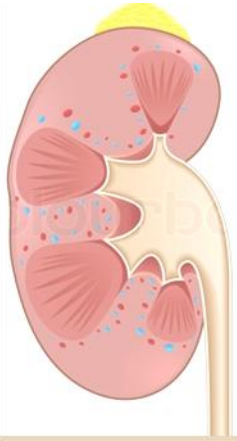
Done by:
Bader Al-Abdulkarim



Team 432 Microbiology

LECTURE (3) PYELONEPHRITIS

Objectives:

Were not given

Color guide

- **Very important**
- male doctor's notes
- Additional information
- female doctor's notes

MIND MAP
(PYELONEPHRITIS)

INTRODUCTION:

pyelonephritis is Bacterial infection of the renal pelvis, tubules and interstitial tissue of one or both kidneys.

} Upper Urinary Tract.

GENERAL NOTES:

- Infection usually ascends from the urethra (Ascending infection is common). Most bacterial causes are bowel organisms eg: Ecoli (70-80%)
- **Hospital-acquired infections** could be due to coliforms and enterococci.
- Pyelonephritis is frequently due to ureterovesical reflux.
- Pyelonephritis may be acute or chronic.
- ASB* in 1st trimester of pregnancy may cause pyelonephritis in 3rd trimester.
- Hematogenous'Descending' infection (Rare). It's caused by: S. aureus, TB, Brucella, Candida or Paratyphoid B.
- We cannot use Nitrofurantoin to treat pyelonephritis (because of its limited tissue penetration) nor nalidixic acid.
- **Nitrite test:** does not detect organisms unable to reduce nitrate to nitrite, such as enterococci, staphylococci, or adenovirus.
- **Proteus** causes Alkaline PH ➔ Phosphate stones ** ➔ Infection.
- You can use Ampicillin, septrin (co-trimoxazole), amoxicillin &ciprofloxacin in treatment of pyelonephritis (refer to lecture 2)

*ASB: Asymptomatic Bacteriuria.

** Urate precipitate in Acidic PH

ETIOLOGY: Almost the same organisms of cystitis.

Gram Positive	Gram negative
Enterococci may also cause endocarditic	Escherichia coli **(most common cause)**
S.aureus	Klebsiella
Coagulase negative Staphylococcus: *S. saprophyticus*	Proteus: *P. Mirabilis* *P. vulgaris*
	Morganella
	Pseudomonas: *P. aeruginosa*
Fungi	
Candida	

Remember !

1) **P. Aeruginosa** is common in: hospitalized patients. (in ICU or on Catheters)
2) **Proteus** is a relatively common cause of UTI in patients with kidney stones.
3) **Serratia marcescens and P. aeruginosa** are generally associated with complicated UTI.(structural abnormalities of the UT)
4) **Candida** usually common in: diabetics, TB & immuno-compromised patients.
5) **S. saprophyticus** is common in: young, sexually active patients.
6) **Enterococcus faecalis** is common in: elderly patient with BPH .

ACUTE PYELONEPHRITIS

Pathogenesis	Pathology	Clinical Manifestations
Ascending infection: 1) Rectal and/or vaginal reservoirs ➔ ➔ 2) Colonization of perianal area ➔➔ 3) Bacterial migration to perivaginal area ➔➔ 4) Bacteria ascend through urethra to bladder ➔➔ *Intercourse may contribute urethral colonization and ascending infection. Hematogenous spread.	-Kidneys enlargement. -Interstitial infiltration of inflammatory cells. -Abscesses on the capsule and at corticomedullary junction. -Destruction of tubules and the glomeruli. -if it's a chronic case, kidneys become scarred, contracted and nonfunctioning.	Symptoms develop rapidly (<24 hours) and may include: 1)Acute illness. 2) Chills. 3) Fever >38°C. 4) Flank pain. 5) Nausea/vomiting. Makes it different than lower UTI 6) Renal angle tenderness. 7) Bacteruria. 8) Leukocytosis. 9) Pyuria. **Note that at the extremes of age, the presentation may be so atypical:** 10) Confusion in elderly. 11) Poor feeding in infants **All these in addition to symptoms of lower tract involvement (Cystiti) :** 1) Dysuria. 2) Frequency.

Risk factors	
	Mechanical: 1) Structural abnormalities 2) VURespecially in young children. 3) Calculi.(kidney stones) 4) Urinary tract catheterisation 5) strictures.(restriction) Constitutional: 1) Diabetes mellitus 2) Immunocompromised states

ACUTE PYELONEPHRITIS

Laboratory Diagnosis	Medical Management
Urinalysis ❖ 10 WBC/hpf is the usual upper limit of normal (more than this ➔ indicative) ❖ Dip stick test: 1) Positive result on leukocyte esterase. test correlates well for detecting >10 WBC/hpf. 2) Positive nitrite result for bacteriuria is only moderately reliable (false-negative results are common) ❖Urine culture and sensitivity. ❖Blood culture. (remember! It could be Hematogenous infection) **Radiological investigations:** CT scan IVP=intra venous pyelogram	❖**Treated at Home:** if there is no nausea, vomiting or dehydration and other signs and symptoms of sepsis ❖**Hospitalization:** Very ill patients and all pregnant women are at least for 2 to 3 days for parenteral therapy. ❖**2 weeks course:** (7-14 days) of: 1) Bactrim(co-trimoxazole, combination of trimethoprim and sulfamethoxazole) 2) Ciprofloxacin. (fluoroquinolone) 3) Gentamicin with or without amoxicillin. ❖Another 6 weeks course if relapse. ❖Follow up urine culture 2 weeks after completion of therapy.

CHRONIC PYELONEPHRITIS

Repeated bouts of acute pyelonephritis may lead to chronic pyelonephritis.

Clinical manifestations	No symptoms of infection Fatigue Headache Poor appetite Polyuria Excessive thirst Weight loss
Assessment and diagnostic findings	✓IVP. ✓Serum creatinine. ✓Blood urea. ✓Culture and sensitivity.
Medical management	✓According to Culture and sensitivity result. ✓Drugs carefully titrated if renal function is impaired.
Nursing management	✓ Keep fluid balance. ✓ Bed rest.
Complications	❖ESRD=end stage renal disease. ❖Hypertension. ❖Kidney stones. ❖Scars

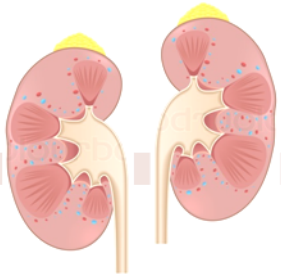
DOCTOR'S NOTES
(SUMMARY)

1. **Pyelonephritis** is a systemic disease effects the pelvis and kidney. Main symptoms are fever and flank pain
2. The Causes are the same as cystitis: ascending infection by mainly E.coli
3. It can be caused by hematogenous spread by: staph.aureus, TB, Brucella or type B tyophoid.
4. **Diagnosed by:** blood culture, urine culture and plan x-ray or IVP.
5. **Urinalysis:** +ve nitrite indicate infection EXCEPT if the cause was:
   a) Group B streptococcus. **b)** Staphylococcus saprophyticus

6. **Manegment:** 7-14 days by antibiotics like: ampicillin, amoxicillin and cotrimoxazole. (refer to lecture 2)
7. **Complications:** renal failure, hypertension and kidney stone.

Remember: **Ampicillin**, **septrin** (**co-trimoxazole**), **amoxicillin** & **ciprofloxacin**.

In treatment of Pyelonephritis



Questions!

Microbiology432@gmail.com

1- which one of the following organisms can cause pyelonephritis by a haematogenous spread?

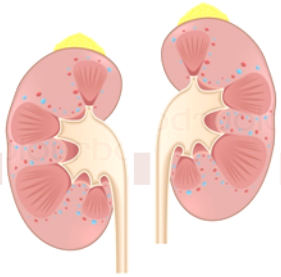
a. E.coli
b. S.aureus
c. S.saprophyticus
d. klebsella

2- which one of the following is often associated with hypertension as a complication?

a. Chronic pyelonephritis
b. Chronic cystitis
c. Chronic urethritis

3- the duration of treatment of pyelonephritis is?

a. About 2 days
b. Less than 1 week
c. More than 3 weeks
d. Between 7 to 14 days



Questions!

Microbiology432@gmail.com

4- A woman has complained of dysuria and frequency for the last 24 hours. Her URINE ANALYSIS is positive for bacteria using a nitrate dipstick and WBC's using a dipstick leucocyte esterase test. Her past medical history is significant for diabetes. The most likely organism to appear at her urine culture is:

a. Group B streptococcus.
b. E coli
c. S.saprophyticus

Answers:
1.b
2.a
3.d
4.b