

POST INFECTIOUS ACUTE GLOMERULONEPHRITIS

Introduction

Acute glomerulonephritis (AGN) implies that it is of abrupt onset and associated with one or more features of what is known as acute nephritic syndrome.

Acute nephritic syndrome

- oedema e.g. facial puffiness
- decreased urine output (oliguria)
- microscopic /macroscopic haematuria
- hypertension
- (urine: tea-coloured or smoky)
- azotemia

Table 1. Aetiology

Causes of nephritis
post streptococcal AGN
post-infectious acute glomerulonephritis (other than group A β -haemolytic streptococci)
subacute bacterial endocarditis
Henoch-Schoenlein purpura
IgA nephropathy
hereditary nephritis
systemic lupus erythematosus
systemic vasculitidis

Table 2. Post Streptococcal AGN

Presenting features
acute nephritic syndrome (most common)
nephrotic syndrome
rapidly progressive glomerulonephritis
hypertensive encephalopathy
pulmonary oedema
subclinical (detected on routine examination)

In children, the commonest cause of an acute nephritic syndrome is post infectious AGN, the majority of which is due to post-streptococcal infection of the pharynx or skin. Post streptococcal AGN is commonest in the 6 – 10 year age group.

Investigation findings in Post-streptococcal AGN

- urinalysis and culture
 - haematuria – present in all patients
 - proteinuria (trace to 2+, but may be in the nephrotic range; usually associated with more severe disease.)
 - red blood cell casts (pathognomonic of acute glomerulonephritis)
 - other cellular casts
 - pyuria may also be present
- bacteriological and serological evidence of an antecedent streptococcal infection
 - raised ASOT (> 200 IU/ml)
 - increased anti-DNAse B (if available) – a better serological marker of preceding streptococcal skin infection
 - throat swab or skin swab
- renal function test
 - blood urea, electrolytes and serum creatinine
- full blood count
 - anaemia (mainly dilutional)
 - leucocytosis may be present
- complement levels
 - C3 level – low at onset of symptoms, normalises by 6 weeks.
 - C4 is usually within normal limits in post-streptococcal AGN.
- ultrasound of the kidneys
 - not necessary if patient has clear cut acute nephritic syndrome

Management

- strict monitoring – fluid intake, urine output, daily weight, BP (nephrotic chart)
- Penicillin V for 10 days to eliminate β - haemolytic streptococcal infection (give erythromycin if penicillin is contraindicated)
- fluid restriction to control oedema and circulatory overload during oliguric phase until child diureses and blood pressure is controlled
 - day 1 : up to 400 mls/m²/day. Do not administer intravenous or oral fluids if child has pulmonary oedema.
 - day 2 : till patient diureses – 400 mls/m²/day
(as long as patient remains in circulatory overload)
 - when child is in diuresis – free fluid is allowed
- diuretic (e.g. frusemide) should be given in children with pulmonary oedema. It is also usually needed for treatment of hypertension
- diet – no added salt to diet. Protein restriction is unnecessary
- look out for complications of post-streptococcal AGN:
 - hypertensive encephalopathy usually presenting with seizures
 - pulmonary oedema (acute left ventricular failure)
 - acute renal failure

Management of severe complications of post-streptococcal AGN

Hypertension

- significant hypertension but asymptomatic
 - bed rest and recheck BP ½ hour later
 - If BP still high, give oral nifedipine 0.25 - 0.5 mg/kg. Recheck BP ½ hour later.
 - monitor BP hourly x 4 hours then 4 hourly if stable.
 - oral nifedipine can be repeated if necessary on 4 hourly basis.
 - may consider regular oral nifedipine (6 – 8 hourly) if BP persistently high.
 - add frusemide 1 mg/kg/dose if BP still not well controlled.
 - other anti-hypertensives if BP still not under control:
 - captopril (0.1-0.5 mg/kg q8 hourly), metoprolol 1-4 mg/kg 12 hourly
- symptomatic, severe hypertension or hypertensive emergency / encephalopathy
 - symptom / signs: headache, vomiting, loss of vision, convulsions, papilloedema
 - emergency management indicated to reduce BP sufficiently to avoid hypertensive complications and yet maintain it at a level that permits antiregulatory mechanism of vital organs to function
 - target of BP control:
 - reduce BP to <90th 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

Pulmonary oedema

- give oxygen, prop patient up; ventilatory support if necessary
- IV frusemide 2 mg/kg/dose stat; double this dose 4 hours later if poor response
- fluid restriction – withhold fluids for 24 hours if possible
- consider dialysis if no response to diuretics.

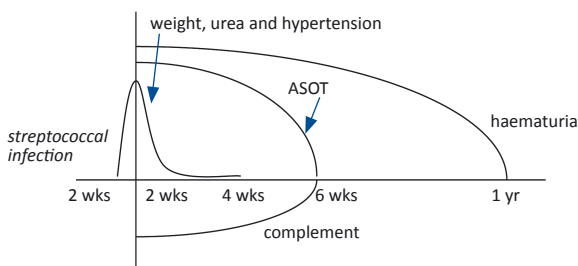
Acute renal failure

- mild renal impairment is common;
- *severe persistent oliguria or anuria with azotaemia is uncommon*
- management of severe acute renal failure – *refer section on acute renal failure*

Table 3. Antihypertensive drugs used for hypertensive emergencies in children

Drug	Dose
Nifedipine	0.25 – 0.5 mg/kg/dose oral may be repeated twice if no response
Sodium nitroprusside	0.5 – 1.0 mcg/kg/min, iv infusion may increased stepwise to 8.0 mcg/kg/min maximum Needs to be given in an ICU setting <i>Caution: in liver and renal failure</i>
Labetolol	0.2 – 1.0 mg/kg/dose by repeated iv boluses or 0.25 – 2.0 mg/kg/hour by iv infusion
Hydralazine	0.2 – 0.4 mg/kg/dose by iv bolus may be repeated twice if no response

Figure 1. Natural history of acute post-streptococcal glomerulonephritis



Follow-up

- for at least 1 year.
- monitor BP at every visit
- do urinalysis and renal function to evaluate recovery.
- repeat C3 levels 6 weeks later if not already normalised by time of discharge

Table 4. Indications for renal biopsy

- severe acute renal failure requiring dialysis.
- features suggesting non post-infectious AGN as the cause of acute nephritis.
- delayed resolution
 - oliguria > 2 weeks
 - azotaemia > 3 weeks
 - gross haematuria > 3 weeks
 - persistent proteinuria > 6 months

Outcome

- short term outcome: excellent, mortality <0.5%.
- long term outcome: 1.8% of children develop chronic kidney disease following post streptococcal AGN. These children should be referred to the paediatric nephrologists for further evaluation and management.