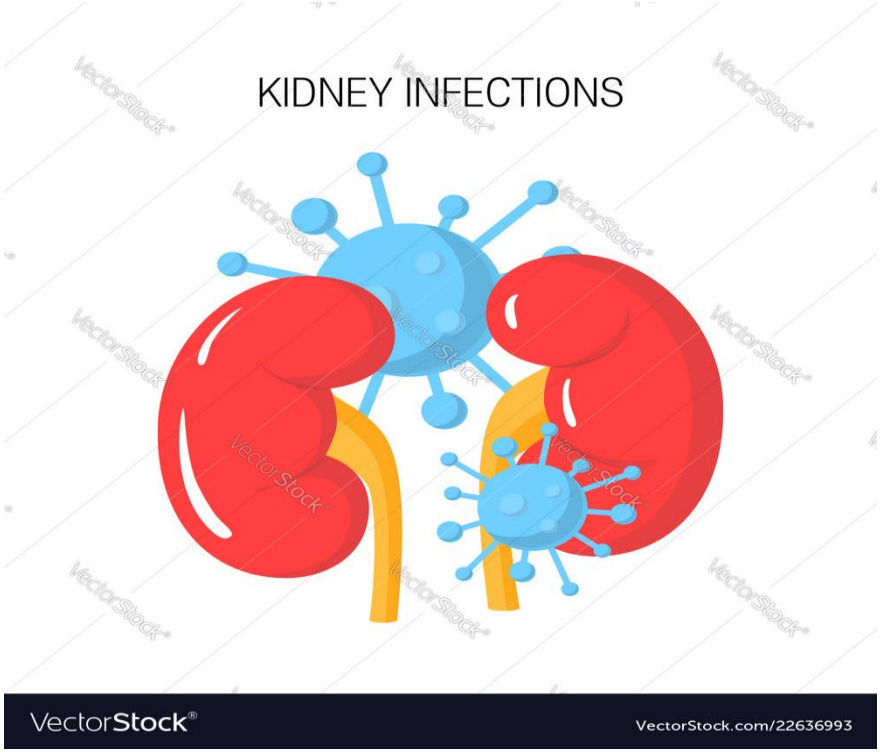
Kidney Infections



Acute pyelonephritis

- Infection of the kidney - Pyelonephritis
- Can arise in two ways

Haematogenous infection

- From a primary site in the tonsils, carious teeth or from cutaneous infections, particularly boils or a carbuncle
- Renal tuberculosis
- Blood borne spread from lymph nodes in the neck, chest or abdomen

Ascending infection

- The urinary tract is the most common route
- Most likely to occur when there is vesico-ureteric reflux
- Urinary stasis and the presence of calculi are common contributory factors

- Escherichia coli and other gram-negative organisms are commonly responsible
- More common in females
- During childhood, at puberty, after intercourse and during pregnancy

Clinical features

- Fever (temperature >38°C)
- Rigors
- Flank pain
- Nausea and vomiting
- Costovertebral angle tenderness
- Cystitis symptoms may or may not be present
- Pyuria
- Symptoms may vary from a mild illness to a severe illness with septic shock, renal failure and a threat to life

Investigations

- Urine full report
- Urine culture and antibiotic sensitivity test
- Blood culture
- Imaging

To rule out pyonephrosis, perirenal abscess and obstruction of the collecting system by renal calculi

1. Renal USS
2. Contrast- enhanced computed tomography (CT) scan

Pyelonephritis complicating pregnancy

- Most often presents between 20 and 28 weeks of gestation
- Pyelonephritis is more common in pregnant women with an underlying urological abnormality or diabetes
- More often affects the right kidney - ureter is often more dilated on that side
- Pyonephrosis and perirenal abscess are rare complications
- Renal USS is indicated

Renal abscess

1. Renal cortical abscess (carbuncle)
2. Corticomedullary abscess
3. Perirenal abscess

- Start with tissue necrosis (lobar necrosis in renal abscess; perirenal fat necrosis in perinephric abscess)
- Renal abscess forms a walled-off cavity
- Perinephric abscess consists of a more diffuse liquefaction
- Perinephric abscess - located between the renal capsule and Gerota's fascia

Renal cortical abscess

- Renal cortical abscess – Carbuncle
- Usually caused by *Staphylococcus aureus*
- Haematogenous spread
- Most commonly seen in

1. Diabetics
2. Intravenous drug abusers
3. Those debilitated by chronic disease
4. Patients with acquired immunodeficiency

Renal corticomedullary abscess

- Usually results from an ascending UTI
- Association with an underlying urinary tract abnormality, such as obstructive uropathy or VUR
- Usually caused by - *E. coli* and other gram-negative bacilli
- Abscesses may extend deeply into the renal parenchyma
- Perforate the renal capsule and form a perirenal abscess

Clinical features

- Pyrexia
- Back or abdominal pain
- Costovertebral tenderness
- No urinary symptoms or findings if the abscess does not communicate with the collecting system (usually with cortical abscess)
- Clinical presentation may be insidious and non-specific

CT scan

- Investigation of choice to establish the diagnosis
- Location of a renal or perirenal abscess

Treatment

- Abscess is small
- Underlying urinary tract abnormality can be corrected

→ Antibiotics without drainage

- Many cases, percutaneous drainage of pus is required to stabilise the patient
- Two percutaneous drains may be needed

1. Drain the perirenal collection
2. Decompress the collecting system of the kidney

Emphysematous pyelonephritis

- Fulminant, necrotising, life-threatening variant of acute pyelonephritis
- Caused by gas-forming organisms

Including *E. coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa* and *Proteus mirabilis*

- 90% of cases occur in diabetic patients
- Urinary tract obstruction may be present
- Symptoms are suggestive of pyelonephritis and there may be a loin mass

- Gas can be detected on

Plain film

USS

CT scan

- Intravenous broad-spectrum antibiotics
- Percutaneous catheter drainage
- Relief of obstruction
- Nephrectomy may be needed in the most severely ill patients

Xanthogranulomatous pyelonephritis (XGP)

- Uncommon
- Severe chronic destructive granulomatous inflammation of the renal parenchyma
- Associated with obstruction and infection of the urinary tract
- Typically middle-aged women
- Chronic symptoms
  - Flank pain
  - Pyrexia
  - Malaise
  - Flank tenderness
  - Palpable mass
  - Irritative voiding symptoms are common

- Urine culture is usually positive for *E. coli*, other gram-negative bacilli or *S. aureus*
- CT scan

1. Enlarged, non-functioning kidney
2. Presence of calculi
3. Low-density masses (xanthomatous tissue)
4. Involvement of adjacent structures

- Nephrectomy is usually the definitive treatment

Tuberculosis (TB)

- Caused by dissemination of the organism through the bloodstream
- Always secondary TB
- Either reinfection or reactivation of old TB
- Organisms are deposited close to the glomeruli causing an inflammatory reaction
- Macrophages react and granulomas are formed
- Bacterial multiplication
- Fibrous tissue is formed
- Later caseous necrosis

Investigations

- Diagnosis is confirmed

1. Tuberculin test
2. 3 consecutive early-morning specimens of urine are examined for acid-fast bacilli with a Ziehl–Neelsen stain
3. Culture

- CT is the most sensitive modality for visualising renal calcifications
- CT urography is more sensitive at identifying all manifestations of renal tuberculosis

Treatment

- Short-course therapy

✓Fewer organisms are involved compared with pulmonary TB

✓Drugs tend to concentrate in the urine

- Pyrazinamide, isoniazid and rifampicin are used
- Surgery - excision of dead tissue

e.g. partial nephrectomy or nephrectomy