Renal Medicine

Acute kidney injury (AKI)

- Acute drop in GFR with a rise in creatinine and oliguria; majority due to pre-renal or ATN
  - pre-renal - hypovolaemia, hypotension, NSAIDs, ACE inhibitors, AAA, RAS, hepatorenal
  - renal - glomerulonephritis, HUS, ATN, aminoglycosides, interstitial nephritis, vasculitis
  - post-renal - calculi, urethral stricture, prostatic hypertrophy / ca., bladder ca., RPF
- Risks - elderly, HTN, PVD, CCF, DM, myeloma, chronic infection
- RIFLE - may cause risk, injury or failure resulting in functional loss or end-stage disease
- Features - confusion, HTN / postural hypotension, distended bladder, fluid overload
- Investigations - urinalysis, cystatin C, USS, consider renal biopsy
- Management - correct precipitants, fluid replacement / diuretics; consider PPI, CVP
  - dialysis indications - creatinine > 500, pH < 7.0, encephalopathy, refractory symptoms
- Complications - fluid overload / pulmonary oedema, metabolic acidosis, haemorrhage

Chronic kidney disease (CKD)

- At least 3 months of reduced GFR and evidence of renal damage
  - stages (eGFR) - 1 (> 90, normal), 2 (60-90, mild), 3 (30-60), 4 (15-30), 5 (< 15, ERF)
  - stages 1 and 2 also require persistent albuminuria, proteinuria, haematuria
- Risks - advanced age, CVD, DM, obesity, glomerulonephritis, PKD, SLE, myeloma
- Symptoms - chronic fatigue, weight loss, anorexia, nocturia, pruritis
- Complications - anaemia, HTN, hyperkalaemia, hyperparathyroidism, dyslipidaemia

Glomerulonephritis

- Mostly affect men; all except for minimal change may progress to CKD (up to 50%)
- Investigations - urine microscopy (red cell casts), renal biopsy
- Management - prednisolone, consider further immunosuppression e.g. ciclosporin
  - salt / fluid restriction, diuretics, BP control to maintain renal function - ACE inhibitors
- Minimal change - affects children aged 2-4 years; most likely cause of nephrotic syndrome
  - associated with atopy in children and HL in adults; majority relapse; no CKD progression
- IgA nephropathy (Berger’s disease) - commonest glomerulonephritis, affects young adults
  - mesangial proliferative; associated with HSP, SLE, hepatitis, AS, cirrhosis, coeliac, RCC
  - often follows URTI (esp. Strep.) or gastroenteritis with gross haematuria
- Focal / segmental - affects older children; leads to nephrotic syndrome
- Membranous - affects adults, most likely cause of nephrotic syndrome
  - may be secondary to SLE, hep. B, malignancy, gold
- Membranoproliferative - affects young adults, associated with low C3
- Crescentic - rapidly progressive; may be associated with ANCA-positive vasculitis
Goodpasture’s syndrome

- **Anti-GBM** antibodies - *acute glomerulonephritis with pulmonary alveolar haemorrhage*
- Risks - smoking, exposure to toxins e.g. solvents, metal dusts, influenza
- Symptoms - fever, nausea, vomiting, weight loss, chest pain, dyspnoea, haemoptysis
- Investigations - FBC (iron deficiency anaemia), ESR (*normal*), **anti-GBM** ELISA, ANCA
- Management - **plasmapheresis**, IV steroids, cyclophosphamide (for 3 months)

Interstitial nephritis

- Majority caused by *drugs* esp. penicillin, cephalosporins, erythromycin, NSAIDs, diuretics
  - also sepsis, EBV, SLE, Sjögren’s, sarcoidosis, anterior uveitis
- Symptoms - AKI, rash, fever; **nephrotic syndrome** (NSAIDs), **haematuria** (beta-lactams)
- Investigations - FBC (eosinophilia), IgE (high), mild proteinuria, USS (cortical brightness)
- Management - correct precipitants, consider **prednisolone**

Nephritic and nephrotic syndromes

- Either may be caused by *glomerulonephritis*, syphilis, EBV, hep. B, varicella, SLE, vasculitis
- Both lead to oedema (esp. periorbital in children), oliguria, mild proteinuria / haematuria
- **Nephritic syndrome** - marked haematuria, often with HTN
  - causes - pneumococcal pneumonia, endocarditis, Guillain-Barré, typhoid, DTP vaccine
- **Nephrotic syndrome** - marked proteinuria (> 3.5g/day / serum protein:creatinine of > 350)
  - also **hypoalbuminaemia**, dyslipidaemia (hypercholesterolaemia - may be xanthoma)
  - leads to *pro-thrombotic state* (DVT, MI) and predisposes to recurrent infection (e.g. UTI)
  - causes - DM, RA, TB, amyloidosis, malignancy, NSAIDs, diamorphine, pre-eclampsia
  - complications - recurrent infection (Ig loss), thrombosis - DVT, MI (antithrombin-III loss)

Medullary sponge kidney

- Congenital cystic disease of collecting ducts, usually bilateral, associated with cystic calculi
  - commonest in women; may be present in up to 20% of cases of renal calculi
  - associated with congenital hemihypertrophy, pyloric stenosis, PKD, Marfan’s, Wilm’s ca.
- Symptoms (aged 20-30) - **haematuria**, **recurrent UTI**, obstructive uropathy
- Investigations - USS (calcification), **IVU** (‘brush-like’ papillary striations, ‘bunch of grapes’)
- Management - encourage fluids, low-protein diet, treat UTI / calculi

Renal artery stenosis

- Risks - **atherosclerosis**, PVD, HTN, DM, advanced age, smoking, hyperlipidaemia
- Symptoms - refractory severe HTN, flash pulmonary oedema
- Investigations - **USS** (unequal kidney size), consider CT / MRI
- Management - control CVD risk factors, avoid ACE inhibitors and NSAIDs
- Complications - acute / chronic renal failure, CCF, end organ damage from HTN
Renal tubular acidosis (RTA)

- Leads to **hypokalaemia** (except type 4), **hyperchloremic metabolic acidosis**
  - **Type 1** (distal) - inability to acidify urine in distal tubule
    - associations - Sjögren’s, SLE, hyperparathyroidism, obstructive uropathy, recurrent UTI
    - symptoms - hyperventilation, myopathy, arrhythmias, osteomalacia, renal calculi
  - **Type 2** (proximal) - inability to reabsorb bicarbonate in proximal tubule
    - symptoms - polyuria, polydipsia, proximal myopathy, osteomalacia
  - **Type 4** (hyperkalaemic) - inadequate aldosterone activity
    - associations - Addison’s, IEM, DM, SLE, amyloidosis, ACE inhibitors, NSAIDs
  - Management - bicarbonate, fludrocortisone in type 4; consider vit. D supplements

Fanconi’s syndrome

- Rare generalised disorder of renal tubular function
- Associations - Wilson’s, glycogen storage disorders, ATN, myeloma, chemotherapy
- Leads to aminoaciduria, glycosuria, phophaturia, RTA (type 2), osteomalacia
- Symptoms - polyuria, polydipsia, dehydration, osteomalacia, FTT
- Management - bicarbonate, phosphate, vit. D, fluid replacement

Urinary tract infection (UTI)

- **Significant bacteriuria** (> $10^5$ CFU/ml) - **E. coli**, Staph. saprophyticus, Proteus mirabilis
  - **recurrent UTI** - 3 episodes within 1 year
- Risks - renal tract abnormalities, antibiotics, post-coital, new sexual partner, DM, catheters
- Symptoms - urinary frequency, dysuria, haematuria, urgency, incontinence
  - pyelonephritis - suprapubic / loin / back pain, frank haematuria, renal angle tenderness
  - systemic features - fever, rigor, nausea, vomiting, delirium
- Management - 200mg **trimethoprim** bd. / 50mg nitrofurantoin qds. / amoxicillin for 3-7 days
  - if resistant - co-amoxiclav, cephalosporin, quinolone
  - pyelonephritis - gentamicin / cefuroxime stat., fluoroquinolone PO for 7 days
  - prophylaxis - 100mg trimethoprim / 50mg nitrofurantoin od. nocte
  - suggest lubrication, post-coital voiding, avoid spermicides, cranberry juice (unproven)
- Complications - ascending infection, abscess, hydronephrosis, renal failure, sepsis

Childhood UTI

- Affects up to 10% children by adolescence; commonest cause of PUO in boys aged < 3
  - 40% will have renal tract abnormalities - reflux, duplex, hydronephrosis, scars
- Risks - low birthweight, phimosis, constipation, FTT, HTN
- Investigations - **renal USS**, DMSA / MCUG (if atypical / recurrent / abnormal USS)
  - MCUG only if aged < 6 months; refer all children aged < 3 months
- Complications - vesico-ureteric reflux, pyelonephritis, renal scarring, HTN, renal impairment