Chronic pyelonephritis

LEARNING OBJECTIVES
At the end of the lecture student should be able to:

- Describe what is chronic Pyelonephritis
- Enumerate different types of Pyelonephritis
- Discuss different types of Nephtopathies.
- Tell Nephrocalcinosis
- Explain Multiple Myeloma

Chronic pyelonephritis

- Predominately interstitial inflammation and scarring of renal parenchyma associated with scarring and deformities of the pelvicalyceal system

- May be due to chronic obstruction or chronic reflux

Chronic pyelonephritis

- Obstructive:
  - recurrent infection superimposed on obstructive lesions
  - UTI on background of vesico-ureteric reflux

- Reflux associated pyelonephritis:
more common form of chronic pyelonephritis
- unilateral or bilateral
- Due to recurrent infections on a background of chronic obstruction (eg. Renal calculi)

**Chronic pyelonephritis (end stage kidney, anamnesis of prostatic hypertrophy)**

**Morphology Gross**
- If bilateral, asymmetric
- **IRREGULAR** scarring (cf. Chronic GN)
- Coarse cortico-medullary scar overlying dilated, blunted or deformed calyx
- Most are in poles
Chronic pyelonephritis

**Microscopy**

- Tubules are variable and may be atrophic, hypertrophic (compensatory) or dilated (thyroidisation)

- Interstitial chronic inflammation and fibrosis

- Vessels show luminal obliteration in area of scar and hyaline arteriolosclerosis (if hypertension)

- Glomeruli may show periglomerular fibrosis, ischemic changes or focal segmental glomerulosclerosis

**Clinical course**

- Insidious or Ac. Recurrent pyelonephritis (back pain, fever, pyuria, bacteruria)

- Reflux: late due to renal insufficiency or HTN (children) or
urine exam.
• Polyuria, nocturia
• FSGS---CRF

**XANTHOGRA
UMANOMATOUS
PYELONEPHRITIS**

• Uncommon variant of chronic pyelonephritis
• Often caused by **Proteus** on a background of obstruction
• **Gross:** yellow-orange nodules
• **Histology:** Foamy macrophages, plasma cells, lymphocytes and neutrophils

**XANTHOGRA
UMANOMATOUS
PYELONEPHRITIS**

**Chronic Pyelonephritis Pathology**

**Tubulointerstitial nephritis**

---Drugs & toxins

• Interstitial immunologic reaction
  -- Ac. H/S nephritis
• ARF
• CRF
  -- subtle, cumulative injury to tubules

**Drug Induced Nephritis (Acute)**

• Occurs with penicillins (methicillin) other antibiotics, diuretics, NSAID’S, cimetidine etc.
• 15 days after exposure
• Fever, eosinophilia, rash, and renal abnormalities
• Hematuria, proteinuria, leukocyteinria
• Rising serum creatinine or acute renal failure with oliguria in 50% of cases
• Recovery follows withdrawal of offending drugs

**Drug Induced Interstitial Nephritis (Acute)**

**Morphology**
• Interstitium shows edema and infiltration by lymphocytes and macrophages; possibly eosinophils and neutrophils; and interstitial granulomas may be seen
• Tubulitis, necrosis and regeneration
• Glomeruli mostly normal

**Drug Induced Interstitial Nephritis (Acute)**

**Pathogenesis**
• May be some immune mechanism
• Onset is idiosyncratic not dose related
• Drug may be hapten that binds to some component of tubular cells and becomes immunogenic
• Injury is due to IgE / or cell mediated reactions to tubular
cells or BM.

- Type I & IV

**ANALGESIC NEPHROPATHY**

- Chronic tubulointerstitial nephritis + papillary necrosis
- Associated with excessive intake of analgesic mixtures (aspirin, caffeine, acetaminophen, phenacetin)
- Papillary damage occurs first
- Cortical changes are secondary
- – Aspirin alters haemodynamics — PG inhibition
  ---- ischemic injury to tubules and vessels
- – Acetaminophen damages tubular cells

**Pathogenesis**

- Papillary damage occurs first
- Cortical changes are secondary
- – Aspirin alters haemodynamics — PG inhibition
  ---- ischemic injury to tubules and vessels
- – Acetaminophen damages tubular cells — direct toxicity

**Gross**

- Size — normal or reduced
- Papillae show necrosis, calcification and fragmentation (cf
DM)

- Cortex is depressed over these areas

**Histology**

- Papillae are structureless necrotic masses with ghost outlines and calcific foci
- Cortex is atrophic, fibrotic and inflamed (due to the effects of obstruction)

**ANALGESIC NEPHROPATHY**

**Clinical course**

- F>M
- Hde., pains etc
- Inability to conc. Urine
- Renal stones---distil renal tubular acidosis
- Hde., anemia, HTN, GI, UTI
- Compl. --TCC pelvis
- Drug withdrawal→ stabilize or improve
- MRI & CT

**NSAID assoc. Nephropathy**

- Selective and non-selective COX inhibitors
- Inhibit COX dependant PG synthesis
- ARF---ischemia
• Ac. H/S interstitial nephritis
• AIN and Minimal change disease
• Memb. GN
  **Chinese Herbs nephropathy**
• Syndrome of Chr. Interstitial nephritis
• Aristolochic acid
• Interstitial fibrosis → RF
• Carcinoma

**Drug induced renal disorders:**
**URATE NEPHROPATHY**

Three forms

• **Acute urate nephropathy**
  --May follow chemotherapy
  --Crystals deposit in tubules and obstruct the nephron
  --ARF

**URATE NEPHROPATHY**

• **Chronic urate nephropathy**
  --protracted hyperuricemia
  --Crystals (mono sodium urate) deposit in ducts and interstitium
  --Birefringent needle-shaped crystals
  --Giant cell reaction (**Tophus**)
--Cortical atrophy and scarring, arteiolar thickening
-- mild and insidious

- **Nephrolithiasis**

**Nephrocalcinosis**
- Deposition of Ca in kidneys
- Hypercalcemia---
• Chronic tubulointerstitial disease & renal insuff.
• Tubular cells---deposition in mitoch., cytopl., BM
• Obstruction --- atrophy, fibrosis, inflammation --- scarring
  **Multiple Myeloma**
• Malignant tumors – direct and therapy
• MM---overt renal insufficiency
• Renal damage
  --Bence Jones proteinuria, cast nephropathy
  --amyloidosis
  --light chain disease
  -- hypercalcaemia and hyperuricemia
  **Multiple Myeloma**
• Tubulointerstitial changes:
  Casts—pink to blue , amorphous masses in lumina
  -- surrounding inflammation and giant cell reaction
• CRF, ARF , BJ proteinuria, light chain dis.

**TUBULOINTERSTITIAL DAMAGE**
• Products in urine (eg. Cytokines, complement, immunoglobulin) are probably important by causing direct injury to cells and causing their activation
• They then express pro-inflammatory cytokines and growth factors

**Interstitial Nephritis**
*(Analgesic Nephropathy)*

• Necrotic papillae appear yellowish-brown
• Papillae show coagulative necrosis
• Basement membrane thickening in small vessels *(analgesic microangiopathy)*
• May see a carcinoma of renal pelvis

THANK YOU