

Histological Spectrum of Renal Biopsies in Pediatric Patients: Our Experience from a Tertiary Care Hospital.

Dr. Praveen Revu¹, Dr. G. Prasad, M.D., D.M², Dr. B. Bhaskar³,
Dr. V. Ramesh Chandra⁴

¹Resident, Department of Nephrology, Andhra Medical College, Visakhapatnam, Andhra Pradesh

²Professor and Head of the Department of Nephrology, Andhra Medical College, Visakhapatnam, Andhra Pradesh

³Resident Department of Nephrology, Andhra Medical College, Visakhapatnam, Andhra Pradesh

⁴Associate Professor Department of Nephrology, Andhra Medical College, Visakhapatnam, Andhra Pradesh

ABSTRACT

BACKGROUND: Renal biopsy has limited indications in children. However, when necessary the procedure should be promptly carried out. Indications for renal biopsy are Rapidly Progressive Renal Failure (RPRF), Steroid Resistant Nephrotic Syndrome (SRNS), non recovering Acute Kidney Injury (AKI) and following transplantation etc. Renal biopsy is usually performed percutaneously by using a Bard magnum gun. The risk of complications is increased in patients with bleeding diathesis, uncontrolled hypertension and renal failure.

AIM: To analyze the histological spectrum of renal biopsies in pediatric patients.

STUDY DESIGN: Prospective observational study done from December 2016 to December 2018.

METHODS: Patients under 18 years of age who underwent renal biopsy at our hospital were included in the present study. Renal biopsy was performed under ultrasound guidance with a biopsy gun and sent for Light microscopy and immunofluorescence examination. Data was analysed by descriptive statistics.

RESULTS: A total of 34 renal biopsies were done in patients under 18 yrs of age with minimum age being 3 yrs. Female to male ratio was 1.125:1. Most common indication for renal biopsy was nephrotic syndrome with atypical features (38.2%) followed by steroid resistant nephrotic syndrome (35.3%) and nephritic syndrome (20.6%). Most common renal biopsy finding was FSGS (26.5%) followed by MCD (23.4%), Membranous Nephropathy (11.8%) and C3 glomerulopathy (11.8%). Among steroid resistant nephrotic syndrome patients common lesion was FSGS (41.6%) followed by MCD (33.3%). C3 glomerulopathy, FSGS and SLE are more common among female patients, whereas MCD was found to be common among male patients. C3 glomerulopathy, FSGS, MCD and membranous nephropathy were more common in children above 10 yrs age.

Conclusions: Most common indication for renal biopsy was nephrotic syndrome with atypical features followed by SRNS and nephritic syndrome. Most common histological finding was FSGS followed by MCD.

Keywords: Renal Biopsy, Nephrotic Syndrome, SRNS, AKI, FSGS, MCD.

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I. Introduction

Renal biopsy has revolutionised the study of glomerular diseases¹. Renal biopsy is useful to know the cause of the disease, the prognosis, and also guides the nephrologist in the treatment of the illness². We, prospectively analysed the renal biopsies in children to know the histological spectrum in the pediatric population. The common indications for renal biopsy in pediatric population include steroid resistant nephrotic syndrome and nephritic syndromes. The pattern of glomerular diseases may differ in different population groups³

Idiopathic nephrotic syndrome (NS) is the most common glomerular nephropathy in pediatric population⁴. Common challenges in childhood nephrotic syndrome are steroid resistance, steroid dependence, frequent relapses with steroid toxicity, and decision regarding starting cytotoxic drugs. Renal histopathology aids in deciding the treatment in these situations. Hence this study was done to analyze the histological spectrum of renal biopsies in pediatric patients

II. Methods

This is a prospective observational study done from December 2016 to December 2018 in Andhra Medical College, Visakhapatnam, Andhra Pradesh, India. The protocol of the study was approved by the

institutional ethics committee. The objectives of the study was to analyze the histological spectrum of renal biopsies in pediatric patients.

Inclusion criteria

Children aged 1 to 18 years presented with
 a. Steroid-resistant NS (SRNS) b.NS with atypical presentation c. SDNS before initiating cytotoxic drugs
 d.RPRF e.High index of suspicion for a different underlying pathology f.Non recovering AKI g. Acute nephritic syndrome

Exclusion Criteria

1.Known CKD patients 2.Patients with severe bleeding diathesis 3.solitary kidney 4. Post Transplantation
 Demographic data, clinical features, indications of renal biopsy and clinical diagnosis of the patients were collected. All renal biopsies were processed for light microscopy and immunofluorescence study.

DEFINITIONS – based on KDIGO

1. Macroscopic Haematuria – presence of blood in urine.
2. Microscopic Haematuria - presence of >5 RBC per high power field.
3. Proteinuria - morning urine albumin 2+ or more, or protein excretion rate of more than 4 mg/m²/hour.
- 4.Nephrotic syndrome was defined as massive proteinuria of > 40 mg/m²/hour, spot protein- creatinine ratio >2, presence of edema and serum albumin concentration of <2.5 g/dl.
5. Nephrotic syndrome with atypical features – presence of hypertension, persistent microscopic or macroscopic haematuria, impaired renal function, low complement levels.
- 6.Steroid resistance - failure to achieve complete remission despite 8 weeks of steroid therapy.
- 7.Steroid dependence –Two consecutive relapses during steroid therapy or within two weeks of stopping steroid therapy.

The investigations done prior to biopsy include complete blood picture, prothrombintime (PT), activated partial thromboplastin time (APTT), renal function test, complete urine examination, 24hr urine protein or spot P/C ratio , Liver function tests, lipid profile, collagen profile, serum complement levels.

Statistical analysis

Data was analyzed by descriptive statistics. Collected data is entered in MS EXCEL 2007 and analyzed in percentages.

III. Results

A total of 34 patients were included in the study. Among them, 16 patients (47%) were males and females were 18 patients (52.9%) with slight female predominance. In our study, majority of the patients were above 10yrs of age (67.6%).

Table: Age distribution

AGE	FREQUENCY	PERCENT
Less than 10 yrs	11	32.4
More than 10 yrs	23	67.6
total	34	100

Table: Gender Distribution

Gender	Frequency	Percent
Female	18	52.9
Male	16	47.1
Total	34	100.0

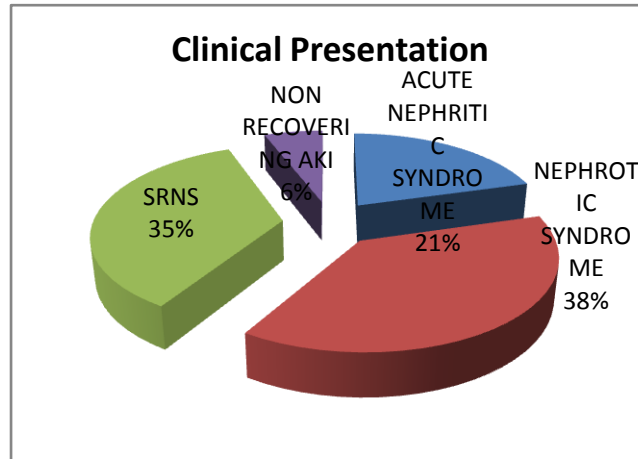
Clinical presentation

In our study the most clinical presentation was nephrotic syndrome with atypical features in 13 patients (38.2%) followed by steroid resistant nephrotic syndrome (SRNS) in 12 patients (35.3%), nephritic syndrome in 7 patients (20.6%) and non recovering AKI in 2 patients (5.8%).

Table: Clinical Presentation

Indication	Frequency	Percent
Acute nephritic syndrome	7	20.6
Nephrotic Syndrome – with atypical features	13	38.2
Steroid resistant nephrotic syndrome	12	35.3
Non recovering AKI	2	5.9
Total	34	100

Fig: Clinical Presentation



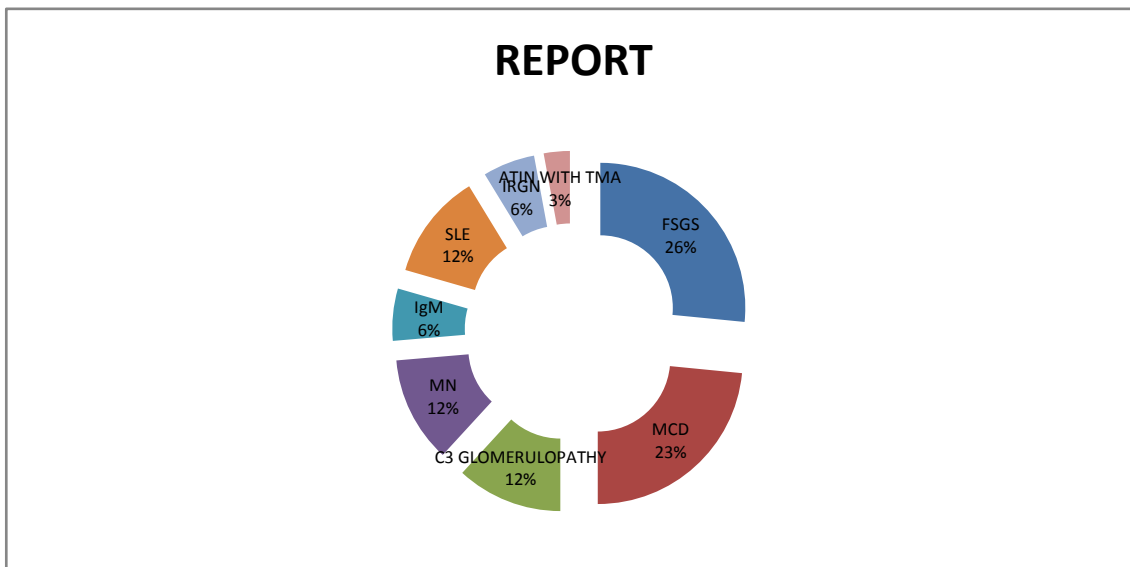
HISTOLOGICAL SPECTRUM OF RENAL BIOPSIES :

In our study, FSGS and MCD are the most common histological lesions seen in 9 Patients(26.5%) and 8(23.4 %) respectively. Other lesions include Membranous Nephropathy in 4 patients (11.8%), C3 Glomerulopathy in 4 patients (11.8%), Lupus nephritis in 4 patients (11.8%), Ig M nephropathy in 2 patients (5.8%), TMA in 1 patient (2.9%), MPGN pattern in 1 patient (2.9%), IRGN in 1 patient (2.9%).

Table: Spectrum of renal biopsies

	FREQUENCY	PERCENT
FSGS	9	26.5
MCD	8	23.4
MEMBRANOUS NEPHROPATHY	4	11.8
C3 GLOMERULOPATHY	4	11.8
IgM NEPHROPATHY	2	5.8
Lupus nephritis	4	11.8
IRGN	2	5.8
TMA	1	2.9
TOTAL	34	100

Figure: Spectrum of renal biopsies



Among 12 patients who presented as SRNS, 5 patients (41.6%) had FSGS, 4 patients (33.3%) had MCD, 2 patients had Ig M nephropathy (16.6%) and 1 patient had membranous nephropathy (8.3%).

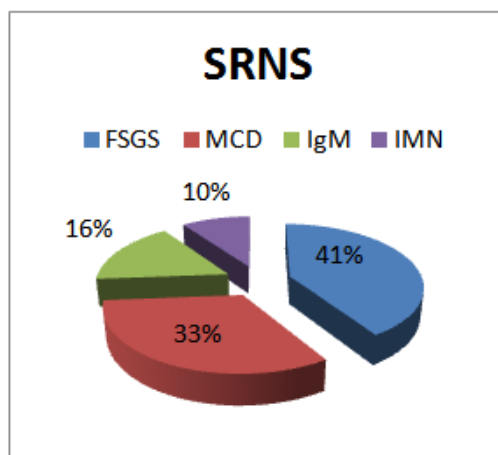


Fig : SRNS – Histological Spectrum

Table : SRNS – Histological Spectrum

LESION	FREQUENCY	PERCENT
FSGS	5	41.6
MCD	4	33.3
IgM	2	16.6
MN	1	8.3

Among patients presented as acute nephritic syndrome, most common presentation is lupus nephritis in 4 patients (57.1%) followed by C3 glomerulopathy in 2 patients (28.6%) and IRGN in 1 patient (14.2%)

Table : Nephritic Syndrome - Histological Spectrum

LESION	FREQUENCY	PERCENT
SLE	4	57.1
C3 glomerulopathy	2	28.6
IRGN	1	14.2

Among patients presented as nephrotic syndrome with atypical features, FSGS and MCD were the most common lesions seen in 4 patients (30.7%) each followed by membranous nephropathy in 3 patients (23%) and C3 glomerulopathy in 2 patients (15.3%).

Table: Nephrotic Syndrome with atypical features - Histological Spectrum

LESION	FREQUENCY	PERCENT
FSGS	4	30.7
MCD	4	30.7
MN	3	23
C3 GLOMERULOPATHY	2	15.3

In patients presented with non resolving AKI, IRGN is seen in 1 patient (50%) and TMA in 1 patient (50%).

IV. Discussion

A total of 34 patients were included in the study. Among them, 16 patients (47%) were males and 18 patients (52.9%) were females with slight female predominance. In our study, majority of the patients were above 10yrs of age (67.6%). Out of 34 patients who underwent renal biopsy nephrotic syndrome was the most common presentation seen in 25 patients (73.5%), followed by nephritic syndrome seen in 7 (20.58%) patients and AKI in 2 patients. This is similar to study done by Lubna et al⁶ done in 108 cases, where nephrotic syndrome remained the major indication (83.3%) for biopsy.

Of the total 25 patients with nephrotic syndrome, 13 patients (52%) had nephrotic syndrome with atypical features, 12 patients (48%) had SRNS. In a similar study done by Prithi Rajendr et al⁷ Jawaharlal Nehru Medical College, Karnataka 56% of cases were SRNS and 44% were SDNS.

In our study, 9 patients (26.5%) had FSGS on renal biopsy, followed by MCD in 8 patients (23.4%). Membranous Nephropathy, Lupus nephritis, C3 Glomerulopathy were seen in 4 patients (11.8%) each, IRGN in 2 patients (5.8%), TMA in 1 patient (2.9%). In an Indian study done by Gulati et al⁸ FSGS accounted for 59% of children, followed by mesangioproliferative glomerulonephritis in 18% of the cases, MCD accounted for 17.4% of their patients. In a similar study done by S. Imtiaz, K. Nasir, et al in Department of

Nephrology, Pakistan, MCD was the most common lesion followed by FSGS, followed by Membranous Nephropathy and MPGN pattern⁹

In the patients who had SRNS, majority of them (41.6%) had FSGS, followed by MCD seen in 32.3% of cases. Ig M nephropathy and Membranous Nephropathy constituted the rest. In patients who had nephrotic syndrome with atypical features FSGS and MCD were found in equal number of patients around 30.7% each, followed by Membranous Nephropathy and C3 glomerulopathy. Those patients who presented as nephritic syndrome had lupus nephritis in 57% of cases, followed by IRGN and C3 glomerulopathy. In a similar study done by Prithi Rajendr et al⁷ at Karnataka, India, 24% of patients with SRNS had MCD, followed by FSGS and Ig A nephropathy in 12% of cases. In a study done by Chao et al, Madani et al, and van Husen et al¹⁰ of all the patients who had nephritic syndrome Minimal change disease has been reported in 23–25%, mesangio proliferative GN in 17.6–24%, FSGS in 14.8%, and MPGN in 10.2%

V. Conclusion

1. Nephrotic syndrome with atypical features was the most common indication for biopsy in pediatric population, followed by SRNS.
2. The most common histological lesion is FSGS followed by MCD.
3. Hence, renal biopsy provides information regarding renal disease pattern in pediatric population and guides the treatment.

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