Urinary System Disorders 3

Lecture 18
Pathology and Clinical Science 1 (BIOC211)
Department of Bioscience

Text Reference:
Porth's Pathophysiology: Concepts of Altered Health States
Ninth Edition.
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Session Learning Objectives

The aim of this session is to:

- Comprehend the causes, clinical features and management of acute and chronic tubulo interstitial nephritis and polycystic kidney disease
- Explain the pathogenesis, clinical features, investigations and management of chronic pyelonephritis
- Discuss the aetiology, presentations, clinical assessment and management of renal calculi.
- Understand the clinical features, investigations, management and prognosis of tumours in the kidneys.
INTERSTITIAL NEPHRITIS

A group of inflammatory, inherited and other diseases affecting renal tubules and the surrounding tissues

Clinical presentations:

- Often renal failure
- Electrolyte abnormalities (hyperkalaemia & acidosis)
- Proteinuria
- Haematuria
- Pyuria
ACUTE INTERSTITIAL NEPHRITIS (AIN)

Acute inflammation in the tubulo-interstitium.
Sometimes associated with uveitis

Aetiology

- Allergic – penicillins, NSAIDs, allopurinol
- Immune – autoimmune nephritis
- Infections – acute bacterial pyelonephritis, TB
- Toxic – myeloma, mushrooms
ACUTE INTERSTITIAL NEPHRITIS (AIN)

Investigations
- Blood tests
- Renal biopsy

Management
- Withdrawal of drug in drug-induced
- Corticosteroids
- Dialysis
- Treatment of cause
ACUTE INTERSTITIAL NEPHRITIS (AIN)
CHRONIC INTERSTITIAL NEPHRITIS (CIN)

Caused by heterogeneous group of disease

- Persistent causes of AIN
- GN
- Immune/ inflammatory
- Toxic
- Drugs
- Infection
- Congenital
- Metabolic and systemic diseases
CHRONIC INTERSTITIAL NEPHRITIS (CIN)

Clinical features

- Chronic Renal Failure, hypertension and small kidneys in adult life
- Electrolyte abnormalities

CHRONIC INTERSTITIAL NEPHRITIS (CIN)

Extensive deposition of fibrous tissue

http://www.humpath.com/IMG/jpg/chronic_interstitial_nephritis.jpg
CHRONIC INTERSTITIAL NEPHRITIS (CIN)

Normal Glomerulus

Lymphocytes and fibrous tissue present

POLYCYSTIC KIDNEY DISEASE (PKD)

- Prevalence of adult PKD 1: 1000
- Inherited as an autosomal dominant trait

Pathology

- Small cysts developed from infancy/childhood and enlarge slowly and irregularly → surrounding normal kidney tissue is attenuated → renal failure with grossly enlarged kidneys

- Non-pathological cysts are normal, especially with increasing age
## POLYCYSTIC KIDNEY DISEASE (PKD)

### Clinical features

- Discomfort in loin or abdomen
- Acute loin pain/renal colic
- Hypertension
- Haematuria
- UTI
- Renal failure
- Berry aneurysms of cerebral vessels (associated feature)
POLYCYSTIC KIDNEY DISEASE (PKD)

Diagnosis

• Family history
• Clinical findings
• Ultrasound

Management

• Good control of Blood Pressure
• Dialysis
• Renal transplant
POLYCYSTIC KIDNEY DISEASE

Large Polycystic Kidneys

POLYCYSTIC KIDNEY DISEASE

http://www.charonboat.com/item/295/page8.htm
POLYCYSTIC KIDNEY DISEASE

http://upload.wikimedia.org/wikipedia/commons/6/68/Polycystic_kidneys%2C_gross_pathology_20G0027_lores.jpg
REFLUX NEPHROPATHY (CHRONIC PYELONEPHRITIS)

Chronic interstitial nephritis associated with vesico-ureteric reflux (VUR) in early life with appearance of scars in the kidneys

Pathogenesis

• VUR is associated with recurrent UTI in childhood → renal scars
• VUR – unilateral or bilateral and of any grade or severity
REFLUX NEPHROPATHY
(CHRONIC PYELONEPHRITIS)

○ Clinical features
  • Usually asymptomatic
  • Hypertension at any age
  • Proteinuria
  • Features of Chronic Renal Failure
  • Features of UTI

○ Investigations
  • Radionucleide scan
  • Ultrasound
  • CT, MRI
# Reflux Nephropathy (Chronic Pyelonephritis)

## Management
- Treat infection
- Prophylactic therapy for UTI
- Nephrectomy (unilateral)

## Prognosis
- Good prognosis with small or unilateral renal scars
CHRONIC PYELONEPHRITIS

http://1.bp.blogspot.com/-c0aqbGlgcO4/TX7pPs9eLRI/AAAAAAAAA4o/0xDg_StGFmQ/s1600/chronic_pyelonephritis.jpg
URINARY TRACT CALCULI & NEPHROCALCINOSIS

Aetiology
- Formation is poorly understood

Types of stones
- Urinary calculi consist of aggregates of crystals containing small amounts of protein and glycoprotein
  - calcium oxalate
  - calcium phosphate
  - magnesium phosphate
  - uric acid stones
  - cysteine stones
- Vary in size, particles like sand to very large staghorn stone
- Deposits of calcium may be present throughout renal parenchyma (nephrocalcinosis)
# URINARY TRACT CALCULI

## Table 41.2 Composition, Contributing Factors, and Treatment of Kidney Stones

<table>
<thead>
<tr>
<th>Type of Stone</th>
<th>Contributing Factors</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium (oxalate and phosphate)</td>
<td>Hypercalcemia and hypercalciuria</td>
<td>Treatment of underlying conditions</td>
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<tr>
<td></td>
<td>Immobilization</td>
<td>Increased fluid intake</td>
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<tr>
<td></td>
<td>Hyperparathyroidism</td>
<td>Thiazide diuretics</td>
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<td></td>
<td>Vitamin D intoxication</td>
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<td>Diffuse bone disease</td>
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<td>Milk-alkali syndrome</td>
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<td></td>
<td>Renal tubular acidosis</td>
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<tr>
<td></td>
<td>Hyperoxaluria</td>
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<tr>
<td></td>
<td>Intestinal bypass surgery</td>
<td>Dietary restriction of foods high in oxalate</td>
</tr>
<tr>
<td>Magnesium ammonium phosphate</td>
<td>Urea-splitting UTIs</td>
<td>Treatment of UTI</td>
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<tr>
<td>(struvite)</td>
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<td>Acidification of the urine</td>
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<td></td>
<td></td>
<td>Increased fluid intake</td>
</tr>
<tr>
<td>Uric acid (urate)</td>
<td>Formed in acid urine with pH of approximately 5.5</td>
<td>Increased fluid intake</td>
</tr>
<tr>
<td></td>
<td>Gout</td>
<td>Allopurinol for hyperuricosuria</td>
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<td>High-purine diet</td>
<td>Alkalinization of urine</td>
</tr>
<tr>
<td>Cystine</td>
<td>Cystinuria (inherited disorder of amino acid metabolism)</td>
<td>Increased fluid intake</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alkalinization of urine</td>
</tr>
</tbody>
</table>

STAGHORN CALCULI

URINARY TRACT CALCULI & NEPHROCALCINOSIS

Conditions associated with stone formation

- Infection of urinary tract
- Climate or occupation giving rise to low urine volume
- High protein, high salt diet and high calcium
- Hypercalciuria
- Hyperoxaluria
- Some inherited disorders
# URINARY TRACT CALCULI & NEPHROCALCINOSIS

## Clinical features

- Depend on size, shape and position of the stone
- Nephrocalcinosis - usually no symptom
- Pain, recurrent urinary infection or clinical features of urinary tract obstruction
- Stone impacted in the ureter → renal colic (loin to groin)
- Hematuria
- Frequency
URINARY TRACT CALCULI & NEPHROCALCINOSIS

- **Investigation**
  - Examination of urine – RBCs
  - Plain X ray abdomen
  - IVU
  - CT
  - Ultrasound
  - Chemical analysis of stone

- **Management**
  - Bed rest, analgesics
  - Adequate fluid intake
  - Lithotripsy
  - Endoscopic surgery
Calculi occupying the Medulla

NEPHROCALCINOSIS

NEPHROCALCINOSIS

KIDNEY STONES

[Images of kidney stones labeled as 'Agony', 'Pain', and 'Misery']

http://curezone.com/upload/Kidney_Stones/kidney_stone_agony_pain_misery.jpg
TUMOURS OF THE KIDNEY

- 3% of malignancies
- Benign, malignant and secondary tumours can occur
## RENAL ADENOCARCINOMA

- Most common malignant tumour of the kidney in adults
- More common in males
- Peak incidence between 65-75 years of age
- Tumour arises from renal tubules
- Direct invasion of perinephric tissues is common
- Lymphatic spread to para-aortic nodes
- Blood-borne metastasis to anywhere in the body
# RENAL ADENOCARCINOMA

## Clinical features
- Haematuria 60%
- Loin pain 40%
- Mass
- Systemic effects

## Investigations
- Ultrasound
- CT

## Management
- Radical nephrectomy
- Immunotherapy

## Prognosis
- If confined to kidney – 75% 5-yr survival
RENAL CARCINOMA

Poorly differentiated adenocarcinoma

http://www.microscopyu.com/staticgallery/pathology/images/adenocarcinomaofkidney20x04.jpg

Porth’s Pathophysiology: Concepts of Altered Health States
CHRONIC KIDNEY DISEASE
SUMMARY

Readings and Resources

Resources:

- **Set Textbooks:**

- **Additional textbooks:**
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