Renal Block

Lecture – 3

Treatment of Urinary Tract Infections

Microbiology team 430

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➢ Goal Of Treatment:

1. To eradicate the offending organisms from the urinary bladder & tissues.
2. The main treatment of UTI is by antibiotics.

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➢ Choice of antibiotic depends on:

type of infection	• complicated • uncomplicated
how many times patient has had the infection	• primary • recurrent
infection clinical manifestation	• symptomatic • asymptomatic bacteriuria
Type of patient	• children • pregnant women • hospitalized • diabetic
bacterial count	• the bacterial count has to be segnificant > 10^5

➢ **Uncomplicated UTI** (Low-risk patient for recurrent infection)

- **Healthy none pregnant young sexually active patient**
- 3 days antibiotic without urine test, cure rate 94% **(it's enough because the antibiotics are concentrated in the urine)**
- Choice of antibiotic depend on susceptibility pattern, they include:
  - Amoxicillin (with or without clavulanate) **(with clavulanate we call it augmentin)**
  - Cephlosporins (*first or second generation*)
  - Trimethoprim/Sulfamethoxazole "TMP-SMX"
  - Nitrofurantoin (long term use) **(it is contraindicated during the last 2 weeks of pregnancy)**
  - Fluoroquinolone (ciprofloxacin or norfloxacin)

Fluoroquinolone not used for pregnant women or children, it's only first choice if other antibiotics are resistance. **"not for pregnant women due to the risk of spontaneous abortions and birth defects, and in children because it cause arthropathy (damage of the cartilage)".**

➢ **Relapsing infection**:

- Patient become worse
- Caused by treatment failure or structural abnormalities or abscesses **"in the kidney"**
- Antibiotics used as initial infection
- Treatment for 7-14 days.

(Either the Pt had a complication because the organism becomes resistant or he was affected by another organism).

➢ **Recurrent infections:**

- Patients with two or more symptomatic UTIs within 6 months or 3 or more symptomatic UTI over a year.
- **These patients need preventive therapy**.
- Antibiotics taken as soon as symptoms develop.
- If infection occurs **less than twice a year**, a clean catch urine test should be taken for culture & treated as initial attack for 3 days.

The deference between relapsing & recurrent:

- **Pt admitted to the hospital with UTI & suddenly he become sick even if he on antibiotics.(Relapsing)**
- **After 2 month of treatment, Pt become sick.(Recurrent)**

When to Consult the Doctor?

- **If symptoms persist**
- **A change in symptoms**
- **Pregnant women.**
- **More than 4 infections per year**
- **Impaired immune system**
- **Previous kidney infections**
- **Structural abnormalities of urinary tract**
- **History of infection with antibiotic resistant bacteria.**

Postcoital Antibiotics	Prophylactic Antibiotics
▪ **If recurrent UTI related to sexual activity.**	▪ Optional for Pt who don't respond to other measures. ▪ **Reduces recurrence** by up to 95%.
▪ **A single preventive dose taken immediately after intercourse**	▪ Low dose antibiotic taken continuously for 6 months or longer.
▪ **TMP-SMX, Cephalexin or ciprofloxacin** **(TMP-SMX may cause Steven Jones syndrome which is characterized be sever skin reaction)**	▪ TMP-SMX, Nitrofurantoin, or Cephalexin. ▪ Antibiotics taken at bed time more effective.

➢ Pyelonephritis

- **Uncomplicated pyelonephritis**
  - Patients with fever, chills and flank pain ,but **they are healthy non-pregnant** not nauseous or vomiting with no signs of kidney involvement
  - ✓ **Can be treated at home with oral antibiotics** for 14 days with one of the followings:
    - Ciprofloxacin, Cephalosporin, Amoxicillin-Clavulanate, in or SMX-SMX.
  - ✓ First dose may be given by injection. **(because it is a serious infection).**
  - ✓ Urine culture may be obtained within one week of completion of therapy & again after 4 weeks

Drugs of choice are ampicillin, Gentamicin, ciprofloxacin or 3rd generation of cephalosporin. We can't use Nitrofurantoin in upper UTI.

- **Moderate to severe pyelonephritis:**
  - **Patients need hospitalization**. (Because it's sever & the Pt needs I.V rout)
  - ✓ Antibiotic given by IV route for 3-5 days until symptoms relieved for 24-48 hrs.
  - ✓ If fever and back pain continue after 72 hrs of antibiotic imaging tests indicated to exclude abscesses, obstruction or other abnormality. (such as tumors).

- **Chronic pyelonephritis:**
  - Those patients need long-term antibiotic treatment even during periods when they have no symptoms.

➢ Pregnant women

- They are at High risk for UTI and complications, Should be screened for UTI
  - Antibiotics during pregnancy include:
    - Amoxicillin and Ampicillin
    - Cephalosporin
    - Nitrofurantoin **(Note that it is contraindicated in the last 2 weeks of pregnancy).**
    - **Screening & 3 -5 days antibiotic needed.**

Pregnant women should not take Fluoroquinolone

Pregnant women with asymptomatic bacteruria *(evidence of infection but no symptoms)* have 30% risk for acute pyelonephritis in the second or third trimester. **(We have to treat her to avoid abortions & pyelonephritis).**

➢ Diabetic patients

- They have more frequent and more sever UTIs.
- Treated for 7-14 days antibiotics even patients with uncomplicated infections.

(If they have asymptomatic bacteruria, they should not be treated).

➢ Children

They are treated with:

- TMP-SMX
- Cephalexin (sometimes given as I.V)
- Gentamicin (if pervious antibiotics are resistance)

❖ **Vesicoureteral reflux (VUR):**

- Abnormal movement of urine from the bladder into kidneys (reversed flow)
- Common in children with UTI
- Can lead to pyelonephritis and kidney damage
- Surgery used to correct VUR and antibiotics used to prevent infections, such as:
  - Cefixime (suprax).
  - Gentamicin

2-4 days in a one daily dose, Oral antibiotic followed by IV.

VUR:

The sphincter between the bladder & ureter (oblique) is affected → reflux of the urine into the ureter → the ureter become dilated & the kidney become hydronephrotic → renal failure.

➢ catheter-induced UTI (very common)

- Catheter should not be used unless absolutely necessary and they should be removed as soon as possible.
- Catheterized patients who develop UTI with symptoms are at risk for sepsis & should be treated for each episode with antibiotics, and catheter should be removed if possible.
- Associated organisms are constantly changing and could be multiple species of bacteria.
- Antibiotic use for prophylaxis is rarely recommended (Because patient has high bacteria counts and do not develop symptomatic UTI)
- Antibiotic therapy has little benefit if the catheter is to remain in place for long period

If catheter is required for long-periods:

- Used intermittently (replaced every 2 weeks) to reduce risk of infection
- Irrigating bladder with antibiotics between replacements
- Daily hygiene and use of closed system to prevent infection.

➢ Urethritis in men

- Doxycycline (7 days regimen)
- Azithromycin (single dose)
  (*Not recommended* to avoid spread to the prostate gland)

- Patients should also be tested for accompanying STD (sexually transmitted disease).

Summery

- If the Pt doesn't have symptoms & the bacterial count is significant (asymptomatic bacteruria), we don't treat him except if she is pregnant or Pt in the O.R or after transplantation.
- Duration of antibiotics:
    1. **Cystitis** either complicated or uncomplicated ⟶ **3 to 7 days.**
    2. **Pyelonephritis** either complicated or uncomplicated ⟶ **10 to 14 days.**
- E.coli is the most resistant against ampicillin & the least resistant to Nitrofurantoin, ciprofloxacin & Co-trimoxazole.
- Drugs that we use in UTI:
    - Ampicillin, Gentamicin, Cephalosporin (first & second generation), Nitrophrantoin, Doxcycline (used in urethritis against Chlamydia), floruquenolone or Co-trimoxazole.
    - **Enterococcus.fecealis is resistant to all these drugs except ampicillin.**
- Postcoital antibiotics :
    - A **single preventive** dose taken immediately after intercourse.
- Pregnant women :
    - Pregnant women should **NOT** take Quinolone.
    - Pregnant women with asymptomatic bacteruria have 30% risk for acute pyelonephritis, **that's why we have to treat her immediately with antibiotics.**
- **UTI in children** is serious because they might **have VUR** which can lead to pyelonephritis & kidney damage.
    - **Surgery** used to **correct VUR** and **antibiotics** used to **prevent infections.**
- catheter-induced UTI
    - **Catheter should not be used unless absolutely necessary and they should be removed as soon as possible.**
    - **Catheterized patients who develop UTI with symptoms are at risk for sepsis & should be treated for each episode with antibiotics, and catheter should be removed if possible.**
- Patients with two or more symptomatic UTIs within 6 **need preventive therapy.**
- Choice of antibiotic depend on **susceptibility pattern.**

The Drugs:

1. Cephalosporin:
    - First generation: Cephalexin & cephradin.
    - Second generation: cephuroxim axetil
    - 3rd generation: ceftriaxone & cefaxim.
2. Fluoroquinolone:
    - Ciprofloxacin, norfloxacin, Gatifloxacin, moxifloxacin.