




PEDIATRIC PROTEINURIA AND HEMATURIA

Adam Goldstein
Howard Trachtman, M.D.

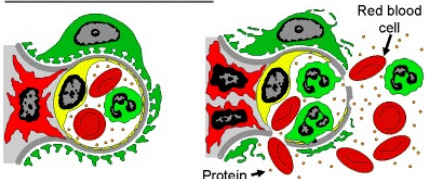
BASIC INFORMATION

- Hematuria
 - Gross hematuria (GH): 10-20% of pediatric referrals
 - Microscopic hematuria (MH): 80-90%
- Proteinuria
 - Measured as protein:creatinine ratio > 0.2 (mg/mg)
 - OR albumin:creatinine ratio > 30 (mg/g)
 - OR > 4 mg/m²/hr in time collection
- A recent study puts the incidence of hematuria and proteinuria in children at over 6%




MECHANISM OF DISEASE

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).



THOSE AT HIGHER RISK OF UA FINDINGS

Proteinuria	Hematuria
<ul style="list-style-type: none"> • History of kidney disease • Hypertension • Fever, exertion 	<ul style="list-style-type: none"> • History of kidney disease • History of urinary stone disease • Use of certain medications including analgesic and anticoagulants • Those who perform strenuous activities • Recent viral or bacterial disease



Signs and Symptoms

Hematuria

Gross

Pink or red colored urine w/ or w/o clots

Microscopic

Possible pain as a result of observing clots, free hemoglobin

Nothing will be seen with the naked eye

Proteinuria

Short duration


No symptoms

May be sign of significant glomerular disease

Persistent

Edema

Declining GFR



DIFFERENTIAL DIAGNOSIS: HEMATURIA


Glomerular

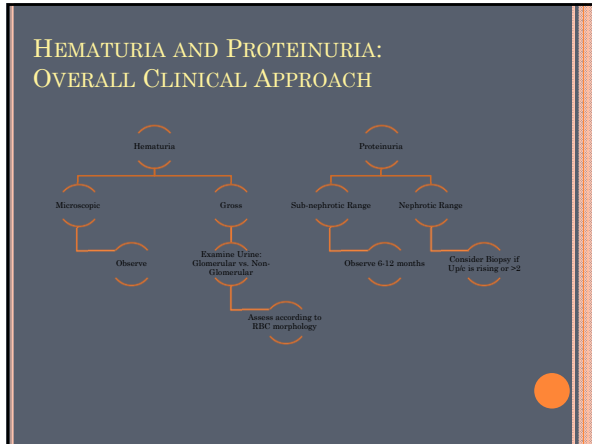
- Resolving PSAGN
- IgA Nephropathy
- Hereditary Nephritis

Non-Glomerular

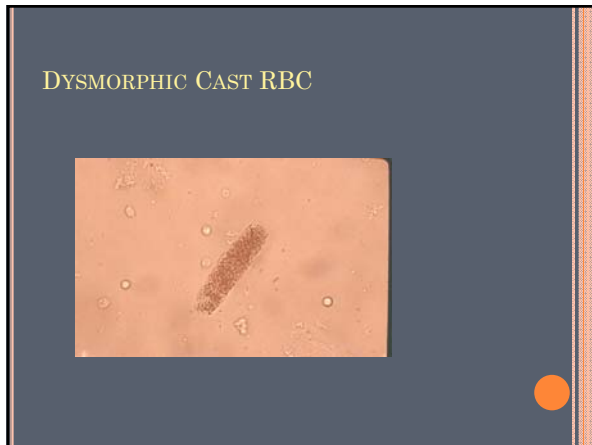
- Anatomic Abnormality
- Hypercalciuria
- Kidney Stones
- UTI

Underlying causes are the same in children with GH or MH. However, likelihood of establishing the diagnosis is greater with GH.

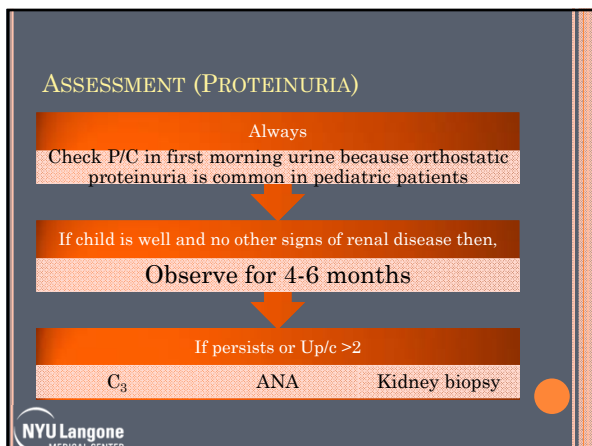




- ### ASSESSMENT: HEMATURIA - OVERALL
- Microscopy: RBC morphology and casts
 - Other Urinalysis Findings:
 - WBCs suggest UTI or renal parenchymal disease.
 - Concomitant proteinuria indicates higher likelihood of significant kidney disease
 - Blood tests:
 - Creatinine
 - Albumin/ Cholesterol
 - C₃
 - Cystoscopy (hardly ever indicated in children)
 - Kidney imaging test: Only for non- glomerular hematuria
 - Kidney biopsy
- NYU Langone MEDICAL CENTER



- ### ASSESSMENT: HEMATURIA- GLOM VS. NON GLOM
- | Glomerular: Casts/ Dysmorphic RBC | Non- Glomerular: No Casts/ Eumorphic RBC |
|---|--|
| <input type="checkbox"/> Careful Family History | <input type="checkbox"/> Urine calcium/creatinine |
| <input type="checkbox"/> C ₃ | <input type="checkbox"/> Ultrasound if gross hematuria |
| <input type="checkbox"/> Audiogram | |
| <input type="checkbox"/> ? Serum Creatinine | |
| <input type="checkbox"/> Kidney biopsy | |
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- ### TREATMENT: HEMATURIA
- Isolated MH usually resolves
 - MH that persists but is not accompanied by any other evidence of renal disease can be followed
 - GH usually prompts immediate evaluation.
 - If a cause for GH is found, treat accordingly.
 - If no cause for GH is found:
 - Children with non- glomerular GH can be observed.
 - Those with glomerular GH usually require kidney biopsy.
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TREATMENT: PROTEINURIA

- If proteinuria is sub-nephrotic:
 - Observation warranted if patient is well
 - If it is persistent, a biopsy may be done and treatment will be guided by the diagnosis
- If proteinuria is in the nephrotic range:
 - Biopsy is usually performed and treatment is based on histopathology findings
- ACE inhibitors or angiotensin receptor blockers can be used as sole treatment in patients with sub-nephrotic proteinuria or as ancillary therapy in those with nephrotic range proteinuria



AREAS OF CONTROVERSY

JAMA Hematuria Prognosis	Frequency of Testing	Proteinuria as a CV risk factor
<p>An Israeli study, with over 1.2 million military recruits who had a UA in their initial examination, demonstrated a hazard ration of 32 for ESKD in those with persistent isolated MH.</p> <p>Implication: Routine UA may predict adverse renal prognosis.</p>	<p>AAP recommends no routine UA in healthy children at all visits because of frequent false positives, psychological effects, and cost of testing.</p> <p>Implication: Some children with renal disease may experience a delay in diagnosis.</p>	<p>Studies in adults suggest a correlation between proteinuria and developing a cardiovascular disease.</p> <p>Implication: There are no data about the long term CV ramifications of detecting proteinuria in childhood.</p>



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