

CT Children's CLASP Guideline

Gross Hematuria with Suspected Acute Post-Infectious Glomerulonephritis (APIGN)

INTRODUCTION

Acute Post-Infectious Glomerulonephritis (APIGN) is the most common cause of acute glomerulonephritis in children, predominantly affecting children aged 5-12 years of age. It is an immune-mediated disease triggered by glomerular deposition of immune complexes following infection, with the most common being group A β - hemolytic streptococcal pharyngitis (latent period 1-3 weeks) or skin infection (latent period 3-6 weeks). However, APIGN can be caused by many different infections.

The clinical presentation of patients with APIGN varies widely and is characterized by nephritic syndrome including edema, gross hematuria, hypertension, and oliguria. The diagnosis is made clinically with low serum complement C3 and normal complement C4 levels with preceding infection. The prognosis in children is great, with >95% achieving full recovery with supportive care.

Clinical management guidelines for pediatric patients primarily focus on confirming the diagnosis, monitoring for acute complications, and providing supportive care. Pediatricians play a critical role in the initial recognition, management, and structured follow-up of these patients, including monitoring for resolution of hypocomplementemia and identifying the minority of children who develop complications or atypical features warranting nephrology referral.

INITIAL EVALUATION AND MANAGEMENT

INITIAL EVALUATION:

- Most common presenting features of APIGN:
 - Gross hematuria, classically described as coca-cola or tea-colored urine
 - Edema, can present with periorbital swelling
 - Hypertension
 - Interval of 1-3 weeks after pharyngitis or 3-6 weeks after a streptococcal skin infection (impetigo)
- **Physical Exam:**
 - Assess for evidence of edema and/or hypertension
 - Obtain accurate weight and compare to most recent weight to assess volume status
 - Obtain manual blood pressure with appropriately sized blood pressure cuff to assess for hypertension (see [Hypertension CLASP](#) for instructions on how to properly obtain a blood pressure)
- **Initial Evaluation:**
 - Complete blood count
 - Renal function panel
 - Complications may include hyponatremia, hypoalbuminemia, elevated creatinine
 - Complement C3 (low in ~95-99% cases), complement C4 (typically normal)
 - Urinalysis with microscopy and first morning urine protein/creatinine ratio
 - Microscopic hematuria: >5 RBC/hpf
 - Non-nephrotic range proteinuria: Urine protein to creatinine ratio (UP:C) >0.2-2.0

- Nephrotic-range proteinuria: UP:C >2.0
- Renal ultrasound
 - Rule out other etiologies for gross hematuria
- Consider based on symptoms:
 - Evidence of streptococcal infection: strep culture, ASO titer (sensitive for pharyngitis), anti-DNAse B (sensitive for skin infection)
 - Urine culture
- Diagnosis: APIGN is likely if (*see Appendix: Diagnostic Algorithm for Gross Hematuria with Suspected APIGN*)
 - Nephritic Syndrome: gross hematuria, hypertension, edema
 - Isolated low Complement C3; Complement C4 levels are typically normal.
 - Preceding infection

INITIAL MANAGEMENT:

- Treatment is **supportive**
- Fluid and salt restriction in patients with edema or hypertension
 - Encourage low sodium diet (*see DASH Eating Plan: [DASH Eating Plan | NHLBI, NIH](#)*)
 - Fluid restriction: consider limiting to 2/3 maintenance fluid requirement
- Antibiotics: dependent on evidence of streptococcal or urinary tract infection
- Avoid NSAIDs and other nephrotoxic medications
- If Nephrology involved, antihypertensive agents and diuretics will be directed by Nephrology based on presentation

SUGGESTED MONITORING:

There are no standard guidelines/protocols for PIGN monitoring. If additional questions/concerns, would discuss with Nephrology.

Weeks 1-4:

- PCP assessment every 2 weeks: urine output, weight, blood pressure to monitor for hypertension and fluid overload
- First morning UA & UP:C every 2 weeks

Weeks 4-12:

- PCP assessment monthly: urine output, weight, blood pressure to monitor for hypertension and fluid overload
- First morning UA & UP:C monthly
 - Hematuria may persist up to 12-18 months and may continue after proteinuria has resolved
- Repeat C3 in 8-12 weeks
 - C3 should normalize by 6-8 weeks for most patients

Month 3:

- Refer to Nephrology if first morning UP:C remains abnormal (>0.2) or C3 remains low

Months 3-18:

- UA every 6 months
- If point-of-care UA shows blood, obtain urine microscopy to evaluate for microscopic hematuria (>5 RBC/hpf)

	Month 18: Refer to Nephrology for persistent microscopic hematuria
WHEN TO REFER	URGENT REFERRAL TO NEPHROLOGY - Evidence of fluid overload, oliguria/anuria, hypertension greater than the 95%+12 mmHg - Abnormal renal function panel (e.g., elevated or rising serum creatinine from baseline, low albumin, hyponatremia) - Nephrotic range proteinuria (UP:C >2.0) or nephrotic syndrome (UP:C >2.0, albumin <3.0, edema) - Low C3 <u>and</u> C4 at presentation ROUTINE REFERRAL TO NEPHROLOGY - If APIGN likely, refer to Nephrology if: - gross hematuria after 2 weeks - Persistent proteinuria (UP:C >0.2) after 4 weeks - Persistently low C3 at 8-12 weeks - Microscopic hematuria beyond 18 months - If APIGN unlikely to be the cause of gross hematuria and does not meet criteria for Urgent Referrals
HOW TO REFER	Referral to Nephrology via CT Children's One Call Access Center For more information on how to place referrals to Connecticut Children's, click here. Phone: 860.837.7350 Fax: 833.226.2329 Information to be included with the referral: Results of lab work, including urine studies
WHAT TO EXPECT	What to expect from CT Children's visit: - Complete physical exam and history - Microscopic analysis of urine - Further evaluation based on findings

ALGORITHM: Diagnostic Algorithm for Suspected APIGN

