Organ Pathology
Seminar / FAQ

Kidney & Urinary Tract Pathology

Jaroslava Dušková
*Inst. Pathol. , 1st Med. Faculty, Charles Univ. Prague*
Diseases of the kidney and urinary tract
Classification?

Most frequent/important ones?
Disease Nosologic Unit

- Definition
- Incidence, age/sex prevalence (if any)
- Etiology
- Possible clinical manifestation
- Pathogenesis
  - macroscopy
  - microscopy
  - ultrastructure or other dg. tools
  - *other (nonmorphological) dg. tools*
- Complications
- Healing & prognosis
Classification

- **inborn**
  - agenesis, hypoplasia, dysplasia, cystoses

- **acquired**
  - noneoplastic
    - inflamm. + lithiasis
    - pseudotumours
  - **NEOPLASMS**
    - benign
    - MALIGNANT
Macrocystosis renun

defect of ch 16 – polycystin-1 protein

PKD 1 and 2 proteins
Morphology features of “benign” and malignant hypertension in kidney
Morphology features of “benign” and malignant hypertension in kidney

- „Benign“ hypertension: atherosclerosis, fibroelastosis, hyalinized arterioles, multiple scars – granular surface

- Malignant hypertension (diast. pressure over 130mmHg) - autoimmune - AB against renin – angiotensin components. Fibrinoid necroses of arterioles, kidney edema & hemorrhages, necroses of kidney cortex. Death from brain haemorrhage or heart failure if not treated aggressively

RQ 99, 100
Vasculitides Affecting the Kidney

- **Systemic** AB against BM – Goodpasture – pulmorenal syndrome
- **Vasculitides with immune complexes** – Henoch-Schönlein, SLE,
- **ANCA –positive**
  - Wegener’s granulomatosis
  - microscopic polyangiitis
  - Churg-Strauss syndrome with eosinophilia and astma

Kidney morphology: necrotizing pauciimmune GN with crescents
Glomerulonephritis/Glomerulopathy
Glomerulonephritis/Glomerulopathy

- primary (inborn, acquired)
- secondary (following or accompanying another disease like SLE, hepatitis C etc.)
- Manifesting clinically as:
  - proteinuria-nefrotic syndrome
  - hematuria prevalent
  - combined (h+p)-uria
  - GN in vasculitides
  - GN in SLE
  - chronic GN
Glomerulonephritis

special group of inflammatory glomerular diseases caused by:

- deposition of immune complexes
- antibodies against glomerular components
- antibodies against glomerular depositions
- ANCA – anti-neutrophil-cytoplasm-antibodies
Glomerulonephritis – clinic

– nephritic syndrome
  ✷ hypertension
  ✷ hematuria
  ✷ mild proteinuria
  ✷ oedema

– nephrotic syndrome
  ✷ massive proteinuria
    – hypalbuminemia
    – oedema
    – hypercholesterolemia

Terminal stage of kidney failure

UREMIA
Glomerulonephritis - morphology

Macroscopy:
early:
mild enlargement, petechiae,
late:
end stage kidney

Microscopy:
glomerular changes & scaring

Diagnosis:
clinical symptoms,
puncture biopsy
immunohistochemistry and electron microscopy
Glomerulopathies manifesting with acute nephritic syndrome

- **Acute postinfectious** (strepto and others, SLE…)
- **Kidney morphology** : GN with increased cellularity (mesangial and endocapillary)
- **Membranoproliferative** – secondary to hepatitis B, C, HIV, SLE, neoplasms…. 
Glomerulopathies with hematuria

- **Clinic**: hematuria - diff. dg!!!.
  Progression to failure

- **IgA nephropathy**
  - Kidney morphology: mesangioproliferative GN with IgA deposits

- **Henoch Schönlein purpura** – childhood vasculitis

- **Alport syndrome** – mutation of collagen IV gene
Rapidly Progressive GN

- **Clinic**: hematuria, proteinuria, loss of kidney function
- **Kidney morphology**: GN with crescents
- **Etiology - variable:**
  - ANCA – positive
    - Wegener’s granulomatosis
    - microscopic polyangiitis
    - Churg-Strauss syndrome with eosinophilia and asthma
  - anti GBM GN
  - Vasculitides with immune complexes – Henoch-Schönlein, SLE,
  - idiopathic… (= unknown)
Glomerulopathies with nephrotic syndrome

- **Clinic**: proteinuria
- **Minimal change disease** (in children) – fusion of pedicels, response to steroid th.
- **NSAID related GN** in adults
- **Focal Segmental Glomerulosclerosis**: heroin, secondary to gl.-loss nephropathy
- **Amyloid**
- **Diabetic GN**
SLE and its Kidney manifestations

- Multisystem autoimmune disease with rash, artralgiae, oral ulcers, RENAL DISORDERS… Libman –Sacks endocarditis, CNS damage…..

- Antinuclear and other antibodies

- 6 classes of kidney involvement (minimal, mesangial, focal, diffuse, membranous, advanced) — difference in therapy and prognosis
Diseases of Kidney Tubules and Intersticiium

- **Acute tubular necrosis ATN** (drugs - atb, toxins – heavy metals, - shock kidney
  - oliguria < 400ml - anuria < 100ml - subsequently polyuria > 3000ml in 24 hours

- **Tubulointerstitial nephritis TIN** (bacteria, viruses, metabolic disorders)

- **Drug induced** – NSAID, analgetic – phenacetin

- **Light chain deposition disease**
Ascendent kidney infections
Ascendent kidney infections

- tubulointerstitial nephritis – pyelonephritis
- mostly G- bacteria
- risk increased in
  - diabetics,
  - pregnant,
  - lithiasis
- complications:
  - urosepsis
  - amyloid
Nephrolithiasis
Urocystolithiasis

Hyperplasia adenomyomatosa prostatae

Hypertrophia trabecularis tunicae muscularis vesicae urinariae
Gonorrhoea
**Pathology of gonorrhoea**

<table>
<thead>
<tr>
<th>Man</th>
<th>Woman</th>
<th>Newborn</th>
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<tbody>
<tr>
<td>- urethritis gonorrhoeica anterior</td>
<td>- endocervicitis</td>
<td>- vulvovaginitis</td>
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<tr>
<td>- urethritis gonorrhoeica posterior — strictura partis membranaceae urethrae</td>
<td>- colpitis ulcrosa</td>
<td>- conjunctivitis</td>
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<td>- balanitis erosiva (esp. in phimosis)</td>
<td>- endometritis</td>
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<td>- prostatitis abscedens</td>
<td>- salpingitis purulenta</td>
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<td>- vesiculitis seminalis purulenta</td>
<td>- pelvic inflamm. tumour</td>
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<td>- hydrocele acuta</td>
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Systemic Effects of Uremia – 1/2

- **skeletal** – osteitis fibrosa
  - demineralization and fibrosis – osteomalacia (rickets), pain, spontaneous fractures

- **cardiopulmonary & blood**
  - hypertension, normochromic and normocytic anemia, edema, pericarditis – friction rub

- **GIT**
  - anorexia, nausea, mouth ulcers, stomatitis, peptic ulcers, colitis, bleeding, hiccups
Systemic Effects of Uremia – 2/2

- **NEUROLOGIC – ENCEPHALOPATHY**
  - fatigue, loss of attention, problem solving difficulties, motor coordination, twitching, stupor, coma

- **Integumentary & immunologic**
  - abnormal pigmentation and pruritus
  - increased risk of infection and neoplasms

- **Reproductive**
  - menorrhagia, amenorrhea,
  - infertility, loss of libido – both sexes affected
Kidney Transplantation and Rejection Morphology

- **Rejection** – result of MAJOR HC and minor HC glycoproteins and peptides
- **T and B lymphocytes activity**
- **Acute cellular**: (Banff criteria)
  - mild – interstitium and tubular damage
  - severe – arterial damage
- **Acute humoral** (early and late – years): Donor Specific Antibodies
- **Chronic**: interstitial fibrosis, vascular damage

Graft damage of non-rejection type: infection – viruses – CMV, drugs, preceding diseases – diabetes….
Kidney Neoplasms

- classification principles
- clinical manifestation
- most frequent representatives
- complications
Kidney Neoplasms

benign - mixed mesench., adenoma, papiloma

MALIGNANT – ADENOCARCINOMA,
UROTHELIAL CARCINOMA

Complications: anemia, polyglobulia, METASTASES,
Kidney Tumours - mesenchymal

Angiomyolipoma - mixed mesenchymal tumour  ICD-O  M 8860/0

- sporadic or associated with tuberous sclerosis  \((TSC 1,2 \text{ genes} – 9q34)\)
- occasionally large & multiple, bulging
Angiomyolipoma renis sin.

B4995/12
Clear cell carcinoma

Grawitz’s tumour
Papillary (Chromophillic) Ca
M 8260/3 10%

- In dialysed more frequent; can be multifocal and bilateral
- X-ray hypovascular
- Histology – papillary/tubulopapillary
  type 1 – cubic cells
  type 2 – cylindric cells (worse prognosis)
- Genetics – trisomy or tetrasomy 7 and 17
  in men often Y chromosome missing
  mutation of c-met oncogen

Prognosis: G, pT dependent
slightly better than in conventional ca
Chromophobe Carcinoma

M 8317/3 5%

- Macro - brown color
- Mikro - solid, cytoplasms clear or eosinophillic positive in Hale´s colloidal iron staining raisin-like cell nuclei
- Elmi microvesicles in cytoplasm
- Genetics missing chromosomes - 1, 2, 10, 13, 6, 21, 17

Prognosis: G, pT dependent
Oncocytoma renis

Loss of chromosomes 1, 14, y

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Oncocytoma

- Kidney cortex
- may be multicentric and bilateral
- Macro – tan with a central stellate scar
- Micro – eosinophillic granular cytoplasm, bizarre nuclei
- Elmi – mitochondria filling up the cytoplasm
- Biological behaviour: benign
Nephroblastoma
– Wilms’ tumour
Nephroblastoma (Wilms´tumour)
M 8960/3

- syn. - embryonal adenosarcoma
- Children - preschool age

- Macro: gray-white large retroperitoneal mass palpable through abdominal wall
- Micro: undifferentiated renal blastema, tubular and glomeruloid formations may be present

- Prognosis: curable (stage!) – resection and chemotherapy
- Follow up: - nephrogenic rests
Nephroblastoma (Wilms´tumour)
M 8960/3

Genetics

- **WAGR syndrome** – Wilms-Aniridia-Genital Anomaly-Retardation
- **Denys – Drash syndrome DDS** - gonadal dysgenesis and renal abnormalities
  *inactivation of the WT 1 gene*
- **Beckwith – Wiedeman syndrome BWS** - organomegaly (tongue, kidney, liver, hemihypertrophy)
  *loss of silencing of maternal IGF 2 gene*
Nephroblastoma – Wilms’ tumour
Kidney Carcinoma – report

- type
- grade (Fuhrmann)
- stage
- prognostic factors (MIB1, p53...
Urothelial Neoplasms ?
Urothelial Neoplasms

- papiloma (rare)
- urothelial papilocarcinoma

Symptoms

- hematuria
  - microscopic – anemia
  - macroscopic
- obstruction – ureteri and pelvis
Papilloma
PUNLMP
ICD-O 8130/1
Papillary ca
HG (G2-3)
Ca urotheliale invasivum
Urothelial Carcinoma – report

- type
- grade
- resection completeness
- stage
- prognostic factors (MIB1, p53…)

Urothelial Carcinoma - complications

- local recurrence
- progression
- metastases