

UTIs & PYELONEPHRITIS IN PREGNANCY

FLAME LECTURE: 173B

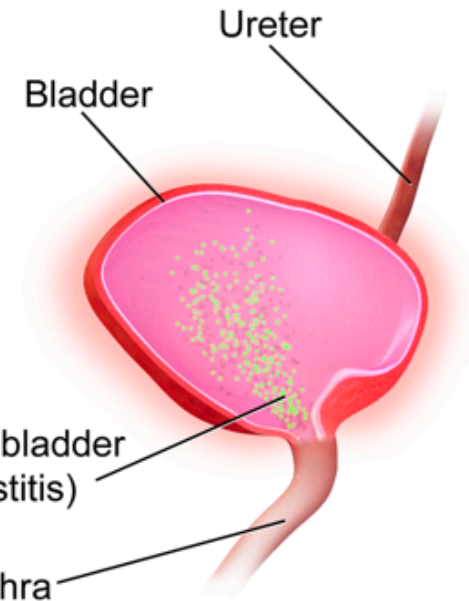
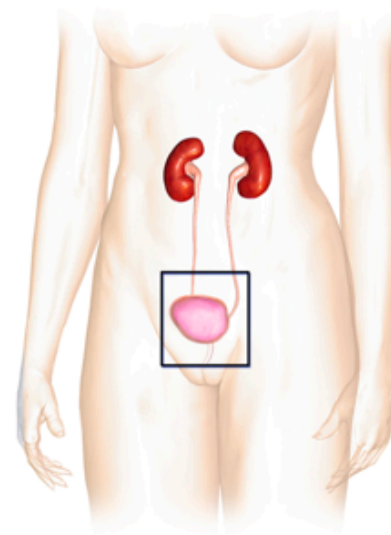
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LEARNING OBJECTIVES

- ▶ To understand the risk factors, clinical signs and symptoms, diagnosis, and management of UTIs
- ▶ To discuss specific treatments and prophylaxis for acute uncomplicated cystitis, pyelonephritis, and UTIs in pregnancy
- ▶ Prerequisites:
 - ▶ NONE
- ▶ Related:
 - ▶ FLAME 173A: UTIs in NON-PREGNANT WOMEN

CLASSIFICATION

- ▶ Lower Urinary Tract Infection:
 - ▶ Urethritis – Infection of the urethra
 - ▶ Cystitis – Infection of the bladder
- ▶ Upper Urinary Tract Infection:
 - ▶ Ureteritis – Infection of the ureter
 - ▶ Pyelonephritis – Infection of the kidney



BACKGROUND

- ▶ Pregnancy Physiology = Pathophysiology:
 - ▶ Mechanical compression on the ureter by the uterus and progesterone-induced relaxation of the ureter lead to mild ureteral and renal calyceal dilation (especially on the right side)
 - ▶ Mechanical compression of the bladder and decreased detrusor tone lead to increased capacity and incomplete emptying of the bladder
 - ▶ All of the above lead to urinary stasis
 - ▶ Further, increased GFR → increased urinary glucose levels and alkalization of urine → facilitates bacterial growth

BACKGROUND

- ▶ Pyelonephritis affects 1-2% of pregnancies
 - ▶ 80-90% of cases occur in 2nd to 3rd trimesters
- ▶ Even asymptomatic bacteriuria (>100K colonies) increases the risk of UTI/pyelonephritis in pregnancy
 - ▶ Thus, all pregnant patients should be screened
 - ▶ Collect a midstream urine sample in first trimester and send for UA with reflex culture
 - ▶ Consider point-of-care UAs at each pregnancy visit
 - ▶ Treatment of asymptomatic bacteriuria can decrease the risk of UTI from 30% to 1-2%

RISK FACTORS FOR UTI/PYELONEPHRITIS

- ▶ In addition to pregnancy itself:
 - ▶ History of urinary tract infection
 - ▶ Frequent or recent sexual activity
 - ▶ Increasing parity
 - ▶ Diabetes mellitus
 - ▶ Obesity
 - ▶ Sickle cell trait
 - ▶ Anatomic congenital genitourinary abnormalities
 - ▶ Urinary tract calculi
 - ▶ Neurologic disorders or medical conditions requiring indwelling or repetitive bladder catheterization

ACUTE UNCOMPLICATED CYSTITIS

- ▶ Pathogenesis: ascending infection to bladder from colonization of vaginal introitus often by fecal flora
- ▶ Common pathogens: *E. coli* (75-90%), *Proteus*, *Klebsiella*, *Enterococcus*, *Staph saprophyticus*, *GBS*
- ▶ Clinical symptoms:
 - ▶ Dysuria, urinary frequency, urgency, suprapubic pain/pressure, and/or hematuria

PYELONEPHRITIS

- ▶ Infection of the upper urinary tract involving the kidneys
- ▶ Clinical symptoms:
 - ▶ Fever ($>38^{\circ}\text{C}$), chills, flank pain, costovertebral angle tenderness (CVAT), nausea, vomiting
 - ▶ Symptoms of cystitis may or may not be present
- ▶ Serious complications:
 - ▶ Sepsis, shock, acute renal failure, ARDS, preterm labor and delivery

DIAGNOSIS

- ▶ **Cystitis**: diagnosis can be made based on clinical symptoms
 - ▶ But remember, many women in pregnancy at risk for UTI may be asymptomatic
- ▶ **Pyelonephritis**: diagnosis based on clinical symptoms with or without symptoms of cystitis
 - ▶ Urinalysis (either by dipstick or microscopy) and urine culture should be ordered
- ▶ Urine culture and sensitivities especially indicated for:
 - ▶ Pyelonephritis
 - ▶ Cystitis with atypical symptoms
 - ▶ If antimicrobial resistance is suspected
 - ▶ Symptoms persist or recur within 3 months of treatment

DIAGNOSIS (cont'd)

- ▶ Urine collection: use voided midstream clean-catch urine sample
- ▶ Urinalysis (by dipstick or microscopy)
 - ▶ (+) **Leukocyte esterase**: detects enzyme released by leukocytes
 - ▶ (+) **Nitrite**: detects *Enterobacteriaceae* (convert urinary nitrate to nitrite). Note: negative result does not rule out UTI, because a UTI can be caused by a non-nitrite producing organism
 - ▶ (+) **Pyuria**: ≥ 10 leukocytes/mL
- ▶ **Urine culture**:
 - ▶ $\geq 10^5$ colony forming units [CFU]/mL of pathogenic bacteria from clean-catch or indwelling catheter specimen
 - ▶ $\geq 10^2$ CFU/mL of pathogenic bacteria from straight catheter specimen

DIFFERENTIAL DIAGNOSIS

- ▶ If UA is negative, but pt is symptomatic, consider other diagnosis:
 - ▶ CT/GC urethritis
 - ▶ HSV urethritis
 - ▶ Vaginitis: yeast infection, trichomoniasis, bacterial vaginosis
 - ▶ Pelvic inflammatory disease (PID)
 - ▶ Overactive bladder
 - ▶ Interstitial cystitis
 - ▶ Painful bladder syndrome
 - ▶ Nephrolithiasis

TREATMENT OPTIONS FOR CYSTITIS

Antimicrobial Agent	Dose	Adverse Events
Trimethoprim-sulfamethoxazole (avoid in 1st tri and at term)	160 mg trimethoprim / 800 mg sulfamethoxazole q12h x 3d	Fever, rash, photosensitivity, neutropenia, thrombocytopenia, anorexia, nausea, vomiting, pruritis, headache, urticaria, Stevens-Johnson syndrome, toxic epidermal necrosis
Amoxicillin	500 mg q12 x 7d 250 mg q8h x 7d	Diarrhea, headache, nausea, vomiting, rash, hypersensitivity, anemia, mucocutaneous candidiasis, pseudomembranous colitis
Cephalexin	250mg q6h x 7d 500mg q12h x 7d	Abdominal pain, diarrhea, headache, dizziness, dyspepsia, agitation/confusion, hypersensitivity, anemia, erythema multiform, epidermal necrolysis, hepatitis
Nitrofurantoin macrocrystals (avoid in 1st tri)	100 mg q12h x 7d	Anorexia, nausea, vomiting, hypersensitivity, peripheral neuropathy, hepatitis, hemolytic anemia, pulmonary reactions
Fosfomycin tromethamine	3000 mg once	Diarrhea, nausea, vomiting, rash, hypersensitivity

TREATMENT FOR PYELONEPHRITIS

- ▶ Antibiotics to NOT USE:
 - ▶ Fluoroquinolones: toxic to developing cartilage in experimental animal studies
 - ▶ Tetracyclines: can chelate calcium affecting bone growth, and cause tooth discoloration
- ▶ Other antibiotics deserving special consideration
 - ▶ Aminoglycosides have been associated with renal toxicity, ototoxicity (several reports of total irreversible bilateral congenital deafness), but gentamicin has been considered safe with close monitoring
 - ▶ Trimethoprim/Sulfamethoxazole: Concern with 1st tri use given its inhibitory effect on folate metabolism, concern near delivery of increasing risk of hyperbilirubinemia

TREATMENT FOR PYELONEPHRITIS

OUTPATIENT

- ▶ Considerations for outpatient management:
 - ▶ Patient must be < 24 weeks
 - ▶ Mild symptoms
 - ▶ Can tolerate PO, no severe nausea/vomiting
 - ▶ No evidence of sepsis
 - ▶ No underlying medical conditions
 - ▶ No history of substance abuse
 - ▶ Reliable to follow-up

TREATMENT FOR PYELONEPHRITIS

OUTPATIENT ANTIBIOTICS

- ▶ If deemed stable for outpatient management, give initial IV dose of Ceftriaxone 1g IV or IM
- ▶ Patient should then return 24 hours later for a second IV or IM dose of Ceftriaxone
- ▶ This should be followed by an additional 10-12 days of oral Cephalexin
- ▶ Schedule patient for outpatient follow up at completion of regimen
- ▶ Give patients strict precautions to return to hospital if not improving or having fevers in that 5-10% of patients may fail this regimen
- ▶ Every pregnant patient with pyelonephritis requires prophylactic Nitrofurantoin 100mg q24 for the remainder of pregnancy and 4-6 weeks postpartum

TREATMENT FOR PYELONEPHRITIS

INPATIENT

- ▶ Initial management recommendations if not eligible for outpatient management or failed outpatient management:
 - ▶ Conservative IV fluids (given risk of ARDS), monitor urine output
 - ▶ Send UCx, CBC, BMP (trend WBC or electrolytes as necessary)
 - ▶ CXR/CT Chest if patient having dyspnea (given risk of ARDS [1-8% in pregnancy]; or alternative pathology)
 - ▶ Consider renal U/S to r/o obstruction or abscess if symptoms or fevers persists > 24-48 hours after initiation of treatment
 - ▶ Antibiotic choice should ideally be guided by UCx susceptibilities, though often when deciding on an initial management regimen, this information will not yet be available and your choices are limited

TREATMENT FOR PYELONEPHRITIS

INPATIENT ANTIBIOTICS

- ▶ Ceftriaxone 1-2 g IV q24h
- ▶ Ampicillin 2g q6h + Gentamicin 1.5 mg/kg q8h
- ▶ Alternatives include: cefepime, aztreonam, ticarcillin-clavulanate, piperacillin-tazobactam, meropenem, ertapenem, doripenem
- ▶ Can transition from IV to PO antibiotics after patient is afebrile for 24-28h (usually 48) and asymptomatic

RECURRENT UTI

- ▶ The risk of recurrent pyelonephritis is 20% in pregnancy, and the risk of recurrent UTI is even higher
 - ▶ Thus, antimicrobial prophylaxis is indicated for women with ≥ 2 UTIs or a single episode of pyelonephritis
- ▶ Common suppressive regimens:
 - ▶ Nitrofurantoin 100 mg once daily at bedtime
 - ▶ Cephalexin 250 q12h or 500 mg once daily at bedtime
 - ▶ We often switch to this as a prophylactic method if the patient again has a UTI while on Nitrofurantoin suppression
- ▶ Other strategies with low-risk: postcoital voiding, cranberry juice, and probiotics

RECURRENT UTI (cont'd)

- ▶ When are urologic studies (e.g. excretory urography, cystoscopy, intravenous pyelogram) indicated?
 - ▶ Routine urologic evaluation of young women with recurrent UTIs has NOT been shown to be cost-effective and has a low diagnostic yield (especially in pregnancy)
 - ▶ These are only considered after two recurrences of pyelonephritis, if a complicating factor is identified, or if there are persistent fevers in the setting of pyelonephritis
 - ▶ Renal ultrasound or spiral CT recommended to rule out nephrolithiasis or obstructive uropathy before conducting more invasive studies like cystoscopy

IMPORTANT LINKS / REFERENCES

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