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Acute Post-Streptococcal Glomerulonephritis

Standard Operating Procedure (SOP)



Union of Myanmar Special region - 1
Pediatric (SOP)

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Union of Myanmar Special region - 1
Pediatric (SOP)

NEPHROLOGY

Acute Post-Streptococcal Glomerulonephritis

Acute post streptococcal glomerulonephritis (APSGN) is the commonest cause of an acute nephritic syndrome in children resulting in abrupt onset of glomerular injury and inflammation that leads to a decline in glomerular filtration rate with sodium and water retention.

Patients may present with:

- *Macroscopic or microscopic haematuria*
- *Signs of fluid overload such as hypertension and oedema*
- *Renal dysfunction*

History and Clinical Features

- *APSGN may occur at any age, but is most common between the ages of 2 and 15 years (median age at presentation 6-8 years old).*
- *APSGN typically follows either pharyngeal or, less commonly, skin infection with group A streptococcus.*
- *The symptoms usually develop:*
 - *1-2 weeks after a throat infection or*
 - *3-6 weeks after skin infection.*
- *Severity varies from asymptomatic microscopic haematuria to anuria causing renal failure*
- *Gross haematuria occurs in 30-50%*
- *Volume overload occurs in up to 2/3 of patients and may be severe enough to cause congestive heart failure and pulmonary oedema*
- *Hypertension occurs in up to 80%. Severity may not correlate with degree of volume overload*
- *Hypertensive encephalopathy (seizure, confusion and coma) is the presenting features in 5%*

Investigations

- *Urinalysis*
 - *Proteinuria <2 g/m² day, not nephrotic range (<+++)*
 - *Haematuria-RBC & RBC cast (60-85 %)*
- *For streptococcal infection*
 - *Skin/throat swab culture*

- ASO titer
- Renal function test
 - Blood urea
 - Creatinine
 - Electrolytes

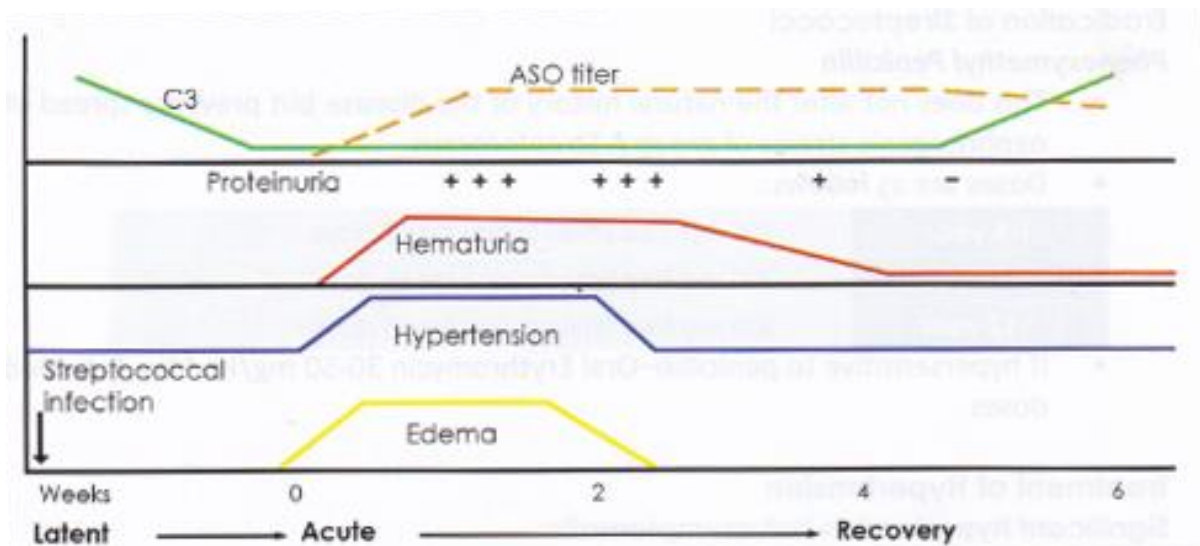


Figure 6.1. Summary of the typical clinical course of acute post streptococcal glomerulonephritis

**Ref Clinical Paediatric Nephrology 3rd edition 2002 Kher K, Schnoper HW, Greenbaum LW (Editors). Taylorand Francis, Oxford, UK.*

Management

- Indication for hospitalization
- Hypertension
- Oliguria
- Generalized edema
- Signs of heart failure
- Elevation of serum creatinine or potassium
- Hypertensive encephalopathy

General measures

- Strict monitoring – Daily fluid intake, urine output, weight, blood pressure,urine albumin
- Fluid input and urine output should be closely monitored.
 - All children should be weighed daily.
 - All patients should be on a "no added salt" diet.

- If oliguric (<0.5 ml/kg/hr), restrict fluid intake to replacement of insensible losses (400 ml/m²/day) plus previous day urine output
- If overloaded (i.e. Hypertensive, raised JVP, oedematous), give Furosemide 1-2 mg/kg up to twice daily to induce a negative fluid balance.

Eradication of Streptococci

Phenoxymethyl Penicillin

- This does not alter the natural history of the disease but prevents spread of nephritogenic strains of group A Streptococcus.
- Doses are as follows:
- If hypersensitive to penicillin-Oral Erythromycin 30-50 mg/kg /day 4 divided doses

1-5 year	125 mg four times a day for 10 days
6-12 year	250 mg four times a day for 10 days
>12 year	500 mg four times a day for 10 days

Treatment of Hypertension

Significant hypertension but asymptomatic

- Treat fluid overload which is the usual cause (see above)
- If euvolemic, use Nifedipine (Starting dose 200-300 µg/kg three times daily) or Amlodipine (Starting dose 100-200 µg/kg once daily)
- Do not use ACE inhibitors as these can reduce renal function.
- Beta blockers can exacerbate hyperkalemia.

Symptomatic, severe hypertension or hypertensive emergency/encephalopathy

- Features-headache, vomiting, loss of vision, convulsions, papilledema
- Emergency management indicated to reduce Bp sufficiently to avoid hypertensive complications and yet maintain it at a level that permits autoregulatory mechanism of vital organs to function
- **Target of Bp control:**
 - Reduce BP to $<90^{\text{th}}$ percentile of BP for age, gender and height percentile
 - Total BP to be reduced = observed mean BP-desired mean BP
 - Reduce BP by 25% of target BP over 3-12 hours
 - The next 75% reduction is achieved over 48 hours

Osmotic diuretics, such as mannitol 0.25 mg/kg push may increase dose gradually to 1mg/kg dose if necessary for satisfactory response (however are contraindicated in oliguric and pulmonary edema patient as they might increase vascular volume)

Table 6.1 Medicine doses in hypertensive emergency

Drug	Dosage	Onset	Duration	Advantages	Caveats
Nifedipine	Oral 0.25-0.5 mg/kg q 30 mins, Increase dose if ineffective (maximum dose 20 mg)	15-20 mins	2-5 hours		Only if patient is conscious
Glyceryl trinitrate	Continuous intravenous infusion 1-10 µg/kg/min (maximum dose 400 µg/ min)	At once	3-5 mins	Rapid onset and cessation Relieve coronary spasm Reduce preload and to a lesser extent afterload	Bradycardia, Tachycardia Headache Methemoglobinemia Vomiting
Labetalol	IV 0.2 mg/kg over 2 mins if no response in 5-10 mins, increase to 0.4-1.0 mg/kg (Maximum bolus dose 20 mg) OR Continuous IV infusion 0.4-1 mg/kg/ hour (Maximum 3 mg/kg/hr)	5 mins	0.3-23 hours	Favorable cardiac effect Favorable CNS effect Use in patient with raised intracranial pressure	Contraindicated in acute heart failure Adverse effects Reactive airway disease, Heart failure/block, Paradoxical hypertension, Postural hypotension, Hepatitis, Muscle weakness, Urinary retention, Scalp tingling, Burning in throat
Furosemide	IV 1-5 mg/kg/dose 6 hourly (maximum dose 240 mg) OR continuous IV infusion 0.1-1 mg/kg/ hr	2-5 mins	2 hours	Drug of choice in acute glomerulo-nephritis with fluid overload	Hyponatremia Hypokalemia
Hydralazine	0.1-0.3 mg/kg (maximum 10 mg) slow IV over 3-5 mins Can repeat every 4-6 hours OR continuous infusion 4-6 µg/kg/min (Maximum 300 µg/min)	10-20 mins	3-8 hours	Effective and doses can be repeated if necessary	Increase ICP May cause non-homogenous cerebral perfusion, tachycardia, severe headache, fluid retention

Treatment of circulatory congestion and pulmonary edema

- Prop patient up
- Give oxygen and ventilatory support if necessary (e.g. CPAP)
- Sodium and fluid restriction-Withhold fluids for 24 hours if possible
- Diuretics such as furosemide (2 mg/kg), double dose if no response in 4 hours
- Potassium-sparing diuretics are contraindicated because of an increased risk of hyperkalemia.
- Consider dialysis if no response to diuretics
- Digitalis is ineffective
- Preload and after load reductions are indicated for hypertensive pulmonary edema (e.g. nitrates, morphine, diuretics).

Complications and Management

- Acute left ventricular failure (RefertPage-109 Management of heart failure)
- Hypertensive encephalopathy
- Acute renal failure
 - Mild renal impairment is common
 - Severe persistent oliguria or anuria with azotaemia is uncommon
 - Management of severe acute renal failure-Manage according to ARF guideline

Referral to Pediatric Nephrologist

If one or more of the following are present

- Severe hypertension
- Severe oliguria
- Severe edema
- Nephrotic-range proteinuria
- Azotaemia (moderate to marked)
- Recurrent episodes of gross haematuria
- Atypical onset
 - Absence of latent period
 - No evidence of streptococcal illness
- Failure of expected resolution of clinical signs
 - Gross haematuria within the preceding 10-14 days
 - Microscopic haematuria within 1 year
 - Edema within 2 weeks
 - Proteinuria (>50 mg/dL) within 6 months
 - Azotaemia within 1 week
 - Hypertension within 6 weeks

Indications for Renal Biopsy

- Persistently low C3 beyond 6 weeks
- Persistent heavy proteinuria after 6 months
- Atypical presentation-Nephrotic syndrome, failure of renal function to improve after acute phase.
- Atypical course- Failure of renal function to improve after initial improvement during the acute phase.
- Associated heavy proteinuria and/or reduced renal function should be evaluated for abnormal complement regulation.

Referral to Nephrologist is recommended.