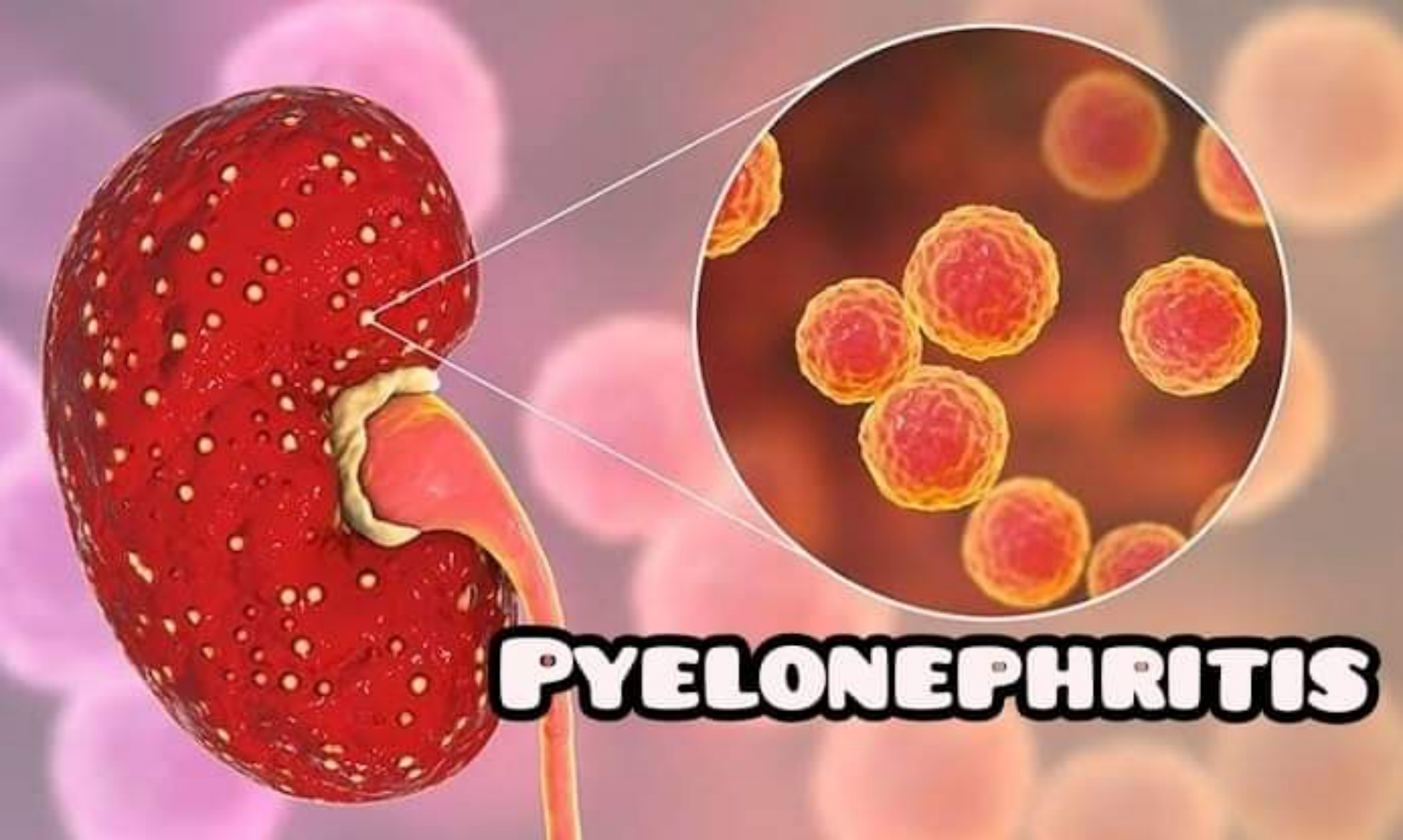

PYELONEPHRITIS

- Definition
- Epidemiology and Risk Fctors
- Etiology
- Pathogenesis
- Clinical feature
- Lab diagnosis
- Treatment

Definition:

- inflammation of the parenchyma and lining of renal pelvis of kidney

Epidemiology and Risk Fctors:

- Host factor:
- Female :Shorter urethra
- Male : uncircumcised infant → bacterial colonization inside prepuce and urethra
- Catherization
  - DIRECT: Bacteria carried directly into bladder during insertion
  - INDIRECT:Facilitation of bacterial access via
    - lumen of catheter
    - Tracking up between outside catheter and urethral wall

Host factor:

- Normal urine flow disruption (obstruction)→ Incomplete bladder emptying → > 2-3ml residual urine→ infection → ascent of infection → pyelonephritis
  - Pregnancy
  - Prostatic hypertrophy
  - Renal calculi
  - Tumor
  - Stricture
- Loss of neurological control of bladder and sphincter(spina bifida , paraplegia, multiple sclerosis)
- Vesicourethral reflux (urine reflux from bladder to ureter, renal pelvis and parenchyma)
- Diabetes Mellitus → diabetic neuropathy→ interfere with bladder function
- Diabetes Mellitus → Impaired cytokine secretion

Host factor:

- genetic background of the host
- familial disposition to pyelonephritis
- women with recurrent UTI
- Have had their first UTI before the age of 15 years
- persistent vaginal colonization
- Mutations in host response genes(those coding for Toll-like receptors and the interleukin 8 receptor)

Host factor:

- Factors independently associated with pyelonephritis in young healthy women include:
- Frequent sexual intercourse
- New sexual partner,
- UTI in the previous 1 2 months,
- Maternal history of UTI,
- Diabetes
- Incontinence.
- spermicide use
- And cystoceles ,incontinence and residual urine in postmenopausal women,

Etiology:

- The uropathogens causing Pyelonephritis vary by clinical syndrome but are usually enteric gram-negative rods that have migrated to the urinary tract. The susceptibility patterns of these organisms vary by clinical syndrome and by geography.
- Gram negative organism
- E.coli (common)
- Proteus mirabilis, Citrobacter, klebsiella, enterobacter, proteus pseudomonas aeruginosa
- Gram positive organism
- Staph.saprophyticus, Staph. Epidermidis enterococcus, Corynebacteria and lactobacilli

Virus

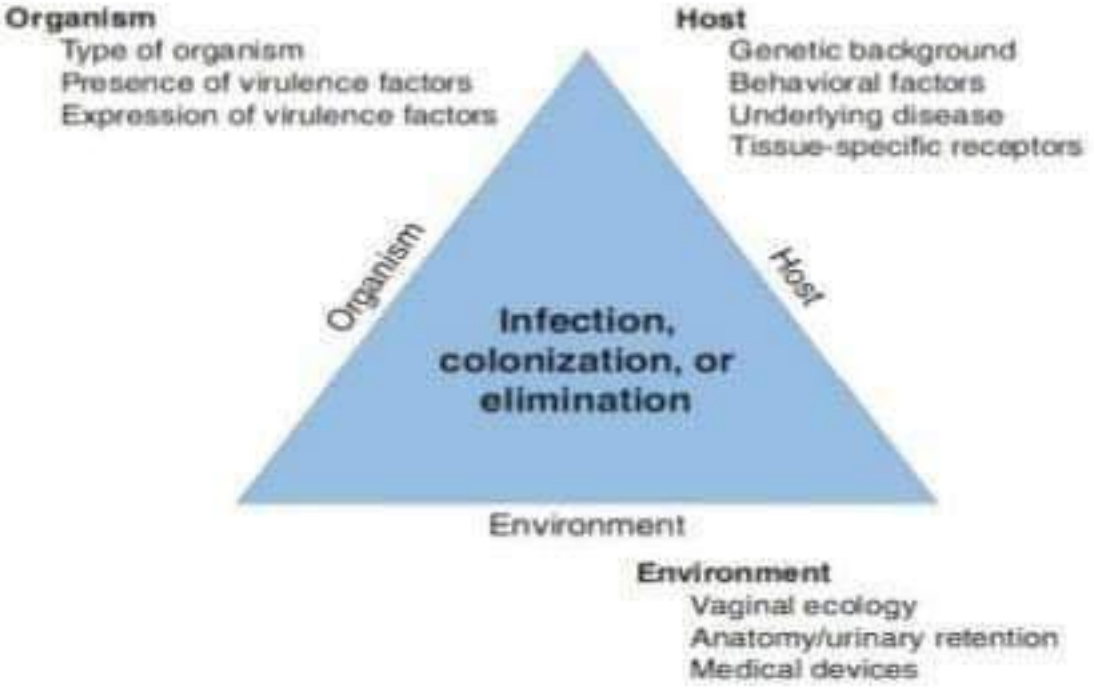
- Rare
- Virus Human polymaviruses , JC and BK
- Cytomegalovirus and rubella
- Korean hemorrhagic fever virus
- Mumps and HIV
- Recovered in urine in absence of UTI

Parasite

- Fungi : candida spp and histoplasma capsulatum
- Protozoa : trichomonas vaginalis
- Helminth: schistosoma haematobium

Pathogenesis:

- The urinary tract can be viewed as an anatomic unit united by a continuous column of urine extending from the urethra to the kidneys. Inthe majority of UTIs bacteria establish infection by ascending from the urethra to the bladder. Continuing ascent up the ureter to the kidney is the pathway for most renal parenchymal infections.

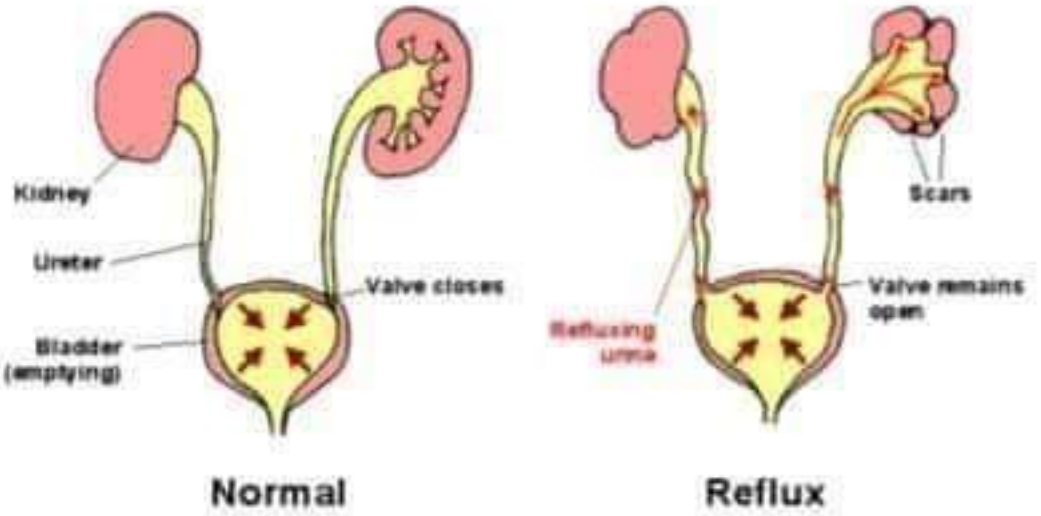


Vaginal Ecology:

- Colonization of the vaginal introitus and periurethral area with organisms from the intestinal flora (usually E. coli)
- Sexual intercourse is associated with an increased risk of vaginal colonization with E. coli
- Nonoxynol-9 in spermicide is toxic to the normal vaginal microflora and thus is likewise associated with an increased risk of E. coli vaginal colonization and bacteriuria

Anatomical And Functional Abnormalities

- urinary stasis or obstruction
- Foreign bodies:stones or urinary catheters
- vesicoureteral reflux
- ureteral obstruction secondary to prostatic hypertrophy
- neurogenic bladder
- urinary dive



Microbial Fators:

- Uropathogenic E. Coli (UPEC)
  - Pyelonephritis associated pili (PAP) adhesion to urethral and bladder epithellium in
  - K antigen that help E coli to be phagocytosis-resistant
  - Hemolysin (membrane damaging toxin)

Clinical Feature

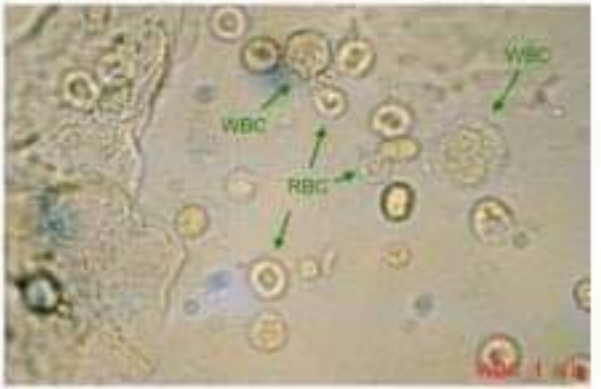
- Mild pyelonephritis:
- low-grade fever
- with or without lower-back or costovertebral-angle pain
- severe pyelonephritis:
- High fever "picket-fence" 72hr
- Nausea
- vomiting
- flank and/or loin pain

- Emphysematous pyelonephritis:
- exclusively in diabetic patients
- production of gas in renal and perinephric tissues
- bilateral papillary necrosis
- rise in the serum creatinine level

- Xanthogranulomatous pyelonephritis
- chronic urinary obstruction (often by staghorn calculi)
- chronic infection
- Suppurative destruction of renal tissue
- Pyelonephritis can also be complicated by intraparenchymal abscess formation; this situation should be suspected when a patient has continued fever and/or bacteremia despite antibacterial therapy.

Laboratory Diagnosis:

- The Urine Dipstick Test:
- Rapid diagnostic test
- Appearance of WBC in urine
- test for nitrite & leukocyte esterase
- (family Enterobacteriaceae, in detected in urine PMN)
- Negative outcome , it s not sufficient for pregnancy women
- Urinalysis:
- WBC in Cast shape due to of pyelonephritis
- No WBC , No Infection



- Urine Culture:
- Method of Sampling:
- Clean Catch:
- Straight Catheterization:
- foley cathatere:
- Suprapubic Aspiration:

- Urine culture interpretation:
- It is positve with colony count equal or more than 10 power 2 In women with dysuria & pyuria
- It is positve with colony count > 10 power 3 In Men

Treatment:

- Fluoroquinolones the first- line therapy for acute uncomplicated pyelonephritis
- A randomizedclinical trial demonstrated that a 7-day course of therapy with oral ciprofloxacin (500 mg twice daily with or without an initial IV 400-mg dose) Was highly effective for the initial management of pyelonephritis in the outpatient setting
- Oral TMP-SMX (one double-strength tablet twice daily for14 days) also is effective for treatment of acute uncomplicated pyelonephritis if the uropathogen is known to be susceptible.
- If the pathogen's susceptibility is not known and TMP SMX
- is used an initial IV l -g dose of ceftriaxone is recommended

- Options for parenteral therapy for uncomplicated pyelonephritis include fluoroquinolones an extended-spectrum cephalosporin with or without anaminoglycoside
- o r acarbapenem. Combinations of a ß-lactam and a ß-lacta mase inhibitor (e.g .ampicillin-sulbactam, ticarcillinc Lavulanate piperacillin-tazobactam) or imipenem-cilastatin can be used in patients with more complicated histories previous episodes of pyelonephritis or recent urinary tract manipulations