, urethritis, and prostatitis
  - **Symptoms:**
    - Storage symptoms (dysuria, urinary urgency, frequency), hematuria, suprapubic tenderness

# Urinary tract infection

## ❖ Symptomatic UTI:

- There's signs and symptoms of UTI and laboratory testing confirm the diagnosis
- **Urinalysis:** 5-15 WBC per high-power
- **Urine culture:**  $1 \times 10^6$  cfu/ml
- ✓ **Isolated:** 5-6 months between attacks
- ✓ **Recurrent:** More than 2 infections within 6 months or more than 3 within 12 months (**define**)
- ✓ **Reinfection:** Infection by a different bacteria
- ✓ **Bacterial persistence:** infection by the same organism from a focus within the urinary tract

سنوات (5)

## ❖ Asymptomatic UTI:

- There is no symptoms, but the urinalysis and culture are positive; treatment only in case of pregnancy and immunodeficiency

# Urinary tract infection

---

## ❖ Uncomplicated UTI:

- In healthy patients with normal urinary tract anatomy

## ❖ Complicated UTI:

### ○ Occurs:

1. In immunocompromised
2. When there is anatomic abnormalities
3. When infected by multi-drug resistant bacteria

**Note:** Any UTI in males is considered complicated UTI

### ○ Results in:

- **Functional:** renal failure, neurogenic bladder, VUR
- **Structural:** stricture, BPH, anatomic malformation

# Prostatitis

Overview of clinical features of bacterial prostatitis and chronic pelvic pain syndrome			
	Acute bacterial prostatitis	Chronic bacterial prostatitis	Chronic pelvic pain syndrome (CPPS)
Constitutional symptoms	<ul style="list-style-type: none"> <li>Spiking fevers, chills</li> <li>Malaise</li> </ul>	<ul style="list-style-type: none"> <li>Commonly absent</li> <li>Low-grade fever in some patients</li> </ul>	<ul style="list-style-type: none"> <li>Commonly absent</li> </ul>
Genitourinary tract symptoms	<ul style="list-style-type: none"> <li>Acute bladder irritation                             <ul style="list-style-type: none"> <li>Acute dysuria</li> <li>Frequency</li> <li>Urgency</li> </ul> </li> <li>Cloudy urine</li> </ul>	<ul style="list-style-type: none"> <li>Chronic bladder irritation                             <ul style="list-style-type: none"> <li>Dysuria</li> <li>Frequency</li> <li>Urgency</li> </ul> </li> <li>Erectile dysfunction</li> <li>Possibly bloody semen</li> </ul>	<ul style="list-style-type: none"> <li>Possibly erectile dysfunction</li> <li>Painful ejaculation</li> <li>Bloody semen</li> <li>May have symptoms of bladder irritation</li> </ul>
Genitourinary pain	<ul style="list-style-type: none"> <li>Severe                             <ul style="list-style-type: none"> <li>Lower back</li> <li>Perineal</li> <li>Pelvic</li> <li>With defecation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Mild</li> </ul>	<ul style="list-style-type: none"> <li>Moderate, diffuse                             <ul style="list-style-type: none"> <li>Lower abdomen</li> <li>Lower back</li> <li>Perineum</li> <li>Scrotum</li> <li>Penis</li> </ul> </li> </ul>
Prostate	<ul style="list-style-type: none"> <li>Tender, boggy</li> <li>Warm, swollen</li> </ul>	<ul style="list-style-type: none"> <li>Often normal</li> <li>May be enlarged and tender</li> </ul>	<ul style="list-style-type: none"> <li>Usually normal</li> <li>May be slightly tender</li> </ul>

- ✓ **Category 1:** Acute bacterial prostatitis
- ✓ **Category 2:** Chronic bacterial prostatitis
- ✓ **Category 3:** Chronic pelvic pain syndrome
- ✓ **Category 4:** Asymptomatic inflammatory prostatitis

# UTIs – Case scenario 1

➤ Newly married **female** with fever, frequency, urgency, dysuria. (Note: UTIs more common in females)

## ❖ What is your diagnosis ?

- Acute cystitis

## ❖ Simple diagnostic tests to assure your diagnosis:

- Urine analysis, urine culture and sensitivity, CBC

## ❖ Treatment (Name & duration):

- **1<sup>st</sup> line:** TMP-SMX
- **2<sup>nd</sup> line:** Fluoroquinolone
- **Duration:** 1-3 days

Diagnosis	Choice of antibiotics	Duration of therapy
Cystitis	1st: TMP-SMX 2nd: Fluoroquinolone	1–3 days
Pyelonephritis	1st: Fluoroquinolone 2nd: 2nd-generation cephalosporin 3rd: Aminopenicillin/BLI	7–10 days
Complicated UTI <sup>a</sup>	1st: Fluoroquinolone 2nd: Aminopenicillin/BLI 3rd: 3rd-generation cephalosporin Aminoglycosides	Afebrile: 2 weeks Febrile: continue for additional 3–5 days after last fever (minimum 2 weeks)
Prostatitis	1st: Fluoroquinolone 2nd: 2nd-generation cephalosporin 3rd: 3rd-generation cephalosporin	Acute: 2 weeks Chronic: 4–6 weeks
Epididymitis	1st: Fluoroquinolone 2nd: 2nd-generation cephalosporin <i>or</i> 1st: Doxycycline 2nd: Macrolide	14 days
Urethritis <sup>b</sup>	1st: IM ceftriaxone + azithromycin 2nd: Doxycycline	Single dose 7 days

# UTIs – Case scenario 2

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➤ 33 years old married female with recurrent dysuria , urgency and hematuria with mild fever

❖ **What is your diagnosis ?**

- Recurrent acute cystitis

❖ **What are the risk factors in this patient ?**

- Married
- Female

# UTIs – Essay

---

## ❖ What are the clinical signs & symptoms of acute pyelonephritis:

- Fever and chills
- Loin pain
- Costovertebral angle tenderness

## ❖ What is the best confirmatory test ?

- Culture

## ❖ What is it called when we start treatment before conformation of the diagnosis ?

- Empirical therapy



# Urolithiasis

# Urolithiasis

---

## ❖ Classification of stones according to X-ray opacity

- **Radio-opaque:** Calcium oxalate, Calcium phosphate
- **Radio-faint:** Cystine, Struvite (Ammonium magnesium phosphate )
- **Radio-lucent:** Uric acid

## ❖ Classification of stones according to the size

- Single, solitary stone
- Staghorn (large occupying the renal pelvis); most common due to struvite

## ❖ Urinalysis:

- **Nonspecific findings:** Gross or microscopic hematuria
- **Findings suggestive of stone composition:**
  - Alkaline urine (pH > 7.5–8) suggests struvite stones associated with urease-producing organisms
  - Acidic urine (pH < 4.5–5.5) may indicate uric acid stones

# Define

- ❖ **Calcium Stones:** (most common) Composed of either Calcium oxalate or phosphate. Radio-dense (i.e., visible of abdominal radiograph) Occurs secondary to hypercalciuria (more common) and hyperoxaluria
- ❖ **Uric Acid Stones:** (2nd most common) Radiolucent (cannot be seen on abdominal radiograph) Causes Associated with Hyperuricemia. (gout)
- ❖ **Struvite Stones:** Radio-dense (magnesium ammonium phosphate) Causes Often seen in patients with recurrent UTI's due to urease producing organisms (such as Proteus and Klebsiella)
- ❖ **Cystine stones:** (rare) radio-lucent Seen in patients with Cystinuria (autosomal recessive)

سنوات قديم ❖ Absorption of Ca mainly in duodenum (T/F question)

سنوات قديم ❖ Stone formation may be a genetic cause (T/F question)

سنوات قديم ❖ Gallbladder stone have an increased risk factor for renal stone (T/F question)

# Imaging – CT scan for urolithiasis

## ❖ Best diagnostic tests for

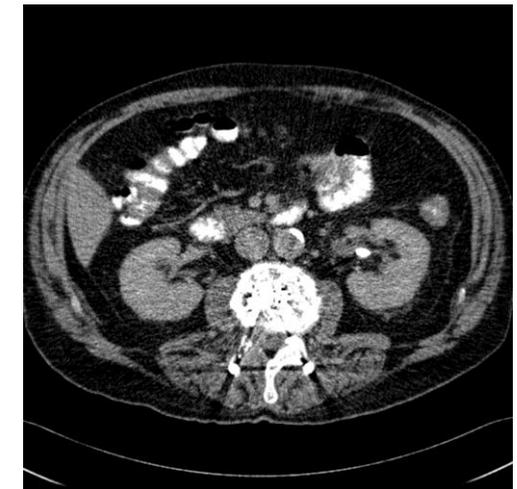
- Kidney stone: **CT without contrast** (9 سنوات)
- Pelviureteric junction obstruction: **CT without contrast** (1 سنوات)

## ❖ Indications of CT scan for urolithiasis:

- First-line for non-pregnant patients

## ❖ Findings:

- Calculus size, location, density, and degree of obstruction
- Hydronephrosis and/or hydroureter
- Perinephric fat stranding as a result of increased lymphatic pressure





# Imaging – Renal U/S

## ❖ Mention 2 findings:

- Dilated renal pelvis (hydronephrosis)
- Hyperechoic signal with acoustic shadow (renal stone)

## ❖ U/S findings in urolithiasis:

- **Obstructive uropathy (e.g., hydronephrosis)**
- **Stone: hyperechoic signal with acoustic shadowing**
- **Twinkle artifact: intense multicolored signal behind a stone seen when using color doppler technique**
- **Absence of ureteral jet when using color doppler technique**

## ❖ Indication of U/S in urolithiasis:

- Suspected nephrolithiasis in patients for whom radiation exposure should be minimized



# What is the management of urolithiasis ?

---

## 1. Medical

1. Analgesia: 1<sup>st</sup> line: NSAIDs, 2<sup>nd</sup> line: Opioids
2. Antiemetics
3. IV fluid for dehydration
4. Expulsive therapy (First-line: Tamsulosin)
5. Provide antibiotic treatment if urinalysis indicates a UTI

## 2. Interventional management

- **Infected stones:** Ureteral stenting or percutaneous nephrostomy
- **Ureteral stones:** Mid or distal ureter stones: Ureterorenoscopy (1<sup>st</sup> line), or ESWL (<10mm)
- **Renal stones > 20 mm OR lower renal pole stones > 10 mm:** percutaneous nephrolithotomy (PCNL)

# The most appropriate method of treatment of

- ❖ **8mm diameter mid ureteric stone:** ESWL (shock wave lithotripsy)
- ❖ **13mm stone in the mid renal calyx:** ureteroscopy (intracorporal)

## ❖ What is your management ?

1. Medical ( NSAIDs → opioid → CCBs → antiemetic → Alpha blocker)
2. Shock-wave lithotripsy (SWL)
3. Ureteroscopy.
4. Percutaneous nephrolithotomy (PCNL).
5. Open Stone surgery



# KUB indicate a stone in the left ureter

## ❖ What is the difference between the KUB and normal abdominal Xray ?

الجواب في أول سيكشن (شكلك أول ما قرأت السؤال وما عرفت تجاوبه شكل واحد عرف انه بكرة طابل)

## ❖ What's the composition of the stone

- Calcium oxalate

## ❖ What's the best management for it

- Medical (I.V fluid, NSAIDs, alpha blocker)



# KUB

➤ Patient with ureteric debris/stones and recurrent UTIs

❖ **What are the findings ?**

- Radiopaque stone
- Double J stent

❖ **What are the indications of Double J stent ?**

1. Obstructive nephropathy
2. Prophylactic pre-ESWL
3. Post-traumatic ureteroscopy
4. Following endopyelotomy
5. Post renal transplant
6. To identify ureter during major surgeries



# Hydronephrosis – IVP

❖ **What is the name of the radiological abnormality shown ?**

○ Hydronephrosis

❖ **Mention 5 causes of this abnormality**

1. BPH
2. Pregnancy
3. Kidney stones
4. Neurogenic bladder
5. Narrowing of the ureters





# Urolithiasis – Case scenario 1

➤ 49 years old male patient has gout, presented to ER with severe left renal colic, the presented x-ray study does not show radio-opaque shadow. with further investigation found to have left ureteric stone.

- 1. Gold standard for diagnosis of stones ?**
  - CT scan without contrast
- 2. What is the likely stone type for this patient ?**
  - Uric acid stone
- 3. What is the important causative factor ?**
  - Acidic urine due to high serum uric acid levels (gout)
- 4. Mention 1 endoscopic method used for stones?**
  - Percutaneous nephrolithotomy





# Urolithiasis – Case scenario 1

➤ 49 years old male patient has gout, presented to ER with severe left renal colic, the presented x-ray study does not show radio-opaque shadow. with further investigation found to have left ureteric stone.

## 5. Mention 4 indication of endoscopic intervention (JJ stent) or nephrostomy for this patient ?

1. Single kidney
2. Bilateral obstruction
3. Obstructive nephropathy
4. Obstructive pyelonephritis
5. Intractable pain



# Urolithiasis – Case scenario 2

➤ A 37 years old businessman presented with flank pain, high fever and chills. He has been started on gout medication since 2 months

## ❖ What is the most probable diagnosis ?

- Uric acid stone

## ❖ What investigations you would like to order ?

- CT scan without contrast, Urinalysis, CBC, KFT, Uric acid blood test

## ❖ What is the medical treatment ?

- Analgesia: 1st line: NSAIDs, 2nd line: Opioids
- Antiemetics
- IV fluid for dehydration
- Medical expulsive therapy (First-line: Tamsulosin)
- Provide antibiotic treatment if urinalysis indicates a UTI

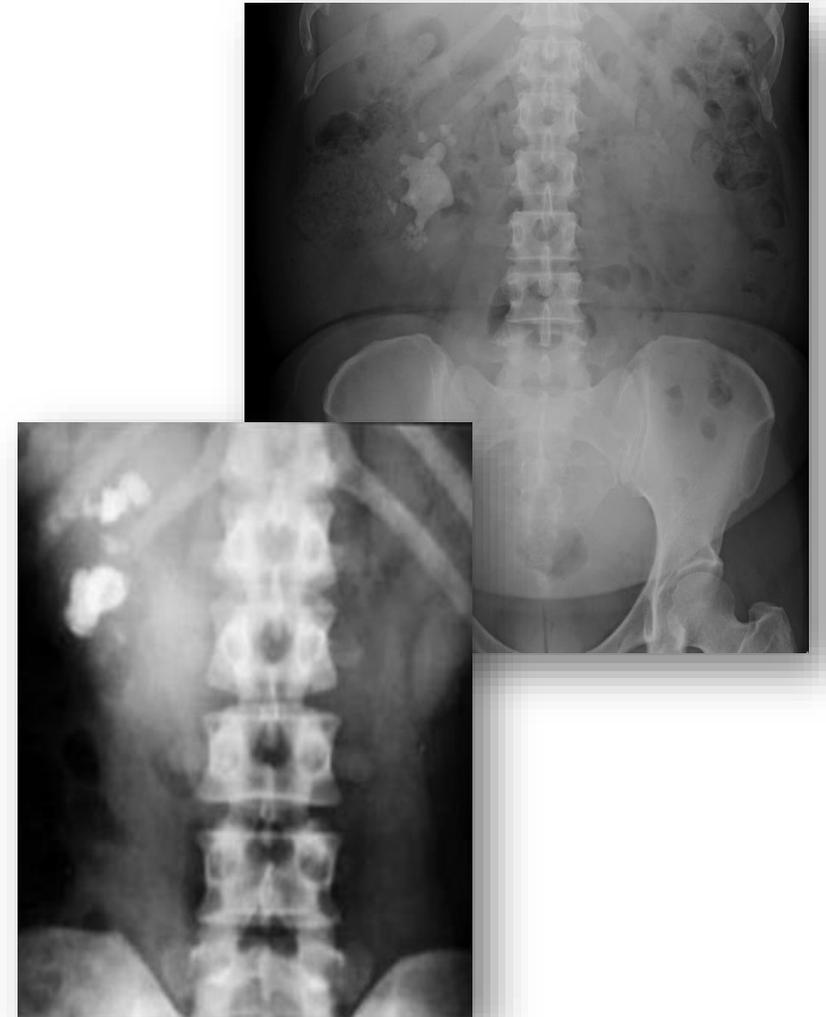
## ❖ If the stone is in the bladder, what is the medical treatment ?

- Potassium citrate



# Urolithiasis – Case scenario 3

- This is KUB of a 37 years old female patient with a history of loin pain and recurrent UTI. The patients has 2 kids
- ❖ **What is the most probable etiology for her condition ?**
  - UTI with urease producing bacteria (proteus, pseudomonas, Klebsiella)
- ❖ **What is the composition of this pathology ?**
  - Magnesium ammonium phosphate
- ❖ **What is the most appropriate method of management ?**
  - Percutaneous nephrolithotomy





# Urolithiasis – Case scenario 4

➤ 68 years old male patient with BPH came to the ER with back pain, abdominal pain, fever, tachycardia, creatinine 0.8

## ❖ What do you see in the X-ray, in the CT

- CT scan: Hydronephrosis
- X-ray: Ureteric stone

## ❖ What is your management?

- Double j insertion (patient not stable need emergent drainage)

## ❖ What is the diagnosis ?

- Urosepsis (**fever, tachycardia**)



# Urolithiasis – Case scenario 5

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➤ Lady with loin pain & history of stone formation (has been removed)

## ❖ Indications for admission

- Intractable pain
- Toxemia suggesting infection
- Bilateral urine flow obstruction
- Solitary kidney & renal failure

# Urolithiasis – Case scenario 6

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➤ Stone at VUJ:

❖ **What is the name of the procedure for removing stones in the ureter ?**

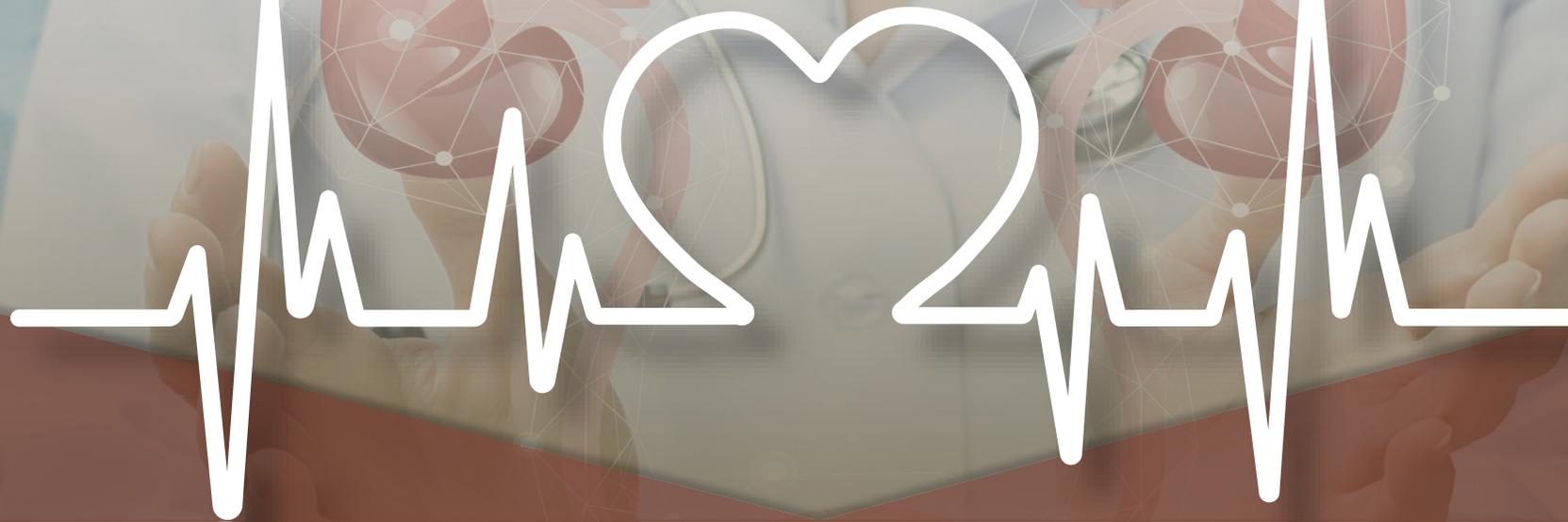
○ Flexible ureteroscopy

❖ **Mention 2 complications of this procedure:**

○ Infection

○ Hematuria

○ Ureteric injury



# Pediatric urology



# Vesicoureteral reflux

# Vesicoureteral reflux

❖ **Definition:** Abnormal backflow of urine from bladder to kidney that can cause the ureters and kidney to swell

سنوات (1)

❖ **Best diagnostic tests for:**

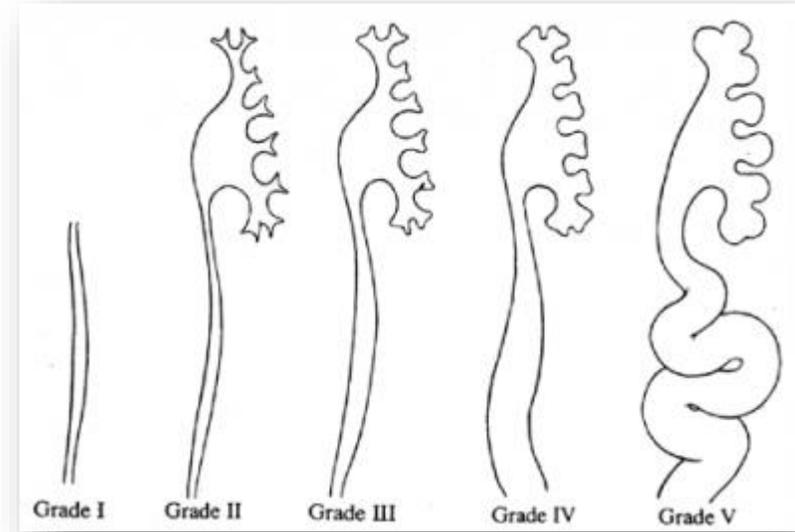
- **Vesicoureteral reflux (VUR):** MCUG
- **Posterior urethral valve:** MCUG
- **Detect and monitor renal scarring:** DMSA scan

❖ **Benefits of Continuous low-dose antibiotic prophylaxis**

- Lowers the occurrence of a subsequent UTI
- Lowers the risk of renal scarring and damage
- Lowers the upgrading of VUR

# Vesicoureteral Reflux Grading

- ❖ **Grade I:** Urine flow back into on or both of the ureters but doesn't reach the kidney (urine reflux into non-dilated ureters)
- ❖ **Grade II:** Flow back up to the kidney but doesn't cause dilatation of renal pelvis
- ❖ **Grade III:** Mild to moderate dilatation of the ureter, renal pelvis and calyces with minimal blunting at fornices
- ❖ **Grade IV:** Moderate to severe dilatation of the ureter, renal pelvis and calyces with mild tortuosity
- ❖ **Grade V:** Severe dilatation with severe tortuosity, blunting renal fornices, cortical thinning and ballooning





# Vesicoureteral reflux (VUR)

## 1. Name of this diagnostic study:

- Micturating cystourethrogram (MCUG)

## 2. Grade: Grade 3

## 3. What is the effect of UTI on this condition ?

- Reflux of infected urine will upgrade this condition, renal failure and scar

## 4. Mention 3 secondary causes of VUR:

- Posterior urethral valve
- Urethral stricture
- Neurogenic bladder
- Detrusor sphincter dyssynergia (DSD)
- Acute cystitis





# Vesicoureteral reflux (VUR)

## 5. Indications of surgery in VUR

1. If it is not possible to keep urine sterile and reflux persists
2. If acute pyelonephritis not responding to treatment
3. If increased renal damage
4. High grade reflux (grade IV or V – not an absolute indication)





# IV pyelogram

## ❖ Findings:

- Bilateral hydroureteronephrosis with lose of papillary impression and ureter dilation

## ❖ Grade: Grade 5

## ❖ Best test to see renal scar

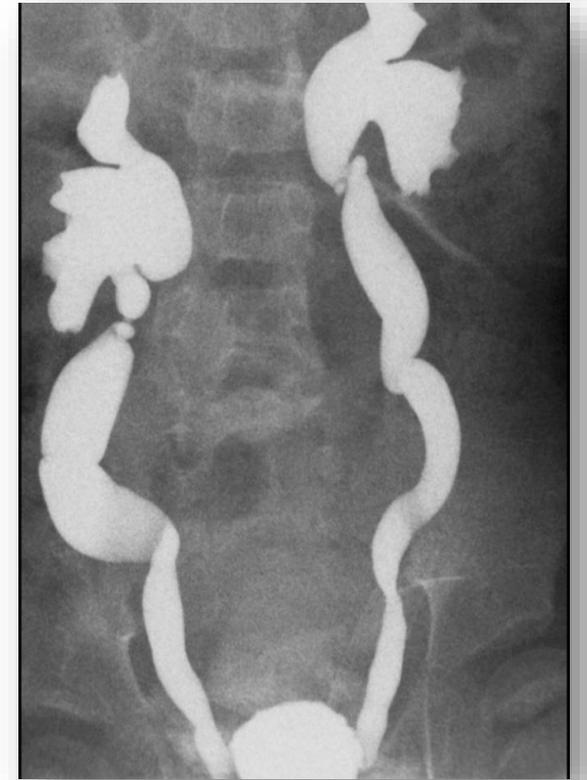
- DMSA

## ❖ You need to see urethra to role out what ?

- Urethral stricture

## ❖ Mention 2 complications on the kidneys:

- Renal scaring, Renal failure



# IV pyelogram

## ❖ Diagnosis:

- Vesicoureteral Reflux

## ❖ Best test to see renal scar

- DMSA

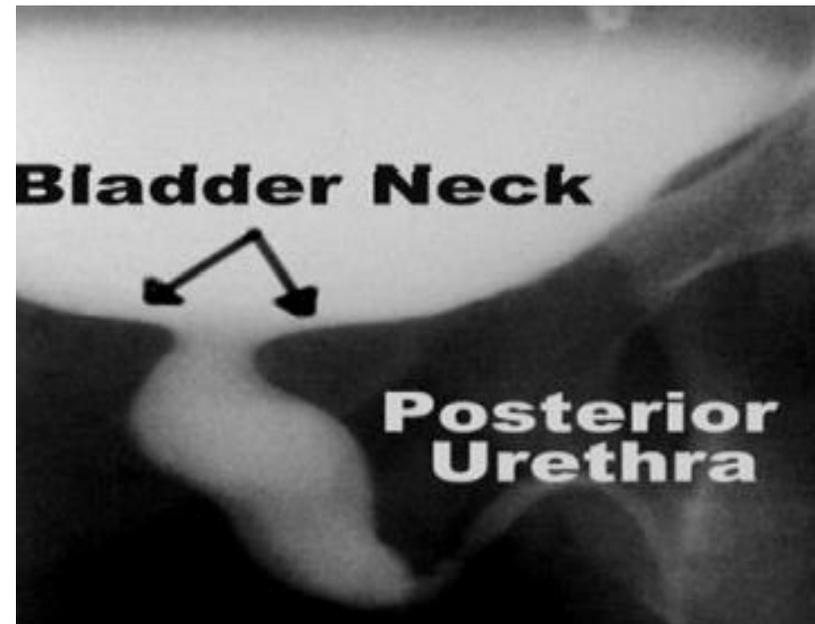
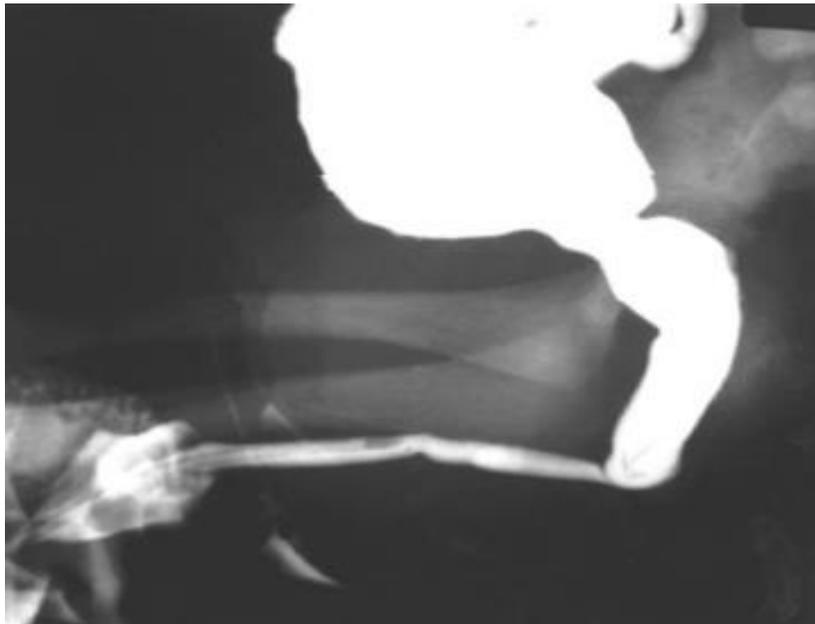
## ❖ If the mother told you that this problem was diagnosed antenatally on her routine visit to the gynecologist, what should you also look for?

- Hypertension, Failure to thrive



# Vesicoureteral reflux – Case scenario 1

- VCUG showing bilateral VUR, the baby was diagnosed with antenatal hydronephrosis
- ❖ **What else should you suspect in him?**
  - Hypertension, Failure to thrive





# Hypospadias & Epispadias

# Essay

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## ❖ Define:

سنوات (4)

○ **Hypospadias:** Congenital deformity in which the opening of the urethra occurs on the underside (ventral) part of penis, any where from the glans to the perineum

إضافي

○ **Epispadias:** An embryonic malformation typically characterized by an exposed urethra on the dorsal penis (in males) or between the labia and the clitoris (in females)

# Hypospadias

- ❖ **Name this anomaly:** Hypospadias
- ❖ **What associated condition you would look for ?**
  - Cryptorchidism
- ❖ **Anatomical locations of this lesion**
  - Anterior: Glandular, coronal, subcoronal
  - Middle: Proximal penile, midshaft, distal penile
  - Posterior: Penoscrotal, scrotal, perineal
- ❖ **Embryology:**
  - Failure of urethral folds and foreskin to fuse on ventral penis at the end of the 3<sup>rd</sup> month



# Hypospadias

## ❖ What is your diagnosis ?

- Hypospadias

## ❖ Mention three associated pathologies

- hooded foreskin, chordee, and deviation of raphe

## ❖ When to preform surgery ?

- At 1-year-old





# Cryptorchidism



# Essay

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## ❖ Define:

سنوات (4)

- **Undescended testes:** A failure of one or both testicles to descend to their natural position in the scrotum.

سنوات (1)

## ❖ Mention 3 differential diagnosis for empty right scrotum:

- Retractable right testis
- Undescended right testis
- Ectopic right testis
- Absent right testis

- ❖ The most common location for undescended testis is **prepubic** and the age at which the operation should be performed is **1 year**.

# Essay

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## ❖ **Mention 5 complications of undescended testis**

- 40-fold higher relative risk of cancer
- Reduced fertility
- Increased risk of testicular torsion
- Increased risk of direct inguinal hernias
- Increased risk of trauma

# Cryptorchidism

## ❖ What is the name of this condition ?

- Cryptorchidism

## ❖ What is the procedure performed, and when ?

- Bilateral orchidopexy, after 1 year

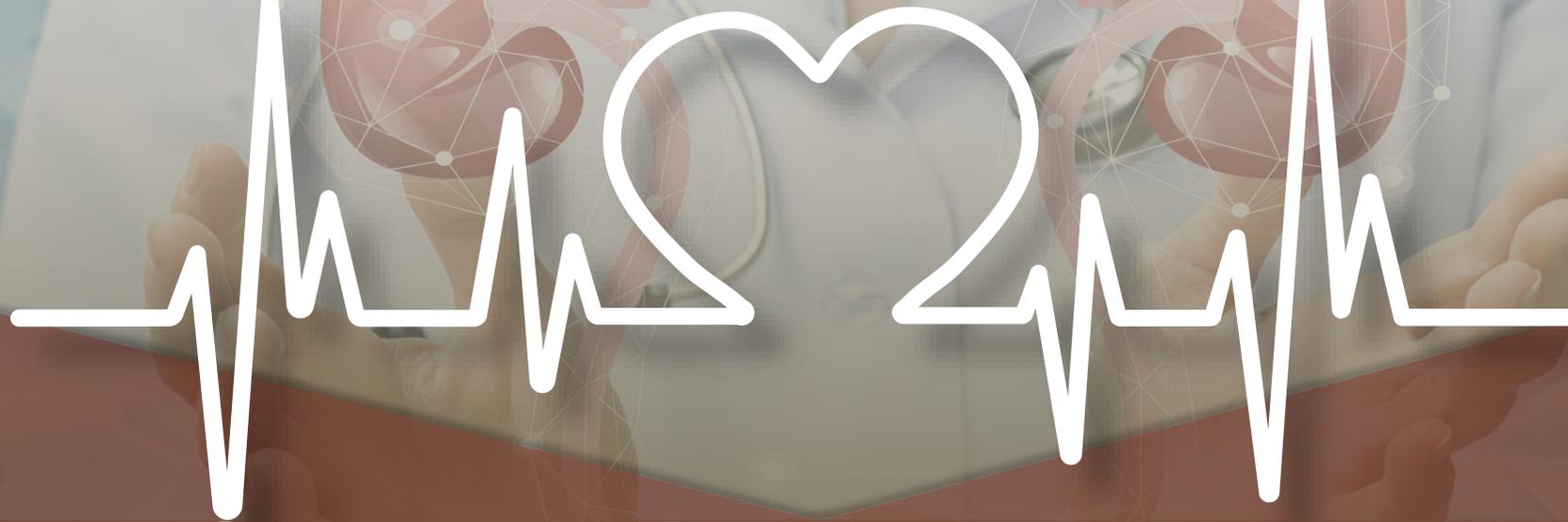
## ❖ Mention 5 complications associated with the condition:

- Hypofertility or infertility, cancer, torsion, trauma, inguinal hernia

## ❖ Investigation:

- Chromosome analysis and hormone test





# Renal tumors

# Renal cysts

سنوات (2)

## ❖ Mention 5 criteria for simple renal cyst on US

1. absence of internal echoes
2. posterior enhancement
3. round/oval shape and
4. sharp, thin posterior walls
5. clear fluid /no septate no calcification

سنوات (1)

## ❖ Most appropriate method of diagnosis: Ultrasound

### ❖ Treatment:

- No treatment is usually recommended, follow up might be recommended in some cases (class IIF, III, IV cysts)
- If the cyst cause hydronephrosis: Aspiration and sclerosing by 95% alcohol, open laparoscopic excision maybe required if symptomatic or recurrent
- Atypical cyst: PNA of content for analysis → Excise the extrarenal portion of the cyst or partial nephrectomy maybe considered

# Benign renal tumors

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## ❖ Renal adenoma:

- More common in males
- **Symptoms:** Usually, asymptomatic
- **Treatment:** < 4cm: Partial nephrectomy, > 4cm: nephrectomy

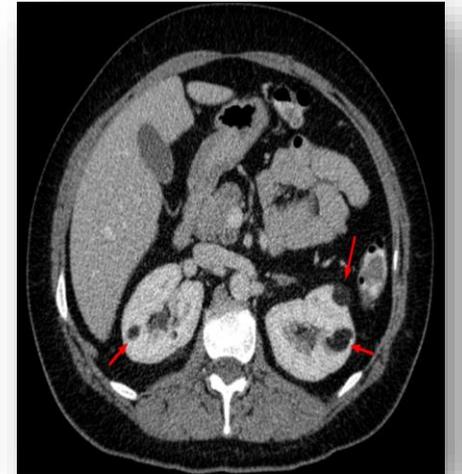
## ❖ Oncocytoma:

- More common in males
- **Symptoms:** Painless hematuria, abdominal mass, flank pain (mimic RCC)
- **Treatment:** Often resected in order to exclude RCC

## ❖ Angiomyolipoma:

- **Associated with** tuberous sclerosis
- **Symptoms:** Usually, asymptomatic
- **Treatment:** Surgical resection of the tumor is indicated for angiomyolipomas that measure > 4 cm in diameter

# CT scan show Bilateral renal mass



## سنوات (4) ❖ Mention 5 differential diagnosis for benign renal mass

1. Renal adenoma (**most common benign tumor**)
2. Oncocytoma
3. Angiomyolipoma
4. Leiomyoma
5. Hemangioma
6. Schwannoma

Rare

## سنوات (1) ❖ Mention 5 syndromes associated with benign renal tumor

1. Tuberous sclerosis
2. Wunderlich's syndrome
3. Von Hippel-Lindau syndrome (renal cysts)
4. Autosomal recessive polycystic kidney disease (renal cysts)
5. Autosomal dominant polycystic kidney disease (renal cysts)

أتوقع السؤال غلط  
لأنه إجابات الأرشيف  
كانت المرتبطة ب  
(malignant)

# Renal cell carcinoma (RCC)

❖ **Risk factors:** Age (50-70), Men, Smoking, obesity, HTN, CKD, long term dialysis, family history, asbestos and cadmium exposure, Painkillers

سنوات قديم

❖ **Symptoms:** Hematuria, Flank pain, palpable renal mass, constitutional symptoms

❖ **Treatment:**

○ **Partial nephrectomy:**

- **Absolute indications:** patients with a **T1a renal mass**, a solitary kidney, bilateral masses, familial RCC, preexisting chronic kidney disease, or proteinuria
- **Relative indications:** patients who are young and/or have a longer life expectancy, multifocal masses, or comorbidities that impact renal function

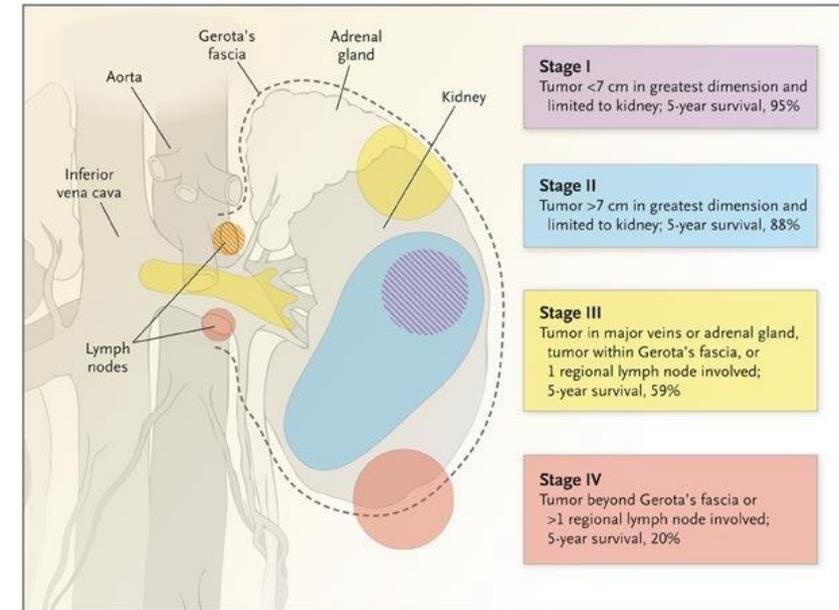
○ **Radical nephrectomy:** Preferred in patients with increased oncological risk

سنوات قديم

❖ **Define radical nephrectomy:** remove kidney +/- LN +/- perinephric fat + upper half of ipsilateral ureter

# T staging of renal cell carcinoma

Tx	Primary tumor cannot be assessed
T0	No evidence of primary tumor
T1	Tumor <7 cm, limited to the kidney
T1a	Tumor is 4 cm or less, limited to kidney
T1b	Tumor >4 cm but <7 cm, limited to kidney
T2	Tumor >7 cm, limited to the kidney
T3	Tumor extends outside the kidney, but not beyond Gerota's (perinephric) fascia
T3a	Tumor invades adrenal gland or perinephric fat
T3b	Tumor grossly extends into renal vein or subdiaphragmatic IVC
T3c	Tumor grossly extends into supradiaphragmatic IVC or heart; invades wall of vena cava
T4	Tumor invades beyond Gerota's fascia



# Renal cell carcinoma (RCC)

## ❖ Spot diagnosis:

- Renal cell carcinoma

## ❖ Management:

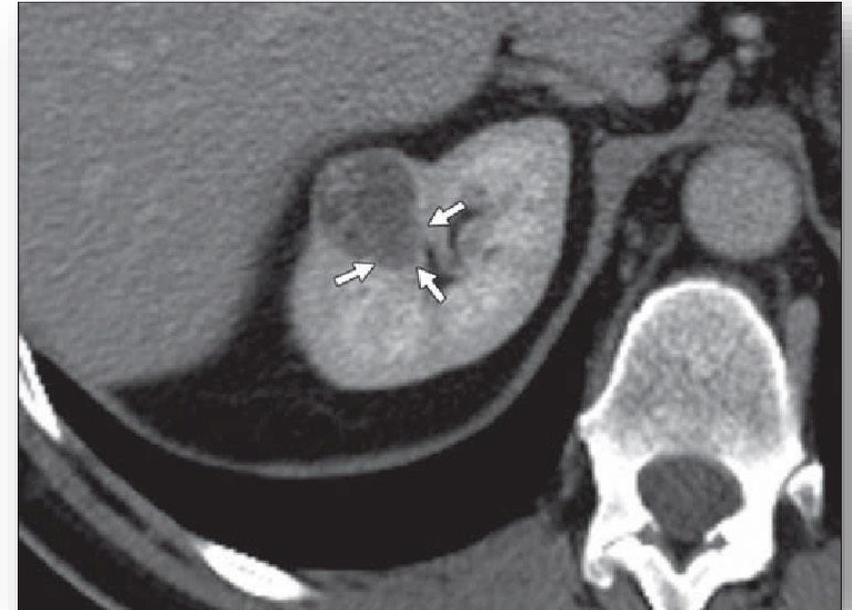
- Partial nephrectomy (<4 cm)

## ❖ What is the gold standard investigation ?

- CT without contrast

## ❖ What is the gold standard treatment ? (in renal tumors in general)

- Partial nephrectomy





# Renal tumors – Case scenario 1

- 70 years old **male** patient came with right **flank pain**, **palpable mass** and **hematuria**, on CT scan mass of **2 cm** appear
- ❖ **Mention 3 syndrome may associate with this mass**
  - Von Hippel lindau syndrome
  - Tuberous sclerosis
  - Birt-Hogg-Dube syndrome
  - Hereditary leiomyomatosis and renal cancer syndrome (HLRCC)
  - Hereditary papillary renal cell carcinoma (HPRCC)
- ❖ **The most appropriate management**
  - Partial nephrectomy (**Tumor is T1a (< 4cm)**)
- ❖ **Most commonly this tumor metastasis to**
  - Lung



## Renal tumors – Case scenario 2

➤ 55 years old male smoker complaining of left loin pain & hematuria, CT with contrast was done

❖ Describe what's you see?

- Hypodense area in the left kidney (with internal heterogeneity)

❖ What's the gold standard management?

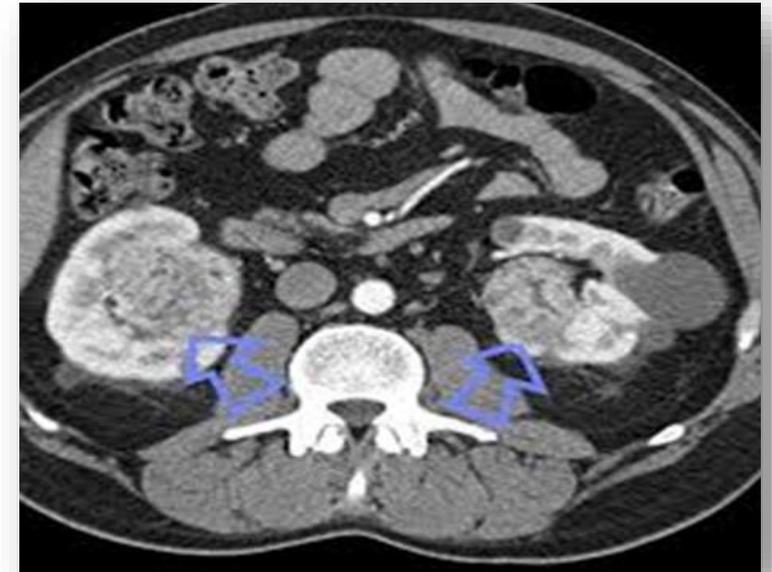
- Partial nephrectomy

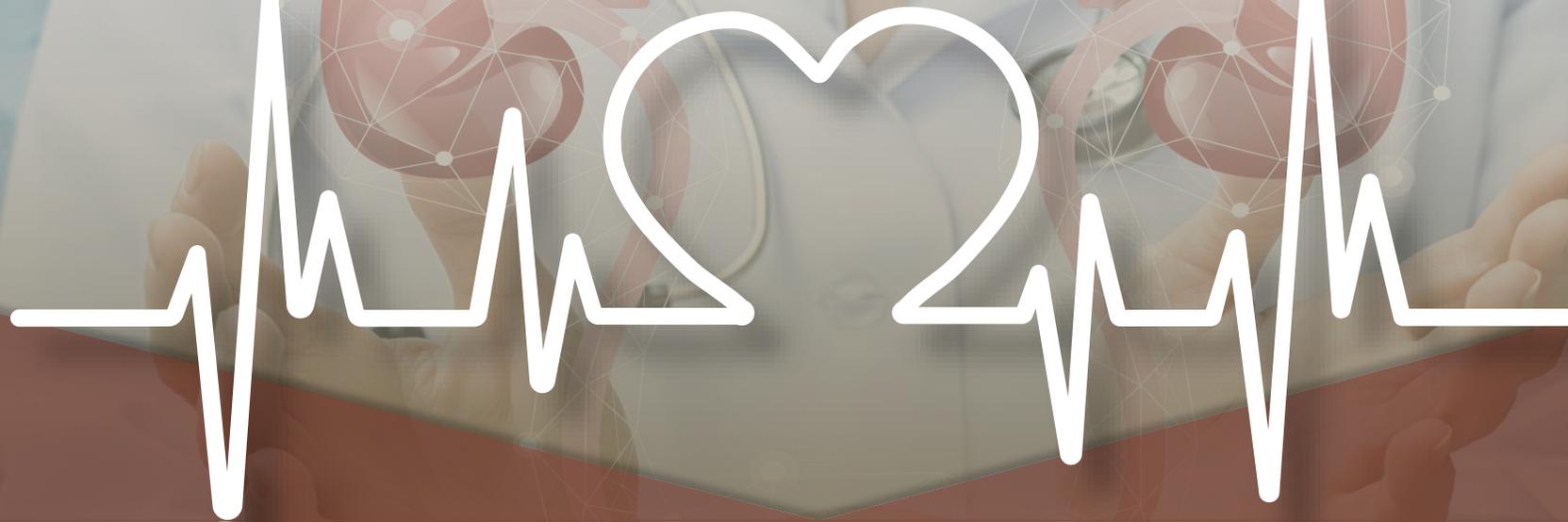




# Renal tumors – Case scenario 3

- ❖ **Diagnosis:** Renal cell carcinoma
- ❖ **Mention 3 clinical presentations**
  - Flank pain
  - Palpable mass
  - Gross hematuria
  - Constitutional symptoms
- ❖ **What investigations should you perform to check for metastasis ?**
  - Chest xray
  - Bone scan
  - CT scan (archieve answer was cystoscopy)





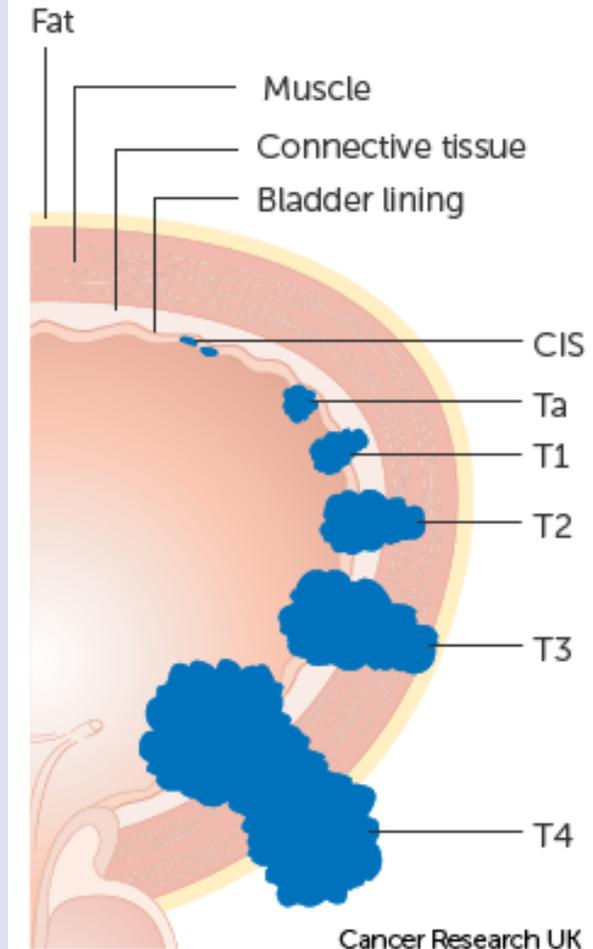
# Bladder cancer

# Bladder cancer

- ❖ **Risk factors:** Age, Men (**3:1, M:F**), **Smoking (highest risk factor; (سنوات قديم)**), Previous cancer treatment, Exposure to certain chemicals, Chronic bladder inflammation, Family history of bladder cancer
- ❖ **Most common types:**
  - Transitional cell carcinoma (90%)
  - Squamous cell carcinoma (8%)
    - **Risk factors:** **Smoking, Bladder stones, Catheters**, Schistosoma haematobium infection (have better prognosis than non-bilharzial SCC)
  - Adenocarcinoma (2%)
    - **Presentation:** Supraumbilical mass, Supraumbilical mucous or bloody discharge
- ❖ **Clinically:** Frequency, urgency, dysuria, pelvic pain, painless midstream intermittent gross hematuria
- ❖ **Diagnoses:** **Cystoscopy** and biopsy mainly then TNM used to determine amount of spread

# Write the "T" stage of bladder cancer

Tx	Primary tumor cannot be assessed
T0	No evidence of primary tumor
Ta	Noninvasive papillary carcinoma
Tis	Carcinoma in situ
T1	Tumor invades subepithelial connective tissue
T2	Tumor invades muscularis propria (detrusor): T2a inner half; T2b outer half
T3	Tumor invades beyond muscularis propria into perivesical fat: T3a = microscopic; T3b = macroscopic (extravesical mass)
T4a	Tumor invades any of prostate, uterus, vagina, bowel
T4b	Tumor invades pelvic or abdominal wall



# Bladder cancer – Treatment

## ❖ T1 and T2:

### A. TURBT

- **Complications (uncommon):** bleeding, sepsis, bladder perforation, incomplete resection, and urethral stricture
- Second resection within 2-6 should be undertaken if:
  - first resection was incomplete
  - when the pathologist reports that the resected specimen contains no muscularis propria
  - if a high-grade, but apparently non-invasive, T1 tumor has been reported since perhaps 10% (3–25%) of these G3pT1 tumors are under-staged T2 tumors
- In the absence of second resection indications review cystoscopy is performed at **3 months** subsequent cystoscopies are performed under local anesthetic at 9 months and thereafter annually for 5y

B. Transurethral cystodiathermy or laser are accepted, quicker and less morbid

## ❖ T3: Cystectomy

## ❖ T4: Chemotherapy & radiotherapy

# Bladder cancer – Treatment

سنوات قديم

❖ **Define radical cystectomy:** Remove bladder + prostatic urethra + distal ureter + regional LN

❖ **Intravesical therapy of bladder cancer:**

○ **Intravesical chemotherapy:**

For low non-invasive bladder cancer after TURBT within 6 hours then induction and maintenance

Decrease risk of recurrence

○ **Intravesical BCG immunotherapy:**

For high grade bladder cancer after TURBT and for carcinoma in situ

Not done immediately after TURBT or if there's hematuria or immunosuppression

Decrease risk of recurrence and progression



# Bladder cancer – Case scenario 1

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➤ Patient 55 years old use indwelling catheter for period of time came with hematuria

❖ **What is your diagnosis?**

- SCC due to chronic irritation from cath.

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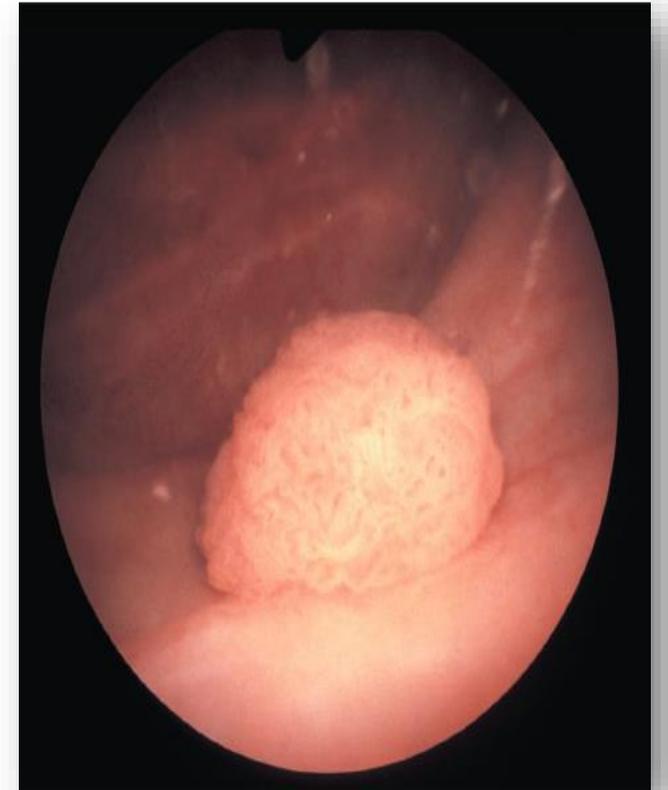
❖ **What is the most appropriate method of treatment of solitary, exophytic T1 transitional cell carcinoma of the bladder ?**

- TURBT



# Cystoscopy show a superficial papillary tumor

- ❖ **What is your diagnosis ?**
  - Transitional cell carcinoma
- ❖ **What is the Best treatment ?**
  - TURBT
- ❖ **When do you repeat cystoscopy ?**
  - After 3 months





# During cystoscopy, this lesion has been seen

## ❖ Best diagnostic method:

- Cystoscopy

## ❖ What is your diagnosis ?

- Transitional cell carcinoma

## ❖ Treatment:

- According to the stage
  - **T1, T2:** TURBT, transurethral cystodiathermy, or laser
  - **T3:** cystectomy
  - **T4:** chemoradiotherapy



# Bladder cancer

- ❖ What is the main symptom of bladder cancer ?
  - **Gross** Hematuria
- ❖ What is the type of hemorrhage in bladder cancer ?
  - **Gross** Hematuria
- ❖ What is the main treatment ?
  - TURB
- ❖ When is it considered superficial ?
  - If it doesn't reach to muscularis propria
- ❖ When is it considered invasive ?
  - When it invades to muscularis propria
- ❖ What is the best diagnostic tool ?
  - Cystoscopy





# Bladder cancer – Case scenario 2

➤ 70y old male patient, smoker, presented to urology clinic complaining of painless intermittent gross hematuria and urinary retention. On U/S: 33 cm urinary mass was found if the mass was shown to be malignant

1. **Best diagnostic test:** Cystoscopy
2. **Most common tumor:** Transitional cell carcinoma
3. **What is your diagnosis ?** Transitional cell carcinoma
4. **What information in the history raises the possibility of a bladder cancer?** Smoking, Male, Old age
5. **Is it ok to do suprapubic catheterization for the patient ? Why ?**
  - No, this tumor can spread by implantation around catheter or skin wound





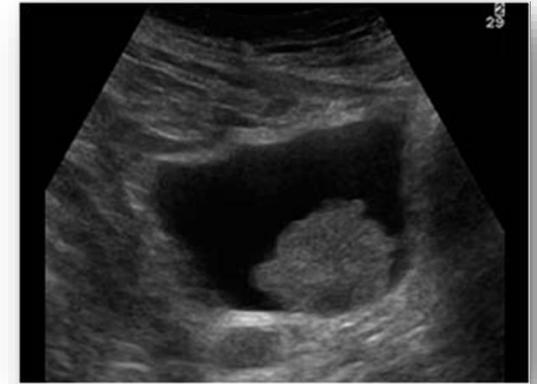
# Bladder cancer – Case scenario 2

➤ 70y old male patient, smoker, presented to urology clinic complaining of painless intermittent gross hematuria and urinary retention. On U/S: 33 cm urinary mass was found if the mass was shown to be malignant

## 6. Treatment:

○ According to the stage

- **T1, T2:** TURBT, transurethral cystodiathermy, or laser
- **T3:** cystectomy
- **T4:** chemoradiotherapy





# Ultrasound – filling defect

## ❖ Mention 5 differential diagnosis

1. stone
2. blood clot
3. polyp
4. fungal ball
5. focal cystitis
6. neoplasm





# IVU – filling defect

- ❖ Describe the radiological abnormality seen
  - Bladder Filling Defect on the left side
- ❖ Mention 5 differential diagnosis
  - Blood clot, Stone, Neoplasm, Polyp, focal cystitis
- ❖ If the patient is a chronic smoker and long periods on bladder catheter, what is the most common form of bladder cancer ?
  - Squamous cell carcinoma





# Bladder cancer – Case scenario 3

➤ A 50-year-old male patient presented with hematuria and bladder filling defect on radiology, He has been a worker in a chemical factory for 25 years

❖ **What is the main finding in this IVP ?**

- Radiolucent filling defect projecting in to the lumen of the bladder
- Bilateral hydronephrosis

❖ **What is your diagnosis ?**

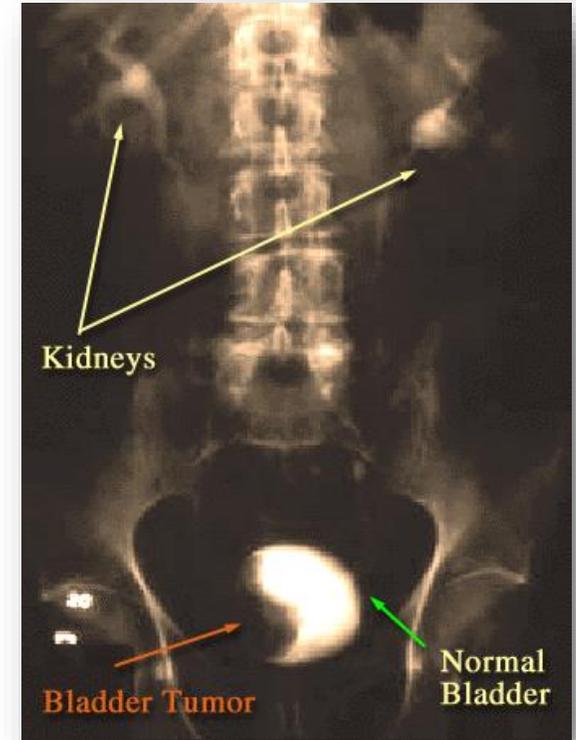
- Transitional cell carcinoma

❖ **What is the best diagnostic study to do ?**

- Cystoscopy

❖ **If this patient was found to have a low-grade bladder tumor, what is the management ?**

- TURBT (transurethral resection of bladder tumor)



# Bladder cancer – Case scenario 4

➤ 55y old male patient, smoker, presented to urology clinic complaining of painless intermittent gross hematuria and urinary retention. On CT scan a 38 mm polypoid enhancing mass is noted at urinary bladder base, without extravesical extension or regional lymphadenopathy. The prostate gland is enlarged

❖ **What is your next step management ?**

○ Cystoscopy

❖ **If you know that the mass was malignant and the biopsy shows high grade tumor invading the lamina propria, what is the management ?**

○ TURB



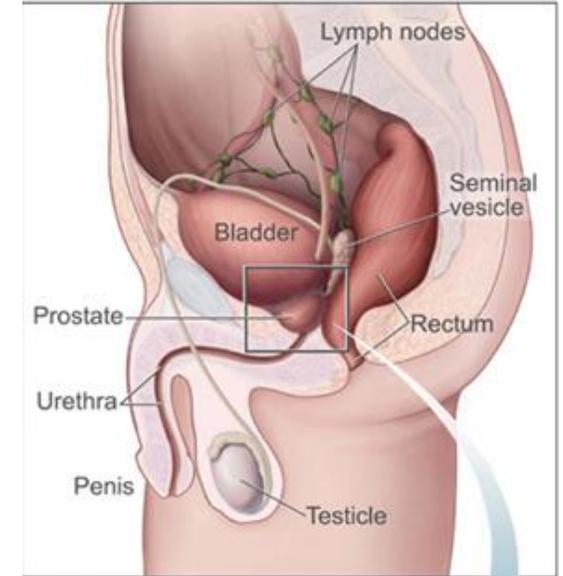
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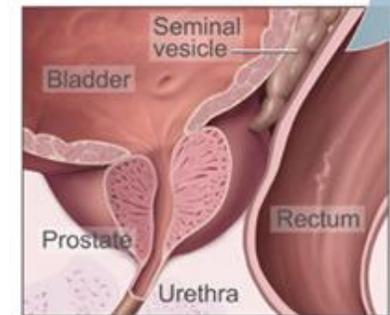
# **Benign prostatic hyperplasia**

# Anatomical relations (what are the boundaries ?)

- ❖ The prostate has
  - A **base**, which lies **superiorly** against the bladder neck
  - An **apex**, which lies **inferiorly** against the urogenital diaphragm
- ❖ **Anterior** to the prostate is the symphysis pubis
- ❖ **Posteriorly**, the prostate is separated from the rectum by the Denonvilliers' fascia
- ❖ **Posterosuperior** to the prostate lies the posterior part of the bladder, seminal vesicle, vasa deferens and ureters
- ❖ The prostate is closely related to the internal sphincter, supramembranous external sphincter, levator ani.



This shows the prostate and nearby organs.

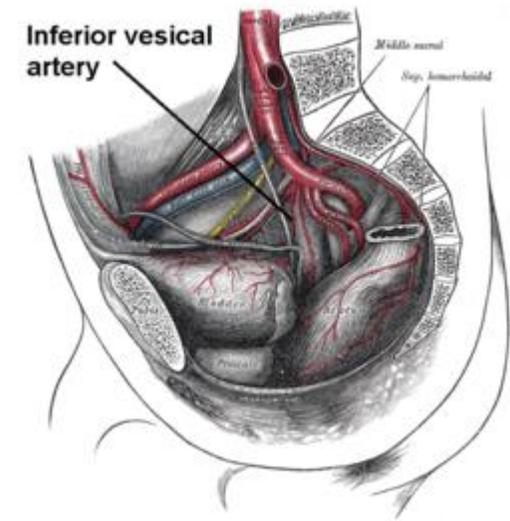
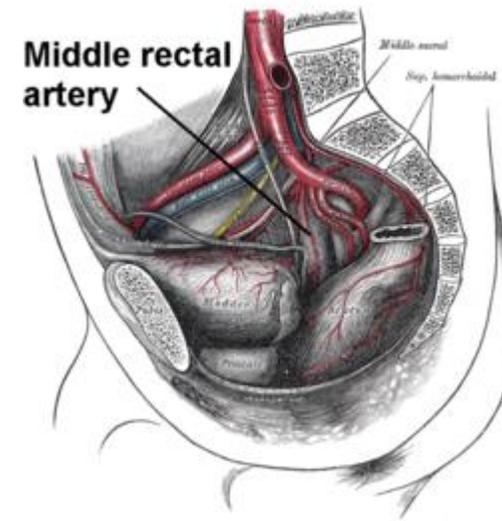


This shows the inside of the prostate, urethra, rectum, and bladder.

# Blood and innervation

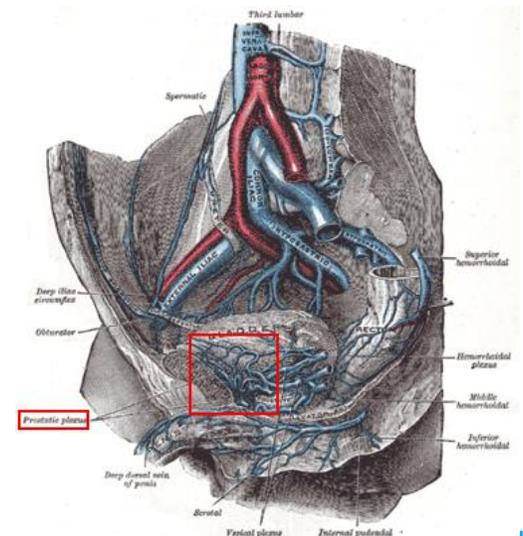
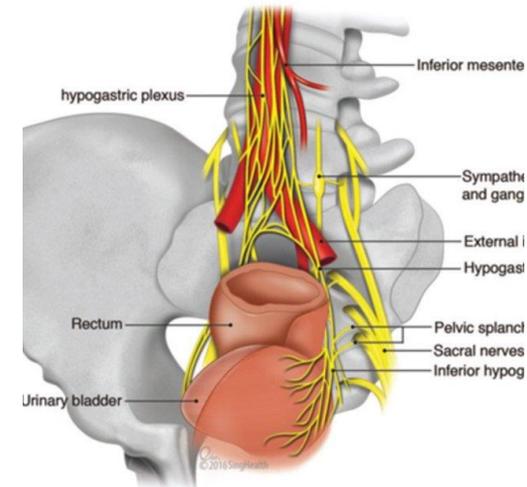
## ❖ Arterial

- Abdominal Aorta → Internal iliac artery → middle rectus & inferior vesical arteries → both give branches to the prostate



## ❖ Venous

- A prostatic venous plexus drains into the internal iliac veins

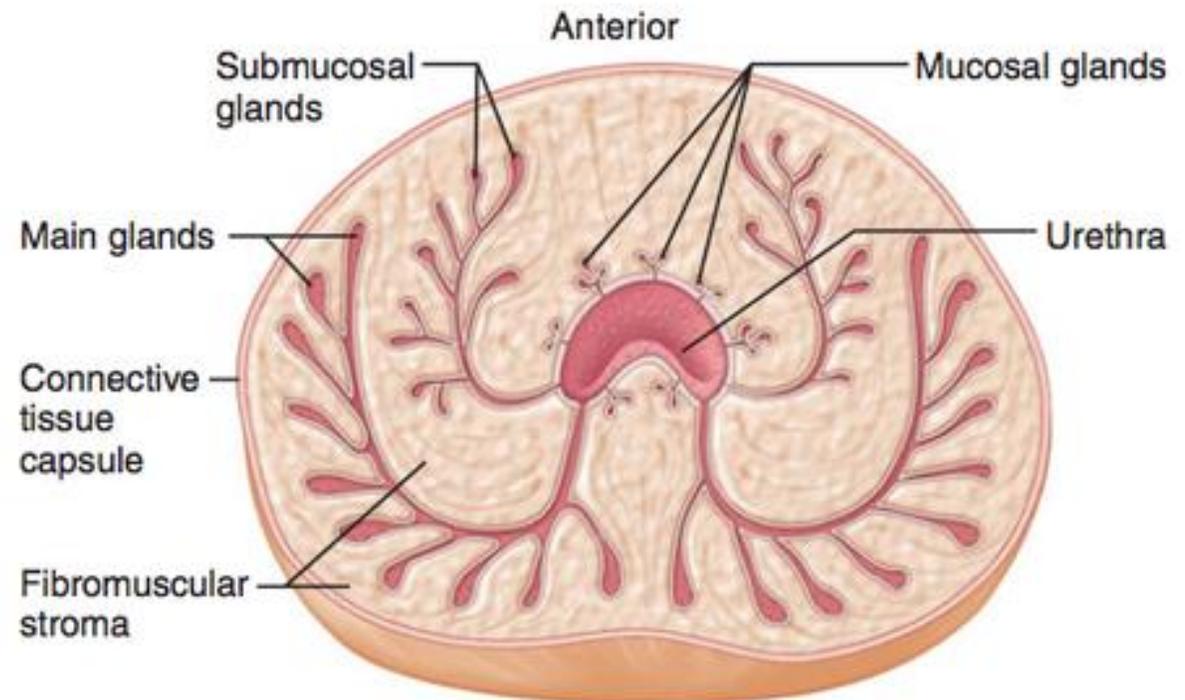


## ❖ Nervous

- Inferior hypogastric plexus → prostatic plexus (sympathetic)

# Structure of the prostate

- ❖ The three elements of the prostate are the glands, muscles and stroma
- ❖ All the elements can enlarge and shrink at different times of life
- ❖ In old age hypertrophy of one or all three elements in the transition zone around the periurethral area gives rise to the nodules of benign prostatic enlargement



# PSA (prostate specific antigen)

سنوات (2)

## ❖ Definition & function:

- A glycoprotein enzyme produced by prostatic epithelial cells.
- Its function is to liquefy the ejaculate, enabling fertilization

## ❖ Ranges:

سنوات (1)

- **0-4ng/ml**: Normal range, in most normal males  $<2.6\text{ng/ml}$
- **4-10ng/ml**: Gray zone; might be BPH, might be cancer → Order PSA kinetics
- **>10ng/ml**: Highly suggestive of prostate cancer

# PSA kinetics

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## ❖ Free to total PSA ratio

- < 18% ratio>> suggestion of cancer or other differentials (prostatitis)
- >18% ratio>> suggest benign cause

## ❖ PSA Density = Serum PSA / Prostate volume

- >18% density>> suggestion of cancer
- <18% density>> suggestion of benign cause

## ❖ PSA velocity

- Change of > 0.75 ng/ml/year associated with increase risk of cancer

## ❖ PSA doubling time

- Used in staging and follow up of prostate cancer



# PSA – Essay

In Females it increases in hyperandrogenic state

سنوآت (3)

## ❖ Mention 5 causes of increased PSA:

1. Getting older
2. BPH
3. Prostate cancer
4. Acute prostatitis
5. UTI
6. Ejaculation
7. DRE (Prostatic massage)
8. Biopsy
9. Instrumentation, TURP, and any surgeries of the prostate

سنوآت (2)

## ❖ What are the normal values of PSA in BPH patients

- Total PSA > 1.5 ng/mL, but not more than 10 ng/mL, with ↑ free PSA/total PSA ratio

# PSA – Case scenario

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➤ Routine PSA examination yields PSA level of 8ng/ml

❖ **What are the cause of increased PSA levels ?**

1. Getting older
2. BPH
3. Prostate cancer
4. Acute prostatitis
5. UTI
6. Ejaculation
7. DRE (Prostatic massage)
8. Biopsy
9. Instrumentation, TURP, and any surgeries of the prostate



# BPH – Essay

سنوات (1)

## ❖ Mechanism of prostatic enlargement causing bladder outlet obstruction

- A combination of hormonal factors, stem cell proliferation and genetic susceptibility → glandular and stromal hyperplasia in the transition zone → formation of smooth, elastic, firm hyperplastic nodule → slit-like prostatic urethral compression → bladder outlet obstruction → obstructive symptoms of BPH

سنوات (2)

## ❖ Mention 5 symptom of mild BPH

1. Hesitancy
2. Poor stream
3. Straining to urinate
4. Incomplete voiding
5. Frequency
6. Urgency

# BPH medical treatment

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## 1. Alpha 1 adrenergic antagonists (Tamsulosin, Doxazosin)

- Relax bladder neck muscle and prostate muscle fibers
- S.E >> Orthostatic hypotension

## 2. 5-alpha reductase inhibitor (Finasteride)

- Shrink/Reduce the size of prostate by inhibiting conversion of testosterone into DHT and thus suppressing prostate growth
- S.E>> Decrease libido and ejaculation dysfunction

## 3. Anti-cholinergic

- Bladder muscle relaxant

## 4. PDE5 inhibitor (Tadalafil)

- ❖ Lifestyle and home messages (limit caffeine and alcohol, bladder training and schedule bathroom visits, healthy diets and exercise)

# Preferred first-line options

Indications		Preferred agent
LUTS predominantly caused by BOO	Small prostate (< 40 mL) and/or serum PSA < 1.5 ng/mL	Alpha blocker
	Large prostate (> 40 mL) and/or serum PSA > 1.5 ng/mL	5-alpha reductase inhibitors (5-ARIs)
	Severe symptoms or an inadequate response to monotherapy	Combination therapy: alpha blocker PLUS a 5-ARI
LUTS predominantly caused by OAB		Antimuscarinic (see also "Urge incontinence")
LUTS caused by mixed BOO and OAB		An alpha blocker PLUS an antimuscarinic
LUTS associated with erectile dysfunction		Phosphodiesterase 5 inhibitor

- **LUTS:** Lower urinary tract symptoms
- **BOO:** Bladder outlet obstruction
- **OAB:** Overactive bladder

# Preferred first-line options – Matching

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- ❖ Patient with prostate 35mg and bothersome symptoms:  $\alpha$  blocker
  - ❖ Patient with prostate 40mg with lower urinary tract symptoms:  $\alpha$  blocker
  - ❖ Patient with prostate 80mg without lower urinary tract symptoms: watchful waiting; active surveillance
  - ❖ Patient with prostate 100mg with large bladder stone: Open prostatectomy; Transvesical prostatectomy
- 

## ❖ In the prostate gland:

- The most common location of BPH is **transitional zone**
- The most common location for a prostatic cancer is **peripheral zone**



# BPH – Case scenario 1

➤ 68 years old male patient with BPH came to the ER with back pain, abdominal pain and he didn't pass urine since morning.

## ❖ **Diagnosis:**

- Urinary retention.

## ❖ **What clinical exam do you do to support the diagnosis?**

- Palpate suprapubic area to determine if there is urine retention or anuria.

## ❖ **Investigations:**

- PSA, urinalysis, creatinine

## ❖ **First step in the management?**

- Foley's catheterization.



# BPH – Case scenario 2

➤ 60 years old male patient with BPH and supra pubic mass presented to your clinic with complete absence in urine

❖ **Type of urinary incontinence ?**

- Overflow incontinence

❖ **First management ?**

- Foley's catheterization.

❖ **Mention 4 BPH complications other than overflow incontinence:**

1. Retention
2. Hydronephrosis
3. Renal insufficiency
4. Infection
5. Gross hematuria
6. Bladder stone



# BPH – Case scenario 3

➤ 80 years old male patient came with acute urine retention, according to the photo

## ❖ What is your management

- Bladder drainage by foley's catheter
- Combination therapy:  $\alpha$  blocker + 5- $\alpha$  reductase inhibitor

## ❖ Mention 4 indication for TURP

1. Failure of medical treatment
2. Recurrent UTI
3. Refractory urinary retention
4. Recurrent gross hematuria
5. Bladder stones
6. Large bladder diverticula
7. Hydronephrosis
8. Renal insufficiency



# BPH – Case scenario 4

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- 60 years old male patient with 80mg prostate and voiding and obstructive symptoms
- ❖ **Type of incontinence:**
  - Overflow incontinence
- ❖ **What is the most likely diagnosis ?**
  - BPH
- ❖ **Medical treatment:**
  - Finasteride

# BPH – Case scenario 5

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- History of 65 years old man with long standing lower back pain and with no urine pass since morning
- ❖ **What clinical exam do you do to support the diagnosis?**
  - Palpate suprapubic area to determine if there is urine retention or anuria.
- ❖ **First management ?**
  - Foley's catheterization.

# BPH – Case scenario 6

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- 60 years old male patient with 80mg prostate and voiding and obstructive symptoms
- ❖ **Type of incontinence:**
  - Overflow incontinence
- ❖ **What is the most likely diagnosis ?**
  - BPH
- ❖ **Medical treatment:**
  - Finasteride



# Patient complain of urinary retention

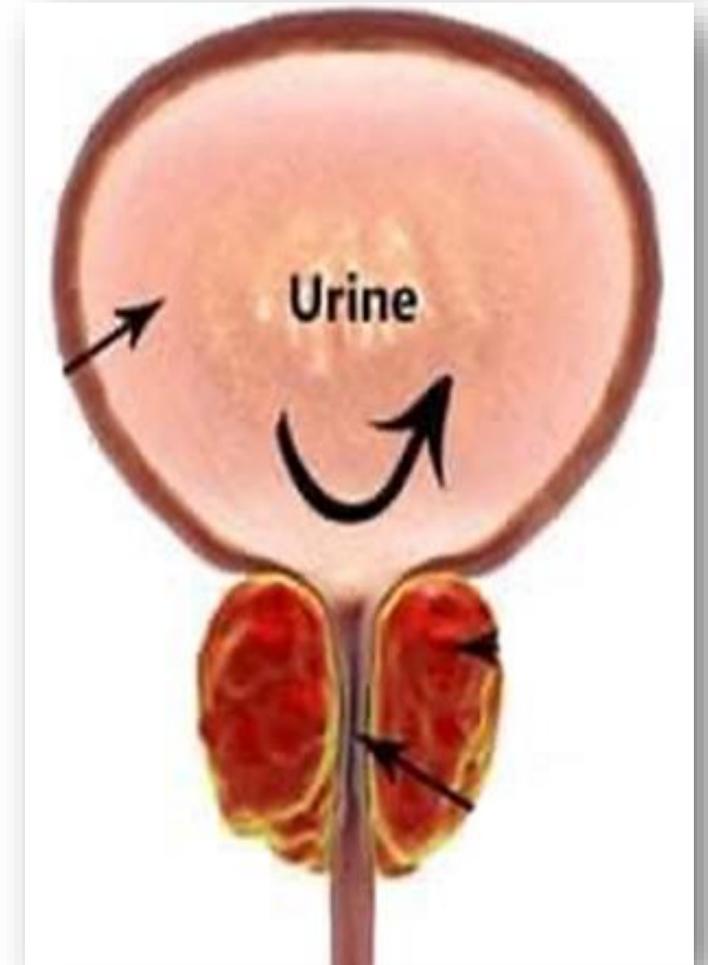
❖ **Diagnosis:** BPH

❖ **Management:**

- **Small prostate or PSA <1.5:**  $\alpha$  blocker
- **Large prostate or PSA >1.5:** 5- $\alpha$  reductase
- **Severe symptoms or failure of monotherapy:** combination therapy ( $\alpha$  blocker & 5- $\alpha$  reductase)

❖ **Mention 5 Indications for surgery**

1. Failure of medical treatment
2. Recurrent UTI
3. Refractory urinary retention
4. Recurrent gross hematuria
5. Bladder stones





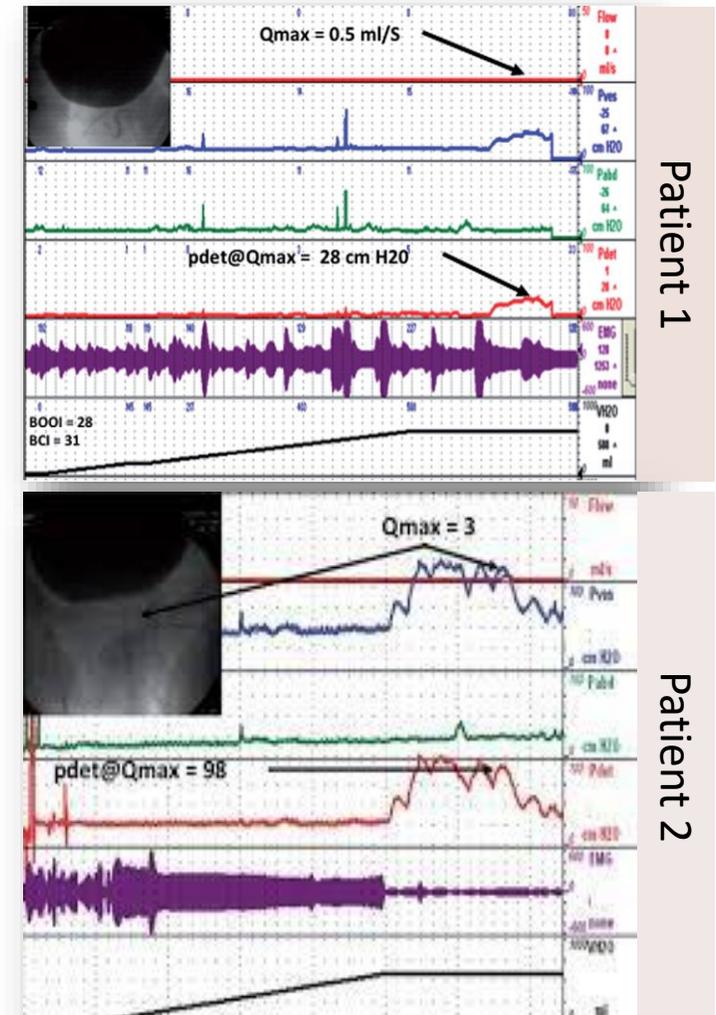
# Urodynamic study for 2 patients with urine incontinence

## 1. Mechanism of prostatic enlargement causing bladder outlet obstruction

- A combination of hormonal factors, stem cell proliferation and genetic susceptibility → glandular and stromal hyperplasia in the transition zone → formation of smooth, elastic, firm hyperplastic nodule → slit-like prostatic urethral compression → bladder outlet obstruction → obstructive symptoms of BPH

## 2. Mention 4 indications of surgery in BPH

1. Failure of medical treatment
2. Recurrent UTI
3. Refractory urinary retention
4. Recurrent gross hematuria





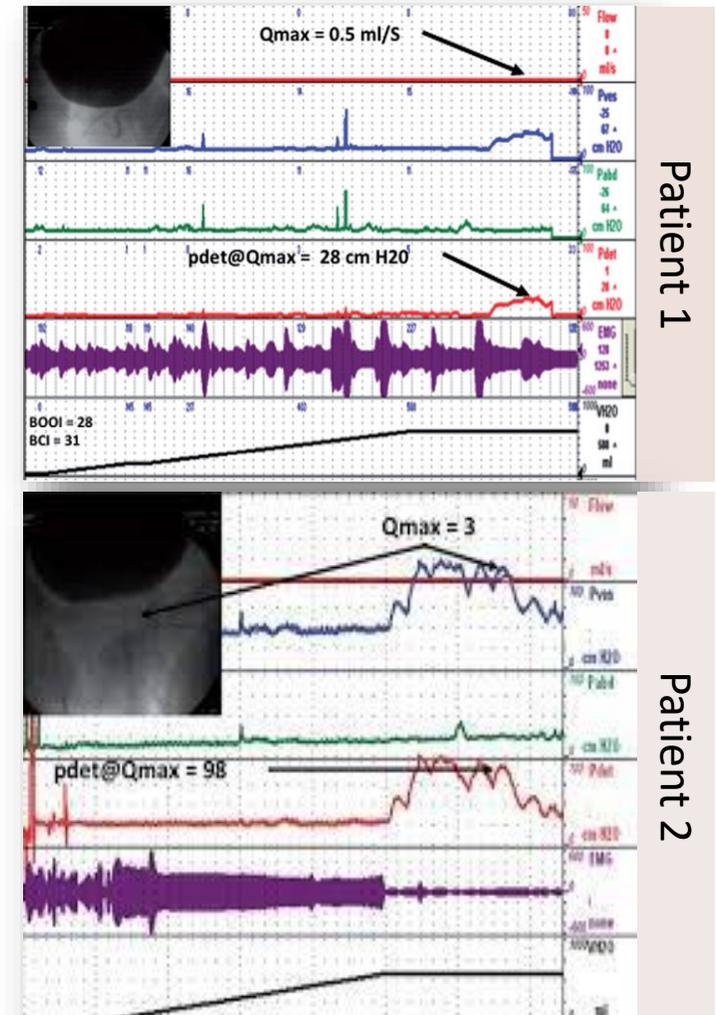
# Urodynamic study for 2 patients with urine incontinence

3. Which one have bladder underactivity ?

○ Patient 1

4. Which patient would have better response for medication ?

○ Patient 2





# Indication of surgery in BPH

سنوات (5)

## ❖ Mention 4 indication of surgery in BPH

1. Failure of medical treatment
2. Recurrent UTI
3. Refractory urinary retention
4. Recurrent gross hematuria
5. Bladder stones
6. Large bladder diverticula
7. Hydronephrosis
8. Renal insufficiency

سنوات (3)

## ❖ Mention 4 indication for TURP

1. Failure of medical treatment
2. Recurrent UTI
3. Refractory urinary retention
4. Recurrent gross hematuria
5. Bladder stones
6. Large bladder diverticula
7. Hydronephrosis
8. Renal insufficiency

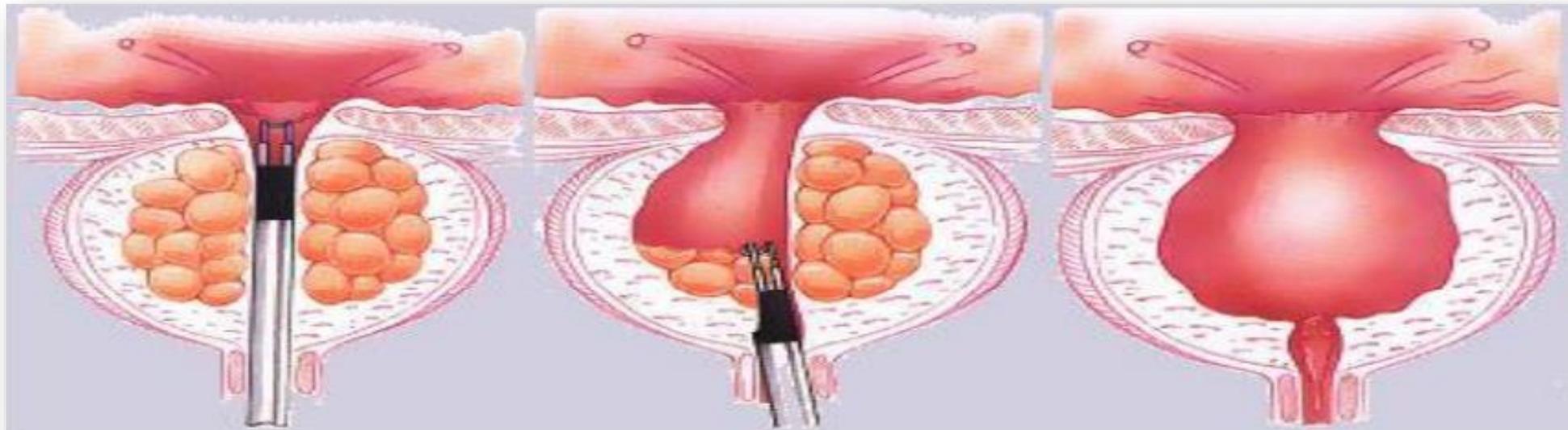
# TURP

## ❖ What is the name of this procedure ?

- Transurethral resection of the prostate (TURP)

## ❖ What are the complications of this procedure ?

1. Retrograde ejaculation (majority)
2. Impotence
3. Incontinence (especially men with storage symptoms)
4. TUR syndrome
5. Urethral stricture
6. Bleeding



# BPH

## ❖ Mention 3 symptoms of BPH

- Frequency, Urgency, Hesitancy

## ❖ What is the most used medical agent to treat BPH ?

- Finasteride

## ❖ What is the most specific surgery to treat BPH ?

- TURPT

## ❖ Mention 5 treatment options for BPH

- Medical
- TURP
- Open simple prostatectomy
- Transurethral incision of the prostate
- Laser treatment

# Transurethral Resection Syndrome (TUR)

## ❖ Etiology:

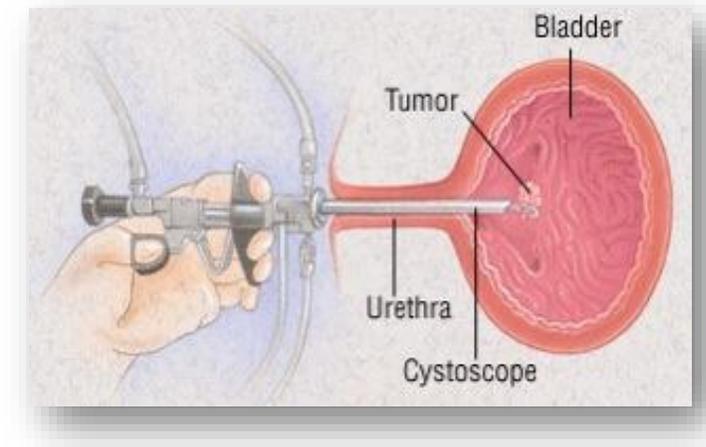
- Arise from the infusion of a large volume of hypotonic irrigating solution into the circulation during endoscopic procedures (TURP, TURBT, PCNL)
- Most commonly after prolonged TURP of large prostate

## ❖ Irrigation fluid: glycine + water

## ❖ During TURP this fluid enter the circulation leading to dilutional hyponatremia (Hypervolemia, Hyponatremia)

## ❖ Signs and symptoms

- Confusion
- Bradycardia
- Nausea and vomiting
- Seizures
- Hypertension due to fluid overload
- Visual disturbances (flashing light), in case of spinal anesthesia (TURP due to glycine inhibitory neurotransmitter which affects on retina)



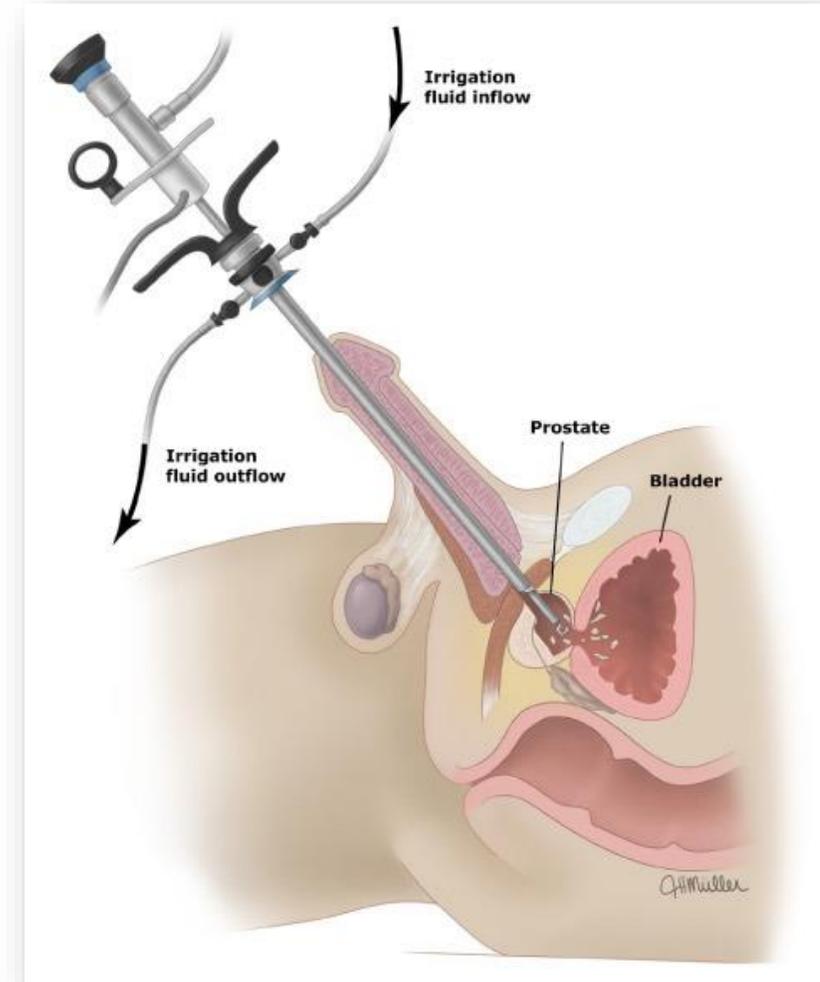
# Transurethral Resection Syndrome (TUR)

## ❖ Prevention:

- Use a continuous irrigating cystoscope, limit resection time and avoid aggressive resection near the capsule
- For prolonged procedures, where greater degree of fluid may occur, measure serum  $\text{Na}^+$  → give 20-40mg IV furosemide

## ❖ Treatment:

- If  $\text{Na}^+$  comes back normal → you'll have done little harm by giving furosemide
- If it comes back  $\text{Na}^+ < 125 \text{ mmol/L}$  → need more treatment and intervention to prevent development of severe TUR syndrome





# Indications of open surgery in BPH

1. Large prostate (>60 g)
  2. Long urethra
  3. Urethral stricture
  4. Concomitant inguinal hernia
  5. Concomitant bladder stones or bladder diverticula
  6. Inability to be positioned for transurethral surgery
  7. Intraoperative bleeding during TURP **obscuring vision**
- Excellent outcomes in terms of improvement of symptoms, but higher morbidity rate, associated with risk of significant blood loss

# Minimally invasive procedures

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1. Laser therapy
2. Transurethral electro-vaporization of the prostate
3. Transurethral needle ablation of the prostate
4. high-intensity focused ultrasound
5. Intra-urethral stents (unco-operative patient)
6. Transurethral balloon dilation of the prostate



# Prostatic cancer

# Prostatic cancer

- ❖ **Risk factors:** Age (>65), Africans, Family history, High fat diet, Familial Ca prostate gene
- ❖ **Histopathology:** Adenocarcinoma of the posterior zone
- ❖ **Symptoms:** Storage symptoms, voiding symptoms, back pain (due to incontinence), bone pain (mets), Leg pain and edema (nodal mets)
- ❖ **Best screening tests:** PSA + DRE
- ❖ **Most common site for metastasis in Prostatic CA is bone → sclerotic lesion**
- ❖ **Gleason's system:**
  - Primary grade - assigned to the dominant pattern of the tumor (has to be greater than 50% of the total pattern seen)
  - Secondary grade - assigned to the next-most frequent pattern (has to be less than 50%, but at least 5%, of the pattern of the total cancer observed)

# Treatment protocol of prostate cancer

- ❖ If life expectancy <10%, Watchful waiting
- ❖ If life expectancy > 10%, asses the risk
  - **Low risk:** Active surveillance, PSA and biopsy every 6 months - 1 year
  - **Intermediate risk:**
    - **Without metastasis:** Radical prostatectomy
    - **With metastasis:** Short course ADT (androgen deprivation therapy) then radiotherapy
  - **High risk:**
    - **Localized:** Radical prostatectomy + EBT (extrabeam radiotherapy)
    - **Locally advanced:** Neoadjuvant hormonal + EBT
    - **Metastasis:** Hormonal therapy (LHRH agonist injection every 1-3 months or surgical castration (bilateral orchiectomy))

# Preferred first-line options – Matching

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- ❖ **Patient with localized prostate cancer:** Radical prostatectomy
- ❖ **Patient with metastatic prostatic cancer:** Hormonal therapy; molecular therapy
- ❖ **Patient with advanced prostatic adenocarcinoma and bony metastasis:** Hormonal therapy; molecular therapy



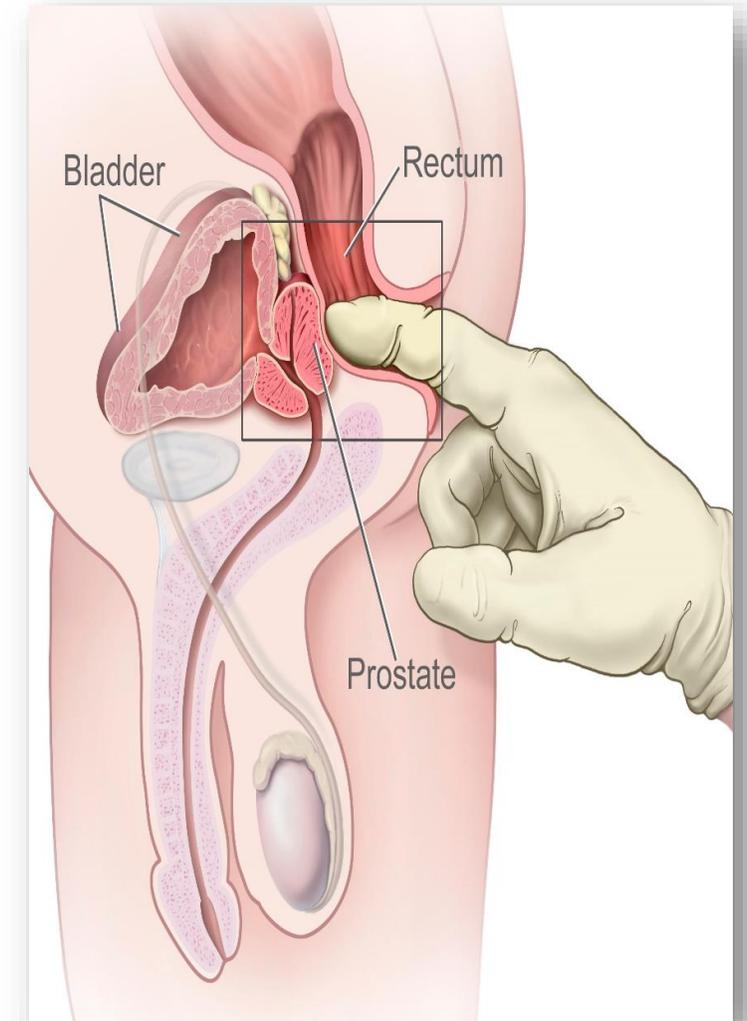
# Prostate cancer

## ❖ Name of this examination

- Digital rectal examination

## ❖ Features suggestive of prostate cancer

1. Localized indurated nodules on an otherwise smooth surface
2. Prostatomegaly
3. Lobar asymmetry
4. Obliteration of the sulcus
5. Hard nontender nodules





# Prostate cancer

## ❖ Spot diagnosis

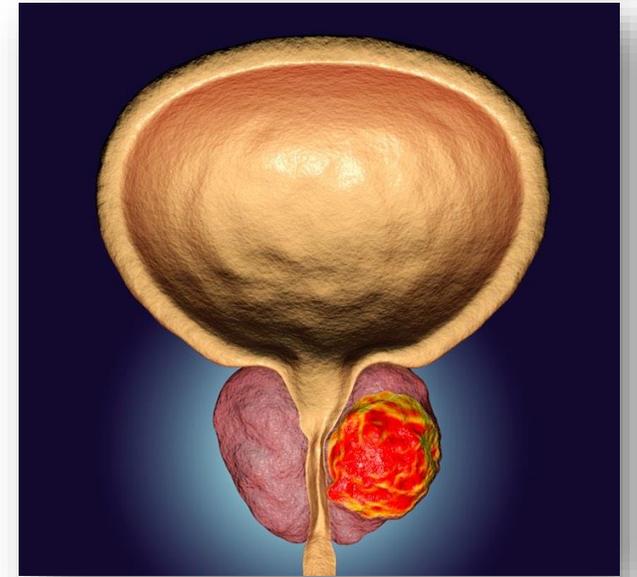
- Prostate cancer

## ❖ Mention 4 findings in digital rectal examination

1. Prostatomegaly
2. Lobar asymmetry
3. Obliteration of the middle sulcus
4. Hard nontender nodules
5. Localized indurated nodules on an otherwise smooth surface

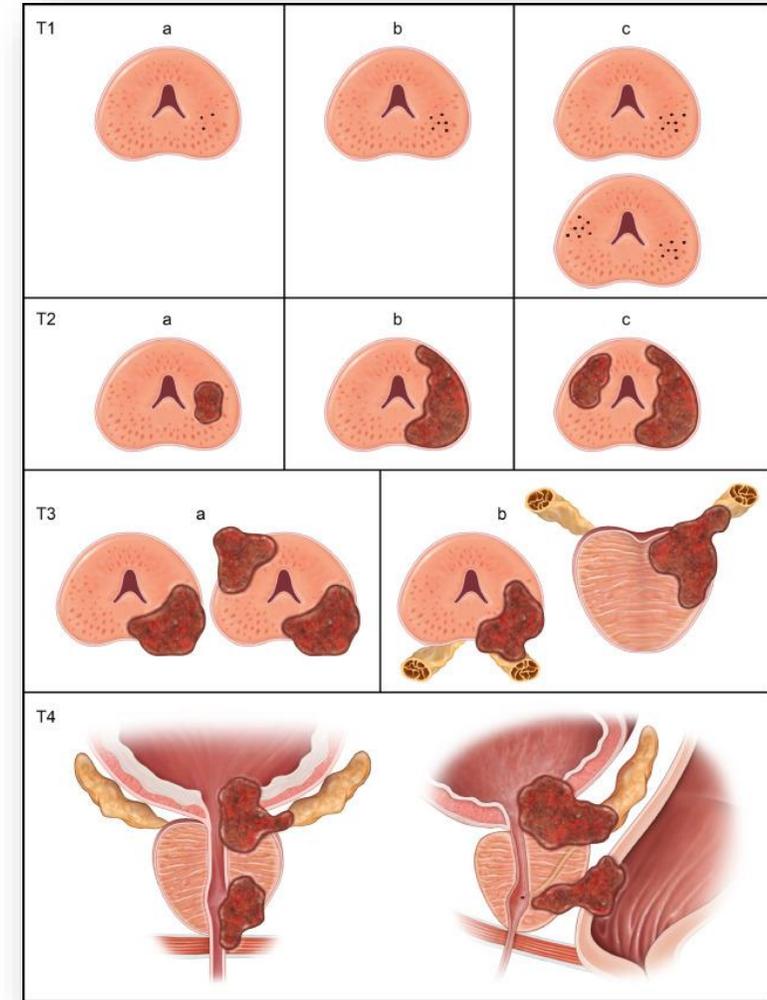
## ❖ Mention 3 symptoms of TUR syndrome

- Nausea and vomiting, seizures, confusion, hypertension, bradycardia, visual disturbances



# T staging of prostatic cancer

- ❖ **TX:** cannot evaluate the primary tumor
- ❖ **T0:** no evidence of tumor
- ❖ **T1:** clinically undetectable tumor, normal DRE and TRUS
  - **T1a:** tumor was incidentally found in less than 5% of prostate tissue resected (for other reasons)
  - **T1b:** tumor was incidentally found in greater than 5% of prostate tissue resected
  - **T1c:** tumor was found in a needle biopsy performed due to an elevated serum PSA
- ❖ **T2:** palpable, confined to prostate
  - **T2a:** the tumor is in half or less than half of one lobe of the prostate gland's
  - **T2b:** the tumor is in more than half of one lobe, but not both
  - **T2c:** the tumor is in both lobes
- ❖ **T3:** the tumor extends through the prostatic capsule (if it is only part-way through, it is still T2)
  - **T3a:** the tumor has spread through the capsule on one or both sides
  - **T3b:** the tumor has invaded one or both seminal vesicles
- ❖ **T4:** the tumor has invaded adjacent structures





# Benign scrotal swellings



# Essay – Anatomy

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## ❖ The content of the spermatic cord include the following

### ○ Three arteries:

- Testicular artery, ductus deferens artery, cremasteric artery

### ○ Three nerves:

- Genital branch of genitofemoral, cremasteric nerve, sympathetic nerve fibers

### ○ Three other structures:

- Ductus deferens, pampiniform plexus, lymphatic vessels



# Painful Scrotal Swelling

# Testicular torsion

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## ❖ Mention 5 symptoms of testicular torsion

- Testicular pain
- Swelling
- Erythema
- Vomiting
- Recurrent episodes (not sure)

## ❖ Mention 5 physical examination findings of torsion

- Erythema and swelling
- High riding testis
- Horizontal lie of the affected testis
- Absent cremasteric reflex
- Prehn's sign

# Testicular torsion

## ❖ What method of investigation is helpful in this situation?

- Color doppler ultrasound

## ❖ Mention 3 signs that you will find during physical examination

- Negative Prehn's sign, retracted testis, and absent cremasteric reflex

## ❖ What is the treatment ?

- Manual testicular detorsion in the ER for immediate pain relief or if the surgery is not immediately available
- Immediate surgical exploration of the scrotum with reduction (untwisting) of the left testis and orchidopexy of both testes
- Orchiectomy of the left testis if it is grossly necrotic or nonviable



## ❖ What happen if it was untreated ?

- Infarction and die



# Testicular torsion – Case scenario 1

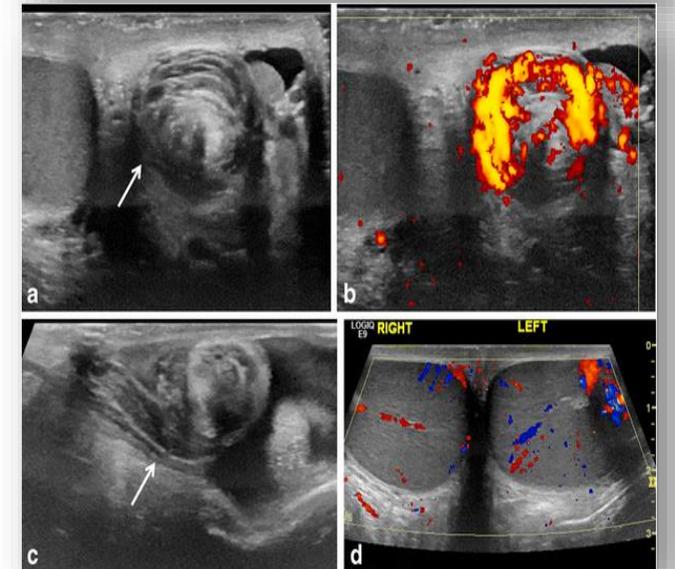
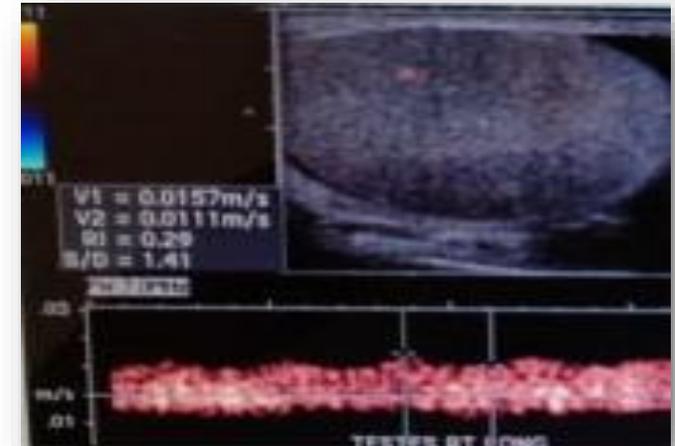
➤ 14 years old boy attend ER complaining of left sudden testicular pain with vomiting, **on doppler U/S no blood flow was identified**

## 1. What is the most likely diagnosis?

- Left testicular torsion

## 2. What is your management ?

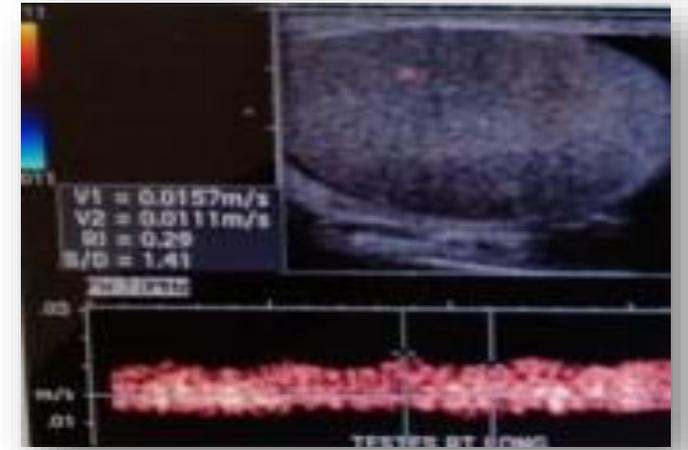
- Manual testicular detorsion in the ER for immediate pain relief or if the surgery is not immediately available
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- Orchiectomy of the left testis if it is grossly necrotic or nonviable





# Testicular torsion – Case scenario 1

➤ 14 years old boy attend ER complaining of left sudden testicular pain with vomiting, on doppler U/S no blood flow was identified



### 3. Mention 3 difference between this case and epididymitis:

○ Answer:

Testicular torsion	Epididymorchitis
Mechanical twist of the testicle	Inflammatory process
Acute onset severe pain	Gradual onset mild pain that increase with time
negative Cremasteric reflex	positive Cremasteric reflex

# Mention 5 difference between this case and epididymitis:

Testicular torsion	Epididymorchitis
Mechanical twist of the testicle	Inflammatory process
Acute onset severe pain	Gradual onset mild pain that increase with time
Afebrile	Associated with high fever, chills and rigors
w/o urinary symptoms	Associated with dysuria and frequency
Negative Prehn sign	Positive Prehn sign
Negative Cremasteric reflex	Positive Cremasteric reflex
Non-tender prostate	Tender prostate
Doppler: Decrease testicular flow	Doppler : increased testicular flow
Testicular position: elevated and more horizontal	Testicular position : normal (vertical)
Associated with nausea and vomiting due to severe pain	Not associated with nausea and vomiting

# Testicular torsion VS Epididymorchitis

	Testicular torsion	Epididymorchitis
Age	(10-30) years	(16-30) & (51-70) years
Pain	Sudden onset not affected by position	Gradual onset worse when standing
Onset	After exercise, sleep or minor trauma	Rarely after sleep
Time to presentation	< 6 hours	> 24 hours
Past episodes	Frequently >2weeks past	Only if previous infection
Severity	Peaks in hours	Peaks in days
Vomiting	Common from pain	Unusual
Fever	Up to 20%	Up to 95%
Swelling	After 12 hours	Common
Dysuria	Rare	Common
Urinanalysis	30% have wbc/bacteria, voiding complication rare	50% may be normal , voiding complication common
Physical exam	- Cremasteric reflex - Prehn sign	+ Cremasteric reflex + Prehn sign
Color Doppler	Decreased testicular flow	Increased testicular flow
Management	Antibiotics, if it fails, we do orchidectomy	Surgery (Orchidopexy or Orchidectomy)



# Testicular torsion – Case scenario 2

❖ 12 years old male patient presented to the ER complaining of 12 hours right testicular pain; emergent exploration surgery was done showing the following:

❖ **Diagnosis:**

- Necrotic right testis due to testicular torsion

❖ **Management:**

- Radical orchiectomy of the right testis
- Orchidopexy of the left testis





# Testicular torsion – Case scenario 2

## ❖ Describe what you see:

- Swollen and black, pulled up testis

## ❖ Which age affect and what's the peak age ?

- 10-30 years (peak is 13-15 years)

## ❖ Mention 3 arteries supplying the testes

- Testicular artery
- Cremasteric artery
- Artery of the ductus deferens

## ❖ What anchor the testes in its position ?

- Spermatic cord





# Painless Scrotal Swelling



# Hydrocele

## ❖ What is the name of this test ?

- Transillumination test

## ❖ What is your diagnosis ?

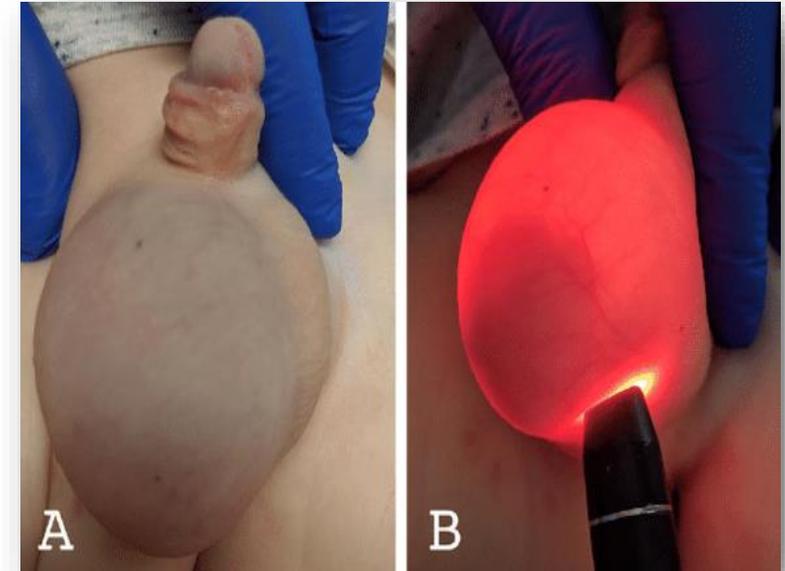
- Hydrocele

## ❖ Mention 5 differential diagnosis

- Spermatocele, Hematocele, Pyocele, Varicocele, Hernia

## ❖ Management:

- **Children:** resolve spontaneously
- **Adults:** surgical excision, if secondary treat underlying cause



# Grades of **varicocele** – Simplified

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- ❖ **Grade 0:** Subclinical Varicocele, Dx by US or venography
- ❖ **Grade 1:** Palpable with Valsalva maneuver on standing
- ❖ **Grade 2:** Easily detected without Valsalva maneuver on standing
- ❖ **Grade 3:** Detected visually at a distance



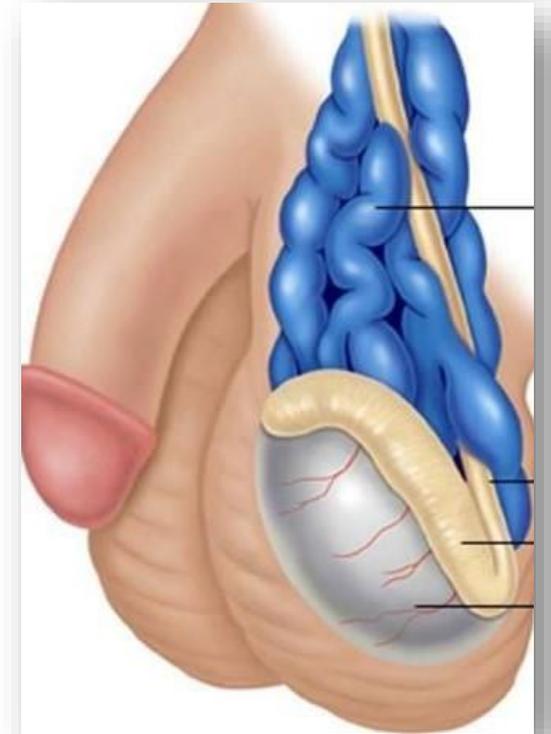
# Patient complains from palpable varicocele

## 1. Why does it occur in the left more than right?

- The longer course of the left spermatic vein and its insertion at a 90° angle into the left renal vein predisposes to slower drainage and increased hydrostatic pressure.

## 2. Which grade is this patient's varicocele ?

- Palpable → Grade 2





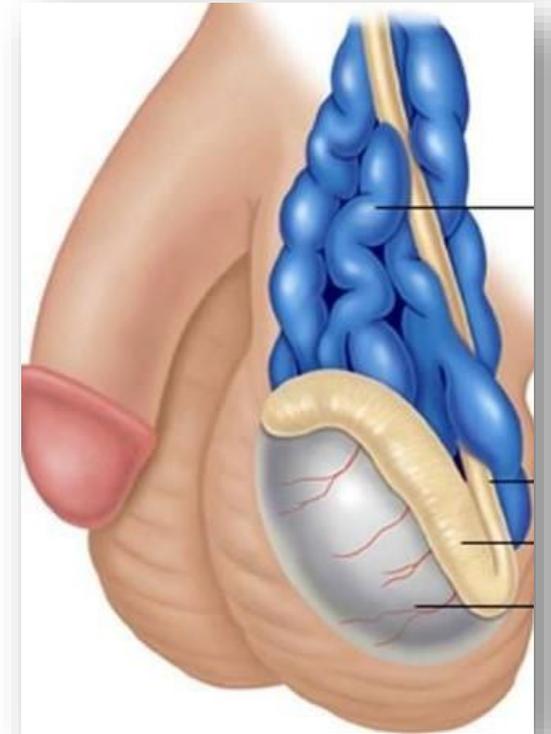
# Patient complains from palpable varicocele

## 3. How it can be assessed clinically ?

- Inspection and palpation while the patient is standing
- Ask the patient to perform Valsalva maneuver

## 4. Mention 4 indications of surgery

1. Pain
2. Fertility problems
3. Abnormal semen analysis
4. Testicular asymmetry
5. Testicular atrophy
6. Delayed growth of the affected testis in children and adolescents
7. Grade III or higher in pediatric





# Case scenario

➤ 28 years old male patient presented to the ER complaining of testicular pain, examination finding was bag of worms over the left testis

## ❖ What is your diagnosis ?

○ Varicocele

## ❖ Mention 4 indications of surgery

1. Pain
2. Fertility problems
3. Abnormal semen analysis
4. Testicular asymmetry
5. Testicular atrophy
6. Delayed growth of the affected testis in children and adolescents
7. Grade III or higher in pediatric



أكثر صورة تكررت (5 مرات)

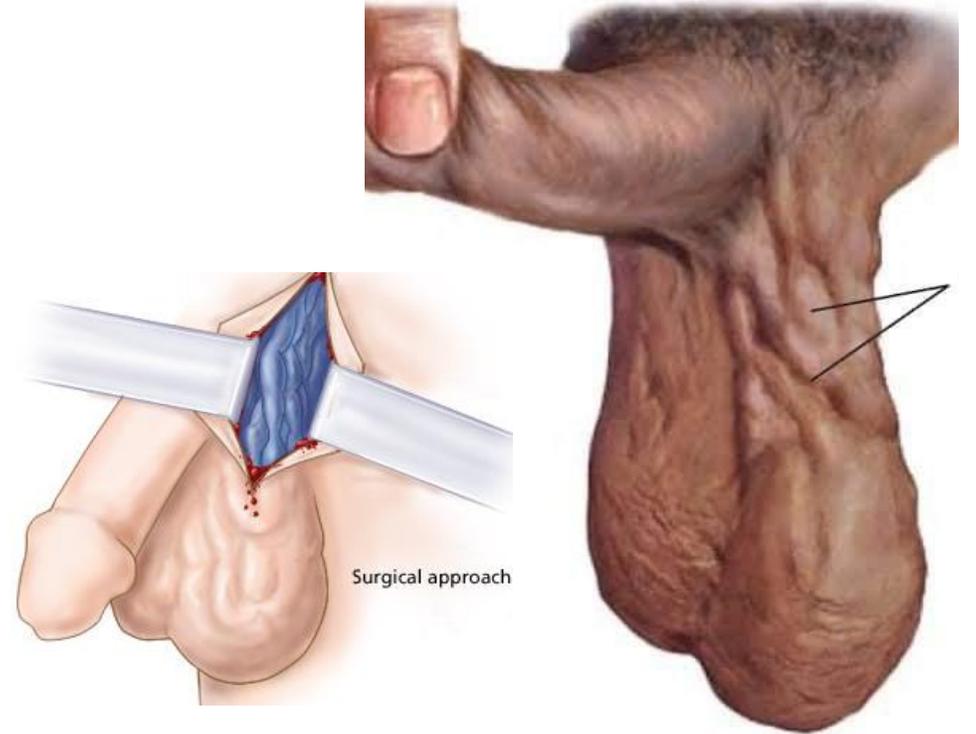
## نفس سؤال السلايد الماضي، السؤال تكرر كثير لكن بصور مختلفة

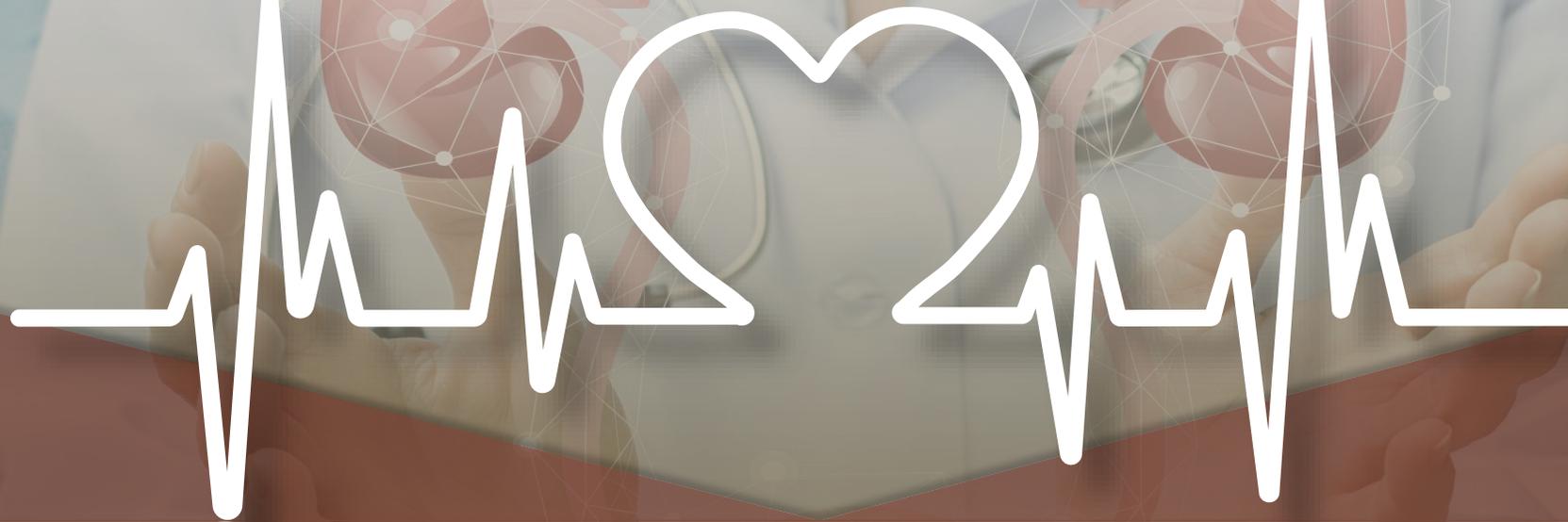
### ❖ What is your diagnosis ?

- Varicocele

### ❖ Mention 4 indications of surgery

1. Pain
2. Fertility problems
3. Abnormal semen analysis
4. Testicular asymmetry
5. Testicular atrophy
6. Delayed growth of the affected testis in children and adolescents
7. Grade III or higher in pediatric





# Testicular tumors

# Testicular tumors

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- ❖ **Risk factors:** Age (20-40), White Caucasian, Previous Testicular cancer, **Cryptorchidism**, Testicular intraepithelial neoplasia, HIV, first-degree relative with testicular cancer
- ❖ **Symptoms:** **Painless scrotal lump**, Acute scrotal pain (5%), 10% develop symptoms suggestive of advanced disease, including weight loss, lumps in the neck, chest symptoms, or bone pain
- ❖ More common on the **right**
- ❖ **Signs:** asymmetry or slight scrotal skin discoloration, hard, non-tender, irregular, non-transilluminable mass
- ❖ **Investigations:**
  - **Imaging:** Ultrasound (first-line), Abdominal and chest CT (for staging purposes)
  - **Serum tumor markers:**  $\alpha$ -fetoprotein (AFP),  $\beta$ -HCG, Lactic dehydrogenase (LDH)



# Testicular tumors – Case scenario 1

- 24 years old patient observe painless mass in right scrotal region during shower. He is a smoker for 10 years.
- ❖ **What information in the history raises the possibility of a testicular tumor?**
  - Painless mass, Age (24)
- ❖ **What is the most important investigation to confirm diagnosis ?**
  - Ultrasound, tumor markers
- ❖ **What blood tests would you like to order ?**
  - Tumor markers (AFP,  $\beta$ -HCG, LDH)
- ❖ **Treatment:**
  1. Radical inguinal orchiectomy (Dx & local control)
  2. Radiotherapy



# Testicular tumors – Case scenario 2

➤ 30 years old male patient present with painless scrotal swelling

❖ **If the tumor reach the scrotal wall what is its T stage ?**

○ T4

❖ **Define radical orchiectomy**

○ The removal of the entire spermatic cord and the testicle through an inguinal incision.

❖ **What is the most common testicular tumor ?**

○ Seminoma

❖ **What is the most common site for metastases in testicular tumor ?**

○ Para-aortic lymph nodes, lung

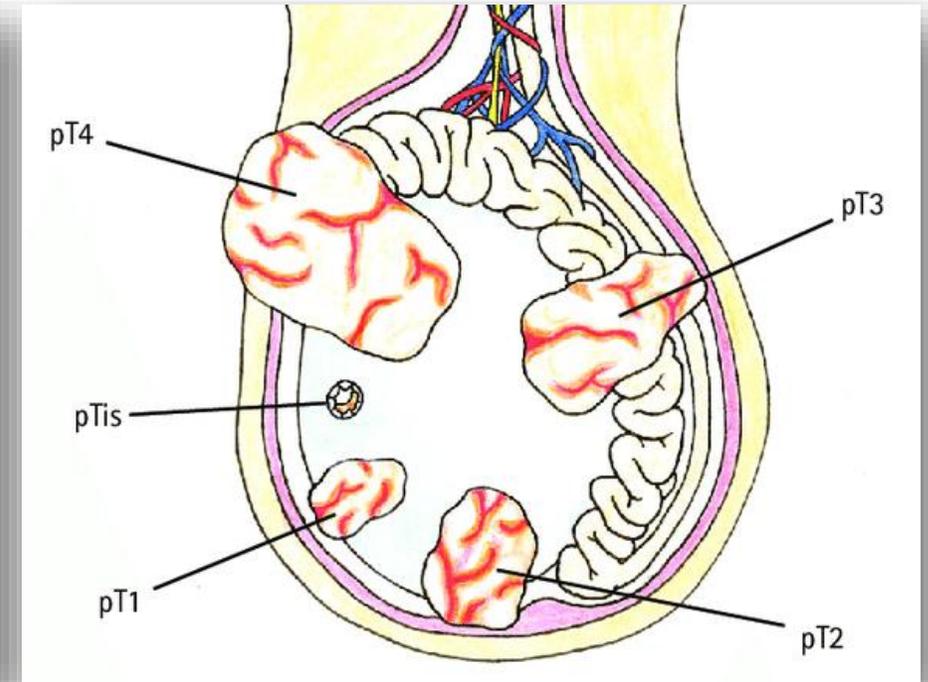
❖ The lymphatic spread of testicular cancer is mainly to Para-aortic lymph nodes

سنوات قديم

سنوات قديم

# T staging of testicular tumor

Tx	Primary tumour has not been assessed (no radical orchidectomy)
I0	No evidence of primary tumour
Tis	Intratubular germ cell neoplasia, testicular Intraepithelial neoplasia (carcinoma <i>in situ</i> )
T1	Tumour limited to testis and epididymis without vascular/lymphatic invasion; may invade tunica albuginea, but not tunica vaginalis
T2	Tumour limited to testis and epididymis with vascular/lymphatic invasion or tumour involving tunica vaginalis
T3	Tumour invades spermatic cord with or without vascular/lymphatic invasion
T4	Tumour invades scrotum with or without vascular/lymphatic invasion





# Erectile dysfunction

غير شامل للموضوع بالكامل

# Phases of erectile process

Description	Term	Phase
Cavernosal smooth muscle contracted; sinusoids empty; minimal arterial flow	Flaccid phase	0
Increased pudendal artery flow; penile elongation	Latent (filling ) phase	1
Rising intracavernosal pressure; erection forming	Tumescent phase transition	2
Increased cavernosal pressure causes penis to become fully erect	Full erection phase	3
Further increases in pressure + ischiocavernosal muscle contraction	Rigid erection phase	4
Following ejaculation, sympathetic discharge resumes; there is smooth muscle contraction and vasoconstriction; reduced arterial flow; blood is expelled from sinusoidal spaces	Detumescence phase	5



# Erectile dysfunction – Case scenario

- Patient came to you complaining of erectile dysfunction
- ❖ **Define the erectile dysfunction:** the inability to achieve and maintain an erection adequate for intercourse to the mutual satisfaction of the man and his partner.
- ❖ **What would you ask him to determine whether it's physiological or psychological dysfunction?**

**Table 2** Distinguishing erectile dysfunction that is psychogenic in origin from organic (physiological) erectile dysfunction.

Patient characteristics	Organic (physiological) erectile dysfunction	Psychogenic erectile dysfunction
Age	40 years and above	<40 years
Onset of symptoms	Gradual (except trauma and pelvic surgery)	Acute
Circumstances	Global	Situational
Symptom course	Consistent or progressive	Intermittent
Morning erections	Poor or absent	Normal
Desire	Normal	Decreased
Comorbid conditions that could cause or contribute to sexual dysfunction	Present	Absent, variable
Relationship problems	Started after onset of symptoms	At onset of symptoms
Anxiety	Started after onset of symptoms	Primary (never experienced normal erections)

# Essay

سنوات  
قديم (1)

## ❖ Mechanism of action of sildenafil (Viagra) in the treatment of erectile dysfunction:

- PDE inhibitor and increases the cGMP that promotes and sustains smooth muscle relaxation and increased blood flow

سنوات  
قديم (1)

## ❖ Psychogenic Causes of erectile dysfunction:

- Anxiety, Depression, Fatigue, Guilt, Stress, Marital Discord, Excessive alcohol consumption

سنوات (1)

## ❖ Mention 5 lines of treatment

- Penile prosthesis
- Phosphodiesterase type-5 (PDE5) inhibitors
- Dopamine receptor agonist
- Intracavernosal injection therapy
- Testosterone replacement therapy

# Peyronie Disease

- ❖ **Definition:** fibroproliferative disorder that affects the tunica albuginea of the penis, causing abnormal curvature of the penis
- ❖ **Pathophysiology:** repeated penile microtrauma during sexual intercourse or athletic activity followed by abnormal wound healing → fibrous plaque formation
- ❖ **Classification:**
  - **Active phase:** progressive penile deformity and painful erection
  - **Stable phase:** lack of progression of penile deformity and pain
- ❖ **Clinical presentation:** Penile pain, Penile nodules, erectile dysfunction
- ❖ **Treatment:**
  - **Active phase:** Oral NSAIDs, or oral pentoxifylline
  - **Stable phase:** Intralesional collagenase injections, Surgical repair



“It’s kind of thing once you seen a picture of it, it is not easy to forget”  
Dr. Jason Ryan (BnB)



# Male infertility

غير شامل شرح للموضوع فقط أسئلة سنوات



# Essay

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- ❖ **Define infertility:** failure of conception after at least 12 months of unprotected intercourse
- ❖ **Mention 3 local causes of infertility**
  - Cryptorchidism, Varicocele, Testicular injury
- ❖ **Mention 3 systemic causes of infertility**
  - Renal failure, Liver cirrhosis, cystic fibrosis
- ❖ **Mention 3 environmental causes of infertility**
  - Pesticides, heavy metals, hot baths

# Sperm parameters

Collected after 2-7 days of sexual abstinence

Parameter	Lower limit reference
Sperm volume	1.5ml
PH	=> 7.2
Total sperm count	39x10 <sup>6</sup> per ejaculate
Sperm concentration	15x10 <sup>6</sup> per ml
Motility	40% progressive + non progressive 32% progressive motility
Morphology	4% Normal forms
Vitality	58% live spermatozoa
Time to liquefy	5-25 minutes
WBCs	< 1x10 <sup>6</sup> per ml
MAR test(for anti-sperm antibodies)	<50% motile spermatozoa with bound particles

# Sperm parameters

## ❖ What is your diagnosis ?

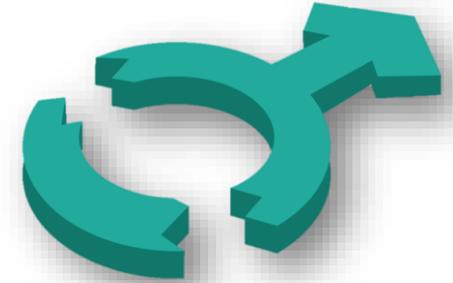
- Normal study

Variable	Cut-off value
Sperm volume	>1.5ml
Sperm concentration	>15 million / ml
Total sperm count	>39 million
Sperm progressive motility (A + B)	>32%
Sperm morphology	>4%
Sperm DNA fragmentation	<30%
Non-sperm cells	<1 million / ml

# Azoospermia

➤ Patient present with primary azoospermia

❖ Define primary azoospermia:



❖ Mention the causes of azoospermia:

- **Pretesticular** (ex. Hypopituitarism, hyperprolactinemia, chemotherapy)
- **Testicular** (ex. Klinefelter's syndrome, cryptorchidism, orchitis, surgery, radiation)
- **Post-testicular** (ex. Vasectomy, cystic fibrosis, ejaculatory duct obstruction)

❖ Blood test you would like to order:

- FSH, LH, Testosterone and prolactin

The background features a hypnotic pattern of concentric circles in shades of red and black. In the center, there is a circular emblem with intricate, dark, swirling patterns, possibly representing a stylized face or a complex symbol.

*“That’s all Folks!”*