

Lecture – 02

Lower urinary tract infections

Cystitis and urethritis



Microbiology Team - 430

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Urethritis (inflammation of the urethra caused by sexually transmitted pathogens) such as:

C. trachomatis, *N. gonorrhoeae* and *H. Simplex*

Diagnosed by swabs

Cystitis (it's a superficial mucosal infection of the bladder)

- **Prevalence:**

Cystitis “**superficial infection**” (LUTI) is less severe and has less symptoms than pyelonephritis “**systemic infection**” (UUTI)

It's more common in women during all life stages, except early childhood 0-3yrs

And incidence is increased with older age

- **Causative Factors:**

Generally	In women (they are infected more than men)	In men
- Structural abnormalities.	- Shorter urethra.	- Persistent bacterial infection of the prostate.
- Obstruction.	- Pregnancy.	
- Bladder stones.	- decreased estrogen production (menopause).	
- Urethral stricture (narrowing of urethra)		
- Catheterization of urinary tract.		
- Diabetes Mellitus.		

- **Clinical presentation :**

- **Dysuria** (painful urination).
- **Frequency** (frequent voiding).
- **Urgency** (an imperative call for toilet).
- **Haematuria** (blood in urine) in 50% of cases.
- Usually no fever.

Bacteriuria:

Presence of 10^5 bacteria / ml or more in the urine.

Asymptomatic bacteriuria:

10^5 bacteria/ml is present in urine, but patient has no symptoms

- **Differential diagnosis** (also have dysuria and frequency as symptoms)

- Urethritis.
- Vaginitis.
- Hypoestrogenism.
- Functional and Mechanical obstruction.

- **Pathogenesis**

- **Ascending infection** (more common):
(Bacteria from the normal flora ascend to the mucosal surfaces of the urethra and the bladder).
- **Hematogenous spread** (less common):
(Through Blood stream from other sites of infection associated with TB and staphylococcus infections).

Different between cystitis and urethritis is that cystitis has:

- more acute onset
- More severe symptoms
- Pain, tenderness on the supra-pubic area
- *bacteriuria*

Sexual intercourse is a major factor for the ascending infection in females due to short urethral distance.

• Etiology

➤ Bacterial:

Gram negative

- ***E.coli***
(the most common 90% of cases)
- **(Enterobacteria) *Klebsiella***
(it is mucoid shape)
- **(Enterobacteria) *Proteus***
(make alkaline urine and causes stones)

Gram positive

- ***Enterococcus fecalis***
(in old men with enlarged prostate)
- ***Staphylococcus saprophyticus***
(cause honeymoon cystitis)

***Staphylococcus saprophyticus* causes honeymoon cystitis only in sexually active females**

➤ Other:

- ***Candida species.***
- Venereal diseases (***gonorrhea, Chlamydia***).
- ***Schistosoma hematobium*** “bilharasia” (in farmers) .

• Non infectious cystitis:

- **Traumatic cystitis** (in women).
- **Interstitial cystitis** (autoimmune disease. But no WBCs found).
- **Eosinophilic cystitis** (due to *Schistosoma hematobium*).
- **Hemorrhagic cystitis** (due to radiotherapy or chemotherapy).

• Diagnosis:

1. Specimen collection, by

- **Midstream urine (MSU)** “clean catch urine” so urine is without peroneal flora and its must be done before treatment.
- Supra-pubic aspiration in children.
- Catheterization (rare and shouldn't be used).

2. Microscopic examination , we find

- **Presence of 10 WBCs/HPF --> (Pyuria – pus (neutrophils) in the urine).**
- Blood cells, parasites or crystals can be seen.

3. Chemical screening tests

- Urine dipstick can rapidly detect (***nitrites and leukocyte esterase***)

4. Urine culture

- **significant bacteriuria (presence of 10⁵bacteria/ml).**

Recurrent cystitis (3 or more episodes of cystitis /year) requires more investigations:

- **Intravenous Urogram (IVU).**
- **Ultrasound.**
- **Cystoscopy.**

To detect obstruction or congenital deformity

- **Treatment**

Depends on the classification of the UTI:

- **Un-complicated UTI** treatment for 3 days
- **Complicated UTI** treatment for 10-14 days

Uncomplicated UTI usually occurs in **non pregnant young sexual active female** without any structural or neurological abnormality

Empiric treatment commonly used depending on the knowledge of common organism and sensitivity pattern, these antibiotics are usually given:

- Ampicillin
- Ciprofloxacin
- Nitrofurantoin (also Prophylaxis in recurrent cystitis)
- Trimethoprim/Sulfamethoxazole (also Prophylaxis in recurrent cystitis)

Prevention of infection is done by drinking plenty of water and taking prophylactic antibiotic.

Summary:

- Cystitis is a **superficial mucosal infection** of the bladder.
- It's more common in women because of the:
 - Short urethra.
 - Pregnancy.
 - Decrease estrogen production during menopause.
- Bacteriuria is Presence of **10⁵ bacteria / ml** or more in the urine.
- Dysuria & frequency is the clinical presentation of cystitis.
- **TB and staphylococcus** infections could **spread hematogenously** causing cystitis.
- Sexual intercourse is a major factor for the ascending infection in females due to short urethral distance.
- **E-coli** is the most common cause of the cystitis (complicated and uncomplicated).
- **Staphylococcus saprophyticus** causes **honeymoon cystitis** only in sexually active females.
- The best specimen collection used for cystitis diagnosis is **MSU** (midstream urine).
- Supra-pubic aspiration is used with children.
- **Uncomplicated** UTI occurs in **non pregnant, healthy, young sexual active female**.
- Duration of treatment :
 - **3 days** for **uncomplicated** cystitis.
 - **10-14 days** for **complicated** or recurrent cystitis.