
بسم الله الرحمن الرحيم

HEMATURIA

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Hematuria

is a common finding on urinalysis with a prevalence rate between 1% and 2%.

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Presentations of Hematuria

- Gross hematuria
- Microscopic hematuria with clinical symptoms
- Asymptomatic microscopic (isolated) hematuria
- Asymptomatic microscopic hematuria with proteinuria

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Diagnosis:

The most sensitive test for detecting the presence of blood in the urine is abnormal urine strip test.

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Urine Strip Test:

The reagent utilizes the pseudoperoxidaze activity of hemoglobin (or myoglobin) to catalyze a reaction between hydrogen peroxide and the chromogen tetramethylbenzidine to produce an oxidized chromogen, which has a green blue color.

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Urine Strip Test:

Strips can detect concentration of 2-5 RBC/HPF

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False negative urine dipstick:

- High specific gravity urine
- High ascorbic acid concentration in the urine.

False positive urine dipstick:

- Delayed reading
- Cross contamination of urine from other chemicals such as oxidized agent, (household bleach)

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Confirmation of hematuria

Urine Microscopy:

- Centrifuge 10 ml of urine for 5 minute
- Decant the supernatant
- Re-suspend the sediment in 0.5 ml of urine
- Place on a slide with a cover slip
- Count the number of RBC. In 20 fields and report the average

Positive Test:

> 5 RBC/HPF

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Definition of hematuria:

- 5 RBC's /HPF in three of three consecutive, fresh, centrifuged urine specimens obtained at least 1 week apart.

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Localization of hematuria:

Limits diagnostic possibilities for patients and prevent unnecessary testing.

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Classification:

- Glomerular hematuria
- Non-Glomerular hematuria

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Glomerular hematuria, Clinical presentation:

- Oliguria,edema
- Hypertension
- Symptoms of systemic disease (e.g. arthritis, rash).

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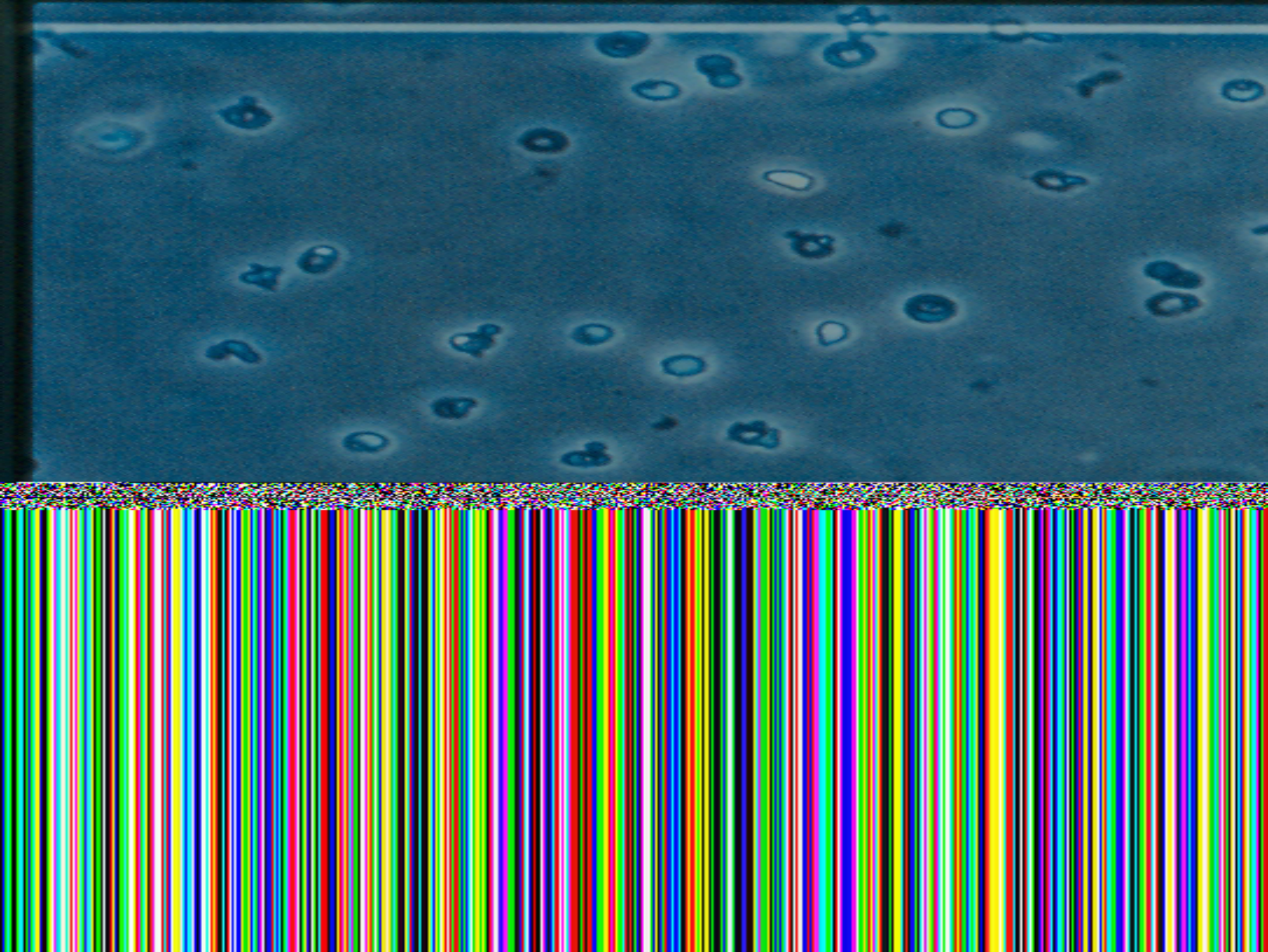
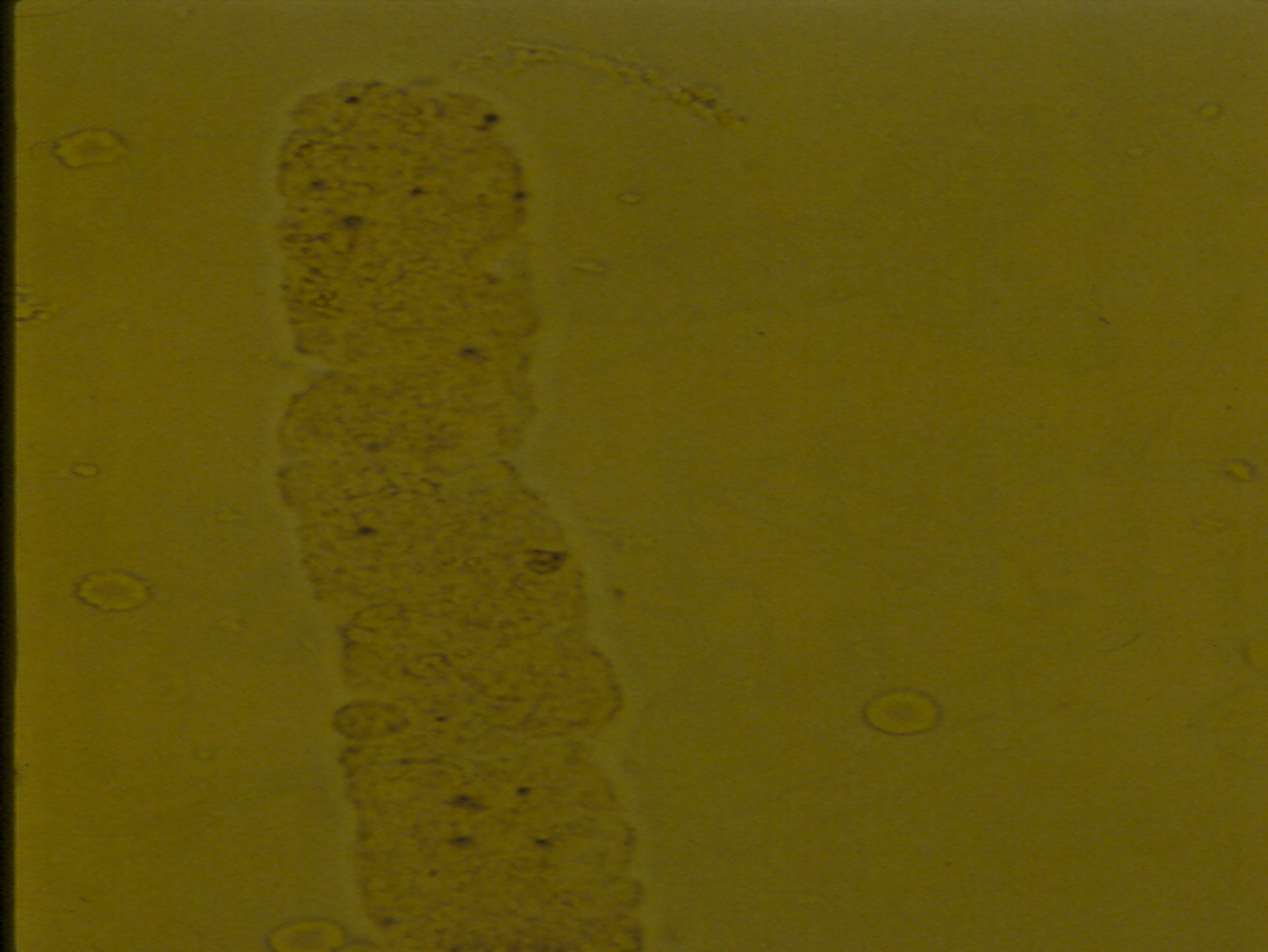
Glomerular hematuria:

- Brown tea, cola-colored urine
- Concomitant proteinuria
- Cellular cast
- Dysmorphic erythrocytes in phase-contrast microsopy
- Low MCV of erythrocyte by automated analyzer





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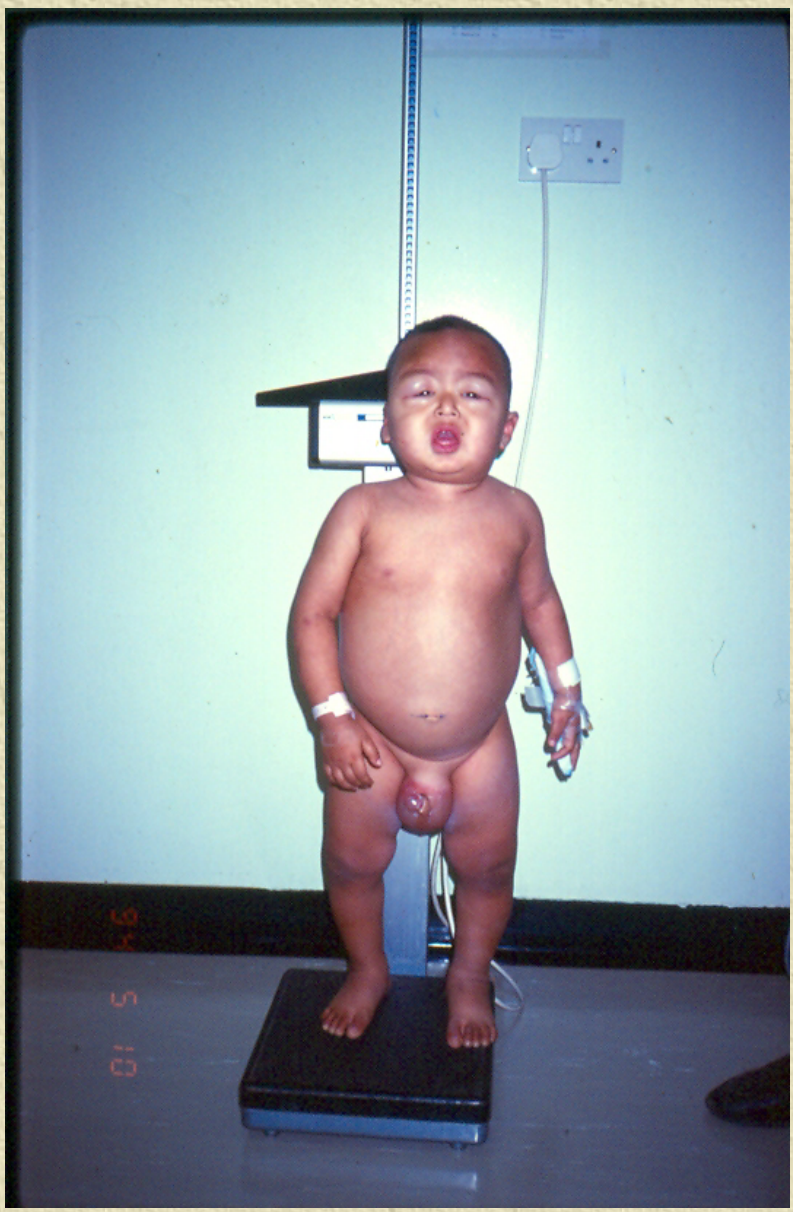
RBC CASTS:

RBC casts are best visualized at the edges of the cover slip and tend to dissolve in urine of high PH.



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Causes of Glomerular hematuria:

- Post-infectious glomerulonephritis
- IgA nephropathy
- Henoch-Schönlein purpura
- Hereditary nephritis
- Benign familial hematuria
- Membranoproliferative glomerulonephritis
- Lupus nephritis

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Postinfectious GN:

- Begins 7-21 days after group A beta-hemolytic streptococcal infection
- Antibiotic treatment for the infections will not prevent the nephritis
- Present with tea colored urine, edema and hypertension.
- May present with only microscopic hematuria.

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Postinfectious GN (cont.)

- ASO may be negative early in the course.
- C_3 low in 90% of patients for 6 weeks
- C_4 normal
- Microscopic hematuria my persist for 2 yrs.

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IgA nephropathy:

- The most common chronic GN in Europe and Asia.
- The most common cause of hematuria in children
- 15% of children with Prolonged hematuria (> 1 year) will have IgA nephropathy
- Present with gross hematuria during viral illness.

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IgA nephropathy……. (cont..)

- Microscopic hematuria present between episodes of gross hematuria
- There is no laboratory test diagnostic of GN
- Diagnosis by histopathologic demonstration of mesangial deposition of IgA
- 25% of children with IgA nephropathy will progress to chronic renal insufficiency.
- Poor outcome: cresentic GN, older age group, hypertension, nephrotic range proteinuria.

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Alport hereditary nephritis:

- Episodes of recurrent or persistent microscopic hematuria.
- Family History: male individuals with nerve deafness and progression to ESRD
- Type IV collagen is abnormal and the basement membrane is disrupted.
- The diagnosis is confirmed by renal biopsy.

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Alport hereditary nephritis… (cont.)

- Hearing test should be done regularly to prevent speech or educational handicap.
- Good-posture diseases post transplant (small risk)
- Female may have a hearing deficit without any urinary abnormalities.

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Benign Familial Hematuria:

- Thin glomerular basement membrane nephropathy.
- Occurs in at least 1% of the population.
- Inherited as AD or AR manner.
- Absence of proteinuria, renal failure, hearing deficits, or ophthalmologic abnormalities.
- Microscopic hematuria, dysmorphic RBC's

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Rapidly Progressive GN:

- Presents with symptoms and signs similar to APIGN
- Require the urgent attention of a Pediatric Nephrologist.
- Laboratory Studies show ARF
- Renal biopsy demonstrates glomerular crescent.
- Untreated RPGN can result in ESRD in a few weeks.

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Causes of non-Glomerular hematuria:

- Hypercalciuria
- Infections (bacterial or viral)
- Papillary necrosis (HbS)
- Urolithiasis
- Trauma
- Foreign body
- Exercise-induced hematuria

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Hypercalciuria:

- Increased urinary excretion of ca despite normal s. ca
- Present in 5% of healthy children
- Most frequent cause of isolated hematuria in non-glomerular hematuria patients.

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Idiopathic Hypercalciuria:

- Renal hypercalciuria: result from a tubular leak of calcium.
- Absorptive hypercalciuria : results from increased gastrointestinal absorption of calcium.

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Idiopathic Hypercalciuria:

- There is often a family history of renal stones.
- Symptoms include dysuria, suprapubic pain, renal colic.

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Idiopathic Hypercalciuria:

- Present with microscopic hematuria and episodic gross hematuria.
- Urine RBC's are shaped normally with no cast.
- The mechanism of the hematuria involve irritations to the renal tubules by ca-containing crystals.
- High risk of development of renal stones.

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Idiopathic Hypercalciuria:

- Screening for hypercalciuria: spot urinary ca/ creatinine ratio.
- A ration of > 0.21 is indicative of hypercalciuria.
- Confirmation of hypercalciuria by collecting a timed (either 12 or 24 hours) urine for ca excretion.
- An excretory rate of greater than 4 mg/kg/day is abnormal.

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Idiopathic Hypercalciuria:

- Increase fluid intake to dilute the urine.
- Severe ca restriction should be avoided.
- Hydrochlorothiazide (HCT) decrease urinary ca excretion.
- HCT in a child with isolated hematuria with no previous nephrolithiasis is not recommended.

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History clues:

- Duration and pattern of hematuria
- Family history (hematuria, renal failure, deafness, urolithiasis)
- Pharyngitis, URTI
- Dysuria or other symptoms of urinary infections
- Rash (HSP)
- Abdominal pain (infections, stone, HSP)
- Drugs (anticoagulant)

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Physical examinations clues:

- Hypertension, edema, pallor
- Rash, impetigo
- Abdnominal or flank tenderness (infection)
- Abdominal mass (tumors)
- Ecchymoses, petechiae, hemangiomas
- Evidence of abdominal trauma
- External genitalia for trauma or bleeding
- Growth pattern
- Hearing test

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Basic Laboratory Evaluation:

- Urine culture
- CBC
- Serum creatinine
- Aso titre
- Urine ca: creatinine ratio
- Urine protein: creatinine ratio
- C3
- Renal ultrasonography
- First degree relatives urine test

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The initial referrals are to the Pediatric Nephrologist rather than to the Pediatric Urologist.

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Other evaluation procedures:

- Renal biopsy
- Cystoscopy
- Renal angiography (rarely indicated)


THANK YOU!
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