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Original Research Article

Clinical profile and outcome of Acute Glomerulonephritis (AGN) in children from a tertiary care centre in Odisha, India

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Abstract
Introduction: *Glomerulonephritis is the term reserved for the variety of renal disease in which inflammation of the glomerulus, manifested by proliferation of cellular elements, is secondary to immunologic mechanism. Acute glomerulonephritis (AGN) is major cause of morbidity in developing countries. This study is an attempt to evaluate the clinical characteristics, complications and outcome of acute nephritic syndrome.*
Methods: *A prospective study was conducted on all the cases found to have acute glomerulonephritis, and sample size constituted all children between 2 years to 14 years, hospitalized in pediatric department of MKCG Medical college from Feb. 2017 to Jan.2018 with acute glomerulonephritis.*
Results: *Out of 50 patients studied 64% were male and 36% were female. The peak age group was 5 to 10 years. Pyoderma was the most common predisposing condition (64%). Latent period between infection and onset of disease was highest in 15-21 days (38%). 86% patients had low C3 at the time of diagnosis. Majority of patients were with low complement C3 level and positive ASO titre. 92% with AGN recovered completely.*
Conclusion: *AGN is a significant renal problem in children and one of the common causes of hospital admissions. Early identification, monitoring and management is required to prevent morbidity and mortality.*
Keywords: *Children, hematuria, Acute glomerulonephritis, complement C3.*

Introduction

Acute glomerulonephritis (AGN) generally presents as a syndrome of findings that include hematuria, edema, hypertension and renal insufficiency. Although the pathogenesis is not fully understood, current evidence supports that most cases of AGN are due to an immunologic response to a variety of different etiologic agents. The immunologic response, in turn, activates a number of biological processes that result in glomerular inflammation and injury. AGN may be isolated to the kidney (primary glomerulonephritis) or be a component of a systemic disorder (secondary glomerulonephritis). Diseases involving the renal glomeruli are encountered frequently in clinical practice and are the most common causes of end stage renal disease worldwide[1]. Acute post streptococcal

glomerulonephritis (APSGN) occur in under developed countries or developing countries.[2] (APSGN) predominantly affects children between the ages of 5 and 15 years, with a slight predominance of males[3]. It is an acute, reversible disease characterized by spontaneous recovery in the vast majority of patients. Typically, gross hematuria and edema develop 7 days to 12 weeks after the streptococcal infection.[1,3] Spontaneous resolution of the clinical manifestations is generally rapid: diuresis usually ensues within one to two weeks, and the serum creatinine concentration returns to base line within four weeks. The rate at which urinary abnormalities disappear is more variable. Hematuria usually resolves within 6 months, but mild proteinuria is present in 15 percent of patients after 3 years and in 2 percent of patients after 10 years[3]. The long-term prognosis of patients with (APSGN) has been a subject of controversy. Although most patients eventually have a complete recovery, hypertension, recurrent or persistent proteinuria, and chronic renal insufficiency develop in some. The reported incidence of chronic renal insufficiency ranges from 0 to 10 percent. It has been suggested that misdiagnosis, racial differences in the risk of progression of renal disease, and differences in the natural history of sporadic and epidemic glomerulonephritis may account for these discrepancies.

There are only a few studies on the clinical profile and follow up of these patients. The analysis of the outcome is important for a better awareness of the long-term prognosis. This study is an attempt to identify the various clinical manifestations of acute nephritic syndrome and to analyse the outcome during one year follow up period.

Methods

This was a prospective study conducted over one year from February 2017 to January 2018.All the cases in the age group of 2 years to 14 years, admitted to pediatric department, with following criteria

1. Sudden onset of oliguria and edema
2. Transient rise in blood pressure
3. Urinary findings of gross or microscopic hematuria or proteinuria
4. No extra renal or laboratory findings consistent with systemic disease

Cases with past history of renal disease or hypertension or proteinuria were excluded from the study.

After the cases were subjected to a detailed history, clinical examination and investigations and data were recorded in a pre-designed proforma. The investigations included hemoglobin, total and differential leukocyte counts, ESR, gross and microscopic examination of urine and culture, 24 hr urinary protein, serum total protein, albumin, cholesterol, urea, creatinine, sodium, potassium, calcium and phosphate. Serum C3 and ASO titer were done wherever indicated. Radiological investigations included ultrasonography of kidney, ureter and bladder.

Results

There were 50 cases of Acute Glomerulonephritis in the study period of one year. Age of the patients ranged from 0 to 15 years. Out of 50 patients, 48% (24) were of 5 to 10 years of age group [table 1]. The male-to-female ratio was found to be 1.6:1[table2]; Pyoderma was associated with 64% (32) of cases of AGN and 24% (12) cases had a history of sore throat [table 3]. Decreased urinary output (94%), puffiness of face (84%) and oedema feet (64%). Gross haematuria seen in 64% (32) of cases were the common clinical presentations observed. Other symptoms were fever, vomiting, chest pain, headache, abdominal pain, respiratory distress and convulsion [table 4]. 86% (43) presented with hypertension.52% had Significant pyuria (>5 WBC/HPF). 8% (4) had no proteinuria and 20% (10) patients had nephrotic range proteinuria; 100% (50) cases had haematuria on microscopic examination. Granular cast, RBC cast and hyaline casts are seen in 11, 16 and 8 cases respectively [table 5]. Hyperkalaemia was seen in 16% (8) cases, and 8% (4) cases had

hypernatremia, 94% (47) had hypercholesterolemia, 62% had urea levels >40 and 60% had creatinine more than >1.2 .Raised CRP was seen in 12%.[table 6]. 8% had hemoglobin less than 7gm/dl. ASO titer was positive in 38% (19) cases, with 20% in pharyngitis, 12% in pyoderma and 6% had no infection. Group A Beta hemolytic streptococci was found in 12% of throat swab and in 14% of skin swab. The outcome of the treatment was 92% were relieved and discharged [table 7].

Table 1 Age Distribution

Age	No. of Cases	Percentage
<5 Years	16	32
5-10 Years	24	48
10-14 Years	10	20
Total	50	100

Table 2 Sex Distribution

Sex	No. of Cases	Percentage
Male	32	64
Female	18	36
Total	50	100

Table 3 History of Preceding Infection

Preceding Infection	No. of Cases	Percentage
Pyoderma	32	64
Sore Throat	12	24
No Infection	6	12
Total	50	100

Table 4 Mode of Presenting Symptoms

Symptoms	No. of Cases	Percentage
Oliguria	47	94
Puffiness Of Face	42	84
Pedal Edema	32	64
Gross Hematuria	32	64
Fever	27	54
Breathlessness	15	30
Headache And Vomiting	11	22
Palpitation	10	20
Pain Abdomen	6	12
Convulsion	6	12
Altered Sensorium	4	8

Table 5 Urinary Findings in AGN

Urinary Examination	No. of Cases	Percentage
Gross Hematuria	8	16
Microscopic Hematuria	50	100
Pus Cells>5/Hpf	26	52
Cast		
RBC Cast	16	32
Granular Cast	11	22
Hyaline Cast	8	16
Albumin		
Nil	4	8
+	22	44
++	12	24
+++	7	14
++++	3	6

Table 6 Blood Chemistry in AGN

Investigations	No. of Cases	Percentage
Raised CRP	6	12
Blood Urea(mg/dl)		
>40	31	62
<40	19	38
Serum Creatinine (mg/dl)		
>1.2	30	60
<1.2	20	40
Serum Cholesterol(mg/dl)		
<200	47	94
>200	3	6
Serum Sodium (meq / L)		
>150	4	8
130-150	45	90
<130	1	2
Serum Potassium (meq/L)		
>5.5	8	16
3.5-5.5	38	76
<3.5	4	8

Table 7 Hospital Course and Outcome

Course in Hospital	No. of Cases	Percentage
Relieved and Discharged	46	92
Left Against Medical Advice	3	6
Death	1	2
Total	50	100

Discussion

AGN is relatively common in developing countries or communities that experience overcrowding, poor housing and poor hygiene and a common cause of hospitalization in children.[1,2] In the index study 80% of the subjects were from low socio economic status, where these could be the contributing factors. Majority of them (48%) were of the age group 5 to 10 years and it is found to be 1.6 times more common in boys as compared to girls. Previous studies have shown the median age at presentation of AGN to be between 6 and 8 years and male-to-female ratio as 2:1[3,4]. Which is similar to our study, Decreased urinary output (94%) Facial puffiness (97.1%), and pedal oedema (94.3%) were the most common presenting features. Gross

haematuria was seen in 25.7% cases. Hypertension occurs in approximately 80-90% of cases of AGN and cerebral complications including headache, seizures, mental status changes and visual changes occur in 30-35% of cases[6]. In the present study, we found hypertension in 86% cases. The incidence of cerebral complications is lower compared to the observations made by other studies, whereas cardiac complications are also relatively few.[7,8] The mortality was 2%.This could be due to earlier presentation in the hospital, better monitoring in the intensive care set-up, good nursing care and adequate control of hypertension. Anaemia (Hb < 10 gm/dL) was found in 86% of cases, which is comparatively higher than other studies[8]. Besides volume overload, nutritional anaemia might have contributed to it. We found nephrotic range proteinuria in 20% cases. Previous studies have shown it to vary from 1% to 32.3%.[9,10]

Though in the present study majority were pyoderma associated, we found ASO positivity to be high in 38%. We found serum C3 level to be low in 83% of the cases. Similar cases have been reported in literature.[10,11,12]

The treatment of AGN is mostly supportive and the most urgent problem is hypertension. Salt restriction and loop diuretics are the first line of treatment followed by vasodilators and Angiotensin Converting Enzyme (ACE) inhibitors (Enalapril). Hypertension usually resolves within 1 to 2 weeks and rarely needs long-term treatment. In the present series almost all patients were treated with penicillin.

Prognosis is usually excellent and it is more favourable in pyoderma-associated than pharyngitis-associated AGN.[13]

Conclusion

Any child presenting with fever along with features of nephropathy points towards the possibility of MALARIA, SCRUB TYPHUS or SEVERE SEPSIS. But nephropathy without fever almost points to possibility of immunologic disease like AGN.

In conclusion, AGN is a common renal disease requiring hospital admission in school going children. AGN is the most common cause of acute hypertension in children. It can lead to life-threatening complications like LVF, Hypertensive encephalopathy and AKI in less than 5% cases. Hence early diagnosis and prompt management are required for better outcome. Diuretics are the cornerstone of management in case of AGN. The disease is strongly influenced by poverty, overcrowding and personal hygiene. Hence, improving the socioeconomic status of the community and availability of a low cost vaccine against Group A streptococcus in future may help in elimination of the disease.

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