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Post-infective glomerulonephritis in children: a hospital based study

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ABSTRACT

Introductions: Post-infective glomerulonephritis (PIGN) is a common pediatric kidney disease in developing countries. This hospital based study aim to analyze clinical profile of PIGN in children in local scenario.

Methods: This was a descriptive review of medical records of children admitted with a diagnosis of PIGN at Patan Hospital in three years period during 2013 to 2016. Hospital medical records were reviewed for demographic profiles, clinical features, laboratory data, treatment, and complications. The data was analyzed descriptively for frequencies and percentage values.

Results: Out of 41 children with PIGN, 40 (97%) were between 5 to 15 years of age (mean 9.5), male to female ratio 1.7:1. Swelling of face and or leg and hypertension were seen in all, hypocomplementemia in 35 (85%), elevated ASO titer in 27 (66%), microscopic hematuria in 37 (90%). The complications of congestive cardiac failure were seen in five (12%), acute renal failure in four (10%) and hypertensive encephalopathy in two (5%).

Conclusions: The common clinical and biochemical profile in children with PIGN were pedal edema, hypertension, hematuria and hypocomplementemia.

Keywords: anti-streptolysin O titer (ASO), complement level C_3, group A streptococcus, kidney biopsy, post-infective glomerulonephritis (PIGN)

INTRODUCTIONS

Acute glomerulonephritis (AGN) is recognized by the presence of hematuria, edema, hypertension and evidence of renal insufficiency (elevated blood urea, nitrogen and creatinine).[1] Post-infective glomerulonephritis (PIGN) is the commonest form of AGN in developing countries.[2] Post-streptococcal glomerulonephritis is common in children between 5-12 years and uncommon before the age of 3 years.[3] It is twice more frequent in males than females.[4] Although nephritogenic beta hemolytic streptococci constitute the commonest cause of PIGN, several other bacteria and viruses have also been implicated.[5]

In this study, the terminology PIGN is used instead of post-streptococcal glomerulonephritis (PSGN). In the absence of highly sensitive diagnostic modality in resource poor countries, the definitive infective etiology cannot be established in many patients presenting with AGN. Since there are no definitive diagnostic criteria for PIGN, the treating clinician usually makes a final diagnosis of PIGN based on clinical features and biochemical parameters and excluding other causes of glomerulonephritis whenever necessary.

This study aims to describe the common clinical features, biochemical findings and complication of PIGN in children admitted to Patan Hospital, Nepal.

METHODS

This was a retrospective descriptive study of children with diagnosis of PIGN admitted at Patan Hospital Patan Academy of Health Sciences, Lalitpur, Nepal, during three years period from 14 April, 2013 to 13 April 2016. Final diagnosis was made on the basis of clinical features (edema, hematuria, hypertension and oliguria), laboratory analyses (deranged renal function, anti-streptolysin O (ASO) titer, complement level C3, ANA) with or without recent history of skin and/or throat infection. Hospital medical records were reviewed for demographic profiles, clinical features, laboratory data, treatment, and complications. The data was analyzed descriptively for frequencies and percentage values.

RESULTS

There were 41 children with diagnosis of PIGN, 40 (97%) between 5 to 15 years of age (mean 9.5) with male to female ratio of 1.7:1. Sixteen (39%) patients were referred from other centers. Twenty-one (51%) children belonged to low socioeconomic status. Duration of stay in hospital ranged from 2 to 38 days (mean 7.5).

Swelling of face and/or leg and hypertension was seen in all (100%), decreased urine output in 21 (51.2%) and red color urine in 19 (46.3%). Thirty-three (80.48%) patients had other features like fever, abdominal pain, bleeding from nose, cough, difficulty in breathing and seizure. Recent history of sore throat was seen in 8 (19.5%) and skin lesion 13 (32%), (Table 1).

Laboratory findings revealed elevated ASO titer in 27 (66%), microscopic hematuria in 37 (90%), decreased C3 in 35 (85%). Renal function derangement was seen in 13 (32%). Serum electrolytes (Na, K) were abnormal in 7 (17%) of patients, (Table 2).

The ANA was done in 12 (29%) and was positive in one patient (8%) diagnosed as diffuse lupus nephritis grade IV by renal biopsy. Similarly, 31 samples were sent for urine culture and sensitivity, of which two (5.8%) were positive for Klebsiella pneumoniae. Granular cast was present in 7 (22.6%) of patients and none of them had RBC cast in urine.

Ultrasound of the kidney in 27 of patients were normal in 17 (63%) and parenchymal disease with increased cortical echogenicity in 10 (37%). Two patients underwent kidney biopsy which showed immune complex mediated diffuse proliferative glomerulonephritis in one

Table 1. Clinical features of children with post-infective glomerulonephritis(PIGN), n=41

Symptoms / Signs	Number	Percentage
Swelling of face and/or leg	41	100.00%
Hypertension	41	100.00%
Pedal edema	38	92.68%
Decreased urine output	21	51.22%
Red or cola colored urine	19	46.34%
Rashes healed/fresh	16	39.02%
History of skin lesion	13	31.71%
Headache	8	19.51%
History of sore throat	8	19.51%
Others	33	80.49%

Table 2. Biochemical profile of children with PIGN (n=41)

Laboratory Parameter	Number	Percentage
Hematuria (RBC>5/hpf	37	90.24%
Low complement (C_3)	35	85.37%
Elevated ASO titer	27	65.85%
Renal derangement	13	31.71%
Granular cast	10	24.39%
Electrolytes disturbances	7	17.07%
Urine culture (2 out of 31)[i]	2[i]	6.45%[i]
Reactive ANA (1 out of 12)[ii]	1[ii]	8.33%[ii]
Throat swab culture	0	0.00%
RBC cast	0	0.00%

[i]31 cultures were sent, [ii]12 ANA were sent

Table 3. Complications of PIGN in children (n=41)

Complications	Number	Percentage
Congestive cardiac failure (CCF)	5	12.20%
Hypertensive encephalopathy	2	4.88%
Both (CCF + hypertensive encephalopathy)	2	4.88%
Acute renal failure	4	9.76%

patient and diffuse (proliferative) lupus nephritis grade IV in another.

Out of 41 patients, 13 (32%) had complications (Table 3).

Twelve (29%) had associated problems like urinary tract infection (12%) and nephrotic range proteinuria (17%).

Diuretics and nifedipine antihypertensive drug was used in 24% and 3% of patients respectively; 73% of total patients received both the drugs to control hypertension. Hypertension disappeared within 2 to 10 days with mean duration of four days. Similarly, pedal edema disappeared within 2 to 21 days with mean duration of 4 days. Dialysis was required in one patient (25% of four acute renal failure) or 2.4% of total 41 PIGN.

DISCUSSIONS

Our study of 41 children with PIGN revealed 40 (97%) were among school age of 5-15 years. Similar observations were reported by previous studies.[4,6,7] We observed more cases of PIGN in male individuals. This may be because male children are usually more active

and liable to get infection. In our study, pyoderma associated nephritis with male individuals were predominant which are comparable to other studies.[6-9]

The incidence is more prevalent among the population particularly where poverty, overcrowding and poor hygienic conditions are prevailent.[2,10,11] Fifty-one percent of children belonged to poor socioeconomic status in our study, whereas Khoybar MA et al. found 81% of children from poor socioeconomic status.[6] The high incidence is due to persistence of streptococcal infection in poor, overcrowded and unhygienic living condition.

Our study, like others, showed edema, hematuria, hypertension and low complement level in significant number of patients.[7,12-14] The low level of C_3 has been found to be one of the reliable indicators of PIGN. Most of our patients had significantly decreased C_3 level. Similar observation was also seen in a study by Fabiola D Cruz et al.[15] However, elevated ASO titer was seen in only 27 (66%) and deranged renal function in 13 (32%) respectively.

There might be several reasons of not having elevated ASO titer in majority of our patients. Firstly, antecedent infection may not be streptococcal in origin in large number of our patients. Secondly, most of our patients were pyoderma related where we rarely get elevate ASO titer in the blood. Thirdly, anti-DNAse B (AND-B) test, which usually gets elevated in pyoderma associated nephritis, could not be done in our setting because of unavailability of the above mentioned test. In a report by Chug KS et al., the utility of ASO titer in patients with acute glomerulonephritis following streptococcal pyoderma is lower, with elevated concentrations in only 57%; ANA-B is more consistently elevated (90%) making it serologic test of choice in this setting.[16]

Some of the previous studies have even made their own criteria while including cases of PIGN. In a study by Khoybar MA et al., post-streptococcal glomerulonephritis was defined as recent onset of hematuria or history of hematuria plus either of followings or all: edema, renal insufficiency, hypertension, heart failure, hypertensive encephalopathy, evidence of recent streptococcal infection (positive throat swab culture, history of skin infection or pharyngitis or elevated ASO titer).[6] In a study by S Rajajee, APGN (acute post-streptococcal glomerulonephritis) was based on acute onset of edema, oliguria, hematuria, proteinuria, no history of antecedent renal disease and recent history of skin and/or throat infection.[17] However, with the variability of clinical features and lab parameters, we had not made any criteria and final diagnosis of PIGN was based on the treating pediatrician after reviewing all clinical features and laboratory parameters. We observed that blood pressure was controlled within 2 to 10 days with an average of 4 days which was similar to other studies.[6, 18]

Various studies have reported the common complications of acute pulmonary edema, hypertensive encephalopathy, acute renal failure and nephrotic syndrome.[6,17,19] The most common complications noted in our study were CCF (12%), acute renal failure (10%), hypertensive encephalopathy (5%) and both CCF and encephalopathy in 5% of cases. According to Paudel DR et al., CCF was found in 17%, rapidly progressive glomerulonephritis (RPGN) in 10% and encephalopathy in 3% of cases.[20] However, Fabiola D. Cruz et al, reports hypertensive encephalopathy and CCF in 11.3% and 36.3% respectively.[15]

In our study, 17% of children had nephrotic range proteinuria. Study by Chug KS et al., found 14% of PIGN patient to have nephrotic range proteinuria at the onset.[16] Paudel et al. found nephrotic range proteinuria in 6.67% of cases.

Two of our patients (5%) underwent renal biopsy, and showed immune complex mediated diffuse proliferative glomerulonephritis and diffuse lupus nephritis grade IV. In a study by Paudel et al., 10% of patients admitted with PIGN revealed crescentic glomerulonephritis on renal biopsy.[20] Study by Marques et al. showed RPGN in 1.2% in age group beyond 14 years.[14]

Out of 41 cases studied, there were no deaths in the present study. The mortality rate varied from <1% to 13% in other previous studies.[8, 17] Thus, even though most children in our study recovered, AGN should not be taken as a benign condition. Timely and proper intervention is necessary and long term follow up should be done in every patient.

CONCLUSIONS

The pedal edema, hypertension, hematuria and hypocomplementemia were important findings of PIGN. Half of children were from poor socio-economic background.

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