



## OUTCOMES AND COMPLICATIONS OF PERCUTANEOUS RENAL BIOPSY AT A TERTIARY CARE UNIT

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### ABSTRACT

**Background:** The indications for performing a renal biopsy vary among nephrologists, determined in part by the presenting signs and symptoms. Renal biopsy gives vital information which helps in estimating the disease prognosis, progression, and management. Percutaneous renal biopsies have good safety profile. **Objective:** To determine the outcomes and complications of renal biopsy done at Nephrology department of a tertiary care hospital. **Study Design:** A cross sectional, observational study. **Place and Duration of Study:** Nephrology department, Nishtar hospital Multan, from May 2017 to December 2017. **Methodology:** Patients were included in the study on the basis of non-probability consecutive sampling technique after taking informed consent. Prior to a percutaneous renal biopsy, a history, physical examination, Ultrasound and all baselines i.e. complete biochemical profile, complete blood count, renal parameters, complete urine analysis, viral markers, serology, platelet count, prothrombin time, partial thromboplastin time and bleeding time were done. All biopsies were conducted in the nephrology department under direct visualization of biopsy needle with ultrasonographic localization. All the biopsies were obtained by percutaneous automated biopsy gun. **Results:** Total 56 patients were selected in the study. Among 56 patients 39 were male and 17 were female. Male to female ratio is 2.2/1. The age of patients ranges from 15 to 55 years with mean age of 29.4±12.1 years. Results of biopsy proven renal diseases were as, 16 (28.5%) were having Membranous Nephropathy, 12 (21.42%) were diagnosed Focal Segmental Glomerulosclerosis (FSGS), 8 (14.2%) diagnosed as Membranoproliferative GN (MPGN), 3 (5.3%) patients with IgA nephropathy, 9% were having amyloidosis. Biopsy results of two patient remained inconclusive. Patient remained under observation for 24 hours and also called for follow up to see the pattern of complication that he developed. Gross hematuria was observed in 5/56 patients, microscopic hematuria initially was present in all patient but after 12 hours only 30 patients were having microscopic hematuria on urine analysis, fall in Hb in 2 patients, Hypertension in 10 patients, tachycardia in 26 patients and urinary retention in 4 patients. **Conclusion:** We concluded that the most common pathology was membranous nephropathy followed by focal segmental glomerulosclerosis, Membranoproliferative GN and Amyloidosis. Percutaneous kidney biopsy can be safely conducted as an outpatient procedure with an observation time of 12 hours post-biopsy to watch for any complications.

**KEYWORDS:** Hematuria, Renal biopsy, FSGS, MCD, Membranous nephropathy, complication, Outcome.

### INTRODUCTION

A percutaneous renal biopsy may be led for a number of reasons, including foundation of the exact diagnosis, as an aid to determine the nature of recommended therapy or to help choose when treatment is worthless.<sup>[1,2]</sup> The indications for performing a renal biopsy vary among nephrologists, determined in part by the presenting signs and symptoms. Renal biopsy is usually performed for proteinuria, hematuria, unexplained renal failure and staging of disease.<sup>[3,4]</sup>

Renal biopsy is the choice of establishing diagnosis for renal parenchymal diseases, particularly glomerulopathies. Its safety and significance has been assessed repeatedly. It has a key part in the analysis of glomerular, vascular, tubulointerstitial, and genetic diseases. It gives imperative data which helps in evaluating the disease prognosis, progression and management.<sup>[5]</sup>

It is known that different patterns of kidney diseases distribution are diagnosed all over the world. In Western Europe, Australia, New Zealand and some countries in

Asia, IgA nephropathy is the most common glomerulonephritis diagnosed by a renal biopsy.<sup>[6,7,8]</sup> Membranoproliferative glomerulonephritis (MPGN) has been reported to be lower in recent decades in Europe, and the frequency of FSGS has been suggested to be increasing in the United States.<sup>[9,10]</sup> IgA nephropathy is the most prevalent primary chronic glomerular disease worldwide.<sup>[11]</sup>

There are many post biopsy complications that can occur, most common of them is hematuria that may be gross and microscopic. Other complication that are observed are hypotension, fall in Hb, hypertension etc.<sup>[1,2]</sup>

This type studies also helps in studying the changing trends in the pattern of different renal disorders as well. These observation help the research/nephrologist to look for specific causes effecting these changing patterns in one specific geographic area. Unfortunately, there is no central renal biopsy registry in Pakistan.<sup>[12,13]</sup> Population based studies on the prevalence of renal disease in Pakistan are non-existent. Very few studies on biopsy proven renal diseases have been published from Pakistan and the neighboring countries<sup>14</sup>. The aim of the study is to report the frequency of different pathological lesions and their clinical manifestation in a single-center tertiary care unit.

## METHODOLOGY

It is a cross-sectional study carried out in nephrology department of a tertiary care unit, Nishtar hospital Multan. Duration of study was 8 months from May 2017 to December 2017. Total of 56 patients were included in the study on the basis of non-probability consecutive sampling technique. Prior to a percutaneous renal biopsy, a history, physical examination, and selected laboratory tests were performed. It is confirmed that the skin overlying at biopsy site is free of any infection, and the blood pressure is normal or well-controlled. Recommended laboratory tests include a complete biochemical profile, complete blood count, renal parameters, complete urine analysis, viral markers, serology, platelet count, prothrombin time, partial thromboplastin time and bleeding time were done. All the patients underwent ultrasonographic evaluation prior to conducting biopsy in the nephrology department. All biopsies were conducted in the nephrology department under direct visualization of biopsy needle with ultrasonographic localization. All the biopsies were obtained by percutaneous automated biopsy gun. Patients were put on strict bed rest for 6 hours and were monitored very closely for vital signs including pulse and blood pressure every 15 minutes for 1st hour, every 30 minutes for 2 hours, every hour for 2 hours, every 2 hours for 4 hours then every 4 hours till discharge. They were also observed for gross hematuria or development of pain. In addition Hemoglobin was monitored at 0, 6 and 14 hours post biopsy and patients were planned for discharge at 24 hours. Specimens of renal biopsies were preserved in 10% formalin for light microscopy and in

normal saline for immunofluorescence along with clinical history and particulars of the patients, sent to a very reliable laboratory for histopathological evaluation included light microscopy (LM) and immunofluorescence (IF). Ethical approval letter was taken from ethical review committee of the institution. The study data was analyzed by using SPSS software version 18.0.

## Inclusion Criteria

Patient who gave informed written consent were included.

Unexplained hematuria, proteinuria and renal failure.

## Exclusion Criteria

The cases with inadequate biopsy specimens.

Systemic diseases such as diabetes mellitus for 10 years or more and hypertension for 5 years or more etc.

Both shrunken kidneys.

Only one kidney.

Bleeding disorders.

Infection at the site of biopsy.

Hb less than 8mg/dl

## RESULTS

Total 56 patients were selected in the study after full-filling inclusion and exclusion criteria. Among 56 patients 39 were male and 17 were female. Male to female ratio is 2.2/1. The age of patients ranges from 15 to 55 years with mean age of  $29.4 \pm 12.1$  years. Results of biopsy proven renal diseases were as, 16 (28.5%) were having Membranous Nephropathy, 12 (21.42%) were diagnosed Focal Segmental Glomerulosclerosis (FSGS), 8 (14.2%) diagnosed as Membranoproliferative GN (MPGN), 3 (5.3%) patients with IgA nephropathy, 3 (5.3%) Acute tubulointerstitial nephritis, 5 (9%) were having amyloidosis, 2 patients were diagnosed lupus nephritis, 2 patients with vasculitis, and one patient was cortical necrosis in biopsy report. Biopsy results of two patient remained inconclusive. Patient remained under observation for 24 hours and also called for follow up to see the pattern of complication that he developed. 9% of total patients developed gross hematuria after biopsy that settled within 24 hours. 30 patients were found to have microscopic hematuria on urine analysis. 4 patients developed urinary retention for few hours after procedure and blood pressure of 10 patients remained high for some hours. Almost 26 patients developed tachycardia for some time.

**Table: Results of Biopsy among 56 patients at Nephrology department of a tertiary care unit.**

Disease	No. of patients	Percentage
Focal segmental glomerulosclerosis (FSGS)	12	21.42%
Membranous Nephropathy	16	28.5%
Minimal change disease	1	1.7%
IgA nephropathy	3	5.3%
Crescentic GN	1	1.7%
Membranoproliferative GN (MPGN)	8	14.2%
Amyloidosis	5	9%
Lupus nephritis	2	3.5%
Cortical necrosis	1	1.7%
Acute tubulointerstitial nephritis	3	5.3%
Vasculitis	2	3.5%
Inconclusive biopsy results	2	3.5%

**Table: complications observed in patients after Biopsy.**

Complication	No. of patients	%age
Gross hematuria	5	9%
Microscopic hematuria	30	53%
Hypertension	10	17.8%
Fall in Hb level	2	3.5%
Urinary retention	4	7.14%
Tachycardia	26	46.4%
Nephrectomy	0	0 %
Death	0	0 %

## DISCUSSION

An increase prevalence of acute and chronic renal failure worldwide warrants early detection of disease to prevent progression to kidney failure, improve quality of life and necessitating renal replacement therapy. Percutaneous renal biopsy remains an important diagnosing investigation for unexplained decline in renal function, proteinuria in nephrotic and non-nephrotic range, hematuria, unexplained renal failure, treatment plan and prognosis of disease.<sup>[15]</sup> There are many minor or major complication of renal biopsy observed in different studies. In our study we have seen that microscopic hematuria was present in almost all the cases and remained present in half of the total sample even after 12 hours of procedure Whereas gross hematuria was observed in 5 patients. Transient microscopic hematuria was seen in almost all the studies.<sup>[16]</sup> Hemoglobin drop of 1gm after biopsy has been observed in 50% of cases in different studies,<sup>[17]</sup> but in our study we observed decrease in Hb was occurred in only 2 patients. Studies have shown that discharging the patient 8 hours after biopsy may miss the 33% of complications.<sup>[18]</sup> Another

study reviewed biopsy complication in 1988 to 1994 reported a mortality rate of 0.02% implying that use of modern techniques like ultrasonography and CT guided has reduced the risk of mortality to almost zero.<sup>[19]</sup> Studies have shown that the risk of bleeding can be increased in a patient with anemia, chronic kidney disease and hypertension. Percutaneous kidney biopsy can be safely conducted with an in hospital observation of 24 hours to see for any post biopsy complication develops. This procedure has excellent safety profile if all the protocols of this procedure followed properly. Regarding the results of renal biopsy many studies has done in different era, population and region, a research done by Y Khan *et al.* from Peshawar reported that Minimal change disease (MCD) was the most common finding in the age group from 26-40 years, Amyloidosis and Membranous nephropathy were the most common diagnosis in patient above 40 years of age<sup>20</sup>. Similar results found in the study of N Anwar *et al.* with Membranous nephropathy (MN) most common followed by Focal segmental glomerulosclerosis (FSGS) and Amyloidosis.<sup>[21]</sup> These results are almost similar to our study. In our study we observed that membranous nephropathy was the most common finding followed by FSGS, Membranoproliferative glomerulonephritis (MPGN) and Amyloidosis. In a study FSGS 27, MCD 20.7% MN 18.6% while IgA is only 4.2%.<sup>[22]</sup> These results are very much different from our study. Overall primary glomerulonephritis were the most predominant renal disease in our study as well as in recent studies. In many studies conducted worldwide showed that IgA nephropathy is the most prevalent result found on renal biopsy. Tubulointerstitial disease were relatively common in our study this feature is same in other studies from Pakistan.<sup>[23]</sup> and India.<sup>[24]</sup> The most common etiology of tubular disease was drugs, especially NSAIDs and Hakeem medications. The average age in our study was 30 years which is similar to other researches done in Pakistan. In our study there is male predominance.

The main limitation in our study is that it is single center study with small sample size due to strict inclusion and exclusion criteria, despite of these limitations our study provides clue regarding clinical syndromes, demographics and pattern of kidney disease diagnosed by renal biopsy at a tertiary care unit in Multan, Pakistan. Developing a comprehensive national registry of renal biopsy findings would serve the dual purpose of being able to directly compare tissue diagnosis to noninvasive techniques and to clearly identify those at highest risk for progression of renal disease By revealing complication rates of percutaneous renal biopsy and identifying underlying renal disease in hospitalized patients while also providing an in-depth analysis of hospitalization outcomes.

## CONCLUSION

We analyzed the renal biopsy data of patients who presented to a tertiary care center in our region. The most

common pathologies were membranous nephropathy, focal segmental glomerulosclerosis, Membranoproliferative GN and Amyloidosis. Small sample size is an inherent limitation of our study, on the other hand, this is an initial step in the understanding of the epidemiology of renal diseases in our region. Our results are slightly different from other local and regional studies, most probably due to varying biopsy indications. There is a need to establish central renal biopsy registry to collect and analyze information on biopsy proven renal diseases in this part of the world.

#### CONFLICT OF INTEREST

This study has no conflict of interest to declare by any author.

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