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Overview of Percutaneous Renal Biopsy in Adults: Single-Centre Experience in Private Hospital

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ABSTRACT

Background: Percutaneous renal biopsy is an integral part of the clinical practice of nephrology. Percutaneous renal biopsy is an essential tool in diagnosing and managing kidney disease. This study's objective was to present our center's renal biopsy experience.
Methods: A retrospective single-center review study to review all percutaneous renal biopsies done at Mayapada Hospital Lebak Bulus between May 2023 and September 2024. The biopsy was done using continuous ultrasound guidance and a 16-gauge automatic biopsy needle. All biopsies were processed for light and immunofluorescence.
Results: 16 patients were aged 18 to above 64; 56% were male. Hematuria with proteinuria was the most common biopsy indication. The number of glomerulus found from histopathological examination was equal, with eight patients with glomerulus finding higher than ten glomerulus. Complications of kidney biopsy, such as hematoma, occurred in 3 patients. The most common clinical manifestation was nephrotic syndrome. At the time of biopsy, six patients with eGFR >90. From histopathological diagnosis, the most common diagnosis was Focal Segmental Glomerulosclerosis (FSGS).
Conclusions: Percutaneous renal biopsy using real-time ultrasound with a 16-gauge needle remains a successful and safe procedure.

Keywords: percutaneous renal biopsy, ultrasound, diagnosis

INTRODUCTION

Percutaneous renal biopsy (PRB) is an integral part of the clinical practice of nephrology. It is essential in the diagnosis of glomerular, vascular, and tubulointerstitial kidney diseases, providing invaluable information in prognosis and patient management. The use of real-time ultrasound and automated biopsy needles has simplified and improved the success and safety of this procedure. Percutaneous kidney biopsy has been used since the early 1950s and has become the gold standard for diagnosing kidney disease.[1] Several reports already exist about the PRB experience in each center.[2,3.4.5] In Indonesia, a report from a private hospital is not already publish. This study is to report our experience in percutaneous kidney biopsy. Percutaneous renal biopsy (PRB) is an important tool for practice nephrology.[6] Although the first description of a technique to perform PRB was published by Ball in the 1930s,[7] only in the 1950s that a more practical and efficient technique is clearly explained by Ibersen and Brun.[8] With the introduction of Franklin's modified Vim Silverman needle in 1954,[9] kidney tissue was obtained for correct histological diagnosis increased by 96-98%.[9,10] Currently, most hospitals perform PRB using automated real-time and percutaneous ultrasound devices.[11,12] This

technique has increased security and increased the number of procedures that can be performed. Apart from being initial diagnostic tools, real-time and automated ultrasound Percutaneous devices can also be used to assess the progression of kidney injury and response to medical treatment.[13,14]

MATERIALS & METHODS

This retrospective study was conducted among adult patients over 18 years old, with a clinical diagnosis of nephrotic or nephritic syndrome, patients with abnormal urine, chronic kidney disease, and acute kidney injury from May 2023 to September 2024, at Tahir Uro-Nephro Center, Mayapada Hospital South Jakarta. Data of all patients who underwent ultrasound guided PRB during the study period were collected and analyzed.

A renal biopsy was done from the lower pole of the left kidney by a nephrologist using a 16-gauge automated biopsy needle under ultrasound guidance.

Picture 1. Percutaneous biopsy of the kidney under ultrasound guidance.

The sonographic image of the right kidney shows the position of the biopsy needle (arrow) after firing. The entire intraparenchymal portion of the needle is located within the renal cortex, avoiding the renal medulla and more centrally located blood vessels.

All procedures were performed in the operation theater under aseptic measures and subcutaneous local anesthesia. After renal biopsy, all patients were kept in hospital for at least 24 hours with monitoring of vitals and gross hematuria. In case of complication, a follow-up ultrasound was done at 24 hours, for evidence of hematoma or perirenal collection.

RESULT

A total of 16 patients underwent PRBs during the study period. Of the 16 patients aged 18 to above 64, and 56% were male.

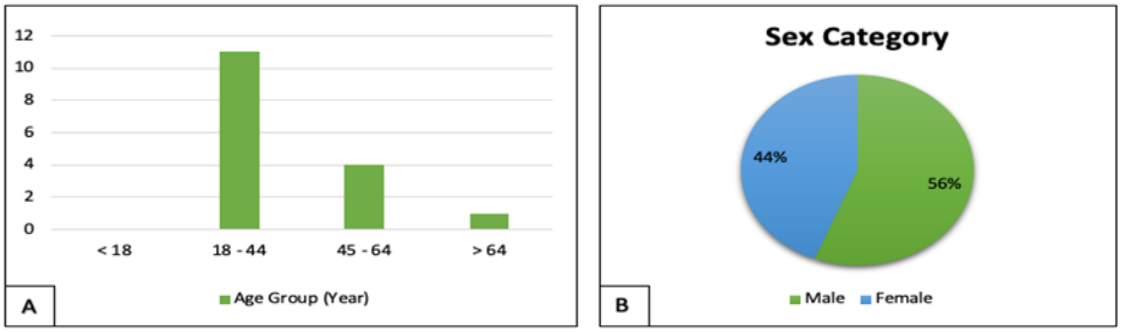

Figure 2: Demographic of biopsic patients. (A) Biopsy demographic according to age category. (B) Biopsy demographic according to sex category.

The most common indication for renal biopsy was hematuria and proteinuria findings (6 patients).

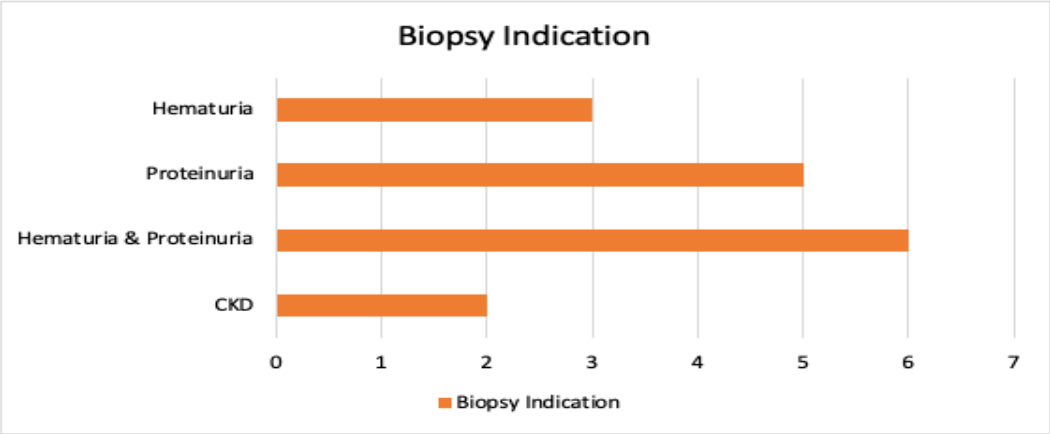

Figure 3: Biopsy indication. CKD: chronic kidney disease.

Adequate renal tissues were obtained in 8 patients with a number of glomerulus of more than ten.

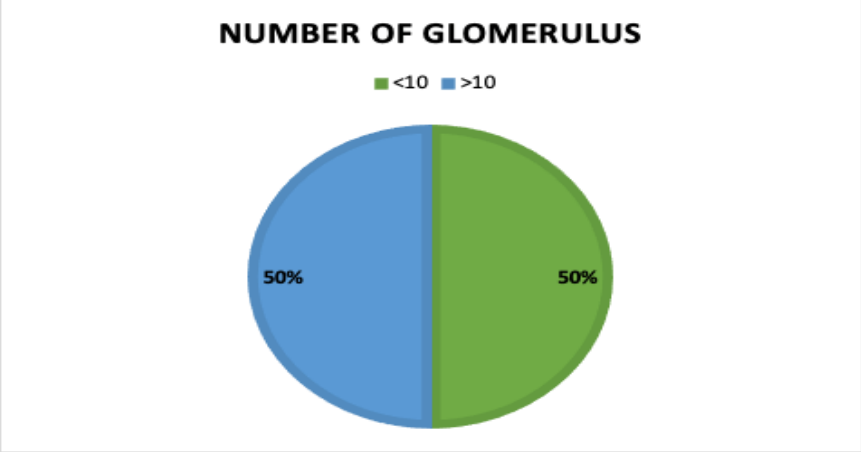

Figure 4. Number of glomerulus according to histopathology findings.

Hematoma is one of the complications that can occur post kidney biopsy. From Table 1, it can be seen that there were 3 patients affected by hematoma.

Table 1. Complications of kidney biopsy

Hematoma	**N**
Yes	3
No	13
Total	**16**

Table 2 shows the clinical diagnosis at the time of biopsy. Nephrotic syndrome was the most prevalent presentation, followed by Lupus nephritis (3 patients).

Table 2. Clinical diagnose at time of biopsy

Clinical diagnose at time of biopsy	**N**
Lupus nephritic	3
RPGN	2
Nephrotic syndrome	5

Chronic GN	2
CKD	2
Infection-related GN	1
Presumed IgA nephropathy	1
Total	16

RPGN: Rapid Glomerulonephritis, CKD: Chronic Kidney Disease

Table 3 summarizes the most prevalent histopathological diagnose of kidney biopsy was Focal Segmental Glomerulosclerosis (FSGS).

Table 3. Histopathological diagnosis of kidney biopsy

Histopathological Diagnosis	N
Amilodosis	1
FSGS	5
Lupus Nephritis	4
IgA nephropathy	2
Thin membrane disease	1
Thrombotic microangiopathy	1
Minimal change disease	1
C3 glomerulopathy	1
Total	16

Of 16 patients, six patients had normal kidney function at the time of biopsy. When categorized into kidney function by estimated glomerular filtration function (eGFR), most had below 90mls/min/m2.

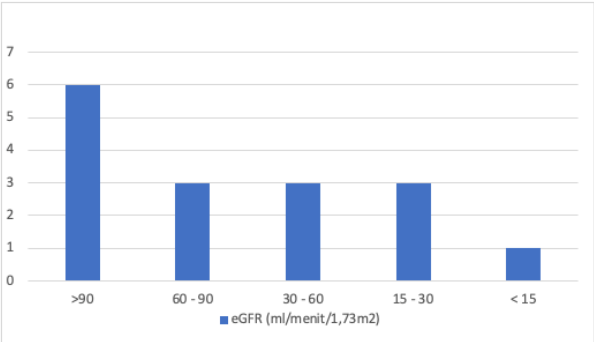

Figure 5. Estimated Glomerular Filtration Rate (eGFR) at time of renal biopsy.

DISCUSSION

A renal biopsy is indicated when knowledge of the histological diagnosis is essential for appropriate therapy. The biopsy findings should always be viewed and interpreted in the context of clinical and historical data. In addition to histological diagnosis, a renal biopsy also allows the prognosis of underlying renal disease to be assessed.

Classic indications for biopsy of the patient's own kidney include new-onset nephrotic syndrome in adults, evidence of proteinuria greater than 1–2 g/24 h with or without hypertension, and impaired renal function of unknown cause, especially when an active urine sediment indicates possible crescentic glomerulonephritis. In our patients, we do the biopsy based on urinary findings, with the most common indication for renal biopsy was hematuria and proteinuria findings (6 patients).

With a kidney biopsy, the intention is to obtain an adequate amount of cortex for diagnostic purposes without damaging the kidney. Using needle core biopsies helps ensure minimal damage and allows for a less

invasive percutaneous approach. The biopsy was done using continuous ultrasound guidance and a 16-gauge automatic biopsy needle. The number of glomeruli is often used to determine the adequacy of a kidney biopsy (eg, at least ten glomeruli). From our study we found adequate renal tissues were obtained in 8 patients with a number of glomerulus of more than ten.

The use of ultrasound guidance and automated biopsy gun provide a low risk of complications such as pain, bleeding, or a small hematoma. Major complications, including the need for nephrectomy or death, are extremely rare.(6) In our study, only three patients had hematoma complications.

CONCLUSION

Percutaneous renal biopsy using real-time ultrasound with a 16-gauge needle remains a successful and safe procedure.

Declaration by Authors

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Conflict of Interest: The authors declare no conflict of interest.

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