Renal involvement in systemic diseases

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Introduction

A variety of systemic conditions can affect the function of the kidneys, from acute illnesses (including for example prolonged hypotension) to drugs and more insidious illnesses.

Overview of the potential renal consequences of some of the commoner/more important systemic diseases.
Renal involvement in systemic diseases

1. Immunologically mediated diseases
2. Diseases associated with paraproteinaemia and neoplasia
3. Metabolic disorders
4. Hypertensive nephropathy
5. Hereditary disorders
1. Immunologically mediated diseases

- SLE
- Goodpasture syndrome
- Schönlein-Henoch purpura
- Necrotizing vasculitis
- Rheumatoid arthritis
- Other immun mediated multisystem diseases
SLE and the kidney

• Common: 35-90%
• Clinical symptoms: mild abnormalities of the urinary sediment to massive proteinuria and from chronic indolent GN-itis to rapidly progressive renal failure
• Clinical types: nephrosis (50%), nephritis, mixed forms, some % rapidly progressive GN
### Renal histopathology in SLE

#### Types
- I. Normal
- II. Mesang. GN
- III. Focal. prolif. GN.
- IV. Diffuse prolif. GN.
- V. Membranous GN.
- VI. Interstitial L.N.

#### Renal survival (5 years)
- 100%
- 85%
- 70%
- 25-40%
- 85%
- ?
Milder forms—treatment directed to control of the extrarenal manifestations (steroids in modest doses, salicylates, antimalarials). Serologic parameters should be followed—antiDNS, C3, C4.

Severe forms (IV): high dose iv metilprednisolon, adjunctive cytotoxic agents (cyclophosphamid, azathioprine)

Uremia: chr. dialysis, kidney transplant. (uncommon the recurrence of the SLE in the allograft)
Goodpasture syndrome

- Antibody against glomerular basement membrane
- Affects young men
- Pulmonary hemorrhage, iron deficiency anaemia, progressive renal failure
- AntiBM AB 90% positive, histology: IF-linear deposits in basement membrane
- Early treatment is effective: plasmapheresis + high dose steroid, later dose reduction + cytotoxic drugs
Schönlein Hennoch purpura

• Vascular purpura, abdominal pain arthralgias, hematuria, proteinuria
• IgA increased, IC contains IgA
• Prognosis is usually good. Steroid, cyt. is not evidently helpful. In severe forms plasmapheresis + steroid, immunosuppression.
Systemic necrotizing vasculitis

- Renal involvement is common
- Several variations: hypersensitive angiitis, polyarteritis nodosa, Wegener granulomatosis, temporal arteritis, Takayasu arteritis etc.
- Prognosis is usually bad.
- Treatment in severe forms: plasmapheresis, steroid, cytostatic drugs.
Rheumatoid arthritis and kidney

- Several forms of glomerular injury may occur
- Amyloidosis
- Nephrosis sy- complication of penicillinamin or gold therapy
- Papillary necrosis- side effect of analgetics
- Vasculitis-mild proliferative or membranous GN
Other immunmediated kidney diseases

- Sjögren sy-nephrosis sy
- Sarcoidosis-membranosus GN
- Chr active hepatitis(hepatitis B )-membranosus, mesangiocap.GN
- Biliary cirrhosis: tubular dysfunction.
2. Paraproteinemias and kidney

- **Myeloma multiplex**: tubulointerstitial, renal failure secondary to hyperCa (polyuria, volumen loss), sec. amyloidosis, light chain deposition

- **Amyloidosis (primary)**: deposits that stain with Congo red. Nephrosis sy .5 years survival 20%, no effective treatment.

- **Cryoglobulinaemia**: in this condition, patients with cryoglobulinaemia-associated [vasculitis](#) appear to be most susceptible to renal disease, particularly if their condition is associated with [Hepatitis C infection](#). Renal pathology may be caused by [thrombosis](#) or immune complex deposition leading to [membranoproliferative glomerulonephritis](#) Th: immunosuppr. Interferon alfa (HCV)
Tumors and kidney

Nephrotic syndrome is the most common clinical manifestation

• Secunder amyloidosis

• IC mediated membranosus GN, which regres after removal of the tumor
3. Metabolic diseases and the kidney - Diabetes mellitus

- Diabetic nephropathy is the commonest cause of end stage renal failure (ESRF) in the developed world (about 30–40% of cases of ESRF).
- Incidence rising in line with diabetes.
Diabetic nephropathy

- Persistent albuminuria >300 mg/day or >200 μg/min or urinary albumin:creatinine ratio (ACR) >2.5 mg/mmol in men and >3.5 mg/mmol in women or a urinary albumin concentration >20 mg/l.
- Confirmed on at least 2 occasions, 3–6 months apart.
- Continuing decline in the Glomerular Filtration Rate (GFR).
- Elevated arterial blood pressure.
Classification of diabetic nephropathy

**Diabetic G.sclerosis**
Type I.: one third to one half of all patients affected. High correlation with diabetic retinopathy. Onset occurs with proteinuria 15-20 year after the initial dg. of DM. End stage renal failure being completed in 5-6 years. Hypertension is common after onset.

Type II.: Incidence and rate of progression is uncertain. Usually occurs in assoc. with hypertension.

**Diabetic interstitial nephropathy** (ischaemic injury)
I. and II type: mild or moderate reduction of GFR. Papillary necrosis not uncommon in conjuction with renal infection.
Management of Diabetic nephropathy

- **Tight glycaemic control**, ideally achieved through combination of dietary modification, pharmacotherapy (including insulin regimen) and regular physical activity.

- **Tight BP control** of at least 140/80 through the use of ACE inhibitors/Angiotensin-2 receptor antagonists ± diuretics/beta-blockers.

- **ACE inhibitors** are of benefit in normotensive diabetics with microalbuminuria.

- **Optimisation of other vascular risk factors** through use of aspirin and statins (vastly increased cardiovascular risk caused by diabetic nephropathy).

- **Renal replacement therapy** (including transplantation) in those with established kidney disease.
4. Hypertensive nephropathy

- Hypertensive nephropathy accounts for about a quarter of all patients with ESRF. Hypertension causes a pathology known as nephrosclerosis due to ischaemia affecting the glomeruli, and hyperfiltration causing intraglomerular hypertension.
Factors suggest hypertensive nephrosclerosis

- Commoner in people of African-Caribbean ethnic origin
- Clinical evidence of [hypertensive retinopathy](#)
- Evidence of [left ventricular hypertrophy](#) on ECG
- History of long-standing or accelerated/malignant hypertension
- [Proteinuria](#) <0.5 g daily
- Hypertension preceding proteinuria
- Significant hypertension antecedent to renal failure
- No evidence of alternative renal/systemic cause for hypertension
- [Renal biopsy](#) histology consistent with nephrosclerosis
Management of hypertensive nephropathy

- **use of a range of anti-hypertensive agents**, particularly ACE inhibitors/angiotensin-2 antagonists and diuretics, but other agents are also used.
- The cohort of patients **at risk of bilateral renal artery stenosis** which may preclude the use of ACE inhibitors due to worsening of renal function.
- **Renal parameters must be monitored very closely** after introduction/dose-alteration of an anti-hypertensive agent.
- **Close attention to modification of other cardiovascular risk factors** and renal replacement therapy are also useful in improving long-term outlook.
- **Revascularisation of the kidneys (via angioplasty/stenting)** may be considered in cases of bilateral renal artery stenosis where there is evidence from **captopril renography** that it is significantly affecting renal function.
5. Hereditary disease and kidney - Sickle cell disease

- The disease causes a **glomerulopathy** with proteinuria and progressive renal insufficiency, leading to ESRF; renal papillary necrosis is another possible mechanism of acute renal syndromes.

- **Albuminuria** is a sensitive marker of glomerular damage and precedes the onset of renal failure.[16]

- There are no effective therapies to prevent the onset of renal failure other than good management of the condition in order to reduce the incidence of, and ameliorate, sickling crises.

- Great care should be taken to avoid or adjust the dose of nephrotoxic drugs which may precipitate acute or acute on chronic renal impairment.

- Those with ESRF will require renal replacement therapy and should be considered for transplantation.
Case: B.A. (17 years old female)

- 1989. Small joint pain, hair loss
- Physical examination: small joint involvement, RR 120/80 P:100/min No edema.
- Labor: spec. grav 1015 protein:+++ Sed:6-8wbc,10-15 rbc 24h prot: 2,6gr ELFO albumin, transferrin. Se prot:53g/l Alb 53% kreat 93uM/l, ANF.antiDNS pos Cryoglob pos C3 decreased
- Kidney biopsy: mesangioprolif.GN
- Therapy: 250mg Metypred
- Proteinuria decreased to 1,2g/24h, hematuria stopped
Case: SZ.M.(32 years old female)

- 1984. weakness, fatigue, small joints pain, back pain, alopecia, photosensitivity, periorbital, hand leg edema for 2 month.
- Physical examination: pallor, leg and hand edema, RR 120/80 P: 90/min
- Labor: urin 1022 prot+++ Ül: 2-4wbc 80-100rbc Ht 0,29 WE: 104mm/h 24h prot 16gr Se prot. 43g/l Alb 33% Se chol: 7,2 urine ELFO: alb, trasferrin, IG-k kreat 65uM/l ANF , antiDNS poz., C3 decreased
- Biopsy: membranoprolif. GN. Th 50mg Prednisolon + 100mg Imuran After 6 m. 24h prot. 6gr, Se prot. 59gr/l Ül: 1-1 rbc
Case: K.L. (65 years old male) 

  We: 24mm/h Ht 0.31 Treatment: Ca.D3 Miacalcic 

  Spinal MRI - tu-200Gy telecobalt irradiation.
K.L.

- Phys. exam: pallor, RR 70/90 P: 94/min
- Labor: fs 1020 prot: +++ Sed: neg
Sü: 70mm/h Ht 0,31 fvs 5000
24h prot 3,6gr ELFO: kappa light chain, Se ELFO: M comp. 5,4g/l BUN 22 kreat 480
Bone marrow: 20% atypical plasma cell.
Treatment: BCNU, Cyclo., Vincrs. Prednisolon
After 3 course of treatment: urin prot.. 0,58g/24h kreat 176uM/l, normal urination, and stool, bone pain decreased
3. Metabolic disorders and kidney

B. Fabry disease.: hereditary error of glycosphingolipid metabolism which accumulate in the kidney (angiokeratomas, acroparaesthesia, corneal opacities, cerebral and coronary artery ischaemia, proteinuria, hematuria)

C. Lecithin-cholesterol acyltransferase deficiency. Foam cells are present in bone marrow and glomeruli