Disorders of the kidney.
Urine analysis.
Nephrotic and nephritic syndrome.
Azotemia and Urinary Abnormalities

- Disturbances in urine volume → oliguria, anuria, polyuria
- Abnormalities of urine sediment → red blood cells (RBC), white blood cells, casts, and crystals
- Abnormal excretion of serum proteins → proteinuria
Azotemia and Urinary Abnormalities 2

- Reduction in glomerular filtration rate (GFR) → azotemia
- Presence of hypertension and/or expanded total body fluid volume → edema
- Electrolyte abnormalities
- Nonconcentrated or concentrated urine → isosthenuria = isoosmotic with plasma
- Fever/pain in some syndromes
Assessment of glomerular filtration rate

- Serum creatinine level $\uparrow \rightarrow$ GFR $\downarrow$
- GFR $< 15$ mL/min $\rightarrow$ symptomatic uremia $\leftarrow$ acute or chronic renal injury
- BUN $\uparrow \rightarrow$ azotemia $\leftarrow$ retention of nitrogenous waste products
- Prerenal, renal, postrenal $\rightarrow$ azotemia
Prerenal Failure

- Circulating blood volume↓ → GI bleeding, burns, diarrhea, diuretics
- Effective arterial volume↓ → sepsis, cardiogenic shock
Postrenal Azotemia

- Urinary tract obstruction → renal pelvic dilatation
- Benign prostatic hyperplasia
- Cancer of prostate
- Cancer of bladder
- Calculi
- Carcinoma of uterusm colon, rectum
- Lymphoma
- Accidental surgical ligation
- Retroperitoneal fibrosis
Intrinsic Renal Disease

- Acute tubular necrosis (ATN)
- Drug-induced interstitial nephritis (NSAIDs)
- Severe infections → sepsis
- Systemic diseases → SLE
- Infiltrative disorders → lymphoma, leukemia
- Diseases of glomeruli → glomerulonephritis (GN), vasculitis
Oliguria and Anuria

- **Oliguria** ← 24-h urine output of <500 mL
- **Anuria** ← complete absence of urine formation (<50 mL)
Proteinuria

- Dipstick examination
- Sulfosalicylic acid or trichloracetic acid precipitation
- Glomerular proteinuria
- Normal: <150 mg/d of total protein in the urine
- Total daily excretion of protein >3.5 g → nephrotic syndrome
- Multiple myeloma: excreted light chains in the urine → Bence-Jones protein
Hematuria, Pyuria, and Casts

- Isolated hematuria → bleeding from the urinary tract ← stones, neoplasms
- Hematuria → 2-5 RBCs per high-power field microscope
- Dipstick
- Gross hematuria with blood clots ← postrenal source
- Hematuria + pyuria + bacteriuria → infection → appropriate culture → antibiotics
Hematuria, Pyuria, and Casts 2

- Isolated microscopic hematuria → glomerular disease → IgA nephropathy, thin basement membrane disease ← renal biopsy

- Hematuria with dysmorphic RBCs + RBC casts + protein excretion >500 mg/d → glomerulonephritis

- Pyuria + bacteria + WBC casts → pyelonephritis
Polyuria

- >3 L/d
- 24-h urine collection
- Urine osmolality
- Diabetes mellitus
- Diabetes insipidus
Glomerular Diseases

- 2 kidneys → 1.8 million glomerular capillary tufts
- Glomerular capillaries filter 120-180 L/d of plasma water
- Inflammation of the glomerular capillaries → glomerulonephritis
Glomerular Syndromes

1. Acute Nephritic Syndromes

- Poststreptococcal GN
- Subacute bacterial endocarditis
- Lupus nephritis
- IgA nephropathy
- ANCA small-vessel vasculitis
- Membranoproliferative GN
- Mesangioproliferative GN
Glomerular Syndromes

2. Pulmonary-Renal Syndromes

- Goodpasture’s syndrome
- ANCA small-vessel vasculitis
- Henoch-Schönlein purpura
Glomerular Syndromes

3. Nephrotic Syndromes

- Minimal change disease
- Focal segmental glomerulosclerosis
- Membranous GN
- Diabetic nephropathy
- Amyloidosis
Glomerular Syndromes

4. Basement Membrane Syndromes

- Anti-GBM disease
- Thin basement membrane disease
Glomerular Syndromes
5. Glomerular Vascular Syndromes

- Atherosclerotic nephropathy
- Hypertensive nephropathy
- Antiphospholipid syndrome
Glomerular Syndromes
6. Infectious Disease-Associated S.

- HIV
- Hepatitis Band C
- Syphilis
- Malaria
Nephrotic syndrome

- Heavy nonselective proteinuria, minimal hematuria, hypoalbuminemia, hypercholesterolemia, edema, hypertension
- Renal failure
- Renal vein thrombosis, pulmonary embolism, deep vein thrombosis incidence↑→ anticoagulation
- Treatment: Steroids+ Cyclophosphamide or Cyclosporine or Mycophenolate or anti-CD20 Ab
Lupus nephritis

- Complication of SLE
- Proteinuria, hematuria, hypertension, renal failure, RBC casts
- Renal biopsy
- Treatment: high-dose Steroids + Cyclophosphamide or Mycophenolate mofetil for 2-6 months