Nephrotic Syndrome Vs Nephritic Syndrome

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• 24 year old male was brought to ED with polytrauma

Has dark colored urine on catheterisation
IVC diameter measurement
Fluid status assessment

- IVC/Ao Index around 1.2 ± 0.17

<table>
<thead>
<tr>
<th>IVC measured</th>
<th>Percent collapse (IVC) during inspiration</th>
<th>CVP (mm Hg)</th>
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<tbody>
<tr>
<td>&lt;1.5 cm</td>
<td>&gt;50%</td>
<td>0-5</td>
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<tr>
<td>1.5-2.5 cm</td>
<td>&gt;50%</td>
<td>5-10</td>
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<tr>
<td>1.5-2.5 cm</td>
<td>&lt;50%</td>
<td>10-15</td>
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<tr>
<td>&gt;2.5 cm</td>
<td>Little phasicity</td>
<td>15-20</td>
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Objectives

- Understand and define nephrotic and nephritic syndromes.
- Describe the initial investigations and management of nephrotic and nephritic syndromes.
- Describe the complications of nephrotic and nephritic syndromes.
Nephritic Syndrome

- Inflammation of the glomeruli
- Cola-colored urine (hematuria)
- Oliguria
- Berger's Disease (IgA Nephropathy) is the most common cause of primary glomerulonephritis

Nephrotic Syndrome

- Hypoalbuminemia
- Hyperlipidemia
- Massive proteinuria
- Peripheral edema

Dr. Srinath
Nephritic Spectrum

- Asymptomatic glomerular hematuria
  - Microscopic or macroscopic hematuria with or without proteinuria (<1 g/d)

- Nephritic syndrome
  - Acute kidney injury with proteinuria of 1–3 g/d, hematuria, RBC casts, edema, and hypertension

- Rapidly progressive glomerulonephritis
  - Acute kidney injury with proteinuria of 1–3 g/d, hematuria, RBC casts, and systemic symptoms

Nephrotic Spectrum

- Asymptomatic proteinuria
  - Proteinuria of 300 mg/d–10 g/d, and bland urine

- Nephrotic syndrome
  - Proteinuria of > 3 g/d plus hypoalbuminemia, edema, hyperlipidemia, and possible oval fat bodies in urine

Chronic glomerular disease

Chronic kidney disease with or without hematuria, proteinuria, hypertension, late-stage glomerulonephritis, burned-out disease

DR. SRINATH
Pathophysiology

**NEPHROTIC**
- Loss of foot processes

**NEPHRITIC**
- Proliferative changes and inflammation of the glomeruli

*Bottom line* – “increased permeability of the glomeruli”
What is nephrotic syndrome?

Increased permeability of the glomerulus leading to loss of proteins into the tubules

**Proteinuria and Hematuria**

A normal capillary in a glomerulus keeps red blood cells, white blood cells and most proteins in the blood and only lets watery fluid into the urine.

A capillary in a diseased glomerulus lets protein into the urine (proteinuria) and red blood cells into the urine (hematuria).
Nephrotic Syndrome

Glomerular Injury

Protein leakage into urinary space (Bowmans space) (up)

Stimulation of renin-angiotensin-aldosterone system

Sodium and H2O retention (up)

Expansion of sodium space

Oedema

Plasma Volume (down)
Cardiac Output (down)

Arterial hypovolemia
Proteinuria > 3gm/day

Edema

Nephrotic Syndrome

Hypoalbuminemia < 2.5gm/dl

Hyperlipidemia
Presentation

- New-onset oedema
  - Initially periorbital or peripheral
  - Later genitals, ascites, anasarca
- Frothy urine
- Generalised symptoms – lethargy, fatigue, reduced appetite
Further possible presentations...

- Oedema
- BP normal/raised
- Leukonychia
- Breathlessness:
  - Pleural effusion, fluid overload, AKI
- DVT/PE/MI
- Eruptive xanthomata/ xanthalosmata
Possible Scenarios ...

- Young, fit 24 year old male complaining of frothy urine.

- 10 year old boy with puffy eyes.

- 74 year old female with multiple co-morbidities and swollen ankles.
Differential Diagnosis for Oedema

- Congestive Cardiac Failure
  - Raised JVP, pulmonary oedema, mild proteinuria
- Liver disease
  - Hypoalbuminaemia, ascites/oedema

What investigations can you do?
Causes of Nephrotic Syndrome

- Primary glomerulonephritis
  - Minimal change disease (80% paed cases)
  - Focal segmental glomerulosclerosis (most common cause in adults)
  - Membranous glomerulonephritis
Systemic Causes

- Secondary glomerulonephritis
  - Diabetic nephropathy
  - Sarcoidosis
  - Autoimmune: SLE, Sjogrens
  - Infection: Syphilis, hepatitis B, HIV
  - Amyloidosis
  - Multiple myeloma
  - Vasculitis
  - Cancer
  - Drugs: gold, penicillamine, captopril, NSAIDs
Investigations

- Urine dipstick for protein
- Urine microscopy
- Bloods – the usual ones, plus renal screen
  - Immunoglobulins, electrophoresis (myeloma screen), complement (C3, C4) autoantibodies (ANA, ANCA, anti-dsDNA, anti-GBM)
- Renal ultrasound
- Renal biopsy (all adults)
  - Children generally trial of steroids first
Management

- Conservative
  - Monitor U&E, BP, fluid balance, weight
  - Salt and fluid restriction
  - Treat underlying cause
Management

Decrease Glomerular pressure
Contain antifibrotic effects

For controlling edema
Combination drugs more useful

For Hyperlipidemia and Hyper triglyceredemia
Complications

- Increased susceptibility to infection
- Thromboembolism
- Hyperlipidaemia
Prognosis

- Varies
- With treatment, generally good prognosis
  - Especially minimal change disease (1% progress to ESRF)
- Without treatment, very poor prognosis
  - Children under 5 or adults older than 30 = worse prognosis
What is nephritic syndrome?
Pathophysiology

- Thin glomerular basement membrane with pores that allow protein and blood into the tubule.

Rapidly-Progressive Glomerulonephritis

- Early: fibrin crescent
- Later: cells move in

Fibrin scabs in Bowman's space prevent filtration and become permanent scars, ruining kidneys.

RPGN results whenever most of the glomeruli are damaged severely enough to allow fibrin to enter Bowman's spaces.
Clinical Syndromes of Glomerular Diseases

Nephritic spectrum

Asymptomatic Glomerular Hematuria
- Micro or macroscopic hematuria, +/- proteinuria (<1 g/d)

Nephritic Syndrome
- Acute kidney injury
- Proteinuria 1-3 g/d
- Hematuria
- RBC casts
- Edema
- Hypertension

RPGN
- Acute kidney injury
- Proteinuria 1-3 g/d
- Hematuria
- RBC casts
- Systemic symptoms

Chronic Glomerular Disease
- Chronic kidney disease
- Hematuria
- Proteinuria
- HTN
- Late-stage GN, burned-out disease

Key:
- active urine sediment
- lots of dysmorphic red cells indicating glomerular bleeding;
- severe inflammation gives RBC casts

RPGN = rapidly progressive GN
Hematuria
Red cell casts
Hypertension
Proteinuria <3gm/day
Oliguria
Nephritic Syndrome
Signs and Symptoms

- Haematuria (E.g. cola coloured)
- Proteinuria
- Hypertension
- Oliguria
- Flank pain
- General systemic symptoms
- Post-infectious = 2-3 weeks after strep-throat/URTI
What are your differentials?

- Malignancy (older patients)
- UTI
- Trauma

- What bedside investigation would you like to do?
- You decide to refer to the renal clinic...
Causes

- Post-infectious glomerulonephritis

- Primary
  - IgA Nephropathy (Berger's disease)
  - Rapidly progressive glomerulonephritis
  - Proliferative glomerulonephritis

- Secondary glomerulonephritis
  - Henoch-Schonlein purpura
  - Vasculitis
Investigations

- Urine dipstick and send sample to lab
- Urine microscopy – red cell casts
- Bloods – the usual plus renal screen
  - Immunoglobulins, electrophoresis, complement (C3, C4) autoantibodies (ANA, ANCA, anti-dsDNA, anti-GBM); blood culture; ASOT (anti-streptolysin O titre)
- Renal ultrasound
- Renal biopsy
Red Cell Casts
Management

- **Conservative**
  - Monitor U&E, BP, fluid balance, weight
  - Salt and fluid restriction
  - Treat underlying cause

- **Medical**
  - Diuretics
  - Treat hypertension
  - Corticosteroids/immunosuppression
  - Dialysis

- **Surgical**
  - Renal transplant
Prognosis

- Varies
- Post-infectious usually self-resolving (95% recover renal function)
- Others are a bit more nasty
URINANALYSIS

NEPHROTIC
- Negligible RBC’s / WBC’s
- Absence of cellular casts
- Free lipid droplets
- Lipid laden macrophages

NEPHRITIC
- RBC’s abundant
- RBC casts
- Lipid elements usually absent
Summary

- Nephrotic syndrome = MASSIVE proteinuria
- Nephritic syndrome = haematuria/red cell casts
- May be a mixed presentation

- New oedema? Dipstick that urine!
- Haematuria? Exclude malignancy!
Which is bad ??
Balakrishnan / 18 / M
• Pt conscious, not oriented
  • Airway – Patent
  • Breathing – RR – 32/min
    – Depth adequate
    – BL basal creps +
    – Spo2 98% @ RA
  • Circulation – HR 136/min
    BP – 130/80mmhg
    IV access obtained with 18 G
HOPI

- Apparently normal 1 ½ months back
- Developed fever – High grade, Intermittent, with chills and rigors.
- H/O cough since 1 month
  - Dry cough
  - No postural and diurnal variations
  - No h/o Hemoptysis
• H/O B/L leg swelling since 1 week
• H/O Puffiness of face since 1 day.
• H/O Altered sensorium since 1 day
• No/H/O headache
• NO/H/O projectile vomiting
• No/H/O Diarrhoea
• No/H/O abdominal distension
• No/H/O chest pain or palpitations
• Was treated locally
• Referred to SKS hospital
• Urine examination showed Hematuria and proteinuria
• Renal parameters were elevated
• Urea – 160
• Creatinine – 6.0
• Advised HD
D/D

- Nephritic syndrome
- Nephrotic syndrome
- Acute renal failure
- Chronic renal failure
- CCF
• PT – 15.8
• INR – 1.11
• Renal biopsy
  – Sclerosing proliferative glomerulonephritis with more than 80% cellular crescents with multifocal tubular atrophy.
Dialysis

- 9 sitting dialysis done
- RFT 185/6.8 reduced 90/5.2