

Original Research Article

Renal biopsy in children with nephrotic syndrome: a study of histopathological pattern

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ABSTRACT

Background: Idiopathic nephrotic syndrome (INS) is a common childhood renal disease characterized by a remitting and relapsing course, associated with different histopathological subtypes. The true incidence of various histopathological subtypes of NS remains under estimated owing to the diversity in indication criteria for performing renal biopsies in pediatric population.

Methods: This was a cross-sectional observational study in children with nephrotic syndrome at a tertiary health care centre. Total 22 children, with nephrotic syndrome, who underwent renal biopsy procedure during a period of one year, were enrolled for the study. Indications of renal biopsy were noted, and the histopathology reports were studied in detail.

Results: In this study group, the most common indication for renal biopsy was “Atypical age (> 8years) of diagnosis in 45.5% (10/22) patients, followed by 22.7% (5/22) in “Children presenting with hypertension and hematuria”. The most common histopathological finding in these children was mesangial proliferative glomerulonephritis in 45.5% (10/22) patients followed by IgA nephropathy with mesangial proliferation in 22.72% (5/22) and minimal change disease in only 13.6% (3/22).

Conclusions: This study highlights the occurrence of non-MCD as the common cause of INS in the children and denotes the significance of performing renal biopsies in children with INS for better prognostication.

Keywords: Histopathology of nephrotic syndrome, Idiopathic nephrotic syndrome, Minimal change disease, Mesangial proliferative glomerulonephritis

INTRODUCTION

Idiopathic nephrotic syndrome (INS) is a common childhood renal disease characterized by a remitting and relapsing course associated with different histopathological subtypes. The estimated annual incidence of NS is 2-7/100,000 children, affecting mostly those under 6 years of age.^{1,2}

Histopathological examination of the renal biopsy helps in establishing the diagnosis, guides treatment and prognosis in children with INS.³ Percutaneous renal

biopsy has now been established as a safe and low risk procedure, to obtain tissue for histopathological analysis in children.⁴ Advent of an automated biopsy device and real time ultrasound for percutaneous renal biopsies has enhanced the probability of obtaining adequate tissue for diagnosis and has reduced the complications associated with the procedure.^{5,6}

Minimal change disease (MCD) is the most common histopathological subtype in children with idiopathic NS.^{7,8} The incidence of focal segmental glomerulosclerosis (FSGS) has shown an increasing trend in

patients with idiopathic NS.⁹ Authors undertook this study in children with nephrotic syndrome, to review the indications of renal biopsies and their histopathological patterns in this region of India.

METHODS

A cross-sectional observational study in children with Nephrotic syndrome at a tertiary health care center. Total 22 children, with nephrotic syndrome, who underwent renal biopsy procedure during one-year period 1st January 2013 to 31st December 2013, were enrolled for the study.

Inclusion criteria

- Age of first episode of nephrotic syndrome <1year or >8years,
- Nephrotic patients presenting with hematuria, hypertension and renal insufficiency,
- Steroid dependent nephrotic syndrome (SDNS),
- Frequently relapsing nephrotic syndrome (FRNS),
- Steroid resistant nephrotic syndrome,

Exclusion criteria

- Active urinary infection,
- Uncontrolled hypertension,
- Coagulation disorder,
- Solitary kidney,
- Renal mass,
- Advanced chronic renal failure,

- Perinephric abscess,
- Renal artery aneurysm.

Ultra sound guided percutaneous renal biopsy procedure was performed with a biopsy gun (Bard Max Core disposable instrument, having 16-gauge biopsy needle, 16 cm length and 22 mm penetration depth).

Thorough history detailed clinical and laboratory evaluation was done for study subjects. Indications of renal biopsy were noted and the histopathological evaluation, in form of light microscopy, immunofluorescence microscopy and electron microscopy were done by an expert pathologist.

RESULTS

(Table 1) depicts that the most common indication for renal biopsy was “Atypical age (>8 years) of diagnosis in 45.5% (10/22) patients, followed by 22.7% (5/22) in “children presenting with hypertension and hematuria.

“Frequently relapsing nephrotic syndrome” was the least common indication for renal biopsy in 13.6% (3/22) children with nephrotic syndrome. The most common histopathological finding on renal biopsy in these children with nephrotic syndrome was mesangial proliferative glomerulonephritis in 45.5% (10/22), followed by IgA nephropathy with mesangial proliferation in 22.72% (5/22) and minimal change disease in only 13.6% (3/22) and membranoproliferative glomerulonephritis was seen in 4.5% (1/22).

Table 1: Indications of renal biopsy and histopathological findings in children with NS.

Indication	Atypical age of diagnosis of nephrotic syndrome (n=10)	Hypertension and haematuria (n=5)	Steroid dependent nephrotic syndrome (n=4)	Frequently relapsing nephrotic syndrome (n=3)	Total (n=22)
Histopathology					
Minimal change disease (MCD)	10% (1)	-	25% (1)	33.3% (1)	13.6% (3)
Membranoproliferative glomerulonephritis	10% (1)	-	-	-	4.5% (1)
Mesangial proliferative glomerulonephritis	40% (4)	40% (2)	50% (2)	66.6% (2)	45.5% (10)
IgA nephropathy with mesangium proliferation	30% (3)	40% (2)	-	-	22.7% (5)
IgM nephropathy with mesangium proliferation	10% (1)	-	25% (1)	-	9 % (2)
Others	-	20% (1)	-	-	4.5% (1)

Mesangial proliferative glomerulonephritis was seen in 66.6% (2/3) of children with frequently relapsing nephrotic syndrome followed by 50% (2/4) of children with steroid dependent nephrotic syndrome. Histopathological finding of mesangial proliferative glomerulonephritis was seen in 40% (4/10) of children

with “Atypical age of diagnosis of NS” and 40% (2/5) in “children presenting with hypertension and hematuria”

DISCUSSION

Nephrotic syndrome in children is a clinical manifestation of different histopathological subtypes.

Incidence of various histopathological subtypes of INS remains under estimated, owing to the diversity in indication criteria for performing renal biopsy. This study provides information about indications of kidney biopsy as well as a pattern of histopathology in children with INS.

The most common indication for renal biopsy was “A typical age (>8years) of diagnosis in (n=10,45.5%) patients with idiopathic nephrotic syndrome and mesangial proliferation was the predominant histological findings in this study. Histopathological patterns in some studies from other geographical locations are presented in (Table 2).¹⁰⁻¹⁵

Table 2: Details of various studies showing, indication of renal biopsy and histopathological patterns in children with nephrotic syndrome.

Study	This study	Nammalwar et al ¹⁰	Arif et al ¹¹	Absar et al ¹²	Bakr et al ¹³	Asinobi et al ¹⁴	Mubarak et al ¹
Location	India	India	Pakistan	Pakistan	Egypt	Nigeria	Pakistan
Number of patients	N=22	N=250	N=75	N=41	N=741	N=41	N=538
Male/female	15/7	-	50/25	29/12	441/300	26/15	347/191
Mean age			11.2±3.7	7.6±3.3 years	7.4±3.6	2-13years 7.9years	9.79±4.59
Most common indication for renal biopsy	Atypical age of diagnosis of NS (45.5%)	Steroid resistant nephrotic syndrome (65.2%)	Steroid resistant nephrotic syndrome (48%)	Steroid resistant nephrotic syndrome (68%)	Steroid resistant nephrotic syndrome (44.4%)	Not mentioned	Not mentioned
Histopathology							
Minimal change disease	10%	52.1%	25.3%	37%	54.3%	9.8%	43.8%
Focal segmental glomerulosclerosis	-	-	46.8%	12%	-	4.9%	38.1%
Membranous glomerulonephritis	-	-	14.7%	7%	-	9.8%	7.9%
Membrano-proliferative glomerulo nephritis	10%	-	5.3%	10%	-	51.2%	3.1%
Mesangial proliferative glomerulo nephriti	40%	-	5.3%	-	-	-	4.8%
IgA nephropathy	30%	-	1.3%	-	-	-	1.1%

The three commonest histopathological patterns in children with INS, reported by various authors were MCD, FSGS, and MPGN. Most common indication for renal biopsy was steroid resistant NS. Present study depicts the prevalence of mesangial proliferation as a predominant histopathological pattern.

Incidence of focal segmental glomerulosclerosis (FSGS) is observed to be increasing over the years in Pakistan.^{11,12,15} Geographical variation seems to be significant contributors for the different histopathological findings of nephrotic syndrome in children.

Major limitation of this study was a small sample size and shorter duration of this study. We recommend conducting a multicentric study, over a long duration, in different populations and creating a central registry of

pediatric kidney biopsy to understand the histopathological pattern of INS in children.

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