



Common urinary tract disorders & Renal stones, renal colic, UTI

Objectives:

- Discuss the pathogenesis and epidemiology of renal stones, renal colic and UTI (K/C)
- Recognize the presentation and the symptoms of renal stones, renal colic and UTI (K/C)
- Discuss how to evaluate renal stones, renal colic and UTI (K/C)
- Discuss the treatment options for renal stones, renal colic and UTI (K/C)
- Discuss the types of lower urinary tract symptoms (LUTS) (K/C)
- Discuss benign prostatic hyperplasia (BPH) (K/C)
- Discuss urinary tract infection (UTI) (K/C)
- Discuss bladder dysfunction and Incontinence (K/C)

Color index:

Main Text

Males slides

Females slides

Past notes

442 notes

Textbook

Important

Golden notes

Extra

Editing file

Urologic disorders

01 Urinary tract infections

02 Urolithiasis

03 Benign prostatic hyperplasia and voiding dysfunction

04 Scrotal disorders

Urinary tract symptoms:

★ Storage and voiding symptoms are so important

- Lower urinary tract symptoms either:

symptoms happen when you are filling the bladder. it should fill with relaxation and compliance that change with pressure and volume.

storage



voiding

happen when passing urine

Pain

although characteristic, isn't usually easily localized.

Renal pain: occurs between 12th rib and sacrospinalis muscle.

Ureteric pain (colic): radiates forwards and downwards toward the groin, testes or labia.

Acute bladder pain: is usually located centrally at lower abdomen.

Bladder and prostate diseases cause **perineal** or **penile pain**

Storage (irritative)

Frequency: may be caused by an actual decrease in the capacity of the bladder or by a decrease in the functional capacity of the bladder

Urgency: a sudden uncontrollable desire to void (storage problem).

incontinence: passage of urine occurs without warning and without any precipitating factors. Urge incontinence is associated with urgency and is seen in acute inflammatory conditions, patients with upper motor neuron injuries and in individuals with an overactive bladder.

Nocturia: night-time frequency may be a result of renal disorders leading to a decrease in the concentrating ability of the kidney, or due to excessive intake of fluids, caffeine or alcohol before bedtime.

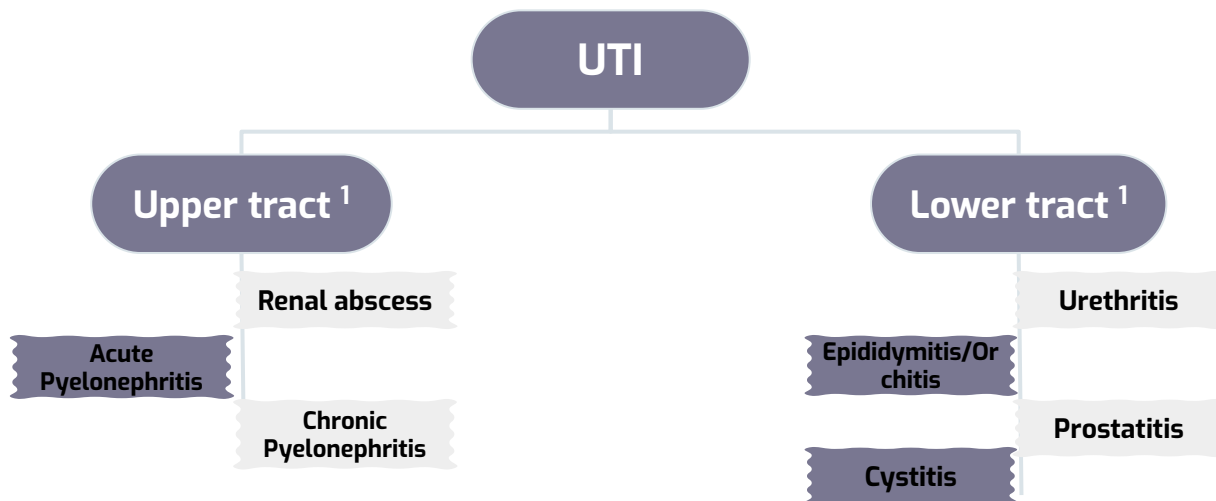
Voiding (obstructive)

Hesitancy: poor stream (delay in starting the stream) and dribbling (obstruction symptoms).

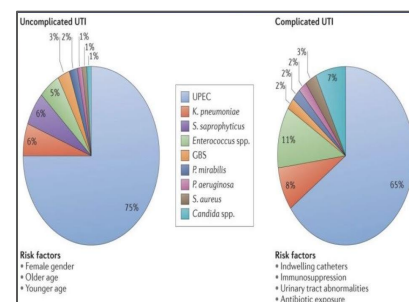
Weak stream: poor stream, they have to strain and increase pressure.

Oliguria: decreased urinary output.

anuria: complete absence of urine output

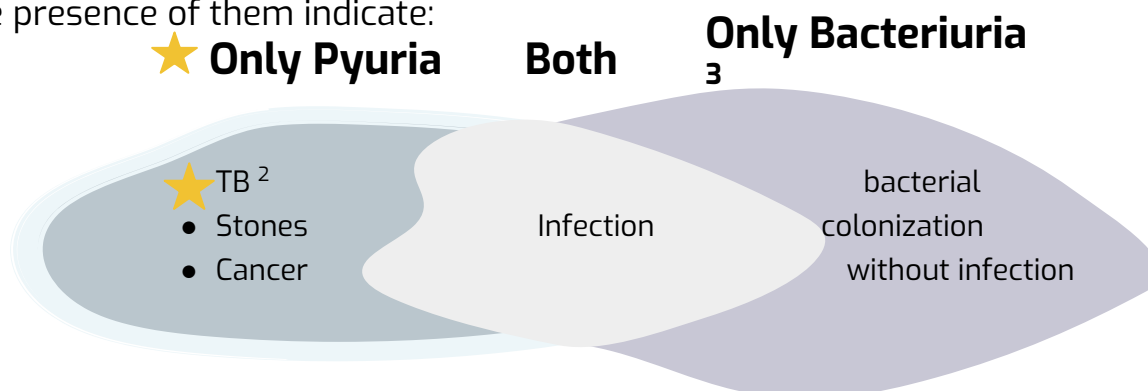


- (UTIs) are severe public health problems.
- Most common: **KEEPS**
 - **K**lebsiella. (3rd leading cause)
 - **G**ram -ve Bacteria (**E**scherichia coli). (The most common cause)
 - **E**nterococcus faecalis.
 - **P**seudomonas aeruginosa
 - Gram +ve Bacteria (**S**taphylococcus Saprophyticus) (2nd leading cause)
- Increasing problems due to:
 - High recurrence rates.
 - ↑ Antimicrobial resistance



	Definition
Bacteriuria	The presence of bacteria in the urine, can be Symptomatic or Asymptomatic.
Pyuria	<ul style="list-style-type: none"> • Presence of white blood cells (pus cells) in the urine. • not only signify infection, also it can mean only inflammation.

- The presence of them indicate:

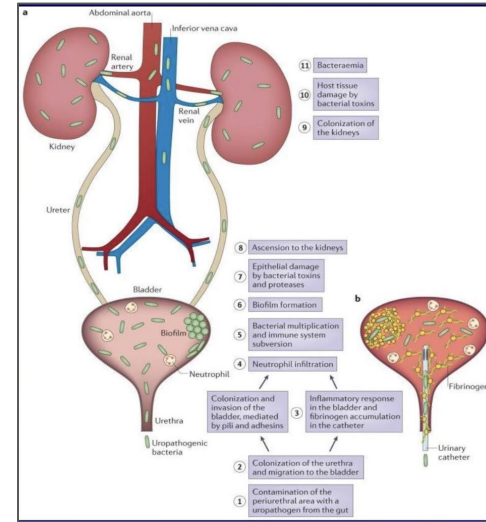


1. Upper tract infections are usually more severe.
 2. TB is then most common (but nowadays due to proper treatment TB in general decreased so keep in mind stones & cancer).
 What is the most common cause of sterile pyuria? TB
 3. You don't have to treat bacteriuria without pyuria because you'll get bacterial resistance

Routes of urinary tract infections

★ Important in exams

- **Ascending Route** (most common) Especially in females because the shorter urethra allows GI pathogens to ascend to the urinary system much easily. And if left untreated it causes upper UTI.
- **Hematogenous Route** (uncommon) (Descending Route)
 - Staph bacteremia (oral sites/candida fungemia) Dental issues and dental infections → disseminate into the bloodstream → renal abscesses.
- **Lymphatic Route** (Rare). (Descending Route)
 - Bowel obstruction inflammation.
 - **Fistula** between the bowel and the female genital tract can also cause UTI.
- Catheterized patients are at increased risk of infection.
- UTI's are also common after urological or gynaecological operations.



Types of urinary tract infections:

Uncomplicated UTI ¹

VS

Complicated UTI ²

- Treated by GP
- Healthy patient (healthy young not pregnant and premenopausal women)
- No anatomic or neurological genitourinary abnormality

- Ureteric obstruction (stone, stricture)
- Urinary retention
- Decreased immune system (renal failure, transplant)
- Foreign body (catheter) or stent
- Male or patient > 65 years
- patients with spinal cord injury (they are prone to develop UTI).³
- Reflux in congenital anomalies
- Pregnant ⁴ and postmenopause ⁵ women

1. Infection in women without further risk factors for infections.
 2. Infection in patients with risk factors for infection
 3. Due to neurogenic bladder, stones and vesicoureteral reflux
 4. Hormonal changes during pregnancy → urinary stasis and vesicoureteral reflux → increased risk of UTIs
 5. Postmenopause: ↓ estrogen → ↓ vaginal lactobacilli (normal protective vaginal flora) → ↑ vaginal pH → ↑ colonization by E. coli

Voiding Dysfunction

- What controls renal continence in males is: the sphincter (mainly) and the neck of the bladder (partially)
- In females: the sphincter mainly
- The lower urinary tract is innervated by 3 sets of peripheral nerves involving the parasympathetic, sympathetic, and somatic nervous systems:

Pelvic parasympathetic nerves

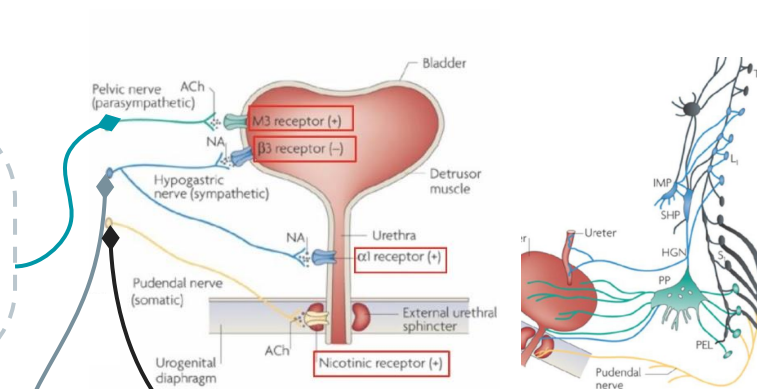
- excite the bladder, and relax the urethra
- Motor (contraction) to the detrusor muscle (M3 receptor) has an agonistic effect.
- Inhibitory (relaxation) to the internal urethral sphincter.

Hypogastric sympathetic nerve

- inhibit the bladder body and excite the bladder base and urethra.
- Inhibitory (relaxation) to the detrusor muscle (β_3 receptor) has antagonistic effect on the detrusor muscle.
- Motor (contraction) to the internal urethral sphincter (α_1 receptor)
- α blocker relax that muscle

Pudendal nerve

- excite the external urethral sphincter.



Lower urinary tract symptoms (LUTS):

STORAGE (irritative)

- Dysuria
- Frequency
- Nocturia
- Urgency
- Incontinence:
 - Urge incontinence¹
 - Stress incontinence²
 - Overflow incontinence³
 - Functional (total) incontinence⁴
 - Mixed incontinence⁵
 - Reflex (spastic bladder) incontinence⁶

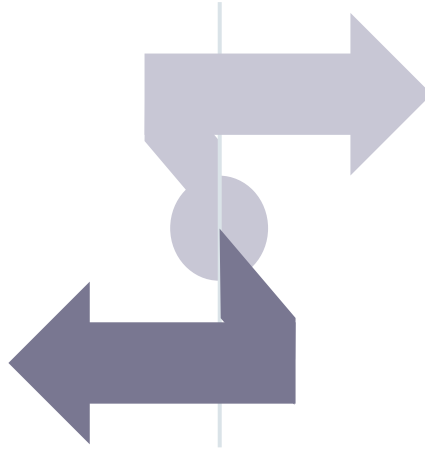
VOIDING (obstructive)

- Hesitancy
- Weak stream
- Straining
- Intermittency
- Dripping
- Retention

1. Involuntary leakage accompanied by or immediately preceded by urgency.
2. Urine leakage associated with increased intra-abdominal pressure from laughing, sneezing, coughing, climbing stairs, or other physical stressors on the abdominal cavity and, thus, the bladder.
3. Occurs when the bladder is overdistended and reaches its limit of compliance. At this point, the intravesical pressure exceeds the resting urethral closure pressure and urine overflows despite the absence of detrusor contraction. Patients experience a sense of incomplete emptying, slow-flowing urine, and urinary dribbling.
4. Inability to hold urine due to reasons other than neuro-urolologic and lower urinary tract dysfunction (eg, delirium, psychiatric disorders, urinary infection, impaired mobility).
5. A combination of stress and urge incontinence, marked by involuntary leakage associated with urgency and also with exertion, effort, sneezing, or coughing
6. Happens when the bladder fills with urine and an involuntary reflex causes it to contract in an effort to empty

Failure to store

- **Bladder problems:**
 - overactivity¹
 - Hypersensitivity
- **Outlet problem:**
 - Stress incontinence²
 - Sphincter deficiency
- **combination**



Failure to void

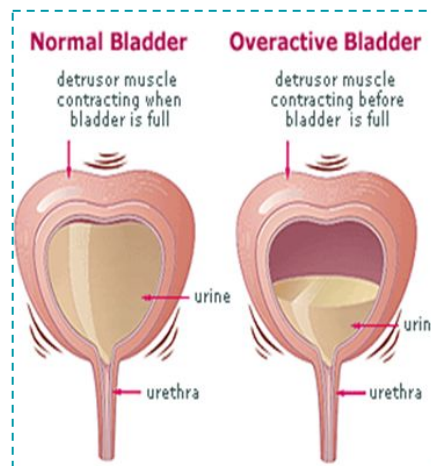
- **Bladder problems:**
 - Neurologic
 - Myogenic
 - idiopathic
- **Outlet problem:**
 - BPH
 - Urethral stricture
 - Sphincter dyssynergia
- **combination**

Overactive bladder:



Diagnosis:

- **History:** If started days ago suspect infection, Make sure the patient is not diabetic, if diabetic ask if controlled or not, there is no dysuria because it's usually with infection
- **Physical exam:** make sure no signs of infection, fever and sepsis .
- **Urine analysis**
- **Culture/ sensitivity test :** to differentiate between overactive bladder and infection
- **Ultrasound (confirmatory):** to check the kidney, check the bladder capacity and if the bladder empty properly, assess by (PVR)post void residual.



- ★ Present with frequency, urgency, incontinence and nocturia. Bladder is sensitise even if there is low volume they feel the urge to go right now.



Treatment:

- **Behavioral:** smoking cessation³, reduce the consumption of stimulants (coffee & tea) and if there is nocturia advise the patient to urinate 2 hours before going to bed , exercise
- **Pelvic floor exercise:** strengthening the muscles.
- **Anticholinergics**⁴
- **beta-3 agonist**⁵

1. Detrusor muscle contract before the bladder is full.

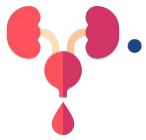
2. Due to increased abdominal pressure under stress for example, during pregnancy.

3. Nicotine can irritate the bladder muscle and potentially cause and involuntary bladder contraction.

4. Are group of substances that blocks the action of acetylcholine → inhibit the parasympathetic nervous system.

5. Causes relaxation of the detrusor muscle of the urinary bladder.

Incontinence



Incontinence is defined as the involuntary leakage of urine.

It may be due to problems in:

continual incontinence with fistulae.

01



02

Storage resulting in:
1-urge 2-stress incontinence
3-mixed(urge+stress)

03

Emptying, resulting in chronic retention with overflow incontinence.

Incontinence can result from **structural or neurogenic causes**



Structural causes:

In males

- 1- Postprostatectomy, any inadvertent damage to the external sphincter can lead to difficulties with continence. Stress incontinence may occur.
- 2- Chronic outflow obstruction, lead to secondary urgency and detrusor overactivity.
- 3- Prostate cancer may involve the external sphincter, preventing it from closing.
- 4- Postmicturition dribble incontinence, caused by a small amount of urine becoming trapped in the 'U-bend' of the bulbar urethra.
- 5- Chronic illness and debility, incontinence may arise from poor tone in the periurethral striated muscle of the pelvic floor and from difficulty in getting to the toilet.

In females

- 1- Childbirth and operations, Multiparous women commonly lose some of the tone in the pelvic floor muscles with each pregnancy, (stress incontinence to almost continual dribbling incontinence.).
- 2- Cystitis.
- 3- Ectopic ureter, Dribbling incontinence in a child should raise the suspicion of an ectopic ureter.
- 4- Cervical cancer.



Neurogenic causes:

- 1- Impaired cortical control
- 2- Emotional state
- 3- Drugs (including alcohol, may alter cortical control of micturition.)
- 4- Damage to the spinal cord

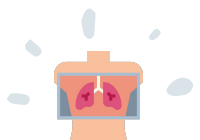
UTI

Urethritis



Signs and symptoms

- Asymptomatic (usually asymptomatic in females).
- Burning on urination.
- Urethral discharge **most common** (especially in young sexually active men. And you have to determine whether this urethral discharge is caused by a gonococcal or a non-gonococcal infection).



★ Diagnosis

- By history Incubation period:
 - ★ Gonococcal (3-10 days) comes with purulent white discharge
 - ★ Nongonococcal (1-5 weeks) comes with scant greenish discharge
- Urethral swab (confirmatory)
- Serum: Chlamydia specific ribosomal RNA (confirmatory)



Treatment

	Gonorrhea	Chlamydia
Organism	<i>Neisseria gonorrhoeae</i>	<i>Chlamydia trachomatis</i>
Organism type	Gram-negative diplococci	Intracellular facultative anaerobe
Incubation period	3-10 days	1-5 wk
Urethral discharge	Usually profuse, purulent	Usually scant
Asymptomatic carriers	40%-60%	40%-60%
Diagnostic test	Ligand chain reaction	Polymerase chain reaction
Other tests	Gram stain	Culture
Recommended treatment	Ceftriaxone 125 mg IM once plus Azithromycin 1 g PO or Doxycycline 100 mg PO bid × 7 days	Immunosassay Azithromycin 1g PO or Doxycycline 100 mg PO bid × 7 days
Alternative treatment	Cefixime 400 mg PO or Ciprofloxacin 500 mg PO or Ofloxacin 400 mg PO plus Azithromycin 1 g PO or Doxycycline 100 mg PO bid × 7 days	Erythromycin 500 mg PO qid 7 days or Erythromycin ethylsuccinate 800 mg PO qid × 7 days or Ofloxacin 300 mg PO bid × 7 days

Doctor said you don't have to memorize it but know that:

- Gonococcal usually has incubation period 3-10 days after unprotected intercourse, while in case of chlamydia up to more than a month
- Do a swab and culture to avoid antibiotic resistance

The treatment empirically:

(Therapy begun on the absence of complete or perfect information)

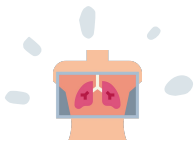
- 1g IM ceftriaxone
- 1 dose azithromycin orally

Epididymitis



Signs and symptoms

- **Acute:** Pain, swelling of epididymis (< 6 weeks)
- **Chronic:** Long-standing pain in the epididymis and testicle. Usually no swelling (>6 weeks)
- If you don't treat urethritis (e.g. an elderly with a Foley catheter) it will lead to ascending infection of testes (orchitis) and epididymitis = epididymo orchitis
- Usually will have inflammation of both testis and epididymis



Diagnosis

- **By physical examination:** you should be able to differentiate **Epididymitis** Vs. **Torsion**
 - **Testicular torsion** pain is severe and happens suddenly, because there's no enough blood supply to the testis → ischemic pain
 - In **epididymitis** the blood flow is high due to distention of testicular capsule from inflammation.
- Ultrasound (confirmatory) (To see the blood vessels)
- Testicular scan in testicular torsion will be photopenic, but in epididymitis will be black
- **By history (age):**
 - Younger ¹: N. gonorrhoeae or C. trachomatis
 - Older ²: E. coli.



Case: a 12 year old boy came with his mother to the ER complaining of pain, swelling and dysuria. Is it Epididymitis or torsion?

Epididymitis

★ You must know how to differentiate between them

- Usually in older patients and shows the cardinal signs of inflammation.
- **Onset:** gradual onset of pain (usually preceding UTI). Subacute.
- **Physical examination reveals:** Fever, local signs of inflammation (redness, hotness). Positive Prehn sign ⁵. Preceded by UTI
- **Ultrasound:** increased blood flow to the testis and the epididymis. because of inflammation

Torsion

Sudden twisting of the spermatic cord, that's will lead to ischemia

- Usually in younger patients
- **Onset:** Acute sudden onset of pain. Pain increases with movement.
- **Physical examination reveals:** High-riding testicle (testicle may appear to be retracted upward and in an abnormal horizontal orientation), **absent cremasteric reflex** ³ and Prehn Sign ⁵.
- **Ultrasound:** No blood flow.
- Torsion is a medical emergency if not treated immediately the testicle will die within 8 hours ⁴.



Treatment

Table 17-3. TREATMENT OF ACUTE EPIDIDYMO-ORCHITIS

Epididymo-Orchitis Secondary to Bacteriuria

1. Do urine culture and sensitivity studies
2. Promptly administer broad-spectrum antimicrobial agent (e.g., tobramycin, trimethoprim-sulfamethoxazole, quinolone antibiotic)
3. Prescribe bed rest and perform scrotal evaluation
4. Strongly consider hospitalization
5. Evaluate for underlying urinary tract disease

Epididymo-Orchitis Secondary to Sexually Transmitted Urethritis

1. Do Gram stain of urethral smear
2. Administer ceftriaxone, 250 mg IM once; then tetracycline, 500 mg PO qid for at least 10 days, or doxycycline, 100 mg PO bid for at least 10 days
3. Prescribe bed rest and perform scrotal evaluation
4. Examine and treat sexual partners

Adapted from Berger RE: Urethritis and epididymitis. Semin Urol 1983;1:143.

- **Secondary to Bacteriuria:** 2 weeks wide spectrum antibiotics
- **Secondary to Sexually transmitted urethritis:** tetracycline or doxycycline for 10 days

1. Thus you have to ask about sexual history with young patients.
2. Usually elderly patients present with prostate-related symptoms, inability to pass urine, and urethral stricture.
3. The cremasteric reflex, is elicited by pinching the medial thigh, which causes elevation of the testicle. Presence of the reflex suggests, but does not confirm, the absence of testicular torsion
4. If it wasn't treated within 3h → the testes could die, not fully restore its function and loss spermatogenesis (testicular blood barrier breaks → exposed sperms → autoimmune attack)
5. Reduced pain when the affected hemiscrotum is elevated. (Reduced in epididymitis but not reduced in Torsion)

Prostatitis

- A syndrome that presents with inflammation ± infection of the prostate gland including, **it's very common and important** :

01
Dysuria,
frequency
also comes with fever



02
Dysfunctional void
(slow urine
stream)

- Perineal Pain
- Painful ejaculation when the seminal vesicle and prostate contract there'll be severe pain due to the inflammation.
- Pelvic pain

Traditional	National Institutes of Health	Description
Acute bacterial prostatitis	Category I	Acute infection of the prostate gland
Chronic bacterial prostatitis	Category II	Chronic infection of the prostate gland
N/A	Category III chronic pelvic pain syndrome (CPPS)	Chronic genitourinary pain in the absence of uropathogenic bacteria localized to the prostate gland with standard methodology
Nonbacterial prostatitis	Category IIIA (inflammatory CPPS)	Significant number of white blood cells in expressed prostatic secretions, postprostatic massage urine sediment (VB3), or semen
Prostatodynia	Category IIIB (noninflammatory CPPS)	Insignificant number of white blood cells in expressed prostatic secretions, postprostatic massage urine sediment (VB3), or semen
N/A	Category IV asymptomatic inflammatory prostatitis (AIP)	White blood cells (and/or bacteria) in expressed prostatic secretions, postprostatic massage urine sediment (VB3), semen, or histologic specimens of prostate gland

N/A, not applicable.

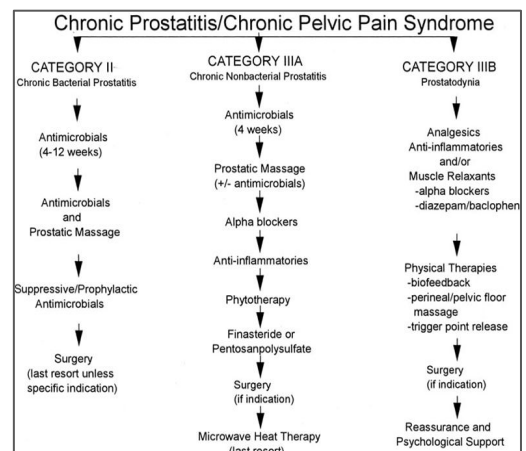
Dr: Just know that prostatitis can be categorized into more than acute or chronic

Acute Bacterial Prostatitis

- Urological emergency, could lead to death or abscess.
- Rare
- Acute pain
- Storage and voiding urinary symptoms
- Fever, chills, malaise, Nausea and vomiting (The usual presentation of urosepsis)
- Perineal and suprapubic pain
- Tender swollen hot prostate (sometimes a prostate abscess can be found as well)
- **Treatment:** antibiotics and urinary drainage (drainage if there is a retention, make sure not to disturb the inflamed area and disseminate the infection to the body)
 - Treatment lasts one month

Chronic prostatitis (Chronic Pelvic pain syndrome)

- Dr: this is for your knowledge and we won't ask you about it. "Don't worry about it"



Cystitis



- It's more common in female, because of their short urethra and post menopause because of low estrogen level
- Mainly storage symptoms with or without hematuria
- dysuria, frequency, urgency, voiding of small urine volumes.
- **Suprapubic /lower abdominal pain**, on clinical examination : you percuss above symphysis pubis and there is no filled bladder and it is painful (tenderness) this maybe cystitis.
- ± Hematuria, sometimes not visible grossly (microscopic hematuria) due to irritation of the urethra.
- Obstructive voiding



- Dip-stick : it'll detect blood cell , pus , pyuria , positive nitrite , low pH.
- Urinalysis : It gives more accurate results than using a dipstick. However, dipstick is faster.
- Urine culture (The gold standard): the ultimate test but takes days, so we usually start by treating the patient empirically.
- pH: to detect stones



- ★ Single dose for 3 or 5 days depending on the antibiotic chosen.
- We don't want to give wide spectrum antibiotics because we don't want to kill normal flora of the vagina
- **Uncomplicated cystitis** → broad spectrum antibiotics for 3 days (mainly) as the following:

- 01** Nitrofurantoin-100 mg twice daily for 5 days.
in KSA we usually use nitrofurantoin or Bactrim because they are least used so less likely to be resistant , it's good drug because it's excreted in urine.
- 02** Fosfomycin -one-time administration of 3 g.
- 03** Oral fluoroquinolones for more than three days.
- 04** Trimethoprim/ sulpha (Bactrim) 160/800 mg, twice daily 3.
- 05** β-Lactams, oral cephalosporins may be used, 5 or more days.

- For men it is recommended to have treatment for at least 7 days (a Quinolone or Bactrim)
- **Complicated cystitis** (symptoms for >7 days or male patient or age >65, recent UTI, diabetic, use of contraceptive diaphragm or pregnancy) → treatment should be extended for at least 7 days.

Table 14-10. TREATMENT REGIMENS FOR ACUTE CYSTITIS

Circumstances	Route	Drug	Dosage (mg)	Frequency per Dose	Duration (days)
Women					
Healthy	Oral	Ciprofloxacin	500	Every 12 hr	3
		Enoxacin	400	Every 12 hr	
		Levofloxacin	500	Every day	
		Lomefloxacin	400	Every day	
		TMP-SMX	160-800	Every 12 hr	
		TMP	100	Every 12 hr	
		Microcrystalline nitrofurantoin	100	Four times a day	
		Norfloxacin	400	Every 12 hr	
		TMP-SMX	160-800	Every 12 hr	
		or	As above	As above	
Symptoms for >7 days, recent urinary tract infection, age >65 yr, diabetes, diaphragm use	Oral	Fluoroquinolone	As above	As above	7
		Amoxicillin	250	Every 8 hr	
		Cephalexin	500	Four times a day	
		Microcrystalline nitrofurantoin	100	Four times a day	
Pregnancy	Oral	TMP-SMX	160-800	Every 12 hr	7
		Fluoroquinolone	As above	As above	
Men					
Healthy and <50 years old	Oral	TMP-SMX	160-800	Every 12 hr	7
		or Fluoroquinolone	As above	As above	

TMP, trimethoprim; TMP-SMX, trimethoprim-sulfamethoxazole.
Modified from Stamm WE, Hooton TM: Management of urinary tract infections in adults. N Engl J Med 1993; 329: 1328-1334. Copyright 1993 Massachusetts Medical Society. All rights reserved.

Pyelonephritis

Inflammation of the kidney and renal pelvis.



- Chills
- Fever
- Costovertebral angle tenderness (flank Pain), also called murphy's punch sign
- GI: abdominal pain, Nausea, vomiting and diarrhea.
- Gram -ve sepsis
- Dysuria and frequency occasionally if the infection disseminated in the urine



- \pm serum Creatinine (Pyelonephritis can cause renal impairment with increased creatinine)
- Urine culture & sensitivity test: 80% of cultures will be positive
 - Enterobacteriaceae (E. coli), most common.
 - Enterococcus
- Urinalysis:
 - \uparrow WBCs
 - RBCs
 - Bacteria
- CBC:
 - Leukocytosis (In cystitis there's NO leukocytosis)

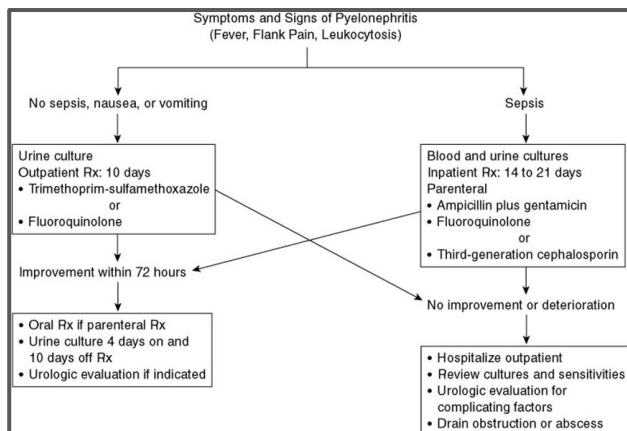


- IVP (intravenous pyelogram) we don't use it anymore
- Ultrasound
- CT to make sure there's no abscess, no stone, no obstruction, because if there is a stone the treatment is different.



Picture A: a stone causing granulomatous pyelonephritis

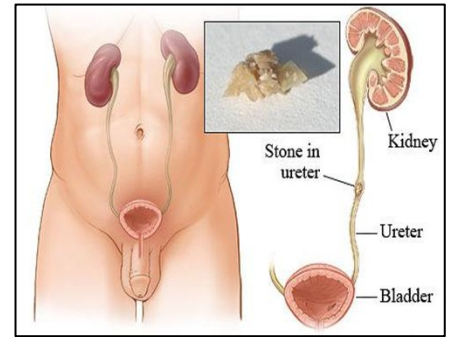
Picture B: pyelonephritis grossly after nephrectomy, you can see the chronic changes, thin parenchyma.



- Basically, if the infection isn't severe and the patient is hemodynamically stable, then the patient is treated in the outpatient clinic.
- After taking urine sample you should give the patient antibiotics even before the results of the culture come back.
- e.g. Ciprofloxacin (cover common bacteria)
- But if the patient is elderly, febrile, vomiting or immunocompromised then the patient needs admission before developing septic shock, they will need hydration and antibiotics.

Urolithiasis

- have been reported in Egyptian mummies 4800 BC
- Prevalence of 2% to 3%,
- Lifetime risk: Male 20%, female 5-10%¹
- Recurrence rate 50% at 10 years
- If you get kidney stones once, you're more likely by 50% to get another one again, but luckily 75% of stones will pass without intervention.



Risk factors ² :

Intrinsic

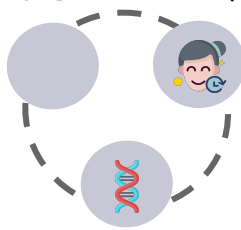
Risk factors you can't change

Sex

Male > female

Age

(20s - 40s)



Genetics

-Cystine is amino acid get filtered & reabsorbed by the kidney, if the patient have cystinuria that means they can't reabsorb it so it'll leak. They can't absorb 4 amino acids include: COLA

Cystine, Ornithine, Lysine, Arginine

-Renal tubular acidosis

Extrinsic

Water intake

Occupation³

(sedentary occupations)

Geography

(mountainous, desert and tropics)

Diet

(purines, oxalates (rich in nuts) and Na)

Climate

(July - October)

People who live in warm, dry climates and those who sweat a lot may be at higher risk than other because of dehydration.

★ Patient who went a bariatric surgery at risk to develop calcium oxalate stones

How do stones form?

Supersaturated

Crystal growth

Aggregation of crystals

Stones

1. High concentration of metabolic products in glomerular filtrate due to:

- 1- Increase in the amount of molecules but the volume of water is constant.
- 2- decrease in volume of water but the amount of molecule is constant.

2. Change in urine PH normal range (5.5-6.5):

- 1- Alkaline urine due to upper UTI.
- 2- Acidic urine due acidosis and diabetic ketoacidosis.

3. Urinary Stagnation due to obstruction of urinary flow

4. Deficiency of stone-forming inhibitors (are substances that present normally in the urine to inhibit stone formation)

1. Because high protein, high salt diet makes kidney stones more likely. Men tend to have a greater intake of both

2. Why is it important to know unchangeable risk factors? because you have to advice the patient, e.g. To drink more water or decrease the consumption of red meat (it has purine & pyrimidine which will cause uric acid stones).

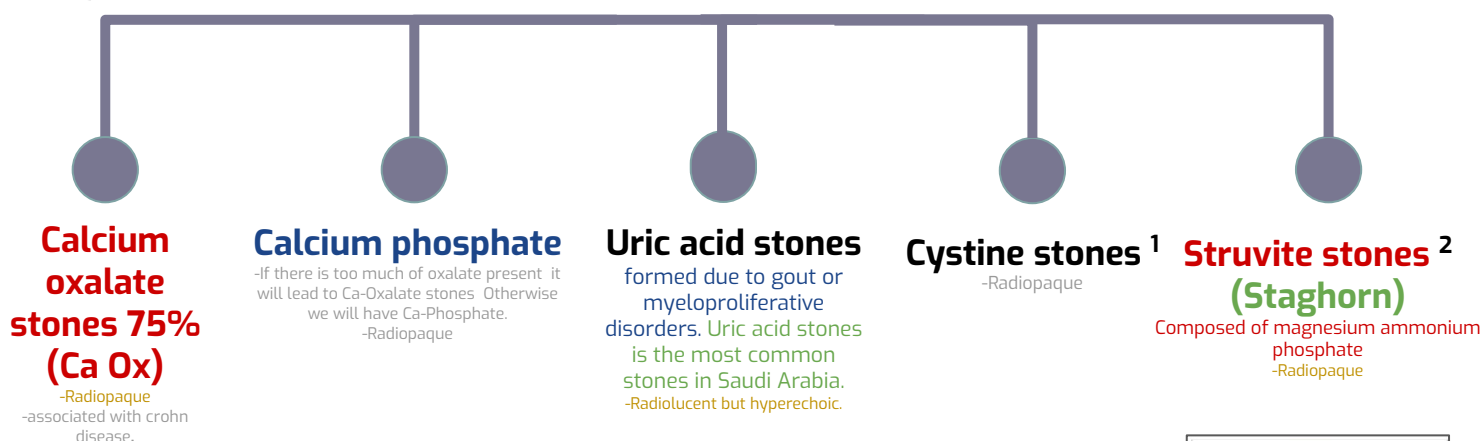
3. Sedentary behaviours leads to a rapid increase in bone resorption → high levels of ca⁺ in the blood → kidney stones

Most people have crystals in their urine, so why not everyone gets stones?

- Anatomic abnormalities **obstruction of flow**
- Modifiers of crystal formation (Inhibitors/promoters):
 - Citrate **inhibits stones (calcium Oxalate)**
 - Magnesium
 - Urinary proteins (nephrocalcin)
 - Oxalate **causes stones and is usually found in parsley (cultural myth about drinking parsley water could cause stones)**



★ Common Stones Types (respectively):



★ Signs and symptoms:

• GI symptoms:

- Nausea & vomiting.
- Ileus or diarrhea.

• Differential diagnosis:

- Gastroenteritis
- acute appendicitis
- colitis
- salpingitis
- Ovarian pathologies
- Ovarian torsion
- Ectopic pregnancy

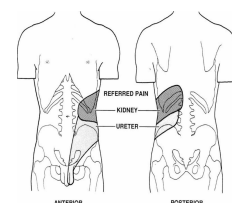
• Restless

- ↑HR³, ↑BP due to pain & anxiety
- fever (if UTI)
- Tender CVA costovertebral: is severe pain that results from touching the region inside of the costovertebral angle. The CVA is formed by the 12th rib and the spine.

- Frequency, dysuria
- Hematuria

• Renal, ureteric colic:

- **Renal calculi** cause flank pain, which may be colicky (arising from the renal pelvis) or a noncolicky (renal pain) dull ache (arising from renal capsule).
- **Ureteric calculi** cause colicky pain and the site of the stone in the ureter determines the site of the pain:
 - **upper ureteric calculi** cause costovertebral angle or flank pain
 - **mid-ureteric calculi** cause pain radiating from 'loin to groin'
 - **lower ureteric calculi** cause pain radiating to the testicle in males and labia majora in females.



1. Cystinuria is an autosomal-recessive defect. Patients with cystinuria have impairment of renal cystine transport, with decreased proximal tubular reabsorption of filtered cystine resulting in increased urinary cystine excretion and cystine urolithiasis.

2. They are associated with chronic urinary tract infection with gram-negative, urease-positive organisms that split urea into ammonia, which then combines with phosphate and magnesium to crystallize into a stone. These organisms are:

★ **Proteus (most common), Pseudomonas, Klebsiella, staphylococcus and mycoplasma**

3. If the kidney function is impaired the blood volume will increase this will increase stress on the heart causes it to stretch and can also trigger this abnormal rhythm.



Case: A 24-year-old male presented with left flank pain for 2 days.



What should be done next?

01

History and Physical Examination

- Pain
- Urinary symptoms
- Eliminate differential diagnosis
- General examination
- Abdominal examination

02

Differential Diagnosis

- Radiculitis (pseudo-renal)
- Leaking abdominal aortic aneurysms
- Pneumonia
- Myocardial infarction
- Ovarian pathology (e.g., twisted ovarian cyst)
- Acute appendicitis
- Testicular torsion
- Inflammatory bowel disease (Crohn's, ulcerative colitis)
- Diverticulitis
- Ectopic pregnancy
- Burst peptic ulcer
- Bowel obstruction



Case Cont. (ureter stone)

- A 24-year-old male presented with left flank pain for 2 days.
- Pain radiating to groin. No aggravating or relieving factors. Sudden. 10/10.
- No urinary symptoms
- Not related to movement
- No GI symptoms
- No fever
- Physical examination revealed left flank tenderness



What should be done next?

03

Investigations

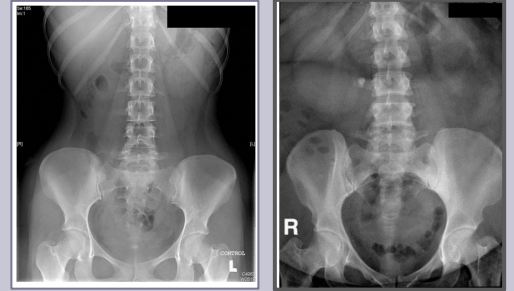
- CBC
- Renal profile
- Urine analysis
- Imaging (which one) continued next page



Case Cont.

KUB

- Not sensitive and not specific (not use for initial diagnosis)
- It Use only to for follow up
- ★ If we give you this image in the OSCE what would you say? Radio opaque shadow on the right side



Ultrasound

In US you can see kidney stone very well , but if the patient have ureter stone you can only see Hydronephrosis, So it not capable diagnosis.

- when do we order it? If the pt was pregnant (bc she can't be exposed to radiation) - pt with mild symptoms and you don't want to expose the pt to radiation.



IVU

We don't use it anymore bc we use a lot of radiation, you need to give contrast and it's time consuming



MRU

It wasn't created for stones, expensive, & takes time (it not capable)



- **CT without contrast**
- ★ Gold Standard, Very specific & sensitive
- ★ If we give you this image in the OSCE what would you say?
CT without contrast of the abdomen showing hyperdensity in the left proximal ureter



Case Cont.

4a

- Hydration
- Analgesia
- Medical expulsion therapy : is the treatment that we use in BPH " benign prostate hyperplasia " : Alpha blockers " alfuzosin or tamsulosin " .
why we use it ? Bc there are some alpha receptor in ureter , that when we block them
the ureter will dilate and it can help to eliminate the stone
- When do you admit/intervene?
This management for Every single pt present with ureter stone except :

> Indications :

- Infection
- Renal impairment: **directly remove the stone**, if the pt. Has stone in his and only single functioning kidney **or** bilateral stones
- Persistent nausea and vomiting : **directly remove the stone**
- Persistent pain not responding to oral analgesia : **directly remove the stone**
- Failure of medical therapy : **directly remove the stone**

Case Cont.

- Same patient presented with fever and increase left flank pain (pyelonephritis with obstruct stone)
- CBC: Elevated WBC
- Renal profile : Normal
- CT: Same
- We need also to do urine culture

> What should be done next? Admission

4b

- Hydration
- Analgesia
- UA and C/S and blood C/S
- Broad spectrum antibiotics (don't describe antibiotics if the patient don't have fever or +ve culture)
- Urine diversion (like when you draining the abscess) : you must do it, bc the antibiotic will not reach to the kidney bc the ureter is block that lead to decrease blood flow to the kidney.

DJ stent

is the procedure to place a thin, flexible plastic tube that is temporarily in the ureter to help urine drain from the kidney into the bladder

Urine Diversion¹

Nephrostomy

a procedure (percutaneous) to drain urine from the kidney using a catheter

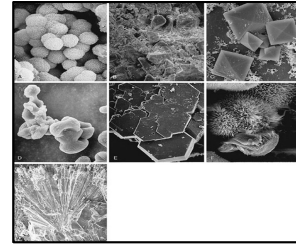


Investigation

● Urinalysis:

- RBC
- WBC
- Bacteria
- Crystals

- No need to memorize the shapes just know there's different crystal shapes.
 - Some people if we take a urine sample from them and see it under microscopy we'll find some crystals but not necessarily it will cause stones, it depends on their lifestyle and is it healthy or not.

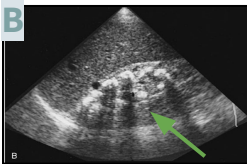


★ Imaging:

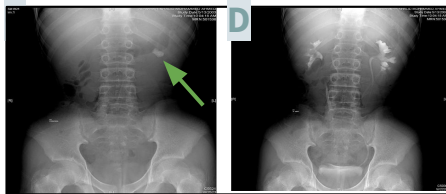
- ★ Start with **non-contrast CT scan** unless it's contraindicated (e.g. pregnant patient), do not use it when we know it's a Stone, then we use Ultrasound or X-ray (KUB)
- Plain Abdominal Films (KUB) (Kidney, Ureter, Bladder)
 It only shows you radio opaque stones like calcium but can't show uric acid (radio lucent) and only shows 70% of stones
- Intravenous Urography (IVU)
- Ultrasonography (U/S)
- Computed Tomography (CT) Gold standard



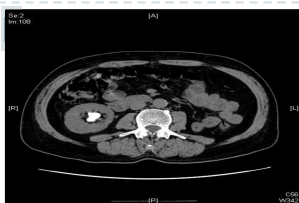
Picture A: KUB shows stones in the cortex (nephrocalcinosis) stones appear bright (radio opaque), but doesn't show uric acid (radio lucent) and only shows 70% of stones



Picture B: by US, the sound blocked by stones so shows hyperechoic lesion with acoustic shadow.



Picture C: shows radio opaque shadow
 Picture D: here we use IVU



Picture E: nowadays we use CT with IV contrast instead of using IVU
 Even uric acid can be shown.

- **Other:** hematological and biochemical tests are used to exclude metabolic causes and to assess renal function



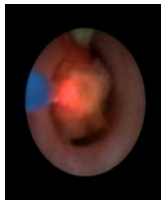
Management

- Most of them are **Conservative**:
 - Hydration
 - Analgesia
 - Antiemetic
 - Stones (<5mm) >90% spontaneous Passage
 - **Selective alpha blocker**: if stone is big it may pass it

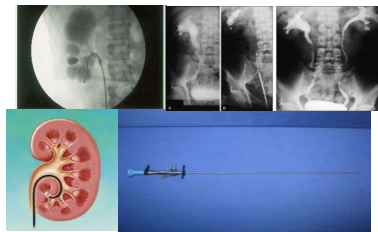
★ Indication for admission and immediate intervention:

- Renal impairment
- Refractory pain
- Pyelonephritis
- intractable Nausea and Vomiting
- **Solitary kidney** (Unilateral Renal Agenesis)
- **Bilateral stones** (both kidney are affected)

• A stone less than 0.5 cm in diameter may pass spontaneously. Immediate treatment should be considered in case of acute pain, renal obstruction, or sepsis. Extracorporeal shock-wave lithotripsy (ESWL) sends shock waves to break up stones. If breaking the stone isn't sufficient then percutaneous nephrolithotomy (PCNL). PCNL involves puncturing the kidney, inserting a sheath and removing it under nephroscope.

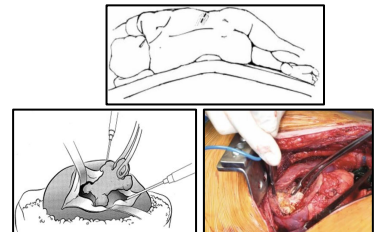


Laser ureteroscopy



Ureteroscopy

flexible (on left) Rigid (the right)
For hard stones, failure of shock wave



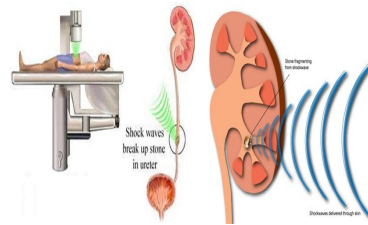
Anatomic nephrolithotomy

Used rarely in very severe cases



Percutaneous Nephrolithotripsy (PNL)

only for big stones



Extracorporeal Shock Wave lithotripsy(SWL)

Least invasive method. Used for small stones in the kidney or the ureter where there's no obstruction.

Side effects of SWL: hemorrhage
Release energy and degrade the stones inside the urinary tract,
Not good for hard, big or recurrent stones because it may affect the renal function.



Definitive Treatment *Videos from Dr Slides*



★ If pt. **does not** have infection

-ESWL

Extracorporeal shock wave lithotripsy is a procedure to break up stones inside the urinary tract, bile ducts or pancreatic duct with a series of shock waves generated by a machine called a lithotripter.

-URS ★ More definitive

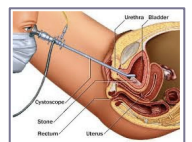
Ureteroscopy, also known as ureterorenoscopy, is a procedure in which a small, flexible scope (ureteroscope) is inserted through the urethra into the bladder and ureter to diagnose and treat urinary tract problems

-Bladder stone

- Cystolitholapaxy

(it's a scope with lesser that fragment stone)

- Cystolitholapaxy



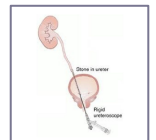
-Ureteric stone

● Mid and Lower Ureter: Ureteroscopy > ESWL

● Upper ureter:

• > 1cm : **Ureteroscopy** > ESWL

• < 1cm : Ureteroscopy or ESWL → to do shock wave stones should appear in radio images



-Renal stone

● > 2 cm : PCNL Percutaneous nephrolithotomy

● < 2 cm : **URS** Vs ESWL



Types of Stones

You don't need to know other than the **highlighted**

Types	PH level at which stones forms	Appearance on X-Ray
Calcium salts	Alkaline Urine	Radio-Opaque
Uric Acid	Acidic Urine	Radiolucent
Mg Ammonium PO4	Alkaline Urine	Faint Radio-Opaque
Cystine	Acidic Urine	Faint Radio-Opaque
Xanthine	Acidic Urine	Radiolucent

Stone type	Children (%)	Adults (%)
Calcium ★	50 to 90	64 to 92
Calcium oxalate	60 to 90	32 to 46
Calcium phosphate	10 to 20	3 to 5
Both	—	29 to 40
Cystine	1 to 5	1
Struvite (magnesium ammonium phosphate) → indicate infection	1 to 18	2 to 15
Uric acid	1 to 10	3 to 16
Other	4	1



Benign Prostatic Hyperplasia (BPH)



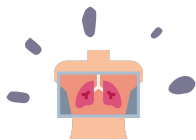
Signs and symptoms

- Disease of elderly men (start at age 40) (average age is 60 to 65 years); prostate gradually enlarges, creating symptoms of urinary outflow obstruction
- Mainly voiding symptoms but can present with both if detrusor muscle became hyperactive
- LUTS
- Increasing frequency may deceive the patient into believing that an adequate amount of urine is passed
- poor bladder emptying
- urinary retention
- urinary tract infection
- Hematuria: Straining may cause vessels at the bladder neck to bleed.
- Renal insufficiency
- In high-pressure chronic retention frequency may progress to continual dribbling incontinence leading over time to signs and symptoms of obstructive uraemia, including drowsiness, anorexia and personality changes.



Physical examination

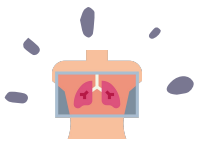
- **Digital rectal examination (DRE):**
 - Evaluate the prostate: size, consistency and tenderness (prostatitis)
 - Hard prostatic nodule → Prostate cancer (asymmetry)
 - BPH, benign nodule, calcification and TB (granuloma)
 - Firm and fibrous = previously infected or has a large amount of stromal tissue
 - Rubbery consistency symmetrical and smooth prostatic enlargement, with a median groove between the two lateral lobes = BPH
 - If digital rectal examination raises suspicion, needle biopsy is indicated
- **Focused neurological exam:** especially elderly, aside checking BPH in DRE we check:
 - Prostate Cancer
 - Rectal Cancer and hematuria
 - Anal tone: so we can assess the bladder innervation to diagnose neurogenic bladder, (usually those patient with neurogenic problem would have constipation as well as voiding symptoms because the nerve supplying the rectum is the same as the bladder)
 - neurologic problems
- **Abdomen:** distended bladder without tender comparing to cystitis



Investigation

- **Urinalysis, culture**
 - UTI
 - Hematuria check for microscopic hematuria (more than 2 RBC per high-power field)
- **Serum Creatinine:**
because the urine put pressure back to kidney and may cause hydronephrosis → renal failure. so we must check renal function.
- **Serum Prostate(PSA):** to rule out malignancy
Normal level of PSA: less than 4.0 ng/mL. Elevated by anything that damages the prostate: prostate cancer, prostatitis, surgical procedures or trauma.
prostate cancer can occur with normal PSA value.
- **Blood urea nitrogen**
- **Flow rate** explained in next page
- **Ultrasound** (Kidney, Bladder And Prostate)
to check complication (upper tract deterioration and prostate size and post void residual)
- Elevated PostVoid Residual (PVR)



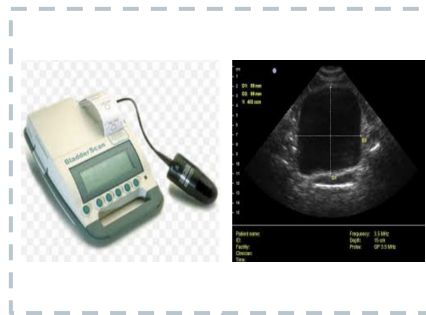


-Investigation cont



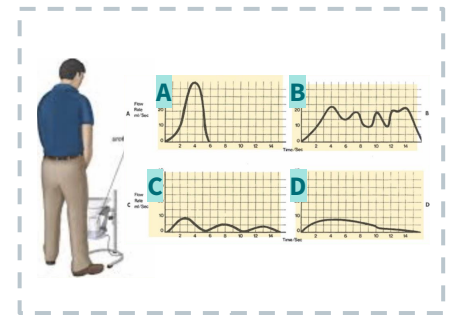
Ultrasound

- We have to do in two dimensions.
- The bladder is full and the prostate volume is 58 ml almost 3 times the normal size (normally it's 20-25 ml)



PVR

Perform PVR (post void residual volume): PVR is the amount of urine retained in the bladder shortly after a voluntary void and functions as a diagnostic tool. This can be accomplished through ultrasound or by bladder scan. Will quantify a reduction in urinary stream and the need for intervention.



Uroflowmetry¹

- Picture A: Normally it's bell-shaped
- Picture B: Fluctuating "but more than 20/sec" = not obstructive most likely urologic (could be BPH or urethritis stricture)
- Picture C: Fluctuating "less than 20/sec" = obstructed bladder
- Picture D: lesser than 20 = bladder neuropathy
- Qmax will be higher in female than male because of the short urethra (Qmax is maximum flow rate)

Complications:

01

bladder stones

02

UTI

03

bladder
decompensation

04

incontinence

05

upper tract
deterioration
(hydronephrosis)

06

hematuria

07

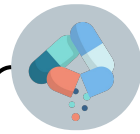
acute urinary
retention
(AUR)

08

Bladder diverticula
which may cause
infection, stones and
tumour

1. Uroflowmetry measures the flow of urine. It tracks how fast urine flows, how much flows out, and how long it takes. Average results are based on age and sex. Typically, urine flow runs from 10 ml to 21 ml per second. Women range closer to 15 ml to 18 ml per second. A slow or low flow rate may mean there is an obstruction at the bladder neck or in the urethra, an enlarged prostate, or a weak bladder. A fast or high flow rate may mean there are weak muscles around the urethra, or urinary incontinence problems.

Treatment Options of BPH



Medical therapy

- We treat only symptomatic patients
- If patient presented with moderate symptoms, we give him alpha-blocker
- No response or have severe symptoms ? add the other drug (Androgen suppressor)
- **α-Adrenergic Blockers:**
Relax the bladder neck, preferable in symptomatic patients with smaller prostate
 - Tamsulocin
 - Alfuzocin
 - Terazocin
- **Androgen Suppression:**
block the conversion of testosterone to DHT, which is responsible for the growth and enlargement of the prostate, useful in large glands.
 - Finasteride
 - Dutasteride



Surgical therapy

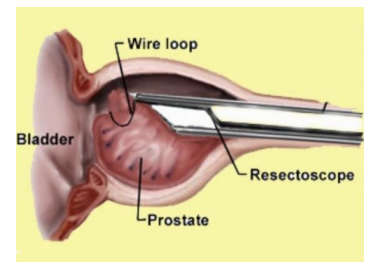
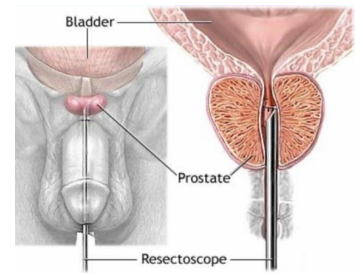
- When medical treatment failed
- The absolute indications for surgery in a patient with BPH are: refractory urinary retention, recurrent UTI, recurrent haematuria, bladder stones, and/or diverticula and high-pressure chronic urinary retention leading to renal insufficiency.
- Retrograde ejaculation (infertility) is a common sequel to any operative procedure on the prostate and all patients should be advised preoperatively of this effect. The main postoperative hazard is bleeding
- **Endoscopic**
- **Transurethral Resection of the Prostate (TURP):** Gold Standard we do surgery either for patients with severe symptoms (Recurrent UTI, Hematuria, Bladder stones), or patients who "want" to do surgery.
- **Laser ablation** Favourable results are seen with laser prostatectomy, with improved haemostasis, reduced hospital stay, earlier catheter removal, and promising long-term follow-up data
- **prostatic stents**
- **Rezūm:** uses the stored thermal energy in water vapor (steam) to treat the extra prostate tissue takes 10 min can be done as an office procedure
- **Open Prostatectomy**
 - Radical prostatectomy → cancer
 - Transvesical prostatectomy → BPH (from the bladder) easier but the bleeding is higher





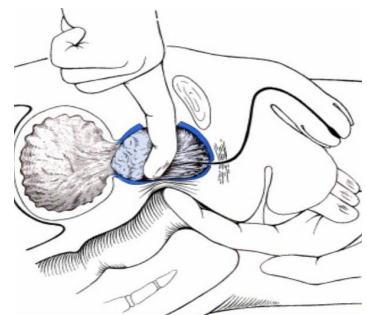
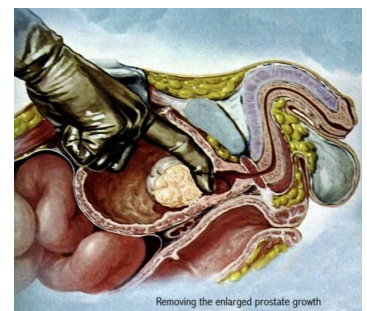
Transurethral Resection of the Prostate TURP

- A transurethral resection of the prostate (TURP) is surgery to remove parts of the prostate gland through the penis (clockwise or like cutting shawarma from up to down).
- No incisions are needed.
- The surgeon reaches the prostate by putting an instrument into the end of the penis and through the urethra.
 - This instrument, called a resectoscope, contains a lighted camera and valves that control irrigating fluid. It also contains an electrical wire loop that cuts tissue and seals blood vessels. The wire loop is guided by the surgeon to remove the tissue blocking the urethra one piece at a time. The pieces of tissue are carried by the irrigating fluid into the bladder and then flushed out at the end of the procedure.
- **Complication of TURP is (TURP Syndrome)** it is a rare but potentially life-threatening complication of a transurethral resection of the prostate procedure.
 - It occurs as a consequence of the absorption of the fluids used to irrigate the bladder during the operation into the prostatic venous sinuses. Characterized by volume overload and Hyponatremia, and it can affect the vision.



Open Prostatectomy

- **Indications for open prostatectomy:**
large prostate (>100 cc) or the presence of bladder diverticulum or bladder stone (to treat the prostate and the bladder simultaneously).
- **Disadvantages:**
 - 1- length of hospitalization
 - 2- abdominal wound
 - 3- damage to external sphincter (in smaller adenomas) may cause incontinence



Scrotal Disorders

Hydrocele

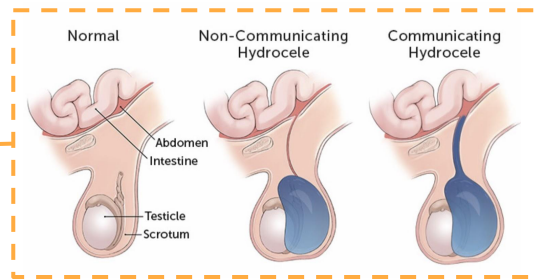
- hydrocele occurs in males when fluid fills the scrotum (painless)
- Fluid can surround one or both testicles, causing swelling in the scrotum.
- More common in baby boys, it may also occur in adult men.



★ The distinction between a cyst of the epididymis and a hydrocele is easy. Epididymal cysts transilluminate brightly and almost always multiple, therefore nodular on palpation and the testes palpated separately from the cyst unlike in hydrocele the testes palpated within a fluid filled sac and demonstrates transillumination.

Communicating

Occurs from the incomplete closure of the tunica vaginalis, forming a direct path between the abdomen and the scrotum so that a small amount of abdominal fluid may flow in and out of the thin pouch. It is distinctive because the fluid fluctuates throughout the day and night, altering the size of the mass



In the fetus, the tunica vaginalis is formed in the abdomen and then moves into the scrotum with the testes. After the pouch is in the scrotum, it seals off from the abdomen.

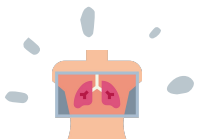
Non-Communicating

Contain fluid confined to the scrotum within the tunica vaginalis. The processus vaginalis is obliterated, and thus the fluid does not communicate with the abdominal cavity. Such hydroceles are common in infants, and the hydrocele fluid is usually reabsorbed before the infant reaches the age of 1 year. This type of hydrocele usually remains the same size or has a very slow growth. Non reducible



Physical examination

- Check for tenderness in an enlarged scrotum.
- Apply pressure to the abdomen and scrotum to check for inguinal hernia (if you can feel the cord above the swelling then it's most probably a hydrocele. In case of hernia, the bowel is projecting through the inguinal canal and you won't be able to feel the cord).hernia you can't get above it but hydrocele you can
- Shine a light through the scrotum (transillumination) → If hydrocele is present transillumination will show clear fluid surrounding the testicle. Although this may be difficult to elicit in long-standing cases owing to fibrosis and thickening of its wall.



Diagnosis and management

- Imaging: ultrasound
- **Two surgical techniques are available:**
 - Hydrocelectomy with Excision of the Hydrocele Sac ¹
We don't like to excise the sac because we may injure the vas deferens
 - Hydrocele Surgery with Plication of the Hydrocele Sac ²
- Needle Aspiration is not favoured and not used anymore because the hydrocele will refill and reoccur

Hydrocele sac



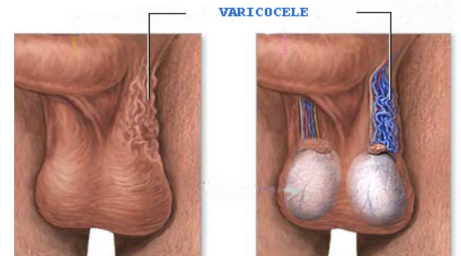
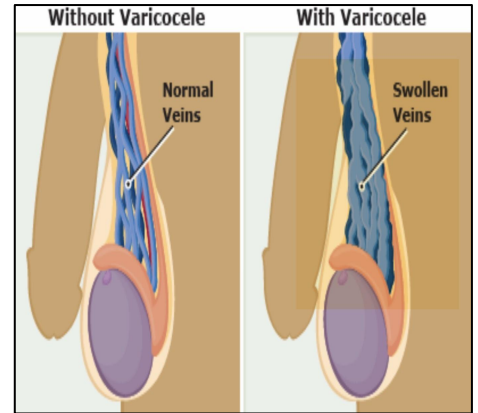
1. An incision is made directly into the scrotum. The hydrocele sac is removed (care is taken not to injure testicular vessels, epididymis or ductus deferens), fluid is removed from the scrotum, and the incision is closed with sutures. This technique is useful for large or thick-walled hydroceles.
2. The hydrocele is opened with a small skin incision. The hydrocele sac is reduced (plicated) by suture. The plication technique is suitable for medium-sized and thin-walled hydroceles. The advantage of the plication technique is the minimized dissection with a reduced complication rate..



Scrotal Disorders

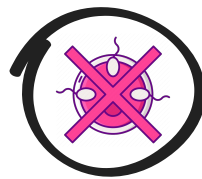
Varicocele

- Abnormal dilation of the pampiniform plexus to the spermatic vein in the spermatic cord; described as a "bag of worms"
- Most identified common cause of male infertility.
- It affects 20% of male population.
- Not all men with varicocele are infertile.
- It can be graded:
 - Palpable with Valsalva maneuver
 - Palpable without Valsalva maneuver.
 - Visible.
- More common on the left side ¹
- It impairs fertility by increase intratesticular temperature
- The main symptom is a dragging sensation in the scrotum, and a feeling of heaviness.
- Testis is intra abdominal organ because its blood supply and vein drainage and lymphatic drainage are all intra abdominal but scrotal skin is extra abdominal



Treatment:

- Indicated in:

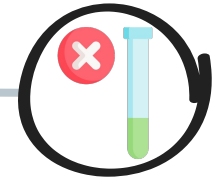


★ **Infertility with abnormal semen parameters.**

If you correct the varicocele you will notice 70% improvement in semen analysis parameter and 30% improvement in pregnancy rate.



Testicular pain



Impaired testicular volume/Growth in kids & adolescents.

1. **More common on the left side**, because of several anatomic factors, including the following:
 - The angle at which the left testicular vein enters the left renal vein (which means it goes all the way up straight so there will be a lot pressure, but the right testicular vein drains directly in IVC so less pressure)
 - The lack of effective anti-reflux valves at the juncture of the testicular vein and renal vein
 - The increased renal vein pressure due to its compression between the superior mesenteric artery and the aorta (ie, nutcracker effect)

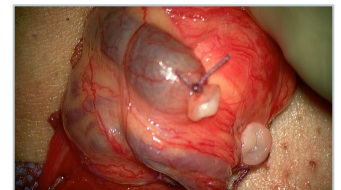
Scrotal Disorders

Treatment Cont.

- **Procedures:**

01 ★ Ligation (open, microscopic or lap)

- The level at which the testicular veins are ligated vary and may be described as:
1- high approach (Palomo's).
2-mid(inguinal) approach
3-low (scrotal) approach.
- The presenting symptom also dictates the approach adopted.
- **High approach** has the advantage of fewer veins as the tributaries of the pampiniform plexus join to form one or two veins at the level of deep ring.
- If symptomatic and fertility is not an issue, a high approach is preferred.
- if the surgery is to be performed for infertility, a **scrotal approach** is preferred. Use of optical magnification (operating microscope/loupes) ensures that the testicular lymphatics are spared, all the tributaries of the pampiniform plexus are ligated and the vas deferens is not damaged (micro-varicocelelectomy).



02 Angioembolization:

- Is a minimally invasive procedure done by interventional radiologists.
- Access can be achieved via the internal jugular or femoral veins to insert a catheter into the testicular vein using x-ray guidance. Then small, metal coils or a special medical foam is used to block off the abnormal testicular vein.

Recall

Q1: What are the three common organisms in UTI?

Answer: 1. E. coli (90%) 2. Proteus 3. Klebsiella

Q2: what are the predisposing factors for UTI?

Answer: stones , obstruction , reflux , diabetes mellitus , pregnancy , indwelling catheter

Q3: what is the etiology of UTI?

Answer: Ascending infection , instrumentation , coitus in females.

Q4: How is UTI diagnosis made?

Answer: Symptoms, urinalysis (>10 WBCs/HPF, $>10^5$ CFU)

Q5: When should work up be performed?

Answer:

After the first infection in male patients (unless Foley is in place)

After the first pyelonephritis in prepubescent female patients

Q6: What is the treatment?

Answer:

Lower: 1 to 4 days of oral antibiotics

Upper: 3 to 7 days of IV antibiotics

Q7: What is the incidence of renal stones?

Answer: 1 in 10 people will have stones

Q8: what are the risk factors for developing calculus disease?

Answer: Poor fluid intake, IBD, hypercalcemia ("CHIMPANZEES"), renal tubular acidosis, small bowel bypass

Q9: What are the four types of stones?

Answer:

1. Calcium oxalate/calcium PO₄ (75%)—secondary absorption, ↓renal reabsorption, ↑ bone reabsorption)

2. Struvite (MgAmPh) (15%)—infection stones; seen in UTI with urea-splitting bacteria (Proteus); may cause staghorn calculi; high urine pH

3. Uric acid (7%)—stones are radiolucent (Think: Uric = Unseen); seen in gout, Lesch–Nyhan, chronic diarrhea, cancer; low urine pH

4. Cystine (1%)—genetic predisposition

Q10: What type of stones is not seen on AXR?

Answer: Uric acid (Think: **U**ric = **U**nseen)

Q11: What stone is associated with UTIs?

Answer: Struvite stones (Think: **S**truvite = **S**epsis)

Q12: What stones are seen in IBD/bowel bypass?

Answer: Calcium oxalate

Q13: What are the symptoms of calculus disease?

Answer: Severe pain; patient cannot sit still: renal colic (typically pain in the kidney/ureter that radiates to the testis or penis), hematuria (remember, patients with peritoneal signs are motionless)

Q14: What are the classic findings/symptoms?

Answer: Flank pain, stone on AXR, hematuria

Q15: Diagnosis?

Answer: KUB (90% radiopaque), IVP, urinalysis and culture, BUN/Cr, CBC

Q16: What is the significance of hematuria and pyuria?

Answer: Stone with concomitant infection



Recall

Q17: treatment of kidney stones?

Answer: Narcotics for pain, vigorous hydration, observation.

Further options: ESWL (lithotripsy), ureteroscopy, percutaneous lithotripsy, open surgery; metabolic workup for recurrence

Q18: what are the indications for intervention?

Answer: Urinary tract obstruction, Persistent infection, Impaired renal function

Q19: What are the contraindications of outpatient treatment?

Answer:

Q20: What are the contraindications of outpatient treatment?

Answer: Pregnancy, diabetes, obstruction, severe dehydration, severe pain, urosepsis/fever, pyelonephritis, previous urologic surgery, only one functioning kidney

Q22: What are the three common sites of obstruction?

Answer:

1. UreteroPelvicJunction(UPJ)
2. UreteroVesicularjunction(UVJ)
3. Intersectionoftheureterandtheiliacvessels

Q23: What are the common types of incontinence?

Answer: Stress incontinence, overflow incontinence, urge incontinence

Q24: How is the diagnosis made?

Answer: History (including meds), physical examination (including pelvic/rectal examination), urinalysis, Post Void Residual (PVR), urodynamics, cystoscopy/VesicoCystoUrethroGram (VCUG) may be necessary

Q25: What is the "Marshall test"?

Answer: Woman with urinary stress incontinence placed in the lithotomy position with a full bladder leaks urine when asked to cough

Q26: What is the treatment of the following disorders:

Stress incontinence?

Bladder neck suspension

Urge incontinence?

Pharmacotherapy (anticholinergics, α -agonists)

Overflow incontinence?

Self-catheterization, surgical relief of obstruction, α -blockers

Q27: What is the size of a normal prostate?

Answer: 20 to 25 g

Q28: Where does BPH occur?

Answer: Periurethrally (Note: Prostate cancer occurs in the periphery of the gland)

Q29: What is the differential diagnosis?

Answer:

- Prostate cancer (e.g., nodular)
- biopsy Neurogenic bladder
- history of neurologic disease Acute prostatitis
- hot, tender gland
- Urethral stricture
- RUG, history of STD
- Stone
- UTI



Recall

Q30: What are the treatment options?

Answer:

Pharmacologic:

α -1 blockade Hormonal, antiandrogens

Surgical:

TURP, TUIP, open prostate resection and Transurethral balloon dilation

Q31: Why do α adrenergic blockers work?

Answer:

1. Relax sphincter

2. Relax prostate capsule

Q32: What is Proscar?

Answer:

Finasteride: 5- α -reductase inhibitor; blocks transformation of testosterone to dihydrotestosterone; may shrink and slow progression of BPH

Q33: What is Hytrin?

Answer: Terazosin: α -blocker; may increase urine outflow by relaxing prostatic smooth muscles

Q34: What are the indications for surgery in BPH?

Answer: Because of obstruction:

Urinary retention

Hydronephrosis

UTIs

Severe symptoms

Q35: What is TUIP?

Answer: TransUrethral Incision of Prostate

Q36: What percentage of tissue removed for BPH will have malignant tissue on histology?

Answer: Up to 10%!

Q37: What are the possible complications of TURP?

Answer: Immediate:

Failure to void

Bleeding




Clot retention

UTI Incontinence



Summary





	 Symptoms	 Diagnosis	 Management
Urethritis	<ul style="list-style-type: none"> Asymptomatic Burning on urination. Urethral discharge 	<ul style="list-style-type: none"> Incubation period: <ul style="list-style-type: none"> Gonococcal (3-10 days) Nongonococcal (1-5 weeks) Confirm: <ul style="list-style-type: none"> Urethral swab Serum: Chlamydia specific ribosomal RNA 	<ul style="list-style-type: none"> 1g IM ceftriaxone 1 dose azithromycin orally
Epididymitis	<ul style="list-style-type: none"> Acute: Pain, swelling of epididymis < 6 weeks Chronic: Long-standing pain in the epididymis and testicle. Usually no swelling 	<ul style="list-style-type: none"> History and physical examination Confirmatory: ultrasound Testicular scan 	<ul style="list-style-type: none"> Bacteriuria: 2 weeks wide spectrum antibiotics Sexually transmitted urethritis: tetracycline or doxycycline for 10 days
Prostatitis	<ul style="list-style-type: none"> Dysuria, frequency Dysfunctional void Perineal pain Painful ejaculation 	-	<ul style="list-style-type: none"> Acute: antibiotics and urinary drainage
Cystitis	<ul style="list-style-type: none"> dysuria, frequency, urgency, voiding of small urine volumes. Suprapubic /lower abdominal pain ± Hematuria 	<ul style="list-style-type: none"> urinalysis It gives more accurate results than using a dipstick. However, dipstick is faster. Urine culture: the ultimate test but takes days 	<ul style="list-style-type: none"> Uncomplicated: broad spectrum antibiotics for 3 days Complicated: Quinolone or Bactrim (TMP-SMX) for 7 days
Pyelonephritis	<ul style="list-style-type: none"> Chills. Fever. Costovertebral angle tenderness (flank Pain). GI: abdominal pain, Nausea, vomiting and diarrhea. Gram -ve sepsis Dysuria and frequency 	<ul style="list-style-type: none"> serum Creatinine Urine culture & sensitivity test Urinalysis CBC Imaging: <ul style="list-style-type: none"> Ultrasound CT IVP 	<ul style="list-style-type: none"> Stable: 10 days wide spectrum antibiotic outpatient Unstable: admit for 2-3 weeks IV antibiotics



Summary



	 Symptoms	 Diagnosis	 Management
Urolithiasis	<ul style="list-style-type: none"> • Renal, ureteric colic • Frequency, dysuria • Hematuria • Restless • GI symptoms 	<ul style="list-style-type: none"> • Urinalysis • Imaging: start with non-contrast CT, if sure use ultrasound and x-ray: <ul style="list-style-type: none"> ○ KUB ○ IVU ○ CT 	<ul style="list-style-type: none"> • Conservative • Indication for admission: <ul style="list-style-type: none"> ○ Renal impairment ○ Refractory pain ○ Pyelonephritis ○ intractable Nausea and Vomiting
Overactive bladder	<ul style="list-style-type: none"> • Frequency • Urgency • Incontinence • Nocturia 	<ul style="list-style-type: none"> • History • Physical exam • Urine analysis • Culture/ sensitivity test • Ultrasound 	<ul style="list-style-type: none"> • Behavioral • Pelvic floor exercise • Anticholinergic • beta-3 agonist
BPH	<ul style="list-style-type: none"> • LUTS • poor bladder emptying • urinary retention • urinary tract infection • Hematuria • Renal insufficiency 	<ul style="list-style-type: none"> • Physical examination: DRE, Focused neurologic exam and Abdomen • Serum creatinine • Serum prostate • Urinalysis, culture • Flow rate • Ultrasound, PVR 	<ul style="list-style-type: none"> • Medical therapy: <ul style="list-style-type: none"> ○ α-Adrenergic Blockers ○ Androgen Suppression • Surgical therapy: <ul style="list-style-type: none"> ○ Endoscopic ○ TURP ○ Laser ablation ○ prostatic stents ○ Open Prostatectomy
Hydrocele	<ul style="list-style-type: none"> • swelling in the scrotum 	<ul style="list-style-type: none"> • Physical examination • Imaging: ultrasound 	<ul style="list-style-type: none"> • Hydrocelectomy with Excision of the Hydrocele Sac • Hydrocele Surgery with Plication of the Hydrocele Sac
Varicocele	<ul style="list-style-type: none"> • dragging sensation in the scrotum, and a feeling of heaviness. • bag of worms • Infertility 	<ul style="list-style-type: none"> • Physical examination 	<ul style="list-style-type: none"> • Indicated in: infertility, testicular pain and low testicular volume • Procedure: ligation and angioembolization





Quiz!

Q1: Which one of the following is a voiding symptoms?

- A) Nocturia
- B) Frequency
- C) Hesitancy

Q2: Ascending Route is most common Especially in females because the shorter urethra allows GI pathogens to ascend to the urinary system much easily. And if left untreated it may cause an upper tract infection such as:

- A) pyelonephritis
- B) Urethritis
- C) Cystitis

Q3: Renal pain usually occurs between:

- A) Upper right abdomen radiating to the back.
- B) between 8th rib to 10th rib.
- C) between 12th rib and sacrospinalis muscle.

Q4: A 32-year-old man and his 29-year-old wife come to the physician because they have been unable to conceive despite regular unprotected sexual intercourse for 13 months. The woman reports regular menstrual cycles since the age of 13. Menses occur at regular 28-day intervals and last 5–7 days. Ovulation predictor kits consistently turn positive around day 14. The man has a negative history of mumps. The man works in construction and his wife is a secretary for a law firm. Examination of the scrotum in a standing position shows soft bands palpated in the upper pole of the left scrotum with an intact left testicle. Following Valsalva maneuver, the patient reports a dull, aching pain in his left hemiscrotum. A light held behind the scrotum does not shine through. The right scrotum appears normal. Semen studies show normal sperm count with moderately decreased motility and abnormal morphology. Which of the following is most likely to improve the patient's ability to conceive?

- A) Ligation of dilated pampiniform venous plexus
- B) Orchiopexy
- C) Inguinal hernia repair

Q5: A 33-year-old woman comes to the ER because of severe right flank pain for 2 hours. The pain is colicky in nature. She has had 2 episodes of vomiting. Her temperature is 37.3°C , pulse is 96/min, blood pressure is 116/76 mm Hg. The remainder of the examination shows no abnormalities. Her leukocyte count is 7400/mm³. A low-dose CT scan of the abdomen and pelvis shows a round 12-mm stone in the distal right ureter. Urine dipstick is mildly positive for blood. Microscopic examination of the urine shows RBCs and no WBCs. 0.9% saline infusion is begun and intravenous is administered. Which of the following is the most appropriate next step in management?

- A) Extracorporeal shock wave lithotripsy
- B) Ureterorenoscopic stone removal
- C) Observation

Answers

Q1	C	Q4	A
Q2	A	Q5	B
Q3	C		-





Quiz!

Q6: A 55-year old man presents with fever and pain in the perineal region. He also complains of frequency, urgency, dysuria, and decreased urinary stream. Upon examination, his abdomen is soft, nondistended, and nontender. Rectal exam demonstrated exquisite tenderness on the anterior aspect. Laboratory exam was consistent with bacterial infection. Which of the following is the most likely diagnoses?

- A) Urinary tract infection
- B) Nephrolithiasis
- C) Prostatitis

Q7: A healthy female came to the emergency with flank pain and fever. She is not complaining of nausea and vomiting. The best management for her is?

- A) Admission with IV ciprofloxacin for 3 days
- B) Outpatient with oral ciprofloxacin for 3 days
- C) Outpatient with oral ciprofloxacin for 10 days

Q8: With regards to renal stones, which of the following is true?

- A) Pure uric acid stones are radiopaque
- B) A staghorn calculus is composed of magnesium ammonium phosphate
- C) Uric acid stones are the least common type of stone

Q9: 40 year old male presents with 4 hour history of excruciating left loin pain radiating to the groin. He informs you that his father had gout. KUB revealed radio-opaque stone in the ureter 4mm in diameter. What is the most likely stone type ?

- A) Cysteine
- B) Uric Acid stone
- C) Calcium oxalate

Q10: A 60-year-old man seeks medical attention because of recurrent urinary tract infections. The patient also reports a history of increasing difficulty in urination (decreased flow, straining, and hesitancy) over the last several months. A prostate-specific antigen (PSA) level is mildly elevated and a prostate biopsy proves benign. Which of the following is the most appropriate initial management of this patient with benign prostatic hyperplasia (BPH)?

- A) α -Adrenergic blocker
- B) 5-alpha reductase inhibitor
- C) Transurethral resection of the prostate (TURP)

Answers

Q6	C	Q9	C
Q7	C	Q10	C
Q8	B		



القادة

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شكر خاص لتيم الجراحة دفعة ٤٣٩

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