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Original Research Article

Complications and renal biopsy profile in childhood steroid resistant nephrotic syndrome

Subramani Palaniyandi[1], Anitha Palaniyandi[2]*

[1]Department of Paediatrics, Tagore Medical College and Hospital, Chennai, Tamilnadu, India
[2]Department of Paediatrics, Sri Ramachandra Medical College and Hospital, Chennai, Tamilnadu, India

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***Correspondence:**
Dr. Anitha Palaniyandi,
E-mail: sep11subbu@gmail.com

ABSTRACT

Background: Nephrotic syndrome is a notable chronic disease in children. The objective of this study was to study the complications and renal biopsy profile in childhood steroid resistant nephrotic syndrome.
Methods: Retrospective observation study done in Sri Ramachandra Medical College and Hospital, Department of Paediatrics, Chennai. Inclusion criteria was children aged 1-12 years diagnosed with steroid resistant nephrotic syndrome defined as absence of remission despite therapy with daily prednisolone at a dose of 2mg/kg/day for 4 weeks. Remission defined as urine albumin nil/trace in 3 consecutive early morning samples. Children less than 1 year of age, children with renal transplant and incomplete records were excluded. Period of study January 2013-December 2015. Informed consent was obtained and 75 cases who fulfilled the study criteria were included in this study. Variables assessed were incidence of hypertension (both at onset of disease and later during the course of disease), incidence of urinary tract infection and its microbiology, associated co-morbidities, complications of nephrotic syndrome and renal biopsy profile.
Results: Incidence of hypertension at onset of disease was 13.3% and later during the course of the disease was 48%. Most common infection was UTI (28%) and the most common organism isolated in urine culture was E-coli. Incidence of other co-morbidities like asthma, atopy was 17.3%. No case had evidence of end stage renal disease. 60% of cases had undergone renal biopsy and minimal change disease was the most common biopsy finding.
Conclusions: Hypertension and UTI remain important complications in nephrotic syndrome and hence all such children should be continued to be monitored for these complications. Minimal change disease (MCD) was the most common renal biopsy finding.

Keywords: Minimal change disease, Nephrotic syndrome, Renal biopsy, SRNS

INTRODUCTION

Nephrotic syndrome is characterized by massive proteinuria, hypoalbuminemia (serum albumin <2.5g/dl), hyperlipidemia (serum cholesterol >200mg/dl) and edema. It affects 1-3 per 1,00,000 children <16 years of age.[1] They are classified as steroid sensitive or resistant based on their response to steroids after 4 weeks of therapy.10-20% do not have proteinuria resolution after 4 weeks of daily steroids and are grouped as steroid resistant nephrotic syndrome.[2]

METHODS

Retrospective observation study done in Sri Ramachandra Medical College and Hospital, Department of Paediatrics, Chennai. Inclusion criteria was children aged 1-12 years diagnosed with steroid resistant nephrotic syndrome

defined as absence of remission despite therapy with daily prednisolone at a dose of 2mg/kg/day for 4 weeks. Remission defined as urine albumin nil/trace in 3 consecutive early morning samples. Children less than 1 year of age, children with renal transplant and incomplete records were excluded. Period of study January 2013-December 2015. Informed consent was obtained and 75 cases who fulfilled the study criteria were included in this study. Variables assessed were incidence of hypertension (both at onset of disease and later during the course of disease), incidence of urinary tract infection and its microbiology, associated co-morbidities, complications of nephrotic syndrome and renal biopsy profile.

RESULTS

Of the 75 children in this case study, 55 were boys (73.3%) and 20 were girls (26.7%).

Incidence of hypertension at onset of disease was 13.3% and later during the course of the disease was 48% as shown in Tables 1 and 2.

Table 1: Incidence of hypertension at onset of nephrotic syndrome.

Hypertension - early	SRNS
Yes	10 (13.3%)
No	65 (86.7%)
Total	75 (100%)

About 10 children had hypertension at onset of nephrotic syndrome.

Table 2: Incidence of hypertension later during the course of nephrotic syndrome.

Hypertension - later	SRNS
Yes	36 (48%)
No	39 (52%)
Total	75 (100%)

Statistically 48% had at least one episode of hypertension during the course of nephrotic syndrome.

All cases were studied for any possible history of complications of nephrotic syndrome including infections. UTI was the most common infection noted in this study with an incidence of 28% (Table 3).

Table 3: Prevelance of UTI (at least one episode) anytime during course of nephrotic syndrome.

UTI	SRNS
Yes	21 (28%)
No	54 (72%)
Total	75 (100%)

About 28% had documented at-least one episode of UTI.

Table 4: Microbiology in urine culture.

Microbiology	SRNS
Nil	54 (72%)
E.coli	12 (16%)
Klebsiella	5 (6.7%)
Pseudomonas	4 (5.3%)
Total	75 (100%)

The most common organism isolated from urine culture was *E-coli* (Table 4). All UTI episodes were treated as inpatient basis with minimum duration of antibiotics being 7 days. *E.coli* was the most common organism isolated in urine culture followed by *Klebsiella*

The second most common complication noted in this study was pneumonia (4%) while 2.7% of cases had developed peritonitis (Table 5). No case had evidence of end stage renal disease. Pneumonia was the second most common complication noted after UTI.

Table 5: Complications anytime during the course of nephrotic syndrome.

Complication	SRNS
Nil	69 (92%)
Pneumonia	3 (4%)
Peritonitis	2 (2.7%)
Thrombosis	1 (1.3%)
Total	75 (100%)

Incidence of other co-morbidities like asthma, atopy was 17.3% (Table 6). Incidence of other co-morbidities like atopy and asthma was 13%.

Table 6: Co-morbidities noted during course of nephrotic syndrome.

Co-morbidites	SRNS
Nil	62 (82.7%)
Atopy	6 (8%)
Asthma	7 (9.3%)
Total	75 (100%)

Table 7: Renal biopsy profile.

Biopsy	SRNS
Renal biopsy not done	30 (40%)
Minimal change disease	24 (32%)
Focal segmental glomerulosclerosis	12 (16%)
Membrano proliferative glomerulonephritis	6 (8%)
IgA Nephropathy	3 (4%)
Total	75 (100%)

Statistically 45 cases had undergone renal biopsy and minimal change disease was the most common biopsy finding (32%) followed by focal segmental

glomerulosclerosis. MCD was the most common renal biopsy finding (Table 7). Focal segmental glomerulosclerosis and Minimal change disease had equal prevalence of hypertension at onset (Table 8).

Table 8: Hypertenision at onset of nephrotic syndrome compared with their renal biopsy.

Hypertension - early	Biopsy					Total
	Not done	Minimal change disease	Focal segmental glomerulosclerosis	Membrano proliferative glomerulonephritis	IgA Nephropathy	
Yes	5 (6.7%)	2 (2.7%)	2 (2.7%)	1 (1.3%)	0 (0%)	10 (13.3%)
No	25 (33.3%)	22 (29.3%)	10 (13.3%)	5 (6.7 %)	3 (4%)	65 (86.7%)
Total	30 (40%)	24 (32%)	12 (16%)	6 (8%)	3 (4%)	75 (100%)

Focal segmental glomerulosclerosis and Minimal change disease had equal prevalance of hypertension at onset (p value 0.837).

DISCUSSION

Complications in children result from abnormalities directly related to the nephrotic syndrome and secondarily from therapy used for its treatment.

About 61.3% of cases in this study had at least one episode of hypertension- either at the onset of disease or during the course of treatment. Children with NS and persistent hypertension are more likely to have chronic kidney disease (CKD) with poor outcome. In addition, hypertension is also a major risk factor for cardiovascular disease. The likelihood of elevated blood pressure varies with the underlying cause of nephrotic syndrome.[3] For children with NS and hypertension, angiotensin converting enzyme (ACE) inhibitors or angiotensin II receptor blockers (ARBs) are the preferred anti-hypertensive agents because of their further antiproteinuric benefit and ability to slow advancement of renal impairment. Nephrotic children are at increased risk of developing infections due to encapsulated bacteria.[4-6] Infections still remain a cause of death in children with nephrotic syndrome.[7] In this study Urinary tract infections were the most common infections, similar to other studies.[8,9] The second most common complication noted was pneumonia followed by peritonitis.

Vaccination in children with nephrotic syndrome may cause a relapse but the protection offered from vaccines greatly outweigh this risk, which is in fact minimal.[6] Pneumococcal vaccine is effective even in children receiving high doses of steroids and it is not associated with an increased risk of relapse.[10]

Incidence of thromboembolic complications in this study was 1.3% whereas the reported incidence in nephrotic children is between 2 and 3 percent.[11,12] Both arterial and venous thromboses have been reported in children with nephrotic syndrome, although venous thrombosis complication accounted for most of the cases.[11] The common renal biopsy finding in childhood nephrotic syndrome is minimal change disease.[3] This is of significance since the vast majority of such patients (>90 percent) respond to steroid therapy.[13]

CONCLUSION

Hypertension and UTI remain important complications in nephrotic syndrome and hence all such children should be continued to be monitored for these complications. Minimal change disease (MCD) was the most common renal biopsy finding.

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