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Hematuria

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Introduction

Evaluation of hematuria proceeds as follows:

- Confirmation of the presence of hematuria and differentiating it from other causes of red/brown urine
- Identifying the potential site of bleeding (glomerular vs. nonglomerular)
- Algorithmic approach based on symptomatology

Definition

Hematuria is defined as the presence of an increased number of red blood cells (RBCs) in the urine.

Classification:

- *Gross hematuria:* Visible to the naked eye
- *Microscopic hematuria:* Apparent only upon urinalysis
  It refers to the presence of >5 RBCs per high-power field (latest guidelines say >3 RBCs/high-power field).
- *Persistent hematuria:* Presence of hematuria on two to three occasions for a period beyond 4 weeks
- *Transient microscopic hematuria:* It is caused by exercise, fever, trauma to urinary tract, and urinary tract infection.

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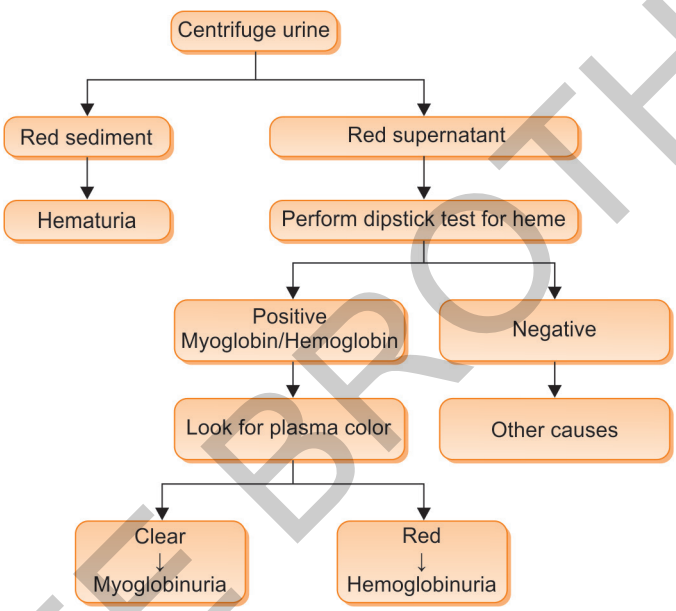
Urinary Dipstick Test

Centrifuge 10 mL of a fresh urine sample at 2,000 rpm for 5 minutes.



Other causes of dipstick-negative red/brown urine:

- *Medications:* Rifampin, doxorubicin, chloroquine, deferoxamine, ibuprofen, iron sorbitol, nitrofurantoin, and phenolphthalein
- *Food dyes:* Beets and food coloring agents
- *Metabolites:* Bile pigments, homogentisic acid, methemoglobin, porphyrin, and tyrosinosis

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Microscopic Urine Examination

It is the gold standard for the detection of microscopic hematuria.

Glomerular hematuria:

- Presence of RBC casts
- Presence of >20% dysmorphic RBCs or >5% acanthocytes is highly suggestive.
- Associated with significant proteinuria

Pointers to Etiology

ETIOLOGY	DIAGNOSIS
Unilateral flank pain that radiates to the groin	Ureteric calculi
Dysuria, frequency, urgency, new-onset enuresis	Urinary tract infection
Medication intake—cyclophosphamide and features of adenoviral illness	Hemorrhagic cystitis
A history of pharyngitis or impetigo (2 or 3 weeks earlier)	Poststreptococcal glomerulonephritis (PSGN)
Synpharyngitic hematuria	Immunoglobulin A nephropathy (IgAN)

Red Flag Signs

- Significant proteinuria
- Hypertension with edema
- Persistent gross/glomerular hematuria
- Decreasing glomerular filtration rate (GFR) and rising serum creatinine
- Hematuria in a child with a family history of kidney failure in early adulthood in a first-order relative

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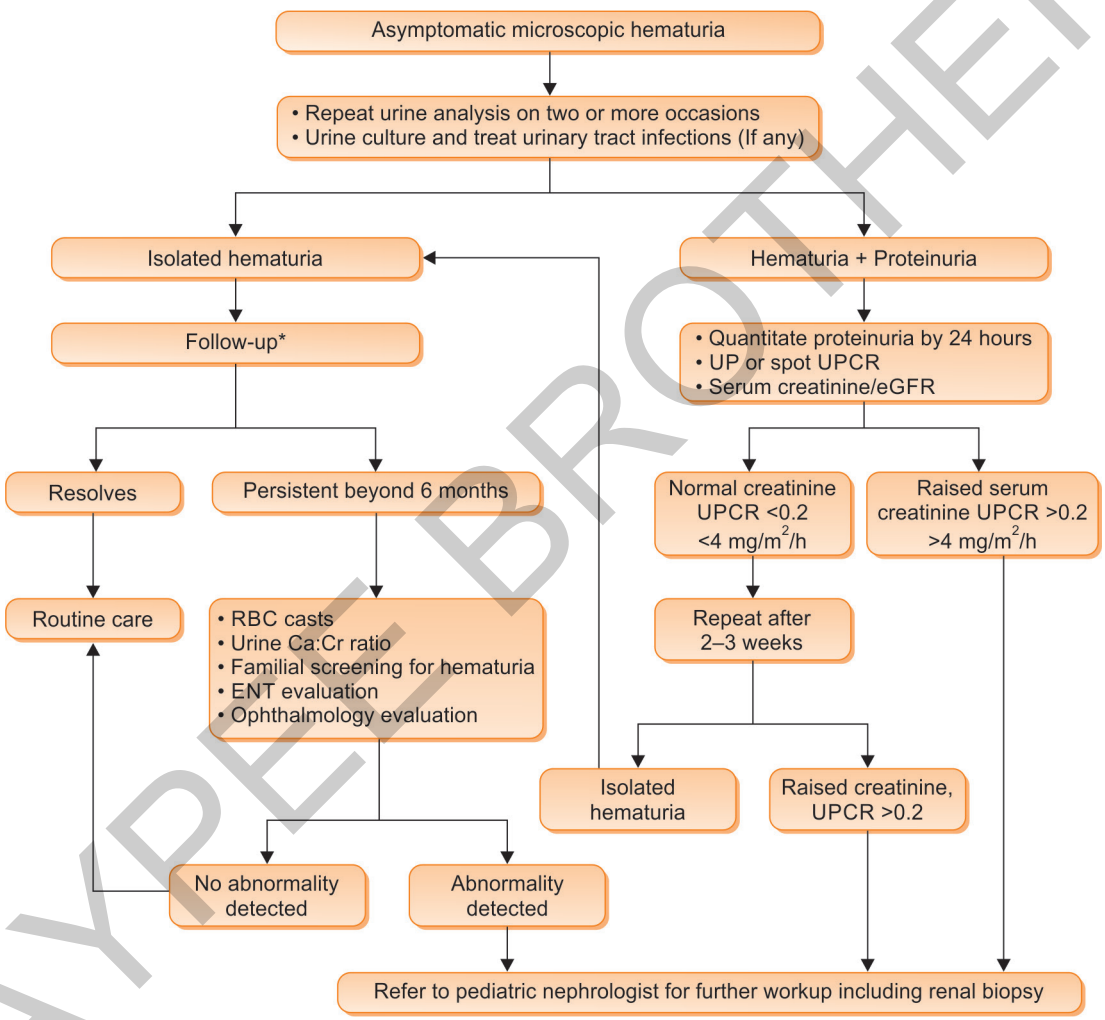
Algorithm for Evaluation of Asymptomatic Microscopic Hematuria



*If anytime during follow-up a patient develops symptoms, work up like symptomatic hematuria (eGFR: estimated glomerular filtration rate; ENT: ear, nose, and throat; UP: urine protein; UPCR: urine protein to creatinine ratio)

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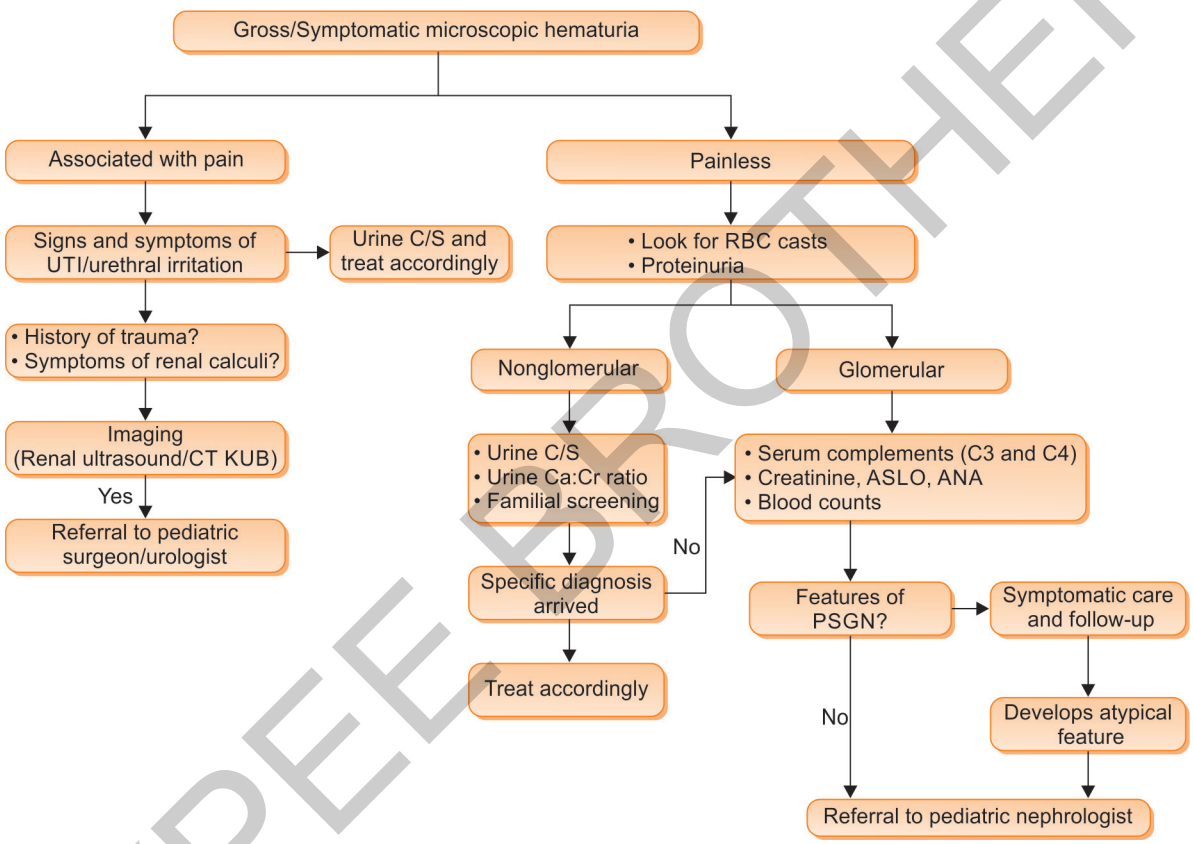
Algorithm for Evaluation of Gross or Symptomatic Microscopic Hematuria



(ANA: antinuclear antibody; ASLO: antistreptolysin O; Ca:Cr: calcium to creatinine ratio; C/S: culture and sensitivity; CT KUB: computed tomography of the kidneys, ureters and bladder; PSGN: poststreptococcal glomerulonephritis; RBC: red blood cells; UTI: urinary tract infection)

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Other Investigations

TESTS	DIAGNOSIS
Serum creatinine	To identify renal impairment
Serum complements (C3 and C4)	Low in SLE and PSGN
ANA, ASLO	SLE and PSGN
Familial screening for hematuria	Hereditary nephritis
Kidney biopsy (when indicated)	Helps in diagnosis and prognostication

(ANA: antinuclear antibody; ASLO: antistreptolysin O; PSGN: poststreptococcal glomerulonephritis; SLE: systemic lupus erythematosus)

Cystoscopy

Cystoscopy is rarely indicated in children.

Indications:

- Bladder mass on ultrasound
- Urethral abnormalities due to trauma
- Symptoms suggestive of inflammatory cystitis

Suggested Reading

- Patel HP, Bissler JJ. Hematuria in children. Pediatr Clin North Am. 2001;48:1519-37.
- Phadke KD, Vijayakumar M, Sharma J, Iyengar A; Indian Pediatric Nephrology Group. Consensus statement on evaluation of hematuria. Indian Pediatr. 2006;43:965-73.

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An Algorithm Approach to
Pediatric Diagnosis

The book is designed to serve as a practical guide, offering clear, step-by-step algorithms that can be applied in clinical settings. These algorithms are based on the latest evidence and best practices, ensuring that clinicians have a reliable resource at their fingertips when faced with the complex task of diagnosing pediatric conditions.

The book is organized by symptomatology, covering 140 symptoms. Each chapter is structured to guide the readers through a logical sequence with differential diagnosis, investigations, and red flag signs that is both comprehensive and precise. Every chapter has a clear algorithm that is concise and easy to follow, finally arriving at the most likely diagnosis.

This book is an invaluable asset for practitioners, teachers, students, and all those who manage children in their clinical practice.

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