Kidney in systemic diseases

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- The kidneys may be directly involved in a number of multisystem diseases or secondarily affected by diseases of other organs.
- Involvement may be at a
  - prerenal,
  - renal (glomerular or interstitial) or
  - postrenal level.

**DIABETES MELLITUS**

- Called as 'diabetic nephropathy'
- After 20 years of disease, the chance of nephropathy is 30-40% in Type I, and 15-20% in Type II.
- Progression into nephrotic syndrome – screening: microalbuminuria
- Hypertension develops
- ESRD, renal replacement therapy (hemodialysis) – poor prognosis

Slower the progression:
- Strict glycemic control
- Treatment of hypertension
- ACEI and ARB

Pathology:
- Diffuse glomerulosclerosis is most common, but nodular glomerulosclerosis is pathognomonic (Kimmelstiel-Wilson disease)
- Kidneys are enlarged – due to cellular hypertrophy and proliferation

Patients with diabetes mellitus are prone to other renal diseases:
- Papillary necrosis
- Chronic interstitial nephritis
- Type IV renal tubular acidosis
- Acute renal failure after the use of contrast material
HEPATIC-RENAL DISEASE

- IgA nephropathy is more common in patients with liver disease.
- Severe hepatic dysfunction may cause a haemodynamically mediated type of renal failure, hepatorenal syndrome.
- It also predisposes the kidney to develop acute renal failure (acute tubular necrosis) in response to relatively minor insults including bleeding and infection.
- Patients with such severe hepatic failure are often difficult to treat by dialysis and have a poor prognosis.

PULMONARY-RENAL DISEASE

- The pulmonary-renal syndrome is a dramatic presentation with renal and respiratory failure.
  - Goodpasture’s disease
  - Small-vessel vasculitis

MALIGNANT DISEASES

Paraneoplastic effects on the kidneys:
- Immune reaction
  - Systemic vasculitis (rare): ANCA-positive and -negative
- Metabolic consequences
  - Hypercalcaemia
- Remote effects of tumour products
  - Light chains in myeloma, amyloidosis
  - Antibodies in cryoglobulinaemia

TUBERCULOSIS OF THE KIDNEY AND URINARY TRACT

- Tuberculosis of the kidney is secondary to tuberculosis elsewhere and is the result of blood-borne infection.
- Initially, lesions develop in the renal cortex; these may ulcerate into the renal pelvis and involve the ureters, bladder, epididymis, seminal vesicles and prostate.
- Calcification in the kidney and stricture formation in the ureter are typical.

Clinical features:
- Symptoms of bladder involvement (frequency, dysuria);
- Haematuria: Sometimes macroscopic;
- Malaise, fever, night sweats, lassitude, weight loss;
- Joint pain;
- Associated genital disease;
- Chronic renal failure as a result of urinary tract obstruction or destruction of kidney tissue.

- Neutrophils are present in the urine but routine urine culture may be negative (sterile pyuria).
- Special techniques of microscopy and culture may be needed to identify tubercle bacilli or to perform urinary microscopy on the specimen.
- Bladder involvement should be assessed by cystoscopy.
- Radiology of the urinary tract and a chest X-ray to look for pulmonary tuberculosis are mandatory.
- Anti-tuberculosis chemotherapy follows standard regimes. Surgery to relieve urinary tract obstruction or to remove a very infected renal kidney may be required.
SICKLE CELL DISEASE

- Renal dysfunction is due to sickling of red blood cells in the renal medulla because of low oxygen tension and hypertonicity.
- Congestion and stasis lead to hemorrhage, interstitial inflammation and papillary infarcts. Papillary necrosis is common.
- Diminished concentration ability – isosthenuria (urine osmolality equal to serum osmolality) can also occur.
- Sickle cell papillary necrosis is less common, but can progress to ESRD.
- Optimal treatment is adequate hydration and control of the sickle cell disease.

VASCULAR DISEASES AFFECTING THE KIDNEYS

- Hypertension
- Hypotension/bilateral cortical necrosis
- Thrombotic diseases/DIC
- Vasculitis
- Systemic Lupus Erythematosus

Hypertension:

- Most common cause of renal failure in older adults.
- Diastolic BP ≥ 95 mm Hg or higher.

Hypertension can either be primary or secondary:

- Primary hypertension is usually idiopathic (no known cause) in 95% of cases.
- Secondary hypertension can be attributed to:
  - Renal causes: Acute GN, Chronic GN, Renal artery Stenosis, vasculitis, etc.
  - Endocrine causes: Adrenocortical hyperfunction, etc.
  - Vascular diseases (atherosclerosis).

Two types of hypertension are recognized:

- Benign Hypertension
  - Chronic, long-standing, most older adults.
- Malignant hypertension
  - M>F, Younger age group (40s),
  - Diastolic pressure > 115 mm Hg
  - Headache, retinopathy, ARF, CRF.

SYSTEMIC VASCULITIS

- Inflammation of the blood vessels
- Mostly autoimmune diseases
- Circulating antibodies
**Small-vessel vasculitis**

- Local inflammatory glomerulonephritis, usually with focal necrosis, and often causes crescentic changes
- Associated with a systemic illness with acute phase response, weight loss and arthralgia
- In some patients causes pulmonary haemorrhage, which can be life-threatening
- In other patients it presents as a kidney-limited disorder, with rapidly deteriorating renal function and crescentic nephritis

The most important causes of this syndrome:

- Microscopic polyangiitis
- Wegener's granulomatosis (ear, nose and throat involvement and lung disease)
- Polyarteritis nodosa, associated with antibodies to neutrophil granule enzymes (antimyeloperoxidase antibodies)
- Henoch-Schönlein purpura
- Vasculitis in other organs may give clues to the underlying systemic disorder and its subtype

**Systemic Lupus Erythematosus (SLE)**

- Subclinical renal involvement, with low-level haematuria and proteinuria but minimal/normal renal function, is common in SLE
- Acute illness is due to glomerular disease, although serologically and sometimes clinically overlap with systemic Sjögren's syndrome
- SLE can produce almost any histological pattern of glomerular disease, and an accordingly wide range of clinical features, ranging from rapidly progressive glomerulonephritis to nephrotic syndrome

**Diffuse proliferative lupus nephritis**

- Typically, patients present with subacute disease and inflammatory features (haematuria, hypertension, variable renal impairment), accompanied by heavy proteinuria that often reaches nephrotic levels
- In severely affected patients the most common histological pattern is an inflammatory, diffusely proliferative glomerulonephritis with distinct features to suggest lupus
- Controlled trials have shown that the risk of ESRF in this type of disease is significantly reduced by cyclophosphamide treatment, often given as regular intravenous pulses

**Thrombotic Diseases that affect the kidney:**

- DIC
- Thrombotic Thrombocytopenic Purpura (TTP)
- Hemolytic Uraemic Syndrome (HUS); E. coli poisoning, metastatic breast cancer, drugs, oral contraceptives

**Renal Biopsy**

- Under USG Guidance
- Indications:
  1. Nephritic syndrome
  2. Nephrotic syndrome
  3. Acute/chronic renal failure
  4. Cause of haematurial proteinuria
  5. Renal graft dysfunction evaluation
Before Transcutaneous renal biopsy

- Fully explained & consent obtained
- Coagulation screening BT/CT/PT/ aPTT
- Blood grouping & Cross-matched

During ~

- Lies prone with hard pillow under abdomen
- USG: site localized
- LA
- Pt holds breath when biopsy performed

After ~

- A pressure dressing to biopsy area
- Complete rest for 24 h
- Fluid intake adequate to prevent clots
- BP/ pulse monitoring
- Avoid heavy lifting/gardening for 2 wks

Complication

- Microscopic hematuria
- Flank pain
- Perirenal hematoma
- AV aneurysm formation = 20%
- Heavy bleeding 1% -- need transfusion
- Infection
- Mortality rate 0.1%