



GENITOURINARY SYSTEM

SUBJECT : Microbiology

LEC NO. : 1

DONE BY : Rama Omoush

وَقُلْ رَبِّ زِدْنِي عِلْمًا

بهاد السيستم ان شاء الله رح نبليش بال UTI بعدين رح نحكي عن
STI هي مش كثير منتشرة عنا بالاردن ولكن برا كثير منتشرة و
كثير بسالو عنها بالامتحانات هاي

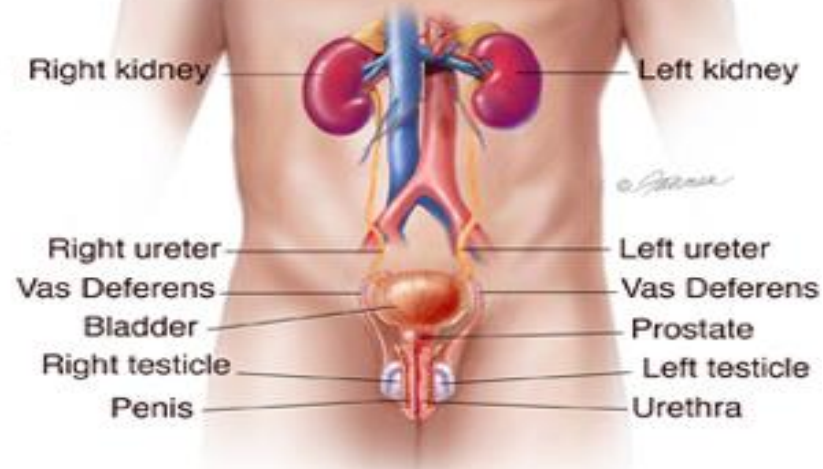
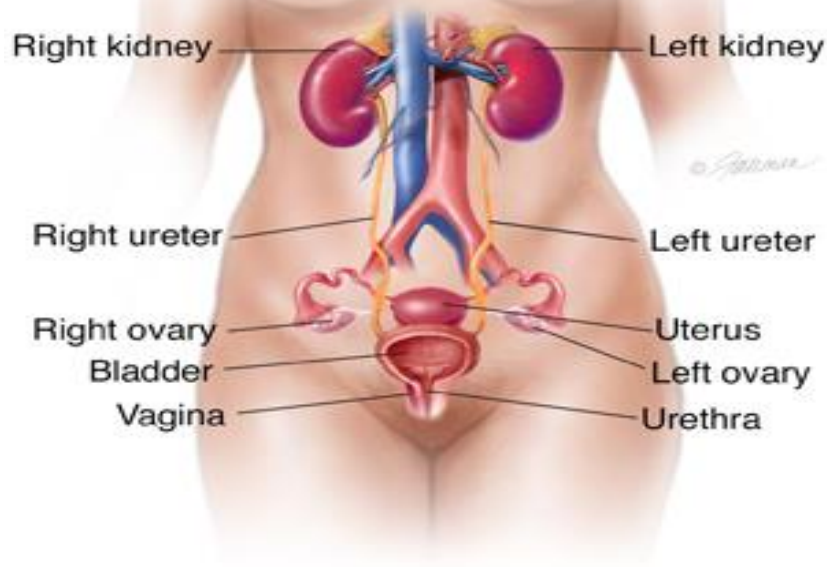
1. UTI
2. Gonorrhoea
3. Chlamydia trachomatis, Ureaplasma and Gardnerella
4. Syphilis
5. Trichomoniasis and Ectoparasitic infections: pubic lice, Scabies
6. HSV, HPV and HIV
7. Candidiasis---Candida-albicans

URINARY TRACT INFECTION

هو موضوع سهل و حلو كثير. وراح يتكرر معنا
جراحة أطفال مسالك نسائية وباطني

هو إشي سهل ومش صعب ولكن يختلف حسب العمر
والجنس فمثلا لو اجتك female عندها UTI غالبا المسبب
بكتيريا بأعطيها انتيبايوتيك لمدة ثلاث أيام وبعدين خلاص
بيروح ولكن لو كان عند man or child هو إشي مش
منتشر يصير عند الزلام عشان هيك لازم أطلب فحوصات
إضافية عشان اشوف شو الي عندهم لانه ممكن يكون اشوي
خطير فبطلب ultrasound, and CT scan

URINARY TRACT INFECTION



Urinary tract is normally sterile due to the fact that bacteria moving upwards are regularly washed out by urination

طول urethra يختلف بين الجنسين

ما في normal Flora لانه ال urine بس ينزل بينظف كل شيء معه ولكن ممكن
ألاقي normal flora بال urethra مثل bacillus, and staphylococcus

Normal flora found in the urethra consist of *lactobacillus and staphylococcus*

Background

1. Bacterial infections of urinary tract are a very common reason to seek health services
2. Common in young females and uncommon in males under age 50
لانه بس يكبر بيصير في عندي atrophy إذا راح
تزيد التهابات
3. Common causative organisms
 - *Escherichia coli* (gram-negative enteral bacteria) causes most community acquired infections
 - *Staphylococcus saprophyticus*, gram-positive organism causes 10 – 15%
 - Catheter-associated UTI's caused by gram-negative bacteria: *Proteus*, *Klebsiella*, *Serratia*, *Pseudomonas*

لما يكون عندي شخص بالمستشفى بالICU او bedridden بركبولوجو
catheter عشان ال urination مما يؤدي انها حتصير تنقل بكتيريا
ولكن حكتكون سالبة اغلبها

URINARY TRACT INFECTION

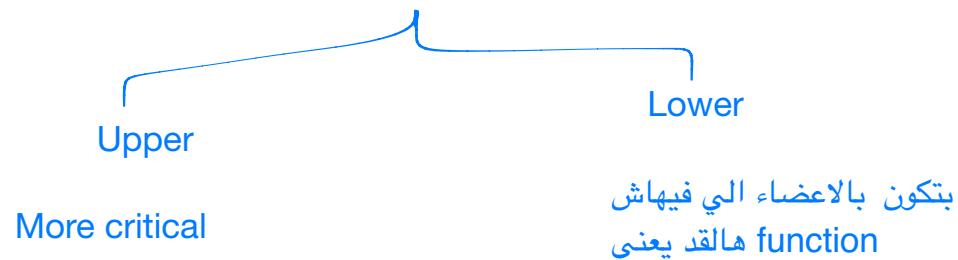
- Second most common infection following respiratory infections
- 20% of women between ages 20-65 suffer one attack per year.
- Approximately 40% of women develop a UTI during their lives

UTIs are named according the place of infection

- -In the urethra = Urethritis
- -In the bladder = Cystitis
- -In the kidneys = Nephritis
- -In the prostate (men) = prostatitis

Majority of infections are caused by bacteria, though some are fungal

الفيروسات نادر جدا



TYPES



**LOWER TRACT
INFECTION**



URETHRITIS

PROSTATITIS

CYSTITIS



**UPPER TRACT
INFECTION**



PYELONEPHRITIS

**PERI NEPHRIC
ABSCESS**

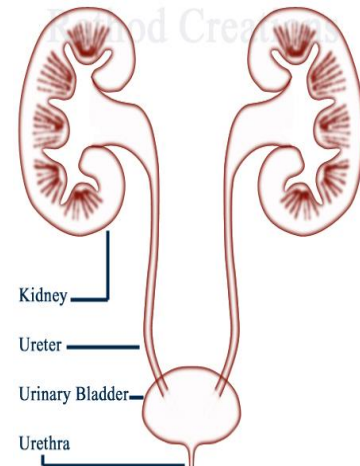
PATHOGENESIS

The normal bladder is capable of clearing itself of organisms within 2 to 3 days of their introduction.

Defense mechanisms

1. The elimination of bacteria by voiding
2. The antibacterial properties of urine and its constituents
 - **Osmlality, urea, ammonium, pH**
3. The intrinsic mucosal bladder defense mechanisms
4. An acid vaginal environment (female)
5. Prostatic secretions (male)

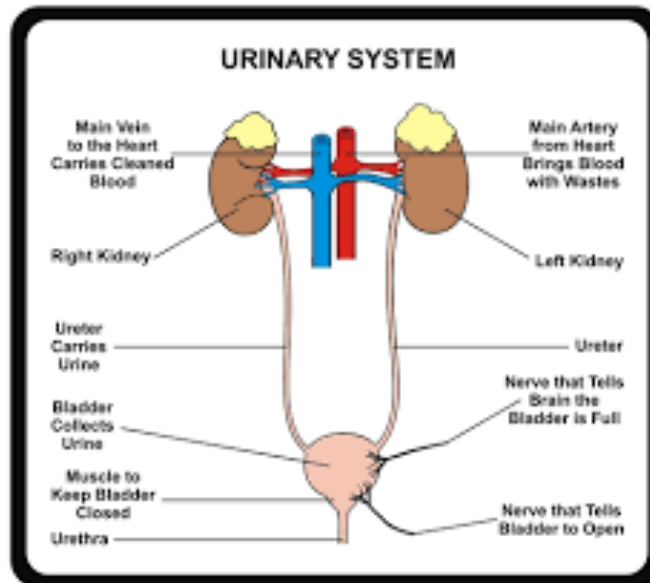
هسا انا في عندي اشيا بدافع فيها بشكل طبيعي اولاً
بتشتغل ك antimicrobial + mucosa بتطلع كمان منهم
chemicals



PATHOGENESIS

Two potential routes :

- (1) **The hematogenous route**, with seeding of the kidney during the course of bacteremia
- (2) **The ascending route**, from the urethra to the bladder, then from the bladder to the kidneys via the ureters.



PATHOGENESIS

Hematogenous Infection

- Because the kidneys receive 20% to 25% of the cardiac output, any microorganism that reaches the bloodstream can be delivered to the kidneys.
- The major causes of hematogenous infection are *S. aureus*, *Salmonella* species, *P. aeruginosa*, and *Candida* species.

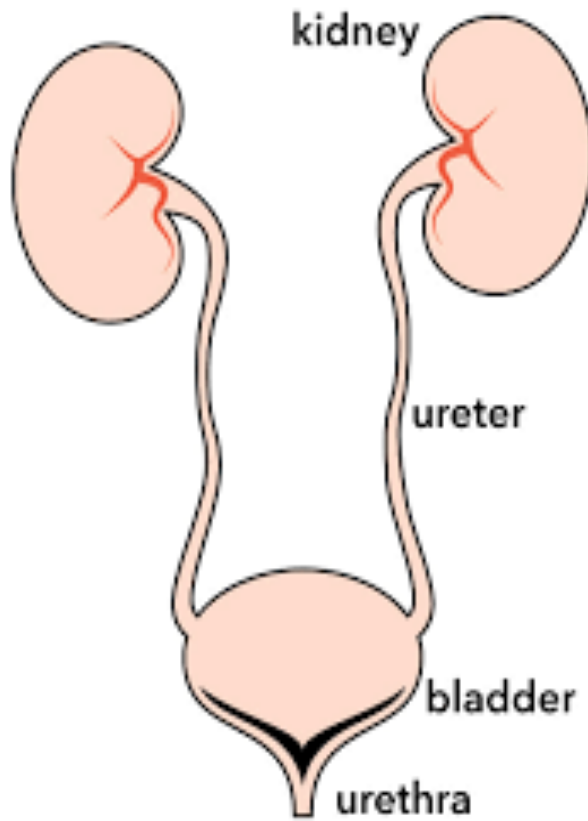
Pneumonia, meningitis and Bacteremia

بكون معهم هدول الامراض و بتوصل للكلية و بتسوي

بس هاد نادر كثير

PATHOGENESIS

ASCENDING INFECTION



- UTI occur when bacteria (*E. coli*) from the digestive tract get into the opening of the urinary tract and multiply
- Bacteria first infect the urethra, then move to the bladder and finally to the kidneys
- UTI tend to occur more in women than men

زبي م بنعرف انو ال *E. coli* من ال normal Flora بال gut ف
مثلا بتكون female و عندها poor hygiene و بتوصل لل
infection و بتعمل urethra

Female are more prone to UTI

- **Small urethra** طویل عند ال male و قصیر عند ال female عشان هیک بتوصل من ال gut
- **Gram negative organism radiate from perianal area to urethra**
- **Sexual intercourse**
- **Susceptibility of epithelium**
- **Pregnancy: ureteral tone and urethral peristalses decrease**

Hormonal changes

و بكون عنا کمان ضغط زاید بفترة الحمل مما یؤدي لحدوث urine stasis

Due to hormones differences

Symptoms of UTI

Burning pain and difficulty urination

- **Dysuria**
- **Increased frequency, urgency**
- **Hematuria**
- **Fever** →

general manifestation
و مش قادر
لما يكون الالتهاب بالاعضاء الي فوق يكون معها
- **Nausea/Vomiting (pyelonephritis)**
- **Flank pain (pyelonephritis)**
- **Discharge**

بتكون بالعادة مع STI مثلا زي
urethritis

Findings on Exam in UTI

- **Physical Exam:**

لما تسوي فحص و تضغط
باماكن معينة رح تلاحظ انو
وجع كل منطقة رح يدل على
التهاب معين

- **Suprapubic tenderness (Cystitis)**
- **CVA tenderness (pyelonephritis)**
- **Urethral discharge (urethritis)**
- **Tender prostate on PRE (prostatitis)**

تتذكرو فحص الكلبنكال سكيلز الي اخدناه و الي حكيتا بنشوف لو
في اي وجع بالبروستات عشان ممكن تدل عكثير اشيا ؟
و كمان ممكن نعرف من الفحث لو في تروما او كانسر او بللا بلا بلا

حببت احطلكم صورة
المنطقة احتياط عشان
تشوفوها و ال CVA
حنشوفها تحت

Right hypochondriac region

Epigastric region

Left hypochondriac region

Right lumbar region

Umbilical region

Left lumbar region

Right iliac region

Hypogastric (suprapubic) region

Left iliac region

UTI

- Most common pathogen for **cystitis, prostatitis, pyelonephritis**:
 - *Escherichia coli*
 - *Staphylococcus saprophyticus*
 - *Proteus mirabilis*
 - *Klebsiella*
 - *Enterococcus*
- Most common pathogen for urethritis
 - *Chlamydia trachomatis*
 - *Neisseria Gonorrhoea*

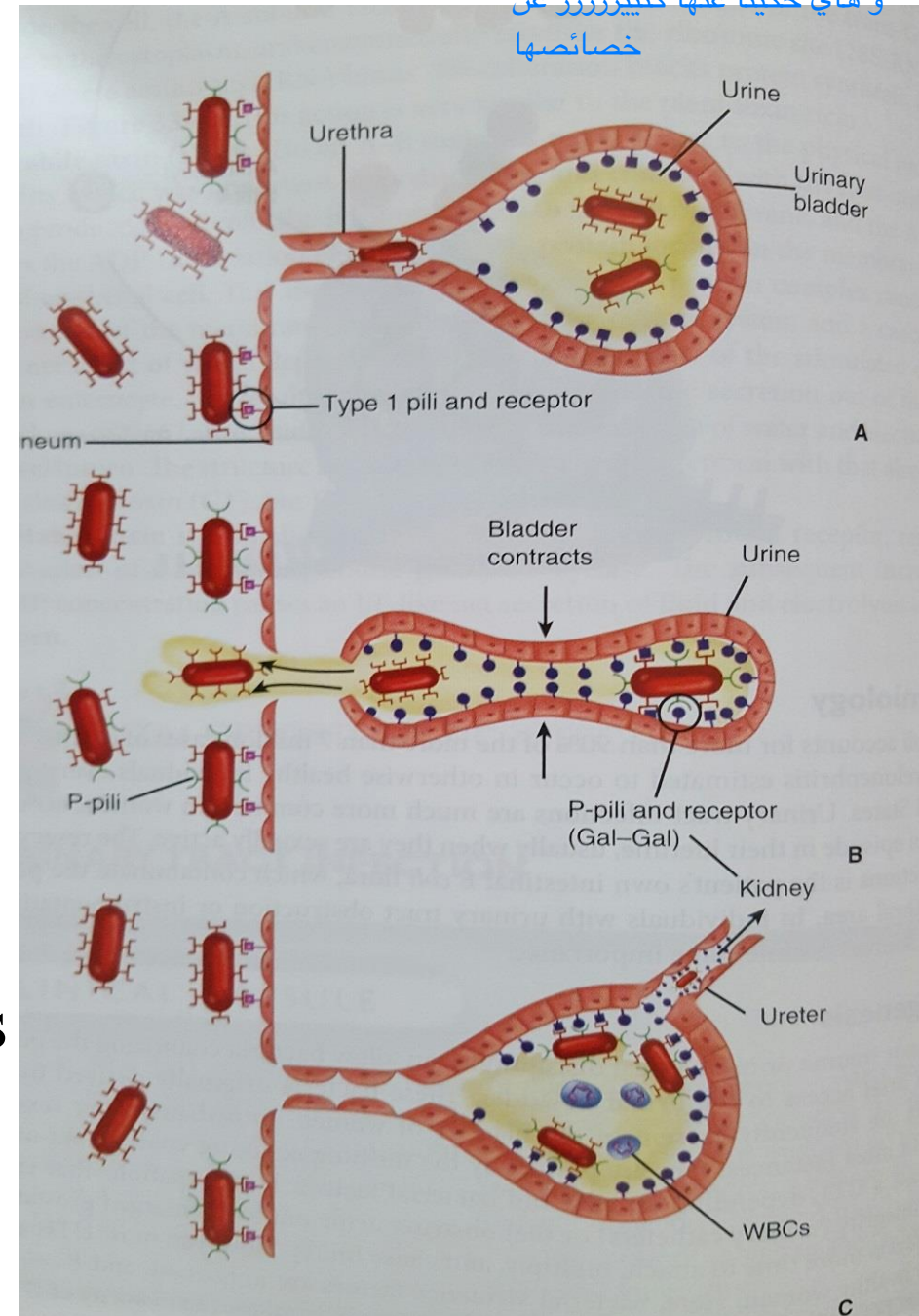


هذول زي م حكيينا
بكونو مع ال
catheter

Uropathogenic *E. coli*

virulence factors:

- Type 1 pili: most imp for periurethral and bladder colonisation
- P pili: most important for upper UTI, bind to Gal-Gal receptors
- Motility
- Alpha haemolysin
- Cytotoxic necrotising factors (CNF)
- Lipopolysaccharide



- Urease-producing members of the genus *Proteus* are associated with urinary stones, which themselves are predisposing factors for infection.
- A direct result of urease activity and ammonia generation is an increase in local pH.
- In the urinary tract alkaline pH leads to precipitation of calcium and magnesium ions and the formation of urinary stones composed of magnesium ammonium phosphate (struvite) and calcium phosphate (apatite).

هسا هاي بتسوي عندي حصوات طب ليش؟ لانها بتطلع urease فبزيد ال alkaline pH فبزود ترسيب ال Mg و ال Ca فبصير عندي stones

Cystitis

1. Most common UTI
2. Remains superficial, involving bladder mucosa, which becomes hyperemic and may hemorrhage
3. General manifestations of cystitis
 - Dysuria
 - Frequency and urgency
 - Nocturia (excessive urination at night)
 - Urine has foul odor, cloudy (pyuria), bloody (hematuria)
 - Suprapubic pain and tenderness

زي م حكيانو هو دايمًا Clear بس عشان
بكون مليون WBC و بكتيريا فبصير هيڪ

Cystitis

- **Uncomplicated** (Simple) cystitis
 - In healthy woman, with no signs of systemic disease
- **Complicated** cystitis
 - In men, or woman with comorbid medical problems.
- **Recurrent** cystitis (3 episodes in previous 12 months OR 2 episode in previous 6 months)

Uncomplicated (simple) Cystitis

- Definition
 - Healthy adult woman (over age 12)
 - Non-pregnant
 - No fever, nausea, vomiting, flank pain
- Diagnosis
 - Dipstick urinalysis (no culture or lab tests needed)

بتكون انثى و عمرها مناسب و مش حامل فبعطيها الدواء ل 3 ايام و بتطيب

Uncomplicated (simple) Cystitis

- Treatment
- First-line antimicrobial for empiric therapy of acute simple cystitis are
 - **Nitrofurantoin, p.o**
 - **Trimethoprim/Sulfamethoxazole for 3 days**
 - Fosfomycin
- beta-lactams are second-line agents
 - Amoxicillin-clavulanate
 - Cefpodoxime
 - Cefadroxil
 - May use fluoroquinolone (ciprofloxacin or levofloxacin) in patient with sulfa allergy, areas with high rates of bactrim-resistance

الدكتور حكا حناخدهم بالفارما و حياك
عالدكتورة انو ناخذ زيهم ف خلص لا
تدرسوهم



Complicated

- Definition

- Females with comorbid medical conditions
- All male patients
- Indwelling foley catheters
- Urosepsis/hospitalization

- Diagnosis

- Urinalysis, Urine culture
- Further labs, if appropriate.

لانه ممكن يكون عنده structures, stones, or tumors
عشان هيك
ضرورة جدا الصور

هون ممكن تكون زي م شرحتلکم اول سلايد يا
زلة يا ولد صغير او بنت صغيرة يكون عندهم
UTI بس لازم اتأكد انو فاش سبب تحت هاد
الالتهاب فبطلب صور زي. Ultrasound CT
scan, MRI

- Treatment

- Fluoroquinolone (or other broad spectrum antibiotic)
- 7-14 days of treatment (depending on severity)
- May treat even longer (2-4 weeks) in males with UTI

ممكن تكون کمان عند بنت كبيرة بس حامل او
عندها مشاكل صحية ثانية زي ضغط سكري و

بلا بلا

شوفو كيف الفرق هون بدنا مدة علاج اکبر و بدنا نضل نسوي follow up عشان نتأكد من کلشي
خصوصي الصغار عشان بخاف يصير عندهم reflux

Special cases of Complicated cystitis

- Indwelling foley catheter
 - Try to get rid of foley if possible!
 - Only treat patient when symptomatic (fever, dysuria)
 - Leukocytes on urinalysis
 - Patient's with indwelling catheters are frequently colonized with great deal of bacteria.
 - **Should change foley before obtaining culture, if possible**

هون لو ضلّيت تعطيه ادوية لبكرا مش
حيطيب لانه راس البلا لساته موجود فلازم
تغيريها

Special cases of Complicated cystitis

- Candiduria
 - Frequently occurs in patients with indwelling foley.
 - If grows in urine, try to get rid of foley!
 - Treat only if symptomatic.
 - If need to treat, give fluconazole (amphotericin if resistance)

Recurrent Cystitis

- Want to make sure urine culture and sensitivity obtained.
- May consider urologic work-up to evaluate for anatomical abnormality.
- Treat for 7-14 days.

PYELONEPHRITIS

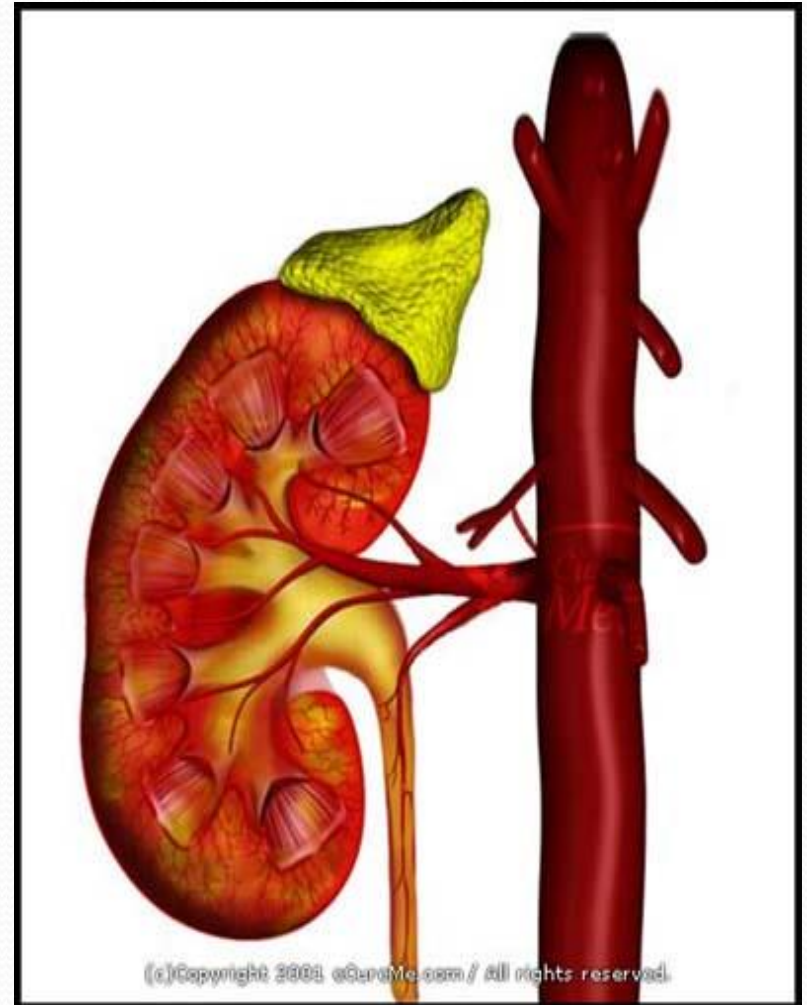
Pathophysiology

- Pyelonephritis, an upper urinary tract infection, is a bacterial infection of the renal pelvis, tubules, and interstitial tissue in one or both kidneys.
- Bacteria reach the bladder through the urethra and ascend to the kidney.
- It is frequently secondary to urine backup into the ureters usually at the time of voiding.
- Urinary tract obstruction (e.g. Urinary stones, tumors, and prostatic hypertrophy) is another cause.
- Pyelonephritis may be acute or chronic.

لوفي عنا structures
stones, tumors
urine و يرجع ل فوق و بسوي
infections

Etiology

- Almost always caused by E.coli
- Leading cause of gram negative sepsis and septic shock



Risk factors

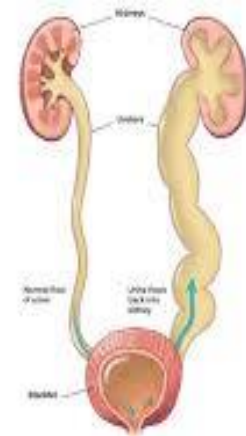
شو حكيتمكم فوق؟ بزيد الضغط فمممكن يزيد ال obstruction

و بتكون المناعة عندها اصلا قليلة

- **Pregnancy**
- Urinary tract obstruction and **congenital malformation**
- Urinary tract trauma, scarring
- Renal calculi
- Polycystic or hypertensive renal disease
- Chronic diseases, i.e. diabetes mellitus
- **Vesicourethral reflux**

مممكن يكون في abnormalities in kidney بتخلي ال urine ما يطلع أصلا

إذا جاك ولا تصغير عمره خمسة الأحد سبعة وعنده UTI you should investigate for



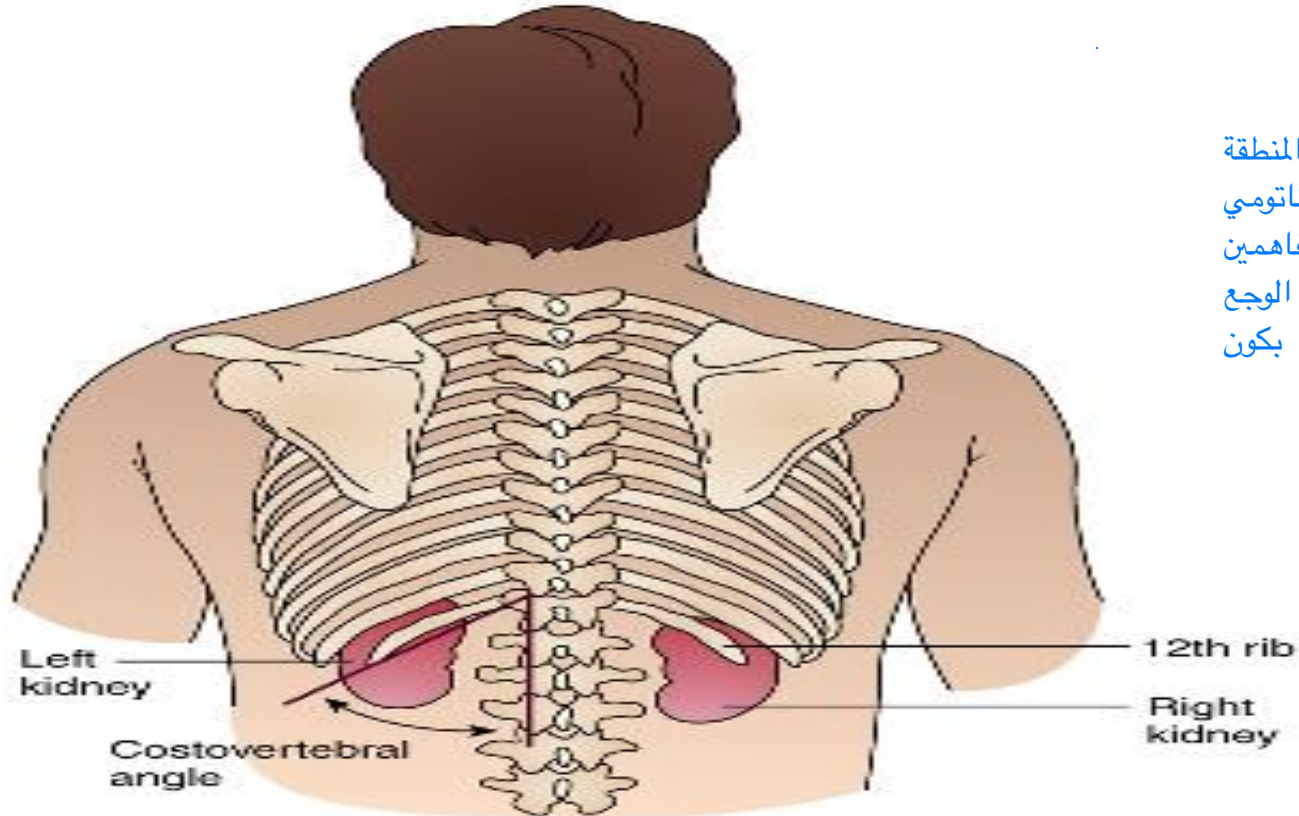
Clinical Manifestations

- Acute Pyelonephritis may be unilateral or bilateral, causing :
 - Chills
 - Fever,
 - Flank pain
 - Leukocytosis
 - Bacteriuria.

Signs and Symptoms

- Pt will become acutely ill, weakness , malaise and pain in the costovertebral angle (CVA)
- CVA tenderness to percussion is a common finding

Costovertebral Angle (CVA)



هاد الوجد يكون بهاي المنطقة
و زي م اخدنا بالاناتومي
مكانها فالفروص فاهمين
ليش بهالكان بالذات الوجد
بكون

Figure 45-2 Location of the costovertebral angle.

Diagnostic Tests

- Diagnosis is confirmed by bacteria and pus in the urine and leukocytosis
- Urine analysis with culture and sensitivity identifies the pathogen and determines appropriate antimicrobial therapy

Diagnostic Tests

- CT with contrast, renal ultrasound, BUN and Creatine levels of the blood and urine may be used to monitor kidney function

Medical Management

- Goal of treatment is to eradicate bacteria from the urine.
- Pt with mild signs and symptoms may be treated on an outpatient basis with antibiotics for 14 to 21 days
- Antibiotics are selected according to results of urinalysis culture and sensitivity and may include broad-spectrum medications

طبعاً العلاج هون بيكون قاسي لأنها مسألة حياة أو موت ممكن أدخله ICU و ممكن يون. بعطيه IV. Antibioti و يخليه عندي بالمستشفى ما بروحو عالدار و بعمله test and follow-up كل يوم عشان أتأكد إنه كل شي تمام لانه مش إشي بسيط فما بقدر أروحه على الدار

Treatment of Pyelonephritis

- 2-weeks of Trimethoprim/sulfamethoxazole or fluoroquinolone
- Hospitalization and IV antibiotics if patient unable to take po.
- Complications:
 - Perinephric/Renal abscess:
 - Suspect in patient who is not improving on antibiotic therapy.

Medicines

- Ampicillin or vancomycin combined with an aminoglycoside (Nebcin, Garamycin) “Antibiotic”



- (cotrimoxazole)

Septra Bactrim



“Trimethoprim”

- Cipro (ciprofloxacin) “Antibiotic”



Medical Management

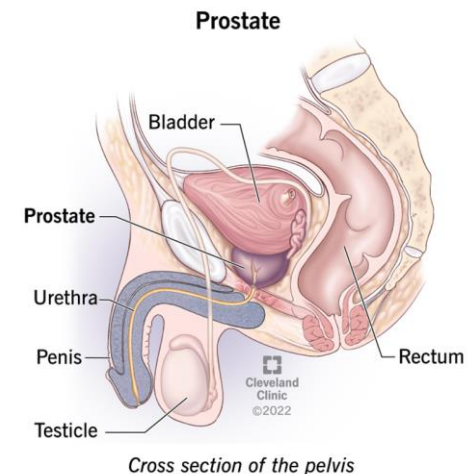
- Adequate fluids at least eight glasses per day.
- Urinary analgesics such as Phenazopyridine (Pyridium) is helpful
- Follow up urine culture is indicated

واكيد هون أهم شي هو إني أعطي سوائل



Prostatitis

- Symptoms:
 - Pain in the perineum, lower abdomen, testicles, penis, and with ejaculation, bladder irritation, bladder outlet obstruction, and sometimes blood in the semen
- Diagnosis:
 - Typical clinical history (fevers, chills, dysuria, malaise, myalgias, pelvic/perineal pain, cloudy urine)
 - The finding of an edematous and tender prostate on physical examination
 - Will have an increased PSA
 - Urinalysis, urine culture



Prostatitis

- Risk Factors:
 - Trauma
 - Sexual abstinence
 - Dehydration
- Treatment:
 - Trimethoprim/sulfamethoxazole, fluroquinolone or other broad spectrum antibiotic
 - **4-6 weeks of treatment**

Prostatitis

- Men age 40-60
- Acute bacterial Prostatitis: high fever, chills, pain around the base of penis, cloudy urine, **sever**
- Chronic bacterial Prostatitis: mild, symptoms come and go, urgency, dysuria, pain after ejaculation, LBP, rectal pain, heavy feeling behind scrotum
- Chronic prostatitis

?What is the second most common type of infection following respiratory infections

- A) Gastrointestinal infections
- B) Skin infections
- C) Urinary tract infections
- D) Ear infections

?Which of the following is NOT a type of UTI based on the place of infection

- A) Urethritis
- B) Prostatitis
- C) Nephritis
- D) Uretinitis

?What is the primary defense mechanism of the normal bladder against organisms

- A) Antibiotic secretion
- B) Kidney filtration
- C) Elimination of bacteria by voiding
- D) Blood clotting

?Which route of infection occurs when bacteria from the digestive tract enter the urinary tract and multiply

- A) Hematogenous route
- B) Descending route
- C) Ascending route
- D) Lymphatic route

Answers

- C) Urinary tract infections
- D) Uretinitis
- C) Elimination of bacteria by voiding
- C) Ascending route

What is the most common pathogen for cystitis, prostatitis, and pyelonephritis?

- A) Staphylococcus aureus
- B) Escherichia coli
- C) Candida albicans
- D) Streptococcus pyogenes

What are the general manifestations of cystitis?

- A) Fever and flank pain
- B) Dysuria, frequency, urgency
- C) Suprapubic tenderness
- D) Nausea and vomiting

Which type of cystitis occurs in healthy adult women with no signs of systemic disease?

- A) Uncomplicated cystitis
- B) Simple cystitis
- C) Chronic cystitis
- D) Complicated cystitis

What is the most common cause of acute pyelonephritis?

- A) Candida albicans
- B) Escherichia coli
- C) Staphylococcus aureus
- D) Streptococcus pyogenes

What is the recommended duration of treatment for uncomplicated cystitis?

- A) 3-5 days
- B) 7-14 days
- C) 21-28 days
- D) 30

Answers B) Escherichia coli B) Dysuria, frequency, urgency A) Uncomplicated cystitis B) Escherichia coli B) 7-14 days

* E.coli *



1. Gram negative bacilli
2. Virulent fimbriae that are associated with cystitis, pyelonephritis
3. Virulent pili that are associated with UTIs, cystitis, and pyelonephritis
4. Lipopolysaccharide capsule

يعطيكم الف عافية بعذر عن
الأخطاء الاملائية وسامحونا
عاي تقصير او تأخير جاهزة
للاستلة ويعطيكم الف عافية
يا رب 🍷❤❤❤❤❤

