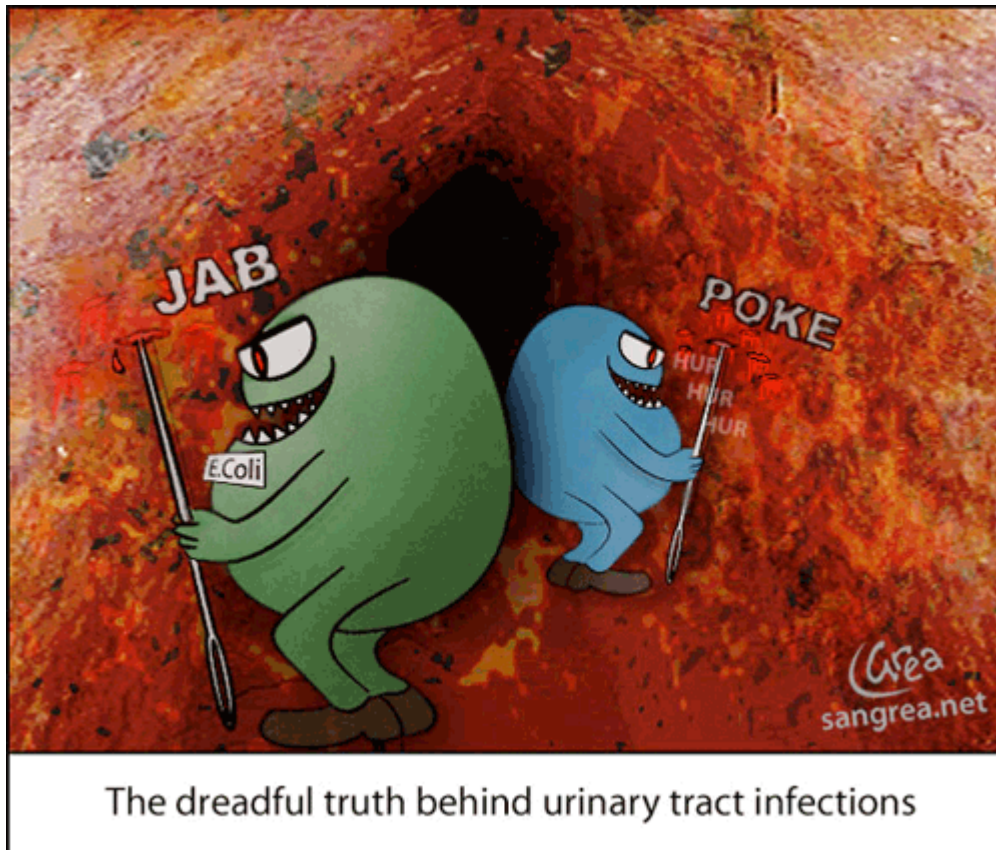


MAC

BACTERIOLOGY



Urinary Tract Infection

* Remember: **RED**
means important!!

The Micro Team[©]

Special thanks to Ismail Raslan

UTI



sites

upper UTI: kidneys __ pyelonephritis

lower UTI: bladder __ cystitis

urethra __ urethritis



clinical features

pyelonephritis: loin pain [flank pain], fever and vomiting

cystitis: frequency and urgency for urination , hematuria and suprapubic pain



cystitis could be:

- Uncomplicated (Simple) cystitis:

In healthy non-pregnant older than 12 yrs females

- Complicated cystitis:

In males

unhealthy females

catheterized patients



urine is sterile due to continuous flushing & urination [local defense mechanism]. BUT when urine passes through the urethra it gets contaminated with normal flora in the urethra.

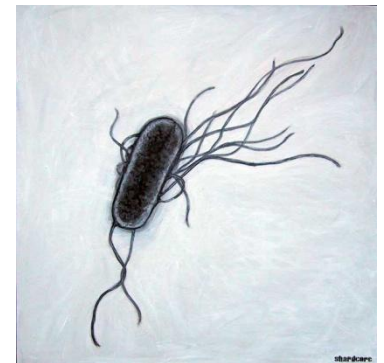


etiology

a) gram -ve bacteria

- 1) *E.coli*: the most common cause

Some strains more invasive due to
K antigen
adherence by pili



- 2) *Pseudomonas*: catheter- associated
- 3) others: *proteus*, *klebsiella*, etc.

b) gram +ve bacteria

- 1) *Staphylococcus species*:

staph. saprophyticus: More common in sexually active young females [honeymoon cystitis]
& *staph. aureus*

- 2) *Strep. Group B*, *Corynebacteria*

c) others: *Chlamydia*, *Mycoplasma* & *N. gonorrhea*



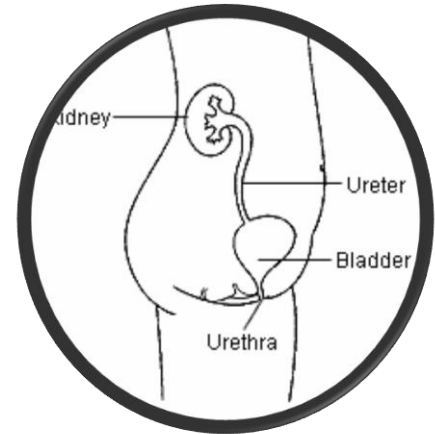
Usually, the source of causative organisms is

the gut normal flora [colon]



females are more prone to have urinary tract infection, because:

- females have shorter urethra compared to males
- sexual intercourse
- pregnancy



predisposing factors

Obstructive factors

Bladder stone [or ureter stone]

Prostatic hypertrophy

Tumors in and adjacent to UT

Functional factors

Pregnancy

Ureteric reflux

Neurogenic problems



pathogenesis

- usually the infection starts at the lower urinary tract [urethra and bladder] and **ascends** to the upper structures [ureters and kidneys]
- less commonly, the infection could be blood borne [hematogenous] in case of septicemia.



diagnosis

Specimen: [must be sent in 2-4 hrs]

mid-stream urine sample (**MSU**)

self adhesive bag [in babies]

suprapubic aspiration [the best specimen]

catheterization [in elderly]

It is collection of uncontaminated urine, from the middle of the bladder. After 2 sec of starting to pass urine

culture: on CLED agar

MacConkey agar



significant bacteriuria: $>100,000$ organisms /ml
(10^5 / ml).

Treatment of UTI



Choice of antibiotic depends on:

- Whether infection is complicated or uncomplicated
- Whether infection is primary or recurrent
- Type of patient [pregnant, child, hospitalized or diabetic patient...etc]

1st: Rx of uncomplicated UTI:

3-day course

Choice depends on susceptibility pattern, including:

- *Amoxicillin* [with or without clavulanate]
- *Cephlosporins* [first or second generation]
- *Fluoroquinolone* [*ciprofloxacin* or *norfloxacin*]



not to be given to pregnant women or children
it is the first choice if other antibiotics are resistant.

- TMP-SMX [Co-trimoxazole]
- *Nitrofurantoin* [long term use]



urinary anti-septic

used only in cystitis

2nd: Rx of relapsing infections: 7-14-day course

Caused by treatment failure or structural abnormalities or abscesses.

Antibiotics used as initial infection

3rd: Rx of recurrent infections:

Patients with two or more symptomatic UTIs within 6 months, or 3 or more over a year.

- Need preventive therapy.
- Antibiotic taken as soon as symptoms develop.

4th: Rx of uncomplicated pyelonephritis: 14-day course

- Can be treated at home with oral antibiotics, including:
Cephalosporins, Amoxicillin-Clavulanate, Ciprofloxacin or Co-trimoxazole
- urine culture may be used in prognosis

5th: Rx of moderate to severe pyelonephritis:

Patients need hospitalization

- Antibiotic given by IV route for 3-5 days until symptoms relieved for 24-48 hrs.

6th: Rx of chronic pyelonephritis:

patients need long-term antibiotic treatment even during periods when they have no symptoms.



Postcoital antibiotics:



Postcoital means after sexual intercourse

If recurrent UTI related to sexual activity, and episodes reoccur more than 2 times within 6 months,

A single preventive dose taken immediately after intercourse

Antibiotics include: *TMP-SMX, Cephalexin* or *Ciprofloxacin*



Treatment of specific populations

1) Pregnant women:

Antibiotics during pregnancy include:

Amoxicillin, ampicillin, cephalosporins, and nitrofurantoin

Pregnant women should NOT take *Quinolones* or *Tetracyclines*

Pregnant women with asymptomatic bacteriuria need 3-5 days antibiotic treatment.

For uncomplicated UTI, need 7-10 days antibiotic treatment.

2) Diabetic patients:

Treated for 7-14 days antibiotics even patients with uncomplicated infections.

3) Children:

Usually treated with *TMP-SMX* or *Cephalexin*.

Sometimes given as IV.

Gentamicin may be recommended as resistance to *Cephalexin* is increasing.

4) Vesicoureteric reflux:

Can lead to pyelonephritis and kidney damage.

Long-term antibiotic + surgery used to correct VUR and prevent infections.

Acute kidney infection: use *Cefixime* or 2-4 days *Gentamicin*. Oral antibiotic follows IV.



→ Male urethritis:

Require **7 days** regimen of *Doxycycline*.

A single dose *Azithromycin* may be effective but *not recommended* to avoid spread to the prostate gland.

Patients should also be tested for accompanying STD.