Renal Pathology

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BUDAPEST
I. Anatomy, Histology
II. Glomerular lesions
   - important morphologic terms
III. Diagnostic algorhytm
Your tests reveal that you are retaining fluids!
2 biopsy cylinders, minimal length 1 cm
Electron microscopy

Light microscopy

Immune microscopy

- HxE
- PAS
- PAAG
- Congo red
- E v Gieson
- MSB

- IgA
- IgG
- IgM
- C3
- C1q
- Kappa
- Lambda

2011.09.21.
"Good, our side's winning!"
Renal biopsy - Interpretation

Categorisation of
glomerulonephritis,
glomerulopathies
(eg diabetes mellitus, amyloid, hereditary renal disease),
interstitial nephritis,
renal vascular disease,
toxic nephropathy

Detect Acute (reversible) vs chronic (irreversible) changes
(e.g. aggressive immune suppression yes/no)

Diagnosis of superimposed second kidney disease, e.g.
IgA-GN after Wegener’s granulomatosis,
Wegener’s granulomatosis + Goodpasture, etc.

Monitoring transplant rejection.
Analysis of the renal biopsy sample
Routine stains

**HE-stain** (*hematoxylin-eosin*)

**composition of tissue:**
cortex vs medulla,
    number of glomeruli
    cellular infiltrates ..

**analysis of glomerulus and vessels:**
glomerular cells,
mesangial matrix
glomerular basement membrane
Periodic Acid Schiff reaction
PAAG, PA-Methenamine – silver
PAAG, PA-Methenamine –silver
Trichrome-stain
Elastica-van Gieson stain
Congo red staining

Under polarizing light
IMPORTANT TERMS
Glomerular changes

<table>
<thead>
<tr>
<th>Diffuse</th>
<th>Focal</th>
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[Images of diffuse and focal glomerular changes]
Glomerular changes

Global

Segmental
Hypercellularity
More cells than normal in glomerulus.

**Proliferative**
Implies multiplication in loco resident glomerular cells.

**Exudative**
Implying inflammatory cells neutrophils and monocytes
Mesangial

mesangiolysis

K-W nodule
Mesangialisation

Mesangial cell interposition
Tram tracking
Wire-loops
Glomerular crescent

A lesion composed of cellular and/or fibrous tissue proliferation which fills all of part of Bowman’s space.

Cellular and fibrocellular
Glomerulosclerosis

Scarring of a glomerulus due to any chronic process.
Necrosis

acute process, including vascular disease.
Immune reaction
Immune reaction

Granular pattern

Linear pattern
• Some diseases, such as **IgA nephropathy** and anti-GBM-glomerulonephritis can only be diagnosed by IH, whereas

- the diagnosis of other diseases is confirmed or refined by IH.
ELECTRONMICROSCOPY
Protein deposits
intraglomerular localisation
dense deposit disease

Transplant recurrence: 100%
Renal biopsy \( (\text{Glomeruli}) \)

There is more information in the biopsy than the diagnosis

The biopsy can provide:

1. Prognostic information
2. An indication of what treatment should be given and the likely response
3. Give a measurement of activity and chronicity
Algorhytmic approach to the interpretation of renal biopsy

Based on the work of
Zhou, XJ, Laszik, Z, Silva, FG

Silva’s Diagnostic Renal Pathology
Cambridge Univ. Press 2009
FIGURE 3.4: Algorithmic approach to the interpretation of glomerular injury by light microscopy.
Glomerular changes

Diffuse

Focal
Glomerular changes

Global

Segmental
Glomerular changes
Glomerular changes

- Normocellular
- Hypercellular
Glomerular changes

NORMOCELLULAR

Normal capillaries

Nephrotic syndrome

Haematuria

Electronmicroscope
Immunohistology
Specials staining
Glomerular changes

NORMOCELLULAR

Normal capillaries

Nephrotic syndrome

Special staining (Congo red + Polarizing)

Amyloidosis
Glomerular changes

NORMOCELLULAR

Normal capillaries

Nephrotic syndrome

IH negative

IH: granular IgG, C3 deposits
EM: subepithelial e.d.deposits

Minimal change nephropathy
Membranous GN Stage IV

Membranous GN Stage I
Glomerular changes

- NORMOCELLULAR
- Normal capillaries
- Haematuria

- Alport sy.
- EM
- Thin GBM D
- IH
- IgA N
Glomerular changes

NORMOCYTOPOIETIC

Abnormal capillaries

- Collapse/sclerosis
- Thickening
- Occlusion
Glomerular changes

NORMOCELLULAR

Abnormal capillaries

Collapse/sclerosis
Thickening
Occlusion
Glomerular changes

NORMOCELLULAR

Abnormal capillaries

Collapse/sclerosis

Segmental

Global
Abnormal capillaries

Glomerular changes

NORMOCELLULAR

Abnormal capillaries

Collapse/sclerosis

Thickening

Occlusion

Normal Mesangium

Mesangial expansion

Membranous glomerulopathy
Glomerular changes

- NORMOCELLULAR
  - Abnormal capillaries
    - Collapse/sclerosis
    - Thickening
    - Occlusion
      - Mesangial expansion

Diabetes glomerulopathy

Control (270 nm)
DM (900nm)
Abnormal capillaries

Glomerular changes

NORMOCELLULAR

Collapse/sclerosis  Thickening  Occlusion

Mesangial expansion

Amyloidosis
Abnormal capillaries

Glomerular changes

NORMOCELLULAR

Collapse/sclerosis

Thickening

Occlusion

Mesangial expansion

Fibrillary glomerulopathy

Mean diameter: 19.3 ±2.1 nm

Congo red
Glomerular changes

NORMOCELLULAR

Abnormal capillaries

Collapse/sclerosis

Thickening

Occlusion
Abnormal capillaries

Glomerular changes

NORMOCELLULAR

Abnormal capillaries

Occlusion

TTP (TMA)
Glomerular changes

NORMOCELLULAR

Abnormal capillaries

Occlusion

Abnormal capillaries and occlusion in DIC.
Glomerular changes

NORMOCELLULAR

Abnormal capillaries

Occlusion

Cryoglobulinemic GN
Glomerular changes

NORMOCELLULAR

Abnormal capillaries

Occlusion

Amyloidosis
Glomerular changes

- Normocellular
- Hypercellular
Glomerular changes

NORMOCELLULAR

HYPERCELLULAR
Glomerular changes

HYPERCELLULAR

Mesangial

Endocapillar

Extracapillar
Glomerular changes

HYPERCELLULAR

Mesangial

IgAN and HSPN
Glomerular changes

HYPERCELLULAR

Mesangial

Lupus Nephritis Class II.

C1q
Glomerular changes

- HYPERCELLULAR

- Mesangial

- Resolving postinfectious GN
Glomerular changes

HYPERCELLULAR

Endocapillary

Diffuse

Focal
Glomerular changes

HYPERCELLULAR

Endocapillary

Diffuse

Acute postinfectious GN
Glomerular changes

HYPERCELLULAR

Endocapillary

Diffuse

MPGN
Glomerular changes

HYPERCELLULAR

Endocapillary

Diffuse

LN Class IV.

C1q
Glomerular changes

HYPERCELLULAR

Endocapillary

Focal

Lupus N Class III.

Infectious endocarditis

IgA N
Glomerular changes

HYPERCELLULAR

Extracapillary

IF negative

ANCA+

ANCA-

Idiopathic vasculitides

IF positive
Glomerular changes

HYPERCELLULAR

Extracapillary

IF negative

ANCA+

Pauci immune GN

Microscopic polyangiitis

Wegener’s granulomatosis

Churg-Strauss syndrome
Glomerular changes

HYPERCELLULAR

Extracapillary

IF positive

Linear pattern

Granular pattern
Glomerular changes

HYPERCELLULAR

Extracapillary

IF positive

Linear pattern

Anti-GBM GN

Goodpasture’s syndrome

IgG
Glomerular changes
↓
HYPERCELLULAR
↓
Extracapillary
↓
IF positive
Granular pattern
IC mediated GN
Thank you for your attention