URINARY TRACT INFECTIONS

Objectives

Define various type of UTI

Classical sign and sympyoms of cystitis and pyelonephritis, urethritis, prostatitis

Determine and interprete urine culture results

The normal urinary tract is sterile for many reasons:

Eradication of bacteria by urinary and mucous flow

Secretory peptides target cytoplasm of bacteria

Urothelial bactericidal activity

Urinary secretory IgA

Bloog group antigens in secretion alter bacterial adhesion

Defenses

Epidemiology

Millions of doctor visit annually

Prevalence increases with hospitalization, diseases, number of infections ➔➔ HOSPİTAL ACQUIRED

Susceptible females – 2 infections in 6 months = 66% chance of developing infection in the next 6 months ➔➔ recure

Prophylaxis change in the time to recurrence not he chance of recurrence

Escherichia coli

E coli serotypes (O2, O4, O6) ➔➔ Fimbriated strains adhering to uroepithelial cells

Leading to colonization ➔➔ Infection

Commonest cause of infections

Gam negative bacilli

Pseudomonas, proteus and Klebsiella inf. ➔➔ follow catheterization and gynocological surgery ➔➔ (Nosocomial pathogen)

Infection with may be complicated by

phosphate stone formation

urea leads to alkaline pH.

S saphrophyticus

More common in young woman

What parts of urınary tract can get ınfected?

Urethra ➔➔ Urethritis

Urinary Bladder ➔➔ Cystitis

Ureters ➔➔ Ureteritis

Kidneys ➔➔ Pyelonephritis

Cystitis

Incidence

1-3% of all GP consultations

5% of women each year with syptoms

Up to 50% of women will suffer from a syptomatic UTI in their lifetime

UTI in man is much rarer

A proportion of patients may be syptomatic in the absence of infections called ''urethral syndrome''

Clinical manifestations:

dysuria (painful urination)

frequency & urgency (frequent urination, the sudden urge to urinate)

suprapubic pain (pain in the lower central abdomen)

hematuria (RBCs in the urine) may or may not be present

Causes

The most common cause of infection

Escherichia coli ➔➔ 70% of uncomplicated case

Other organisms➔➔ Proteus mirabilis, Klebsiella pneumoniae, Staphylococcus saprophyticus, Staphylococcus aureus, and Pseudomonas species

Urethral syndrome not associated with any infection

Rarely kidney or bladder stones,

Prostatism,

Diabetes

Prevention

Drinking plenty of fluids helps prevent cystitis in the first place

If cystitis follows sexual intercourse, ➔➔

passing urine soon after try

Link between lower urinary tract infection and use bath preparations

➔➔ No evidence to suggest

Beware

Pregnant

Under age 12

Males

Systemically ill (fever, sickness, backache)

Catheterised patients,

Kidney or blader stones

Investigation

Urine dipstick

Can be done in the surgery and will be positive for nitrates and leucocytes (leucocyte esterase test). This helps to diferrentiate those with UTI from the 50 % wit hurethral syndrome

Urine microscopy and culture ➔➔ significant bacteriuria (Usually >105/ml)

Asymptomatic bacteriuria

İs present in 12-20% of women aged 65-70 years and does not impair renal function or shorten life ➔➔ no treatment

In 4-7% of pregnant women and associated with premature delivery and low birth weigh ➔➔ need treatment

Differential diagnosis

Urethral syndrome

Bladder lesions e.g. calculi, tumor

Candidal infection

Chlamydia or other sexually transmitted diseases

Urethritis

Drug induced cystitis (e.g. With cyclophosphamide, allopurinol, danazole, tiaprofeniz acids and possibly other NSAIDs)

Complication and prognosis

Ascending infections ➔ ➔

pyelonephritis, renal failure and sepsis

Urinary tract infection during pregnancy is associated with

prematurity

low birth weigh of the baby

high incidence of pyelonephritis in women

Management ıssues - general

50% will resolve in 3 days without treatment

No evidence to support "drink plenty"

Start treatment without culture if the dipstic is positive for nitrates or leucocytes

Management issues- general

Culture indications

Men

Pregnant women

Children

Those with failure of emprical treatment

Those with complicated infection

Self care

Drink slightly acidic drinks ➔➔ cranberry juice, lemon squash, pure orange juice..ect.

Try Potassium citrate

Principles of antimicrobial therapy

Should result in sterile urine

Antimicrobial levels in urine

Resistance clones present 5 – 10% of cases with empric treatment

Antibiotics

Fosfomycin 3g. Sache (Monurol™)

Cephalosporins are also effective (but expensive)

Nitorfurantoin is also effective (but expensive) but frequently cause nausea and vomiting

Fluoroquinolones (Cipro, Norfl, ofl) are effective ➔➔ They're not in first line therapy

SXT is the first line and effective tx.

Antibiotics

3 Days abx is as effective as 5-7 days

No single dose (except fosfomycin)

Longer period also not necessary

In relapses of infection abx treatmen for six weeks are recomended

Antibiotics in pregnancy

Cephalosporins and penicillins

Nitrofurantoin

Not recommended ➔➔ Quinolones. Trimethoprim, Tetracyclines

Duration➔➔ Seven days

Urine should be tested regularly througout pregnancy following initial infection

Acute pyelonephritis

Fever

Nausea and vomiting

More pronounced malaise

Pain in the back

(+) CVA tenderness

Clinical manifestations

Classic sign of cystitis

Enureses (In children)

Frequency

Dysuria

Haesitancy

Suprapubic discomfort

Classic sign of pyelonephritis

+/- UTI signs

Chills

Nausea

Flank pain

Risk factors

Female (%30:%19)

Shorter urethral lenght

Urethral opening close to the anus

Exposure to spermicide

Has antimicrobial activity, disrupt the periurethral flora content

Risk factors (contd.)

Factors that prohibit complete emptying of the bladder

Constipation

Cystocele, rectocele

Uterine prolapse

Urinary calculi, BPH

Estrogen deficiency

Oral antimicrobials

Immmobility

Poor hygiene

Poor toilet habits

Fecal incontinence

Catheterization

Diabetes mellitus

Dehydration

Diagnosis

Urine Collection

Suprapubic aspiration

Cathetetrized specimen

Voided specimen

Urinalysis

Sensitive to colonies of 30K/ml. or less

Bacteria seen o microscopy with no growth may be vaginal flora

Specimen collection

Samples should be collected before the start of abx.

Transport within 2 hours. If delay is suspected than refrigeation at +4^{o}C.or boric acid

Mid stream urine

Adhesive bags in infants

The positive culture

Suprapubic

Any number of pathogens

Should be completely sterile

Transurethral

10^{3} colony forming units

Clean catch

10^{5} colony forming units

Know the adequacy of the tests

Standard urinalysis

Urine dipstic

Microscopy

Enhanced urinalysis ➔➔➔ Nitrites, leucocyte esterase

Microscopy

Gram stain

84% Sensitivity

Neider is sensitive enough to rule out UTI

UTI- who shouldbe studied

Acute pyelonephritis All febrile UTI's

Male of any age with first UTI

Girls younger than 3 years wtih first UTI

Girls older than 3 yerars with secomgd UTI

Girls older than 3 years with first UTI with:..

Family history of UTI

Abnormal voiding pattern

Poor gerowth

Hypertension

Abnormalities with urinarytract

Failure to respond promptly to therapy

Urinary tract ınfections
clinical manfestations

Urinary tract ınfections
(acute uncomplicated pyelonephritis in women)

Mild- to –moderate illness

Outpatient therapy

Fluoroquinolones 7 – 14 days

Severe illness

Hospitalization required

Parenteral cephalosporins, Fluoroquinolone or aminoglycozide, after afebrile – oral therapy (10-14 days total)

Pregnancy – avoid fluoroquinolones

Emphysematous pyelonephritis

Pneumaturia

Acute necrotizing infection caused by gas formation

Incidence: Midlle age or elderly

Diabetes (90%), or obstructive renal unit

Female – to –male: : 6/1

Left kidney: 60%

Mortality: 20 – 80 %

Emphysematous Pyelonephritis/Pathogenesis

Acute bacterial and fungal infection:

70% E coli

Klebsiella, Proteus, Clostridium, and Candida

Gas in upper urinary tract

Iatrogenically via upper tract manipulation

Fistula to bowel

Ascending infection

Emphysematous pyelonephritis/ pathogenesis

Gas extention renal and hepatic vein

Diabetes predispose to gas formation

High glucose level thougout tissue

Diabetic microangiopatic disease

Immundeficient-like state

Emphysematous pyelonephritis/clinical findings

Unilateral 90%

Cinical findings:

Fever and pyuria 80%

Flank or abdominal pain: 70%

Treatment

Cystitis-3 days

7 days if duration of symptoms, Diabetes, age, greater than 65 yrs.,or pregnancy

Pyelonephritis

Women:

7 days uncomplicated without sepis

İnpatient: 10-14 days

Complicated pyelonephritis

14-21 say course

Prophylaxis

Endocarditis: Amp/Gent or Vanc/Gent

Indwelling catheter-2 doses (Prior susceptibility)

Catheter removal pre-op and 72 hours after

TURP- Pre and Pos Op.

Urinary tract ınfections

Candidate for Prophylaxis

Women with ≥ 3 symptomatic uncomplicated infections per 12 moths

Pegnant womens with asymptomatic bacteriuria or previous symptomatic UTI is pregnancy

Men with recurrent UTIs

Prostatitis

Prostatitis classification

Acute vs Chronic vs prosttdynia

Sources of infection

Ascending urethral infection, urinary reflux, extentio of rektal infection, or hematogeneous infection

Bacterial

E coli, proteus, Klebsiella, Pseudomnas, enterococcus,mChlamydia, Ureaplasma

Other agents

Viral fungal and Trichomonas

Postatitis: Classification

Prostatic massage

AVOID İN ACUTE PROSTATITIS

4 Tube Approach

VB1: Urethral urinary sample

VB2: Bladder urinary sample

EPS: Expressed prostate sample

>5.000 colonies/mm abnormal

Acute bacterial prostatitis

History

Lower urinary tract obstruction. Perineal pain, dysuria, and fever

Systemic symptoms

Physical

Tender, warm, boggy swallen prostate

Massage is NOT indicated in acute prostatitis

Acute bacterial prostatitis

Management

Outpatient therapy

SXT, Ampicillin, quinolones, for 4-6 weeks

Bedrest, analgesics, antipyretics, stool softeners

Inpatient therapy

Parenteral antbiotics: Ampicillin and Gentamycin

Avoid urethral catheter for retention

Urology consult

Chronic bacterial prostatitis

History

Bladder outflow obstruction

Dysuria; Perineal, low back or testicular pain

Hematuria, hematospermia, painful

Physical examinations

Varaibe prostate exam

Relapsing UTI in men is the hallmark of chronic bacterial prostitis

GNR most common; also enterococcus and

S saprophyticus

Chronic bacterial prostatitis

Management

Difficult to eradicate given poor penetration of antibiotic into non-inflamated prostate

SXT and fluoroquimnolones

Doxycyclin and macrolydes are seconde line

Prolonged treatment required

Check prostatic fluid after treatment

Alpha-blocker to reduce symptoms

Suppressive therapy

Prostatic complications

Renal parenchymal infection

Bacteremia

Prostate abcess

Immunocompromised

FB; obstructions

Prostatic stones

Nidus for persistent

Prostatodynia

History

Persistnet pelvic, suprapubic, inferapubic, scrotal, inguinal, or perineal pain

Lower tract obstruction and dysuria

Absence of systemic symptoms

Physical exams usually unremarkable

No bacteria identified and no evidence of inflamation present

Limited course of antibiotics, alpha blockade

UTI treatment

1. Increase fluid intake (= urine output)

- Acidify urine
- Antibiotics
- Uncomplicated – 3 days
- Pyelonephritis – 7 -14 days IV
- Asymptomatic bacteriuria in pregnancy –
- 3-7 days

First line antibiotic therapy for uncomplicated UTI

Quinolones are not first line therapy

Duration of therapy for uncomplicated UTI

- SMZ/TMP – 5 days
- cephalosporins – 7 days
- trimethoprim – 5 days
- nitrofurantion – 7 days
- fosfomycin 3 gm – single dose
- quinolones – 3 days

Bacterial sensitivities

E. coli

- nitrofurantoin – 97%
- cephalexin – 95%
- quinalones – 90%

- SMZ/TMP – 88%
- Augmentin – 72%

Bacterial sensitivities

Klebsiella pneumonia

- Quinolones – 100%
- cephalexin – 98%
- SMZ/TMP – 94%
- Amox + Clavulanate – 90%
- Nitrofurantoin – 27%

Don’t forget FOSFOMYCIN 3 gm

ONE dose

Treatment of Recurrent UTI

- Age/gender related factors
    - Menopausal status
    - Pelvic prolapse
    - Urinary incontinence
    - Voiding dysfunction
    - BPH

Treatment of Recurrent UTI

Other clinical considerations

- Fluid intake
- Constipation
- Neurological disease
- Urinary retention

Recurrent UTI Antibiotic Therapy

Duration of therapy can vary depending on clinical situation

Previous antibiotics used to treat UTI

Consideration for QHS antibiotic prophylaxis

Consideration for postcoital antibiotics

ESBL E coli

Emergence – difficult to tell but published literature started in 2007

Extended Spectrum Beta Lactamase producer

Most commonly identified as E coli and Klebsiella

Hospital and community acquired

High rates of relapsing infection

Pitout J et al,,Lancet Inf Dis, Mar 2008

Treatment of ESBL *E coli*

- First identify the bacteria
- Most labs now test for ESBL +/-
- Identify previous antibiotic regimens
- Carbapenems are:
    - Expensive
    - IV only – PICC line
    - Usually 2 – 6 week IV therapy

Prostatitis

- Symptoms:
    - Pain in the perineum, lower abdomen, testicles, penis, and with ejaculation, bladder irritation, bladder outlet obstruction, and sometimes blood in the semen
- Diagnosis:
    - Typical clinical history (fevers, chills, dysuria, malaise, myalgias, pelvic/perineal pain, cloudy urine)
    - The finding of an edematous and tender prostate on physical examination
    - Will have an increased PSA
    - Urinalysis, urine culture

Prostatitis

- Treatment:
    - Trimethoprim/sulfamethoxazole, fluroquinolone or other broad spectrum antibiotic
    - 4-6 weeks of treatment
- Risk Factors:
    - Trauma
    - Sexual abstinence
    - Dehydration

Urethritis

- Chlamydia trachomatis
    - Frequently asymptomatic in females, but can present with dysuria, discharge or pelvic inflammatory disease.
    - Send UA, Urine culture (if pyuria seen, but no bacteria, suspect Chlamydia)
    - Pelvic exam – send discharge from cervical or urethral os for chlamydia PCR
    - Chlamydia screening is now recommended for all females ≤ 25 years
    - Treatment:
        - Azithromycin – 1 g po x 1
        - Doxycycline – 100 mg po BID x 7 days
- Neisseria gonorrhoeae
    - May present with dysuria, discharge, PID
    - Send UA, urine culture
    - Pelvic exam – send discharge samples for gram stain, culture, PCR
    - Treatment:
        - Ceftriaxone – 125 mg IM x 1
        - Cipro – 500 mg po x 1
        - Levofloxacin – 250 mg po x 1
        - Ofloxacin – 400 mg po x 1
        - Spectinomycin – 2 g IM x 1
    - You should always also treat for chlamydia when treating for gonnorhea!

THANK YOU FOR YOUR ATTENTION