Glomerulonephritis:

Classified according to the clinical presentation of i) Nephrotic Syndrome ii) Nephritic Syndrome iii) Rapid Progressive Glomerulonephritis.

1) NEPHROTIC SYNDROME

- Damage to the glomeruli which makes it more permeable (usually water and Na^+ goes out)
  - ↓ Plasma protein leaks
    1. Proteinuria (>3-5g/day)
       - ↓ Albumin
    2. Hypoalbuminemia
       - ↓ Low oncotic pressure → Low osmotic pressure → water drawn out
    3. Odema
       - Loss of proteins causing ↓ inbit of synthesis of lipids (Fats)
    4. Hyperlipidemia
       - ↓
    5. lipiduria.

Causes:

i) Minimal change disease (MCD)
ii) Focal segmental Glomerulosclerosis (FSGS)
iii) Membranous nephropathy (MN).
iv) Membranoproliferative glomerulonephritis (MPGN)
v) Amyloidosis
vi) Diabetic nephropathy.

1) Minimal change Disease: (Nil Disease)

- It is usually seen in children.

T cells from blood
↓ Release cytokines.
Destroys epithelium of nephrons (podocytes) 'foot' projection
↓
Especially foot process of podocytes.
↓ causing
Effacement (Flattening)
↓
Albumin goes through because its small other big immunoglobulin are blocked.
↓
Because of selective proteinuria.
↓
Nephrotic syndrome.

Causes:

- Idiopathic (Unknown)
- Associated with Hodgkins lymphoma (↑ cytokines).

Diagnosis:

- little difficult.
- In light microscopy → No effacement ("Minimal change)
- In Electron microscopy → Effacement with foot process.
- Immunofluorescence → Negative (No immune complex).

Treatment:

* Corticosteroids.

ii) FOCAL SEGMENTAL GLOMERULO SCLEROSIS (FSGS)

Only some of glomeruli — Part of Glomeruli — Glomerulus — Scar tissue.

a) Primary FSGS

1 - Idiopathic - no cause.

- Podocytes damaged → Proteinuria → Nephrotic syndrome

↓

Accumulation of lipids & proteins.

↓

Hyalinosis (Colorless)

↓

Sclerosis (Scar tissue)

→ There might be a continuation of Minimal change Disease.

b) Secondary FSGS

- Clear Underlying Cause.

i) Sickle cell anemia → Abnormal Haemoglobin → Ischemia

ii) HIV → HIV associated Nephropathy

iii) Heroin abuse

iv) kidney hyperperfusion.

v) Increased pressure in Glomerular capillaries.

Diagnosis

① Histology → Segmental Sclerosis + Hyalinosis

② Electron Microscope → Effacement of foot process.

③ Immunofluorescence → Nonspecific focal deposit of IgM & Complement

Treatment - Steroids

Complication - Chronic Renal failure

iii) MEMBRANOUS GLOMERULONEPHRITIS (NEPROPATHY)

- Inflammation of Glomerular Basement membrane (GBM)

Causes:

i) Primary (Idiopathic)
   -> Unknown -> But most Cases.

ii) Secondary.
   Autoantibodies generated in response to
   a) Infection b) Malignancy c) Autoimmune d) Drugs.

Pathogenesis:

1) Autoantibodies (Primary) targeting GBM (Antigen phospholipase A_2 receptor)

Antigen-Antibody complex formed Outside and carried to GBM (Cationic Bovine serum albumin) Cows milk & Beef protein.

↓

Subepithelial deposit of complex (Inbetween GBM and Epithelial (Podocyte))

↓

Complement System & Inflammory cells.

↓

Destruction of GBM, podocytes, Mesangial cells

↓

Nephrotic syndrome.

Diagnosis

① Histology
   ↓
   GBM
   Thickened

② Electron microscopy
   ↓
   SPIKE & DOME
   Pattern:
   ↓
   Effacement of foot Process.

③ Immunofluorescence
   ↓
   Deposits of Immune Complex
   ↓
   Granular

Treatment Steroids Complication: Chronic Renal Failure

iv) MEMBRANOPROLIFERATIVE GLOMERULONEPHRITIS :

- Immune deposits in Glomerules → Inflammation.
  (Just of capillaries) Inappropriate.

Type 1 :- Both Immune Complex + Complement activation.

↓ (From chronic infection antibody) | OH | ↓ $C_3 \rightarrow C_3a + C_3b$

By Nephritic factor IgG.

Mesangial Capillary GN

Subendothelial deposits.

↓

Complement system & Inflammatory cells.

↓

Damage the endothelium, and

Histopathology → Proliferation of GBM & Mesangial cells.

Diagnosis :- "TRAM TRACK" Appearance on light microscopy.

Immunofluorescence → Granular deposits

Type 2 :- (Dense Deposit disease)

- Only Complement deposits, No immune complexes.

  ↓

  Nephritic factor IgG → $C_3 \rightarrow C_3a + C_3b$.

- Deposits in Basement membrane.
- No tram track appearance.

Type 3 :-

- Both Complement + Immune deposits.

→ Deposits in Subendothelial & Subepithelial deposits.

C/F :- Nephrotic sometimes Nephritic Syndrome → Proteinuria, Haematuria, oliguria, Azotemia, Hypertension.

Treatment :- Steroids.

Complication :- Chronic Renal failure.