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Renal stones, UTIs & Common urologic disorders

Objectives

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

Colour Index

- Main Text
- Males slides
- Females slides
- Doctor 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:

- 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.

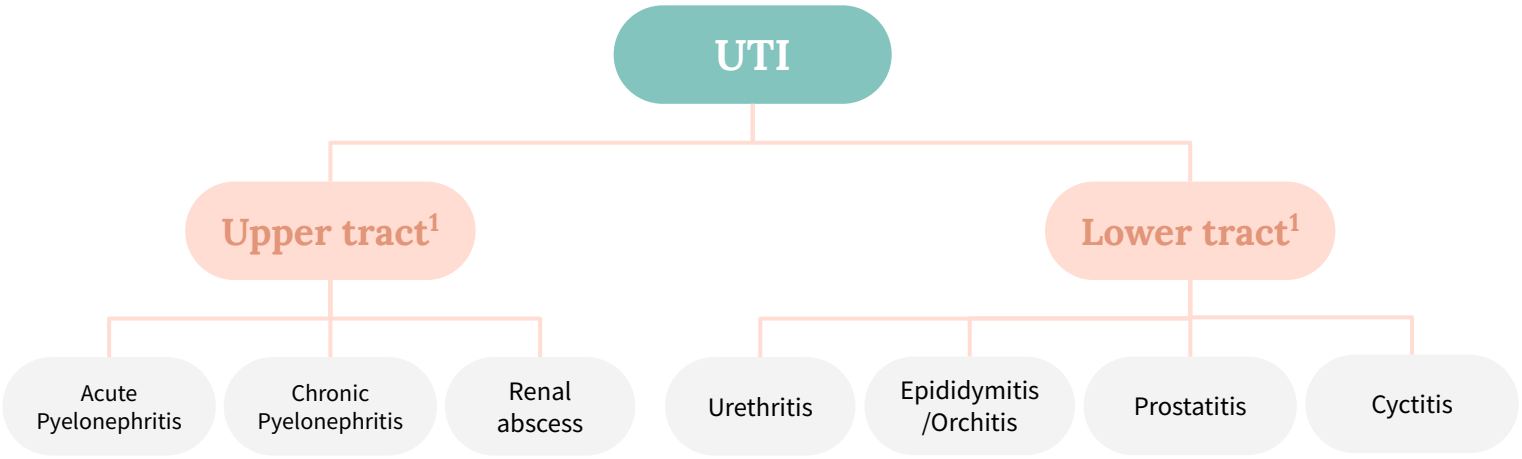
Voiding
(obstructive)

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

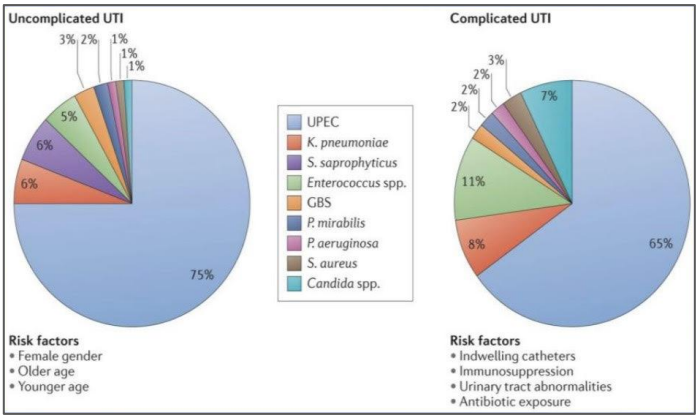
Weak stream: poor stream, they have to strain and increase pressure.

Oliguria: decreased urinary output.

anuria: complete absence of urine output

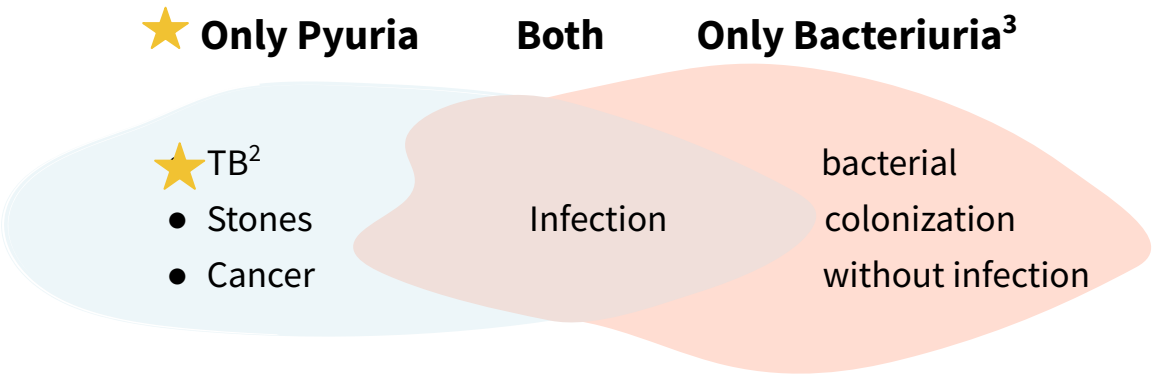


- (UTIs) are severe public health problems.
- Most common:
  - Gram –ve Bacteria (Escherichia coli).
  - Enterococcus faecalis.
  - Klebsiella
  - Pseudomonas aeruginosa
- Increasing problems due to:
  - High recurrence rates.
  - ↑ Antimicrobial resistance



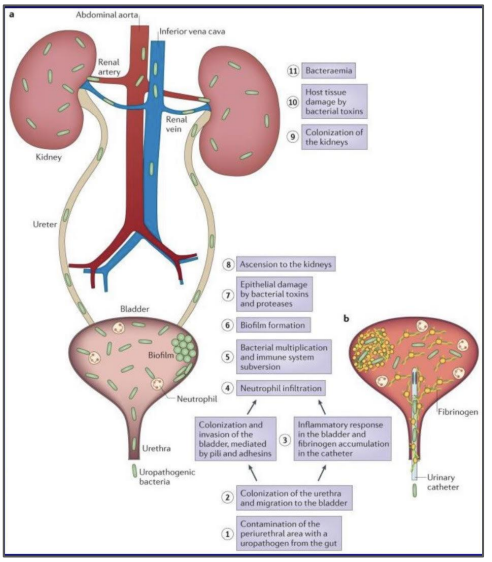
	Definition
Bacteriuria	The presence of bacteria in the urine, can be Symptomatic or Asymptomatic.
Pyuria	• Presence of white blood cells (pus cells) in the urine. • not only signify infection, also it can mean only inflammation.

- 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).
3. You don't have to treat bacteriuria without pyuria because you'll get bacterial resistance

Routes of urinary tract infections:



- 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)
  - Staph bacteremia (oral sites/candida fungemia) Dental issues and dental infections → disseminate into the bloodstream → renal abscesses.
- Lymphatic Route (Rare).
  - 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

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

VS

Complicated UTI

- 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).

UTI:

Urethritis

Signs and symptoms

- Asymptomatic (usually asymptomatic in females).
- Burning on urination.
- Urethral discharge (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 discharge
  - Nongonococcal (1-5 weeks) comes with scant discharge
- Urethral swab (confirmatory)
- Serum: Chlamydia specific ribosomal RNA (confirmatory)

Treatment

Table 17–1. CLASSIC URETHRITIS

	Gonorrhea	Chlamydia
Organism	*Neisseria gonorrheae*	*Chlamydia trachomatis*
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/ligand chain reaction
Other tests	Gram stain Culture	Culture Immunoassay
Recommended treatment	Ceftriaxone 125 mg IM once *plus* Azithromycin 1 g PO *or* Doxycycline 100 mg PO bid × 7 days	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:

- 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

Diagnosis

- By physical examination: you should be able to differentiate Epididymitis vs. Torsion
- Ultrasound (confirmatory)
- Testicular scan
- 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

- usually in older patients and shows the cardinal signs of inflammation.
- Onset: gradual onset of pain (usually preceding UTI).
- Physical examination reveals: Fever, local signs of inflammation (redness, hotness).
- Ultrasound: increased blood flow to the testis and the epididymis.

Torsion

- usually in younger patients
- 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]
- Ultrasound: No blood flow.
- Torsion is a medical emergency if not treated immediately the testicle will die within 8 hours.

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., to-bramycin, 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

Prostatitis

- A syndrome that presents with inflammation ± infection of the prostate gland including:

01 Dysuria, frequency

02 Dysfunctional void (slow urine stream)

03
- Perineal Pain
- Painful ejaculation

Table 15–1. CLASSIFICATION SYSTEM FOR THE PROSTATITIS SYNDROMES

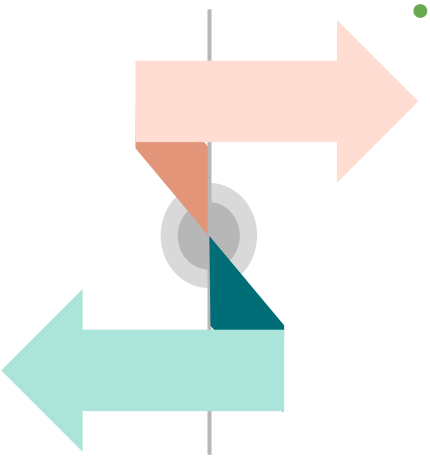
Traditional	National Institutes of Health	Description
Acute bacterial prostatitis	Category I	Acute infection of the prostate gland
Chronic bacterial prostatitis	Category II	Chronic infection of the prostate gland
N/A	Category III chronic pelvic pain syndrome (CPPS)	Chronic genitourinary pain in the absence 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.

Doctor said Just know that prostatitis can be categorized into more than acute or chronic

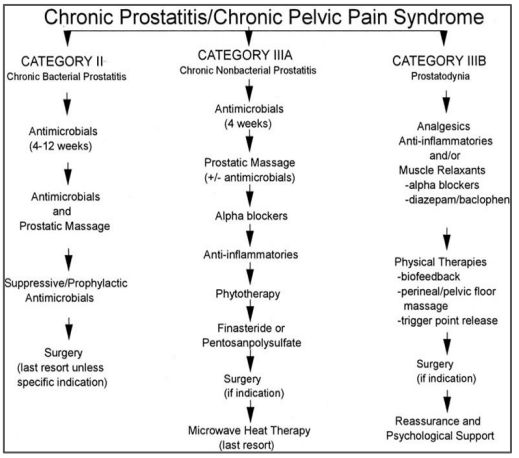
Acute Bacterial Prostatitis

- 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



Chronic prostatitis/Chronic Pelvic pain syndrome :

- Doctor said this is for your knowledge and we won't ask you about it



Cystitis

Signs and symptoms

- It's more common in female.
- 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 this maybe cystitis
- ± Hematuria, sometimes not visible grossly (microscopic hematuria)

Diagnosis

- dip-stick you see blood cell , pus , pyoria , positive nitrite
- urinalysis It gives more accurate results than using a dipstick. However, dipstick is faster.
- Urine culture: the ultimate test but takes days, so we usually start by treating the patient empirically.

Treatment

★ Single dose for 3 or 5 days depending on the antibiotic chosen.

- 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

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	
Symptoms for >7 days, recent urinary tract infection, age >65 yr, diabetes, diaphragm use		TMP–SMX or Fluoroquinolone	160–800 As above	Every 12 hr As above	7
Pregnancy	Oral	Amoxicillin	250	Every 8 hr	7
		Cephalexin	500	Four times a day	
		Microcrystalline nitrofurantoin	100	Four times a day	
		TMP-SMX	160–800	Every 12 hr	
Men					
Healthy and <50 years old	Oral	TMP-SMX or Fluoroquinolone	160–800 As above	Every 12 hr As above	7

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.

Signs and symptoms

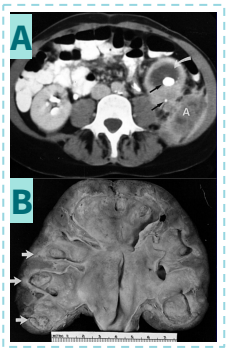
- Chills
- Fever
- Costovertebral angle tenderness (flank Pain). also called murphy's punch sign
- GI: abdomnal pain, Nausea, vomiting and diarrhea.
- Gram -ve sepsis
- Dysuria and frequency

Investigation

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

Imaging

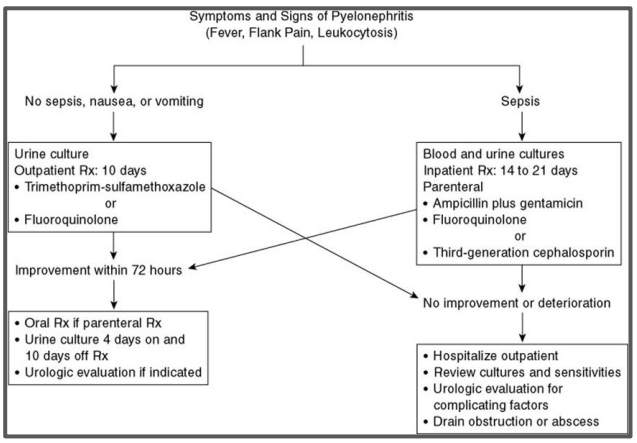
- IVP (intravenous pyelogram) we don't use anymore
- Ultrasound
- CT to make sure there's no abscess



Picture A: a stone causing granulomatous pyelonephritis

Picture B: pyelonephritis grossly

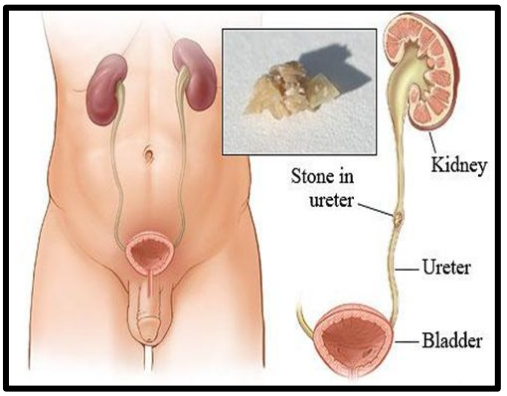
Treatment



- Basically, if the infection isn't severe and the patient is hemodynamically stable, then the patient is treated in the outpatient clinic.
- But if the patient is elderly, febrile, vomiting or immunocompromised then the patient needs admission.

urolithiasis:

- have been reported in Egyptian mummies 4800 BC
- Prevalence of 2% to 3%,
- Lifetime risk: Male 20%, female 5-10%
- Recurrence rate 50% at 10 years

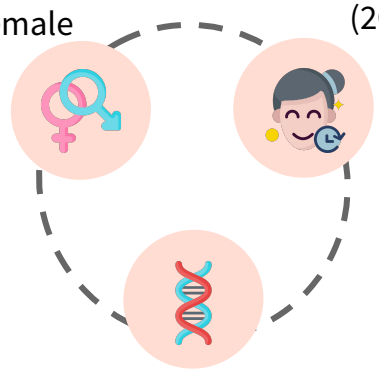


Risk factors:

Intrinsic

Sex
Male > female

Age
(20s - 40s)



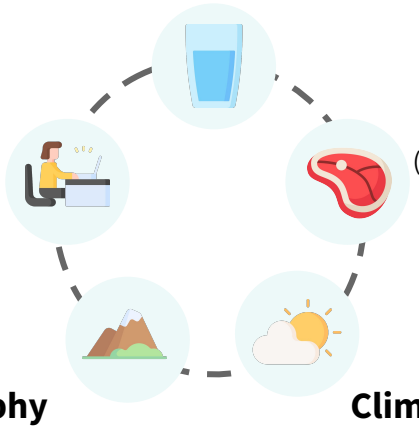
Genetics
include cystine stones, and renal tubular acidosis

Extrinsic

Water intake

Occupation
(sedentary occupations)

Diet
(purines , oxalates and Na)



Geography
(mountainous, desert and tropics)

Climate
(July - October)

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

How do stones form?

01 Supersaturated

02 Crystal growth

03 Aggregation of crystals

04 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): ★

Calcium oxalate stones 75% (Ca Ox)

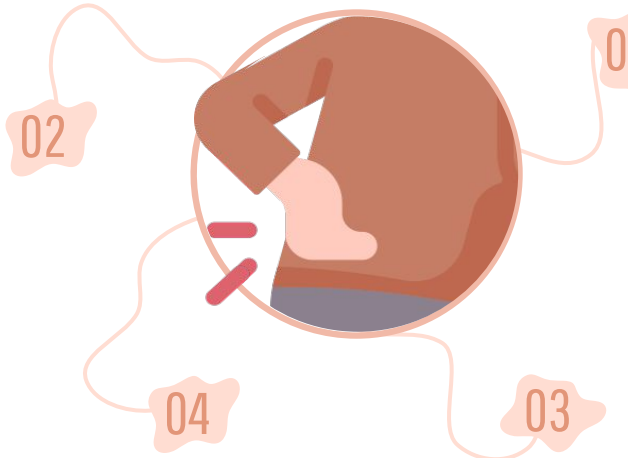
Calcium phosphate
If there is too much of oxalate present it will lead to Ca-Oxalate stones Otherwise we will have Ca-Phosphate.

Uric acid stones
formed due to gout or myeloproliferative disorders.

Cystine stones[1]

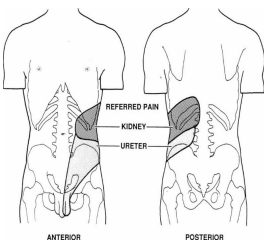
Struvite stones[2] **(Staghorn)**
Composed of magnesium ammonium phosphate

Signs and symptoms: ★



- **GI symptoms:**
  - Nausea & vomiting.
  - Ileus or diarrhea.
- **Differential diagnosis:**
  - Gastroenteritis
  - acute appendicitis
  - colitis
  - salpingitis

- **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.



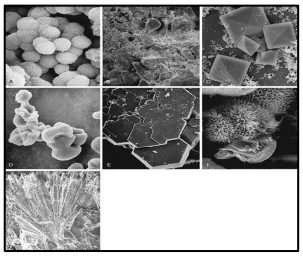
- **Restless**
  - ↑HR, ↑BP
  - fever (If UTI)
  - Tender CVA costovertebral: is pain that results from touching the region inside of the costovertebral angle. The CVA is formed by the 12th rib and the spine.

- Frequency, dysuria
- Hematuria

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 crystalize into a stone. These organisms are: Proteus (most common), Pseudomonas, Klebsiella, staphylococcus and mycoplasma

Investigation:

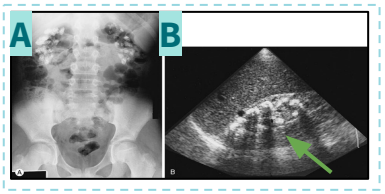
- **Urinalysis:**
  - RBC
  - WBC
  - Bacteria
  - Crystals



Different shapes of crystals

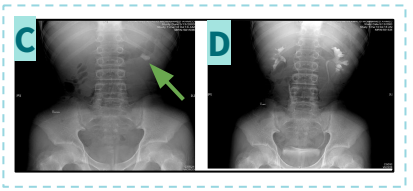
- **Other:** hematological and biochemical tests are used to exclude metabolic causes and to assess renal function

- **Imaging:**
  - ★ Start with non-contrast CT scan unless it's contraindicated (e.g. pregnant patient), do not use it when we know its a Stone, then we use Ultrasound or X-ray (KUB)
  - Plain Abdominal Films (KUB)
  - Intravenous Urography (IVU)
  - Ultrasonography (U/S)
  - Computed Tomography (CT)

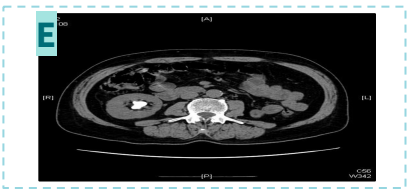


Picture A: KUB shows stones in the cortex (nephrocalcinosis) stones appear bright (radio opaque), but doesn't show uric acid (radio lucent) and only shows 70% of stones

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



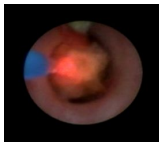
Picture E: nowadays we use CT with IV contrast instead of using IVU Even uric acid can be shown.

Management:

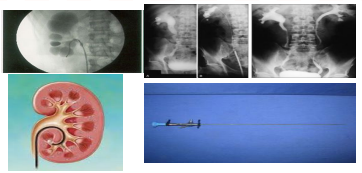
- Most of them **Conservative:**
  - Hydration
  - Analgesia
  - Antiemetic
  - Stones (<5mm) >90% spontaneous Passage

★ **Indication for admission:**
  - Renal impairment
  - Refractory pain
  - Pyelonephritis
  - intractable Nausea and Vomiting

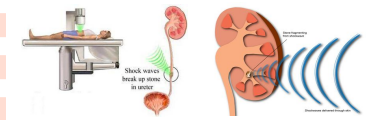
- A stone less than 0.5 cm in diameter may pass spontaneously. Immediate treatment should be considered in case of acute pain, renal obstruction, or sepsis. Extracorporeal shock-wave lithotripsy (ESWL) sends shock waves to break up stones. If breaking the stone isn't sufficient then percutaneous nephrolithotomy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



Laser ureteroscopy:

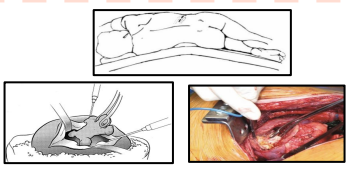


ureteroscopy:
flexibile (on left) Rigid (the right)
For hard stones, failure of shock wave



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

Percutaneous Nephrolithotripsy (PNL)
only for big stones



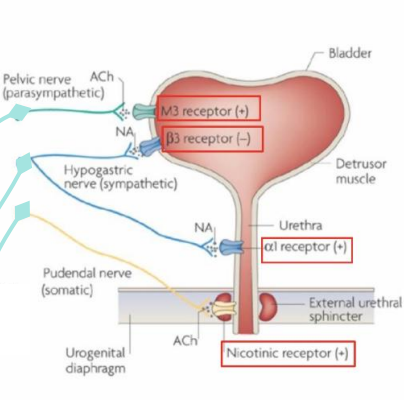
Anatrophic nephrolithotomy
Used rarely in very severe cases

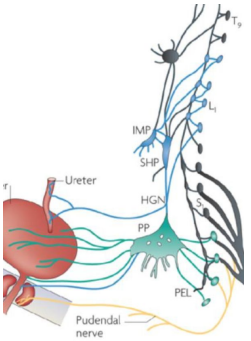
Voiding dysfunction

- 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)
- Inhibitory (relaxation) to the internal urethral sphincter.





Pudendal nerve

- excite the external urethral sphincter.

Hypogastric sympathetic nerve

- inhibit the bladder body and excite the bladder base and urethra.
- Inhibitory (relaxation) to the detrusor muscle (β3 receptor)
- Motor (contraction) to the internal urethral sphincter (α1 receptor) α blocker relax that muscle

Lower urinary tract symptoms (LUTS):

STORAGE (irritative)

- Dysuria
- Frequency
- Nocturia
- Urgency
- Incontinence:

- Urge incontinence[1]
- Stress incontinence[2]
- Overflow incontinence[3]
- Functional (total) incontinence[4]
- Mixed incontinence[5]
- Reflex (spastic bladder) incontinence[6]

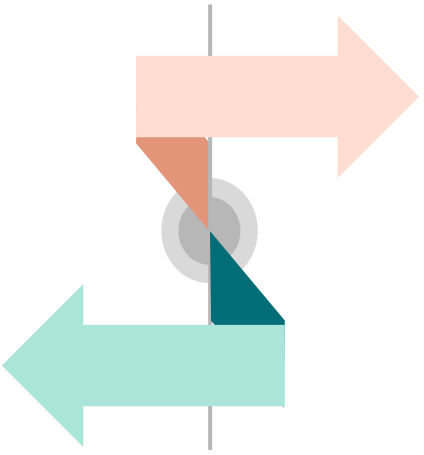
VOIDING (obstructive)

- Hesitancy
- Weak stream
- Straining
- Intermittency
- Drippling
- 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-urologic 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:**
  - overactivity
  - Hypersensitivity
- **Outlet problem:**
  - Stress incontinence
  - Sphincter deficiency
- **combination**



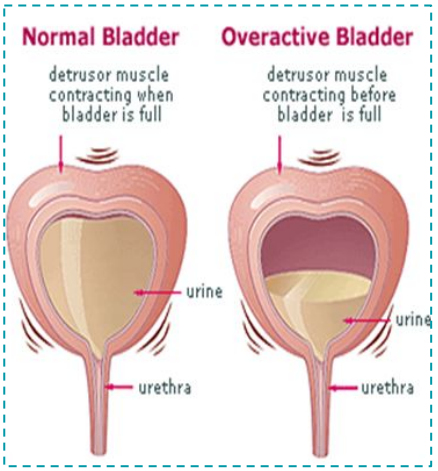
Failure to void

- **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, and if diabetic ask whether the diabetes is controlled or not
- Physical exam: make sure no signs of infection, fever and sepsis ...
- Urine analysis
- Culture/ sensitivity test
- Ultrasound: to check the kidney, check the bladder capacity and if the bladder empty properly.



Present with frequency, urgency, incontinence and nocturia.

Treatment:

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

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
- LUTS usually voiding symptoms it may presents as storage if detrusor muscle became hyperactive
- 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
- signs and symptoms of obstructive uraemia, including drowsiness, anorexia and personality changes.

Physical examination

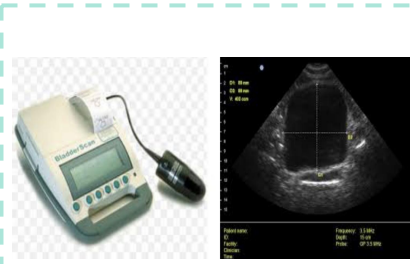
- **Digital rectal examination (DRE):**
  - Evaluate the prostate: size, consistency and tenderness (prostatitis)
  - hard prostatic nodule: Prostate cancer (asymmetry) , BPH, calcification and TB (granuloma)
  - firm and fibrous = previously infected or has a large amount of stromal tissue
  - rubbery 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 neurologic exam:** especially elderly aside checking BPH in DRE we check:-
  - Prostate Cancer
  - rectal Cancer and hematuria
  - anal tone: so we can assess the bladder inervation to diagnose neurogenic bladder
  - neurologic problems
- **Abdomen:** distended bladder without tender comparing to cystitis

Investigation

- **Urinalysis, culture**
  - UTI
  - Hematuria
- **Serum Creatinine:** because the urine put pressure back to kidney and may cause hydronephrosis > renal failure. so we must check renal function.
- **Serum Prostate:** Normal level of PSA: less than 4.0 ng/mL. Elevated by anything that damages the prostate: prostate cancer, prostatitis, surgical procedures or trauma
- **Blood urea nitrogen**
- **Flow rate** explained in next page
- **Ultrasound** (Kidney, Bladder And Prostate) to check complication
- elevated PostVoid Residual (PVR)

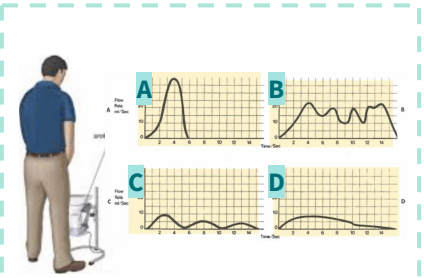
Ultrasound

- We have to do in two dimensions.
- The bladder is full and the prostate volume is 58 ml almost 3 times the normal size



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.



Uroflowmetry[1]

- Picture A: Normally it's bell-shaped
- Picture B: Fluctuating "but more than 20/sec" = not obstructive
- Picture C: Fluctuating "less than 20/sec" = obstructed bladder
- Picture D: lesser than 20 = bladder neuropathy

Complications:

01 **bladder stones**

02 **UTI**

03 **bladder decompensation**

04 **incontinence**

05 **upper tract deterioration** (hydroureter)(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.

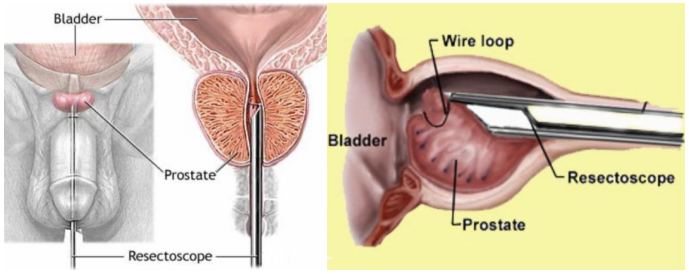
Treatment options:

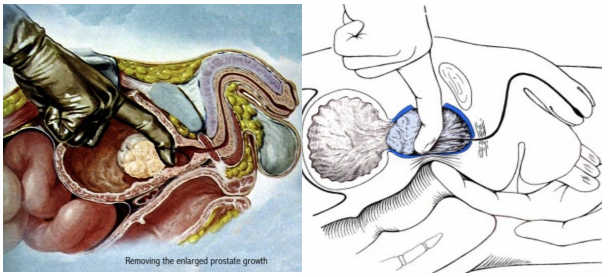
Medical therapy

- We treat only symptomatic patients
- if patient presented with moderate symptoms, we give him alpha-blocker
- no response? add the other drug (Androgen suppressor)
- **α-Adrenergic Blockers:**
  - Tamsulocin
  - Alfuzocin
  - Terazocin
- **Androgen Suppression:**
  - 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, Hematurea, Bladder stones), or patients who "want" to do surgery
- **Laser ablation**
- **prostatic stents**
- **Open Prostatectomy**





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. 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.

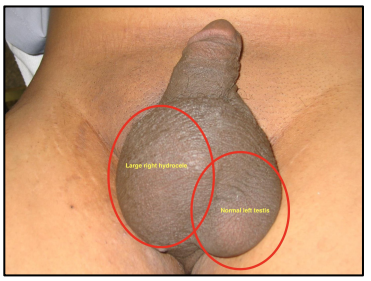
Open Prostatectomy

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:

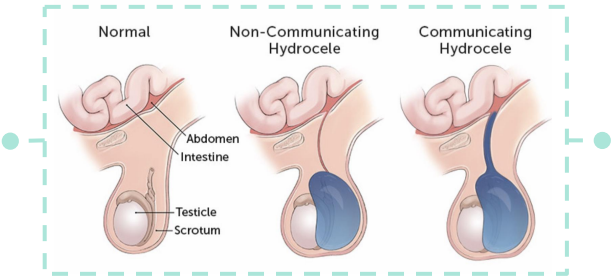


- hydrocele occurs in males when fluid fills the scrotum (painless)
- Fluid can surround one or both testicles, causing swelling in the scrotum.
- More common in baby boys, it may also occur in adult men.

★ The distinction between a cyst of the epididymis and a hydrocoele is easy. Epididymal cysts transilluminate brightly and almost always multiple, therefore nodular on palpation and the testes palpated separately from the cyst unlike in hydrocoele 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 testes, 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

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).
- Shine a light through the scrotum (transillumination) --> If hydrocele is present transillumination will show clear fluid surrounding the testicle.

Diagnosis and management

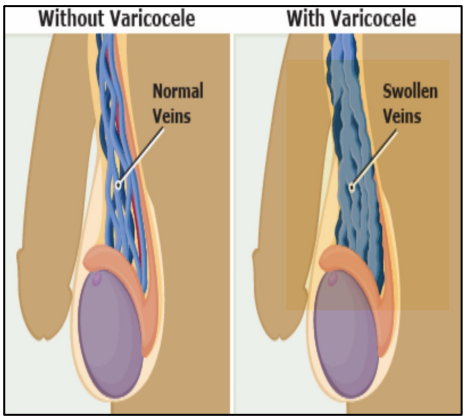
- Imaging: ultrasound
- Two surgical techniques are available:
  - Hydrocelectomy with Excision of the Hydrocele Sac[1]
  - Hydrocele Surgery with Plication of the Hydrocele Sac[2]
- Needle Aspiration is not favoured and not used anymore because the hydrocele will refill and reoccur.

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..

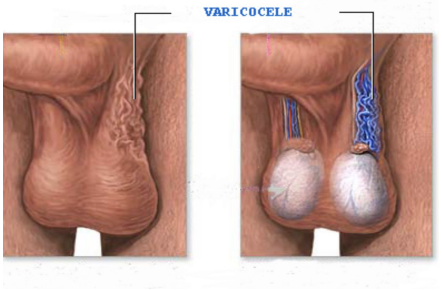
Scrotal disorders

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.



Treatment :

- Indicated in:

Infertility with abnormal semen parameters.

Testicular pain

Impaired testicular volume.

- Procedures:

01 ligation (open, microscopic or lap)

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 (glue) is used to block off the abnormal testicular vein.

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
   - The lack of effective antireflux 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)

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

Q22: Where does BPH occur?
Answer: Periurethrally (Note: Prostate cancer occurs in the periphery of the gland)

Q22: 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

Q22: What are the treatment options?
Answer:
Pharmacologic:
α-1 blockade Hormonal, antiandrogens
Surgical:
TURP, TUIP, open prostate resection and Transurethral balloon dilation

Q22: Why do α adrenergic blockers work?
Answer:
1. Relax sphincter
2. Relaxprostatecapsule

Q22: What is Proscar?
Answer:
Finasteride: 5-α-reductase inhibitor; blocks transformation of testosterone to dihydrotestosterone; may shrink and slow progression of BPH

Q22: What is Hytrin?
Answer: Terazosin: α-blocker; may increase urine outflow by relaxing prostatic smooth muscles

Q22: What are the indications for surgery in BPH?
Answer: Because of obstruction:
Urinary retention
Hydronephrosis
UTIs
Severe symptoms

Q22: What is TUIP?
Answer: TransUrethral Incision of Prostate

Q22: What percentage of tissue removed for BPH will have malignant tissue on histology?
Answer: Up to 10%!

Q22: What are the possible complications of TURP?
Answer: Immediate:
Failure to void
Bleeding
Clot retention
UTI Incontinence

Summary

	Symptoms	Diagnosis	Management

Urethritis	• Asymptomatic
	• Burning on urination.
	• Urethral discharge
		• Incubation period:
		  ○ Gonococcal (3-10 days)
		  ○ Nongonococcal (1-5 weeks)
		• Confirm:
		  ○ Urethral swab
		  ○ Serum: Chlamydia specific ribosomal RNA
			• 1g IM ceftriaxone
			• 1 dose azithromycin orally

Epididymitis	• **Acute:** Pain , swelling of epididymis < 6 weeks • **Chronic:** Long-standing pain in the epididymis and testicle. Usually no swelling	• History and physical examination • Confirmatory: ultrasound • Testicular scan	• **Bacteriuria:** 2 weeks wide spectrum antibiotics • **Sexually transmitted urethritis:** tetracycline or doxycycline for 10 days
Prostatitis	• Dysuria, frequency • Dysfunctional void • Perineal pain • Painful ejaculation	-	• **Acute:** antibiotics and urinary drainage
Cystitis	• dysuria, frequency, urgency, voiding of small urine volumes. • Suprapubic /lower abdominal pain • ± Hematuria	• **urinalysis** It gives more accurate results than using a dipstick. However, **dipstick** is faster. • **Urine culture:** the ultimate test but takes days	• **Uncomplicated:** broad spectrum antibiotics for 3 days • **Complicated:** Quinolone or Bactrim (TMP-SMX) for 7 days

Pyelonephritis	• Chills.
	• Fever.
	• Costovertebral angle tenderness (flank Pain).
	• GI: abdominal pain, Nausea, vomiting and diarrhea.
	• Gram -ve sepsis
	• Dysuria and frequency
		• serum Creatinine
		• Urine culture & sensitivity test
		• Urinalysis
		• CBC
		• Imaging:
		  ○ Ultrasound
		  ○ CT
		  ○ IVP
			• **Stable:** 10 days wide spectrum antibiotic outpatient
			• **Unstable:** admit for 2-3 weeks IV antibiotics

Summary

	Symptoms	Diagnosis	Management

Urolithiasis	• Renal, ureteric colic
	• Frequency, dysuria
	• Hematuria
	• Restless
	• GI symptoms
		• Urinalysis
		• Imaging: start with non-contrast CT, if sure use ultrasound and x-ray:
		  ○ KUB
		  ○ IVU
		  ○ CT
			• **Conservative**
			• **Indication for admission:**
			  ○ Renal impairment
			  ○ Refractory pain
			  ○ Pyelonephritis
			  ○ intractable Nausea and Vomiting

Overactive bladder	• Frequency • Urgency • Incontinence • Nocturia	• History • Physical exam • Urine analysis • Culture/ sensitivity test • Ultrasound	• Behavioral • Pelvic floor exercise • Anticholinergic • beta-3 agonist

BPH	• LUTS
	• poor bladder emptying
	• urinary retention
	• urinary tract infection
	• Hematuria
	• Renal insufficiency
		• Physical examination: DRE, Focused neurologic exam and Abdomen
		• Serum creatinine
		• Serum prostate
		• Urinalysis, culture
		• Flow rate
		• Ultrasound, PVR
			• **Medical therapy:**
			  ○ α-Adrenergic Blockers
			  ○ Androgen Suppression
			• **Surgical therapy:**
			  ○ Endoscopic
			  ○ TURP
			  ○ Laser ablation
			  ○ prostatic stents
			  ○ Open Prostatectomy

Hydrocele	• swelling in the scrotum	• Physical examination • Imaging: ultrasound	• Hydrocelectomy with Excision of the Hydrocele Sac • Hydrocele Surgery with Plication of the Hydrocele Sac
Varicocele	• dragging sensation in the scrotum, and a feeling of heaviness. • bag of worms • Infertility	• Physical examination	• Indicated in: infertility, testicular pain and low testicular volume • Procedure: ligation and angioembolization

Quiz

MCQ

Q1: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

Q2: 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

Q3: 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 calcium-ammonium-magnesium phosphate
C) Uric acid stones are the least common type of stone

Q4: 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

Q5: 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

Q1	C	Q4	C
Q2	C	Q5	C
Q3	B		

Extra Questions

Good Luck!

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Feedback