

# Lecture 1



## Cystitis

- Additional Notes
- Important
- Explanation
- Examples

# Urinary Tract Infection

- Anatomically Urinary Tract infection (UTI) is divided into **upper and lower urinary tract infection**
- **Patient presents with urinary symptoms and significant bacteriuria  $10^5$  CFU/ml**
- Asymptomatic bacteriuria when patient present with significant bacteriuria but without symptoms
- Lower UTIs:
  - ✓ **Cystitis (infection of the bladder; superficial mucosal infections)**
  - ✓ Urethritis (sexually transmitted pathogens)
  - ✓ Prostatitis and epididymitis
- Upper UTIs:
  - ✓ Acute pyelonephritis
  - ✓ Chronic pyelonephritis
- Uncomplicated UTI (healthy non-pregnant young female)
- Complicated UTI (nosocomial UTIs, relapses, structural or functional abnormalities, urologic dysfunction UTI of men) → **any case other than healthy non-pregnant young female.**

# Risk Factors

- In women:
  - ✓ Sexual intercourse “Mainly”
  - ✓ Short wide urethra
  - ✓ Pregnancy (progesterone, obstruction)
  - ✓ Decreased estrogen production during menopause.
  - ✓ Genetic factors
- In men:
  - ✓ persistent bacterial infection of the prostate.
- In both sexes:
  - ✓ Diabetes mellitus
  - ✓ Presence of bladder stone
  - ✓ Urethral stricture
  - ✓ Catheterization of the urinary tract
- Hematogenous through Blood stream ( less common) from other sites of infection.

# Pathogenesis of Cystitis

- Infection results when **bacteria ascends to the urinary bladder**.
- These bacteria are residents or transient members of the perineal flora, and are derived from the large intestine flora.
- Toxins produced by uropathogens.
- Lead to frequent irritation of the mucosal surfaces of the urethra and the bladder.
- Condition that create access to bladder are:
  - ✓ Sexual intercourse due to short urethral distance.

# Etiological Agents

- Gram negative bacteria:
  - ✓ *Enterobacteriaceae* include:
    - *E.coli* is the most common (60%) cause of cystitis.
    - *Klebsiella pneumoniae*
    - *Proteus spp.*
    - *P.aeruginosa*.
- Gram positive bacteria:
  - ✓ *Enterococcus fecalis*
  - ✓ group B Strept. (mainly pregnant women and diabetics)
  - ✓ *Staphylococcus saprophyticus* (**honeymoon cystitis**, Only in female in Sexual intercourse age).
- *Candida* species “Not Common”
- Venereal diseases: (gonorrhea, Chlamydia) may present with cystitis.
- *Schistosoma hematobium* in endemic area.

# Clinical Presentation

- Symptoms of Lower Urinary tract infection:
  - ✓ Dysuria (painful urination or burning micturation)
  - ✓ Frequency (frequent voiding) the need to urinate more often than usual.
  - ✓ Urgency (an imperative call for toilet) sudden, compelling urge to urinate.
  - ✓ Hematuria ( blood in urine) in 50% of cases.
  - ✓ Usually no fever
- Symptoms of Upper Urinary tract infection:
  - ✓ Severe flank pain
  - ✓ High fever
  - ✓ Vomiting
  - ✓ Very sick
- Children are hard to diagnosis.

# Laboratory Diagnosis

- Specimen collection:
  - ✓ Most important sample is midstream urine
  - ✓ The best sample is In/Out catheter
  - ✓ For children: Supra-pubic aspiration or catheterization
  - ✓ Catheter urine should not be used for diagnosis of UTI.
- Urine culture:
  - ✓ Important to identify bacterial cause and antimicrobial sensitivity
  - ✓ Quantitative culture:
    - Patient has bacteriuria  $> 10^5$  CFU/ml → Definite UTI
    - Patients has bacteriuria  $< 10^5$  CFU/ml → No UTI

- Microscopic examination:
  - ✓ About 90% of patients have  $> 10$  WBCs/mm<sup>3</sup>
  - ✓ Blood cells, parasites or crystals can be seen
  - ✓ Gram stain of uncentrifuged sample is sensitive and specific but rarely done.
- Chemical screening tests:
  - ✓ Looking for:
    - Nitrates: an enzyme producing by Gram –ve bacteria.  
So, nitrates would be +ve in cases of *E.coli* and –ve in *Strept.* or *Staph.*
    - Leukocyte esterase: producing by WBCs



# Treatment

- Complicated UTI:
  - ✓ Treatment period: 10-14 days
- Uncomplicated UTI:
  - ✓ Treatment period: 3 days.
- Drug of choice:
  - Trimethoprim/sulfamethoxazole
  - Ciprofloxacin
  - Ampicillin “not used anymore due to increasing in E-coli resistant”
  - Nitrofurantoin, for lower UTI. **Can't be used in upper UTI.**

# Quiz

1. Which one of the following represents "uncomplicated UTI"?

- a) UTI in non pregnant and young lady
- b) UTI with diabetes mellitus
- c) UTI after sexual intercourse
- d) UTI in old age male

2. What is the most predisposing factor for a young male children?

- a) Sexual intercourse
- b) Congenital abnormalities
- c) Prostate hypertrophy

3. *S.aureus* was found in urine (bacteriuria):

- a) Exclude bacteremia because *S.aureus* never affect UT
- b) Indicates upper UTI
- c) indicates lower UTI

4. A woman was admitted to be inpatient in hospital. After a while she developed a UTI. What is the most likely organism after E-coli?

- a) *Pseudomonas*
- b) *Enterococcus*
- c) Viruses
- d) *S.epidermidis*

# Quiz

5. A 50-year-old woman was diagnosed with UTI. What is the best specimen to confirm the diagnosis in this case?

- a) Suprapubic    b) Catheter    c) Blood    d) Midstream urine

6. Complicated and recurrent cystitis are treated by:

- a) Drinking plenty of water    b) 12 days of antibiotics    c) 3 days of antibiotics

7. What is the cause that makes women more susceptible for UTI more than men?

- a) Decrease estrogen after menopause    b) Shorter + wider urethra  
c) Urethra near to rectum    d) All of the following