

Lecture 3



Pyelonephritis

- Additional Notes
- Important
- Explanation
- Examples

Pyelonephritis

- It is bacterial infection of the renal pelvis, tubules and interstitial tissue of one or both kidneys.
- It causes some scarring of the kidney and may lead to significant damage that may cause hypertension.
- Infection ascends from the urethra.
- Most common causative organism: *E.coli*
- Hospital-acquired infections may be due to: *Coliforms* and *Enterococci*.
- Haematogenous spread is very rare. e.g. *S.aureus*, *M.tuberculosis*.
- Pyelonephritis may be chronic or acute.
- Repeated bouts of acute pyelonephritis may lead to chronic pyelonephritis
- Asymptomatic bacteriuria in 1st trimester of pregnancy may cause pyelonephritis in 3rd trimester

Risk factors

- Mechanical:
 - ✓ VUR “vesicoureteral reflux” especially in young children
 - ✓ Calculi
 - ✓ Urinary tract catheterization
 - ✓ Nephrostomy
 - ✓ Pregnancy
 - ✓ Neurogenic bladder
 - ✓ Prostate disease
 - ✓ Bladder tumors
 - ✓ Urethral stricture
- Constitutional:
 - ✓ Diabetes mellitus
 - ✓ Immunocompromised patients

Pathogenesis and Pathology

- Pathogenesis:
 - Rectal or/and vaginal reservoirs
 - Colonization of perianal area
 - Bacterial migration to perivaginal area
 - Bacteria ascend through urethra to bladder
- Pathology:
 - Kidneys enlargement
 - Interstitial infiltration of inflammatory cells
 - Abscesses on the capsule and at corticomedullary junction
 - Destruction of tubules and the glomeruli
 - If chronic, kidneys become scarred contracted and nonfunctioning

Acute Pyelonephritis

- Clinical manifestations:

- ✓ Acute illness
- ✓ Chills
- ✓ Fever
- ✓ Flank pain
- ✓ Nausea/vomiting
- ✓ Renal angle tenderness
- ✓ Bacteriuria
- ✓ Leukocytosis
- ✓ Pyuria
- ✓ Confusion in elderly
- ✓ Poor feeding in infants
- ✓ Dysuria
- ✓ Frequency

- Laboratory diagnosis:

- ✓ 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”

Chronic Pyelonephritis

- Clinical manifestations:
 - ✓ No symptoms of infection
 - ✓ Headache
 - ✓ Fatigue
 - ✓ Poor appetite
 - ✓ Polyuria
 - ✓ Excessive thirst
 - ✓ Weight loss
- Diagnosis:
 - ✓ IVP
 - ✓ Serum creatinine
 - ✓ Blood urea
 - ✓ Culture and sensitivity test
- 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

Treatment

- Mild or moderate symptoms:
 - ✓ Outpatient treatment (7-14 days) oral treatment:
 - Fluoroquinolone⁽¹⁾
 - TMP/SMX⁽²⁾ , if uropathogen is known to be susceptible
 - If gram-positive pathogen: amoxicillin or augmuntin⁽³⁾
- Hospitalized patients:
 - ✓ IV antibiotics first 48-72 hours followed by 7 days of oral therapy:
 - Fluoroquinolone IV then Orally
 - Aminoglycoside⁽⁴⁾ with/without ampicillin IV, then TMP/SMX orally
 - Third generation cephalosporin IV, then TMP/SMX orally
- Ambulatory patients:
 - ✓ 7-14 days of oral therapy

(1) e.g. Ciprofloxacin

(2) It's known as bactrim

(3) It is combination of amoxicillin and clavulanate

(4) e.g. Gentamicin

Quiz

1. One of pyelonephritis complications is:

- a) Vasculitis b) Nephritic syndrome c) Hypertension d) Dehydration

2. Most common pathway to get infection of pyelonephritis:

- a) From GIT (ascending pathway: urethral contamination from rectum)
b) Hematogenous c) From needle

3. A patient has pyelonephritis. From history she got infected hematogenously. What do you think the most common cause in this pathway?

- a) E.coli + Klebsiella b) TB + E.coli c) TB + S.aureus d) Pseudomonas + Cryptosporidium

4. What is the most common gram positive microbe that causes pyelonephritis?

- a) E.coli b) S.aureus c) Enterobacter species d) Enterococcus species

Quiz

5. An asymptomatic 84-year old male with an indwelling Foley catheter. The organism was resistant to some drugs. What do you think the etiology is in this case?

- a) *Pseudomonas arginosa* b) *Proteus mirabilis* c) *Candida* d) Viral infection

6. In Q5. What is the best antibiotic used to treat this case?

- a) Nitrofurantoin b) Vancomycin c) Azithromycin d) Ciprofloxacin

7. There are two drugs not used in case of pyelonephritis:

- a) Nalidixic acid + Nitrofurantoin b) Amoxicillin + clavulanic acid
c) Levofloxacin + Doxycycline d) TMP + SMX

8. How long does it take to treat complicated pyelonephritis:

- a) 1-3 months b) 1-3 days c) 1-2 weeks d) 7-14 weeks