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ORIGINAL ARTICLE

EFFICACY AND SAFETY OF ULTRASONOGRAPHY IN PERCUTANEOUS RENAL BIOPSY

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ABSTRACT: INTRODUCTION: Renal biopsy is a essential tool in diagnosing various renal disases and providing prognostic importance of these disease. Percutaneous ultrasound (US) guided renal biopsy is considered as a gold standard in the evaluation of renal disease. The use of real-time US technique with automated biopsy device has improved chances of obtaining adequate tissue for diagnosis and also has reduced the chances of post procedure complications. We studied 74 patients having renal parenchymal disease, who underwent US guided renal biopsy at our institute. **AIMS & OBJECTIVES:** To study the efficacy and safety of ultrasonography in renal biopsy. **MATERIALS AND METHOD:** We performed US guided renal biopsy of 74 patients from period July 2013 to May 2014 in assistance with nephrologist from our institute. Indications for biopsy included hematuria, unexplained proteinuria, nephrotic syndrome, glomerulonephritis, acute renal failure, renal manifestations of systemic diseases and chronic renal failure. Curved transducer of frequency 3-5HZ was used. A 16 gauge automated biopsy needle and 11XE HD PHILLIPS ultrasonography machine was used. Real time ultrasound guidance was used as it provided continuous imaging during the biopsy. Entire procedure was performed within 10min.Diagnostically sufficient tissues were obtained and sent for analysis. **RESULTS:** We studied the efficacy of real time USG as a guidance method in performing percutaneous renal biopsy in 74 patients with diffuse nephropathies. Final histological diagnosis was obtained in 68 patients.There were four procedures with inadequate or insufficient histological material to establish a diagnosis, and two procedures were considered unsuccessful because no renal tissue was obtained. **CONCLUSION:** Real-time sonographic guided percutaneous renal biopsy with an automated 16-gauge core biopsy system is a very safe and accurate method in the hands of trained and experienced personnel.

KEYWORDS: USG, Renal biopsy, glomeruli.

INTRODUCTION: Renal biopsy is an essential tool in diagnosing various renal diseases and providing prognostic importance of these disease.[1] As it is an invasive procedure, the chances of potential complications are always present. But,Ultrasound guidance has made renal biopsy much easier and safer. Percutaneous ultrasound (US) guided renal biopsy is considered as a gold standard in the evaluation of renal disease.[2] The use of real-time US technique with the automated biopsy device has improved chances of obtaining adequate tissue for diagnosis and also has reduced the chances of post procedure complications. Percutaneous US guided puncture of the lower pole of kidney with prone position of the patient is the standard approach. Prone position brings the kidney more close to posterior abdominal wall, so it is considered the most rational approach.[3] We studied 74 patients having renal parenchymal disease, who undergone US guided renal biopsy at our institute.

AIMS & OBJECTIVES: To study the efficacy and safety of ultrasonography in renal biopsy.

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INCLUSION CRITERIA: All the cases of renal parenchymal disease who underwent renal biopsy at our institute during the study period. Exclusion criteria: Patients with uncontrolled bleeding diathesis, uncooperative patients and pregnancy.

MATERIALS AND METHOD: We performed US guided renal biopsy of 74 patients from the period July 2013 to September 2014 in assistance with a nephrologist from our institute. Indications for biopsy included hematuria, unexplained proteinuria, nephrotic syndrome, glomerulonephritis, acute renal failure, renal manifestations of systemic diseases and chronic renal failure. Pre-biopsy laboratory evaluation included a complete biochemical profile, complete blood count and urine analysis. Baseline coagulation parameters including platelet count, prothrombin time, partial thromboplastin time and fibrinogen were documented before the biopsy procedure. Informed and written consent of the patients were taken.

The patients were placed in prone position with pillow kept below the abdomen. Both kidneys were scanned ultrasonically. Curved transducer of frequency 3-5HZ was used. Unless there was clinical indication for one specific kidney, we chose left kidney for biopsy as lower pole of left kidney descends below the last rib. Lower pole of kidney was visualized with ultrasound laterally in posterior or mid axillary line. USG probe was then centered over the lower pole and rotated from sagittal to transverse plane so that the central ray of images pass through the site of the biopsy. The center point of probe surface is marked on the skin. The preparation of the skin surface is done with proper draping. The entire path was then anesthetized with 10ml of 2% lignocaine.

A small incision was then made with a scalpel blade to facilitate the passage of the biopsy needle. A 16 gauge automated biopsy needle was then guided to the capsule to the lower pole of the kidney using 11XE HD PHILLIPS ultrasonography machine and fired into the renal parenchyma.(Figure 1A and 1B) Real time ultrasound guidance was used as it provided continuous imaging during the biopsy. The entire procedure was performed within 10min. Diagnostically sufficient tissues were obtained and sent for analysis. (Figure 2)

RESULTS: We studied the efficacy of real time USG as a guidance method in performing a percutaneous renal biopsy in 74 patients with diffuse nephropathies. The renal tissue obtained from the biopsy was sufficient for light microscopy in 67 patients. Sufficient renal tissue for electron microscopy was obtained in 64 patients and for fluorescence microscopy in 65 patients. The final histological diagnosis was obtained in 68 patients. (Figure 3) Of these, 60biopsies had more than 10 glomeruli (79%), 11 biopsies had 6 to 10 glomeruli (16%), and 3 biopsies had 1 to 5 glomeruli (5%).

There were four procedures with inadequate or insufficient histological material to establish a diagnosis, and two procedures were considered unsuccessful because no renal tissue was obtained. Perinephric collection was the most common post procedure complication seen in 10 patients, which resolved within 7 days. No major complication was found.

Sr. No.	Microscopic Technique	Sufficient tissue sample	Insufficient tissue sample
1	Electron microscopy (EM)	64	10
2	Light microscopy (LM)	67	07
3	Immunofluroscence (IM)	65	09

Table 1

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DISCUSSION: Ultrasound guided percutaneous renal biopsy is now considered as the gold standard method to obtain renal tissue for the diagnosis of renal diseases. It has many advantages over other techniques as it allows continuous visualization of both kidney and needle and can be done regardless of the renal function. It also avoids exposure to radiation, permits procedure to be performed at bedside and avoids the administration of nephrotoxic contrast media.[4]

Maya and colleagues (Maya et al., 2007) showed that real-time ultrasound-guided technique provided a superior yield of kidney tissue and resulted in fewer bleeding complications. The retrospective study of 129 patients showed a higher mean number of glomeruli per biopsy in the sonographic-guided group compared to the blind biopsy group (18 ± 9 versus11 ± 9), and fewer large hematomas requiring intervention (0% versus 11%).[5]

Munoz et al 2011 analyzed 623 US guided biopsies, there were 608 biopsies (97.5%) with an adequate sample (representative) to establish the histopathological diagnosis. Of these, 468 biopsies had more than10 glomeruli (76.9%), 110 biopsies had 6 to10 glomeruli (18.1%), and 30 biopsies had 1 to5 glomeruli (5%). There were five procedures with inadequate or insufficient histological material to establish a diagnosis, and ten procedures were considered unsuccessful because no renal tissue was obtained.[6]

In our study, there were 68 biopsies (94%) with an adequate sample to establish the histopathological diagnosis. Of these, 60 biopsies had more than 10 glomeruli (79%), 10 biopsies had 6 to 10 glomeruli (16 %), and 4 biopsies had 1-5 glomeruli (5%). There were four procedures with inadequate or insufficient histological material to establish a diagnosis, and two procedures were considered unsuccessful because no renal tissue was obtained.

Olaf Hergesell and colleagues analyzed the safety of US guided percutaneous biopsy in 1090 patients. Sufficient tissue for reliable histopathological diagnosis was obtained in almost all cases (1077/1090=98.8%). The median number of glomeruli per biopsy sample was 9 (range 1–37).[7]

Anuj Mishra, Rajab Tarsin, Basma El Habbash et al. In 2006 studied the safety and efficacy of real-time ultrasound guided percutaneous renal biopsy (PRB) in total, of 86 patients using an automated biopsy gun with a 16 - gauge needle. The radiologist's estimate of the number of core samples needed was found to be matching in 93% of cases with histopathologist's determination of sample adequacy. A mean of 17.5 glomeruli were present in each specimen. A glomerular yield of less than five glomeruli was seen in four biopsies. The overall complication rate was 5.8% and these complications were observed within 6 hours of the biopsy.[8]

The overall complication rate in our study was 13.5% and Perinephric collection was the most common post procedure complication in these patients, which resolved within 7 days. No major complication was found.

CONCLUSION: Real-time sonographic guided percutaneous renal biopsy with an automated 16-gauge core biopsy system is a very safe and accurate method in the hands of trained and experienced personnel. Observation of patients for a period of six hours post-biopsy seems to be optimal.

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Figure 1A: Image showing procedure of renal biopsy.
Figure 1B :Real time Ultrasonographic image of Renal Biopsy.

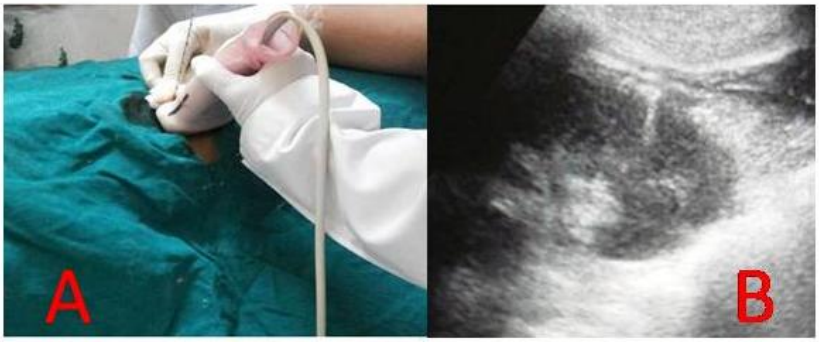

Figure 2: Tissue sample specimen of renal biopsy

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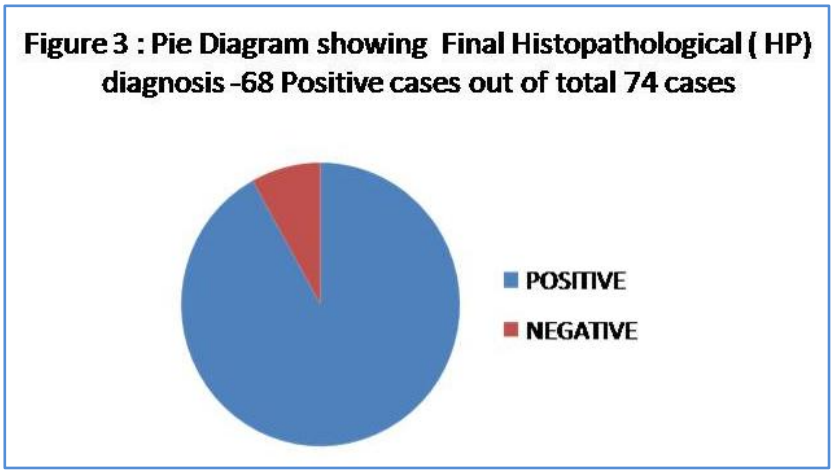

Figure 3 : Pie Diagram showing Final Histopathological (HP) diagnosis -68 Positive cases out of total 74 cases

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