Kidney Biopsy: An Experience from Tertiary Hospital

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ABSTRACT

Introduction: Kidney Biopsy is an important diagnostic tool in Nephrology. It is useful in Nephrology in terms of diagnosis, prognosis and management. There is little information on renal biopsy data from central Nepal. We describe our center`s experience in kidney biopsy in term of histological patterns, complications and outcomes.

Methods: We prospectively analyzed the biopsies data of patients over a period of one and half year. All kinds of kidney disease patients were included for kidney biopsy, irrespective of their clinical syndromes and underlying diagnosis.

Results: A total of 75 biopsies were analyzed. Majority of them were females; 42 (56%). Most of the biopsies; 63 (84%) were from younger subjects ≤ 45 years and majority of them fell in the age group 11-20 years. Most common clinical renal syndrome to undergo biopsy was Sub Nephrotic range Proteinuria in 40 (53.3%). Among comorbid conditions, 40 (53.3%) had Hypertension. The most common histological pattern seen was Mesangial proliferative Glomerulonephritis seen in 18 (24%). Among complications associated with the procedure, macroscopic hematuria was seen in 5 (6.7%) cases and clinically significant perinephric hematoma causing pain was seen in 4 (5.3%). There was no mortality associated with biopsy procedure.

Conclusions: Sub Nephrotic range Proteinuria was the commonest clinical renal Syndrome observed. In terms of renal histology, Mesangial Proliferative Glomerulonephritis (MesPGN) was the commonest histological pattern observed. Kidney biopsy is a safe procedure without any significant adverse events.

Keywords: *kidney biopsy; meningeal proliferative glomerulonephritis; sub nephrotic range proteinuria.*

INTRODUCTION

Kidney biopsy is an important armamentarium in the field of clinical Nephrology. Kidney biopsy is useful not only in making a specific diagnosis but also in assessing and prognosticating the disease activity and finally formulating a treatment plan.[1] The histological study of kidney biopsy has maintained its charm and is still the gold standard for the diagnosis of renal disease till date.[2] Unfortunately we don't have a central renal biopsy registry in Nepal. Renal biopsy is a relatively safe procedure, with life-threatening complications occurring in less than 0.1% of biopsies.[3] The present study was conducted with an aim to study the clinical renal

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syndromes, histopathological patterns, complications and outcomes of kidney biopsy procedure performed in a medical college teaching hospital from central Nepal.

METHODS

A prospective, descriptive study of kidney biopsy was carried out. All kinds of kidney disease patients, irrespective of clinical syndromes; who were biopsied were included in the study. Data were collected from 75 consecutive renal biopsy patients over a period of one and half year; from June 2011 to November 2012 at the Nephrology Unit, College of Medical Sciences Teaching hospital, Nepal. The indications of renal biopsy in the study cases were as per the standard indication. Patients with clinical features suggestive of diabetic nephropathy were excluded unless there were atypical features. Using the self-adjustable, automated, spring loaded Gun biopsy needle of 16-18 G size (Bard Monotopy USA 16-18 G), Nephrology Residents performed all the biopsies, guided by the ultrasonographic localization of kidneys by the Radiology Residents. Two cores of renal tissue were removed during the biopsy procedure, one for light microscopy which was kept in N/10 Formal saline in and another core for Immunofluorescence which was kept in Michel media and then transported to Ranbaxy Clinical Reference Laboratories in India where they were examined for light microscopy and Immunofluorescence (IF). Patients were monitored in the nephrology ward for 24 hours after the biopsy for observation of any complications. Data including various clinical renal syndromes, comorbidities, histological patterns, complications and outcomes associated with kidney biopsies. Data were entered in a designated profroma and transferred to a Microsoft Excel spreadsheet for statistical analysis. The approval to conduct the study was granted by the Ethical Committee of the hospital and a written consent was taken from each patient prior to the biopsy procedure, after explaining the risk and benefit of the procedure and the possible complications of the procedure.

RESULTS

A total of 75 consecutive biopsies were analyzed over a period of one and half year. The mean age of the patient was 30.34 ± 12.5 years. The age range of patients undergoing renal biopsy was three years to 78 years. Majority of the biopsies performed were in females 56% (n = 42). The male to female ratio was 0.8. The other major results of the study are projected in tabulated form.

Out of 75 renal biopsies, 11 (14.7%) biopsies were performed in children between one to 15 years of age. The youngest case to undergo renal biopsy was a child of three years with a clinical diagnosis of Steroid resistant nephrotic syndrome. Sub Nephrotic range proteinuria was the most common indication for renal biopsy which was present in 40 (53.3%) cases, followed by Nephrotic range proteinuria 35 (46.7%) cases and Lupus Nephritis in 11 (14.7%) cases.The commonest comorbidity associated with the clinical renal syndrome was hypertension in 40 (53.3%) followed by hypothyroidism, present in 15 (20%) cases. The most common histological pattern seen in kidney biopsy was Mesangial proliferative glomerulonephritis (MesPGN) seen in 18 (24%) followed by Minimal change disease seen in 16 (21.3%). In Mesangial proliferative glomerulonephritis (MesPGN) group, 9 (12%) cases were due to Idiopathic MesPGN, 4 (5.3%) cases were secondary to SLE and 5 (6.7%) cases were secondary to IgA Nephropathy.

Table 1. Patient Demographic profile/ Age distribution (n = 50).

Mean age (years)		30.34 ± 12.5 years
Male: Female		0.8
Proportion of subject	**Number**	**Percentage**
≤ 10 years	2	2.7%
11-20 years	23	30.7%
21-30 years	18	24.0%
31-40 years	15	20.0%
41-50 years	7	9.3%
51-60 years	6	8.0%
61-70 years	3	4.0%
71-80 years	1	1.3%
≤ 45 years	63	84.0%
46-80 years	12	16.0%

Table 2. Indications of Renal biopsy.

Indication of renal biopsy	Number	Percentage
Sub Nephrotic range proteinuria	40	53.3%
Nephrotic Range proteinuria	35	46.7%
Rapidly Proliferative Renal Failure	14	18.7%
Lupus Nephritis	11	14.7%
Chronic Glomerulonephritis	9	12.0%
Acute Nephritic Syndrome	7	9.3%
Malignant Infiltration	1	1.3%

Table 3. Co-morbidities.

Comorbidities	Number	Percentage
Hypertension	40	53.3%
Hypothyroidism	15	20.0%
Type 2 DM	3	4.0%

DISCUSSION

There is limited data on spectrum of biopsy proven kidney disease from Nepal. The prevalence of biopsy proven renal disease underestimates the true prevalence of the renal disease, as not all patients with renal disease are biopsied. We observed that most of the biopsies were done in young cases below the age of 45 years which comprised 84% (n = 63) of the biopsies and 14.7% cases (n = 11) were in the pediatric age group (1 to 15 years). This low prevalence of kidney biopsy in pediatric age group in our part, indirectly suggested either a higher age of onset of the renal diseases or strict criteria set for renal biopsy or a hesitancy and fear of doing biopsy in the pediatric patients. Similar observations were reported from Czech,[4] Serbia,[5] Italy,[6] France[7] and Romania.[8] However in Korea[9] and Japan,[10] the number of pediatric biopsy cases were quite high 40.5% and 20% respectively.

Table 4. Histological pattern.

Histological Pattern	Number	Percentage
Mesangioproliferative Glomerulonephritis	18	24.0%
Minimal Change Disease	16	21.3%
Membranous Nephropathy	11	14.7%
Lupus Nephritis	10	13.3%
Chronic Glomerulonephritis	7	9.3%
Chronic Interstitial Nephritis	7	9.3%
Membranoproliferative Glomerulonephritis	6	8.0%
IgA Nephropathy	5	6.7%
Diffuse Proliferative Glomerulonephritis	5	6.7%
Focal Segmental Glomerulosclerosis	4	5.3%
Cresentric Glomerulonephritis	3	4.0%

We observed a female predominance, which indirectly signifies that the females were at higher risk of kidney disease. This may be due to the high number of lupus nephritis cases 10 (13.3%) where all subjects were females or this might be because of inherent female factors, which needs further genetic study. Similar to our study, a female predominance was also documented in a study from Egypt.[11] However this finding was in contrast to most other studies from the European countries like in Serbia[5] and in Romania,[8] where an equal gender distribution was seen. Male gender predominance as seen in studies from Italian[6] and Czech.[4]

Sub Nephrotic range proteinuria was the most common indication for renal biopsy, seen in 40 (53.3%) of our cases which is a unique finding not been observed in previous studies. In contrast to our study, many other countries in Arabian region, like Jordan[12] and United Arab Emirates,[13] found Nephrotic Syndrome to be the major indication of renal biopsy seen in 51.6% and 54% respectively. Even outside the Arab world, there was dominance of nephrotic syndrome to be the first indication for the renal biopsy, as shown by studies from Serbia5 (36.92%), Romania8 (52.3%), Senegal[14] (67 %) and Brazil15 (42%).However, it is too early to comment on this issue, because of the small sample size of our study. Nephrotic Syndrome was present in 35 (46.7%) of the cases, being the second commonest indication for the renal biopsy.

Table 5. Complications and outcome.

Complication	Number	Percentage
Macroscopic hematuria	5	6.7%
Clinically significant perinephric hematoma causing pain	4	5.3%
Mortality	None	

The classical acute Nephritic Syndrome was seen in less number of cases accounting for 7 (9.3%) of cases, which is similar to an old Italian survey which also showed that nephritic syndrome accounted for only 4.02 % of the cases.[6] The reason behind this low prevalence of classical acute Nephritic Syndrome is unknown.

Eastern countries showed variable results in term of histological pattern in kidney biopsies. Studies from China[16, 17] and Korea[9] revealed that IgA nephropathy was the most common pathological abnormality, accounting for nearly 50.7% and 28% of the cases respectively. Similarly in Australia[18] and USA[19] also the most common diagnosis was IgA nephropathy, which accounted for 34% and 21% of the reported cases.

Most European studies also showed that the IgA Nephropathy was the most common pathological diagnosis, with a variable percentage; like 37% in Italy,[6] 34% in Czech,[4] 17% in Spain[20] and 15% in Lithuania.[21] IgA nephropathy was reported to be the commonest type of glomerulonephritis in several parts of the world, but it did not appear to be so in our study. In our study IgA nephropathy was seen only in [5] (6.7%) cases. This may be attributed to the trend of not subjecting the patients to kidney biopsy procedure unless there is significant disease activity.

A study from Nepal by Aryal Gopi et al.[22] showed MGN to be the most common form of GN (42.3%) followed by MPGN (21.9%), MCD (10.2%), FSGS (8.0%), IgA

nephropathy (2.9%), post infectious GN (2.2%), chronic GN (2.2%), tubulointerstitial nephritis (1.5%), lupus nephritis (1.5%), focal proliferative GN (1.5%), C1q nephropathy (1.5%), primary renal amyloidosis (1.5%) and other minor form of glomerular diseases (2.8%). The observation in study by Gopi et al.[22] And our study suggests that even within the country (Nepal), there is a great heterogeneity in histological pattern of biopsy proven kidney disease signifying regional variation of the renal disease.

In an African country (Senegal), where there is predominance of the black race, FSGS was the main diagnosis accounting for 67% of the primary glomerulonephritis.[14] Similarly, FSGS is the most common form GNs in Brazil,[23] India,[24] Bahrain,[25] Croatia,[26] and Sudan.[27] In contrast with these reports, the FSGS 4 (5.3%) is ninth on the list as a histological pattern in our study. The most common histopathological diagnosis in Romania[8] was MPGN (29%) and that in Serbia[5] was MGN (21.6%). These variations in prevalence can be attributed to ethnic and social discrepancies in various countries.

Mesangial proliferative glomerulonephritis was the commonest histopathological diagnosis observed in our study comprising of 18 (24%) of the cases which is an unique finding not been observed in previous studies, this may reflect indirectly the high prevalence of ongoing bacterial, viral, and parasitic infections associated with Mesangial proliferative glomerulonephritis, that could have affected the kidneys in our area.

MCD has a variable geographic distribution, being more common in Asia than in North America or Europe.[28] In Korea[29] and Thailand,[30] the MCD comprised 26.6% and 45.8% of total primary glomerular diseases respectively. Similarly in our study, MCD comprised about 16 (21.3%) of the total biopsies.

Studies from Italy[6] and Macedonia,[31] showed MGN to be the major cause of Nephrotic Syndrome accounting for 32.9% and 13.5% of the cases respectively.

Despite hypertension being the most frequent co-morbid condition, only one case in our study had histological evidence of hypertensive nephrosclerosis. Similar findings were supported by a group of studies done in several countries like Brazil,[15] Saudi Arabia,[32] Sudan[27] and Serbia.[5]

Only three(4%) cases with DM in our study, had undergone kidney biopsy and the indication for biopsy in them were nondiabetic kidney disease on top of DM. In histology also, no classical pathological features of diabetic nephropathy was found. One Diabetic subject had presented with Nephrotic Syndrome, others with Sub Nephrotic range Proteinuria and RPRF respectively. The corresponding histological pattern seen in them were MCD, Cresentric Glomerulonephritis and Idiopathic mesangioproliferative glomerulonephritis respectively.

Post biopsy procedure, we did not look for microscopic hematuria. So, its prevalence was not assessed. Excluding microscopic hematuria, the major complication observed with the biopsy procedure was macroscopic hematuria, seen in Five (6.7%) cases. Similarly clinically significant flank pain lasting more than 24 hours was seen in Four (5.3%) cases, for whom the Ultrasound imaging was done, which showed perinephric hematoma and all of them had associated clinical macroscopic hematuria. There was no mortality associated with biopsy procedure. The present study did not document the complications occurring after the discharge of the cases.

CONCLUSIONS

The most common indication of the kidney biopsies was Sub Nephrotic range Proteinuria followed by Nephrotic Syndrome. The rarest indication was malignant infiltration in one of the case. MesPGN was the most common histological diagnosis, representing about one quarter of the cases. In general, the present study has shown a heterogeneous pattern of renal disease within or abroad. The higher frequency of MesPGN seen in our study compared to other countries deserves further evaluation. So a larger and multicentric study is needed to draw the map of the renal diseases which are prevalent in Nepal and the information obtained from these results can be used as baseline data for making efficient policy in Nepalese population for preventing the kidney disease. Kidney biopsy is a safe procedure without any significant adverse events. Owing to the safety profile of the procedure, one should not hesitate to perform the procedure whenever indicated.

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