Mashhad University of Medical Sciences (MUMS)

Reviews in Clinical Medicine

Clinical Research Development Center Ghaem Hospital

# Renal biopsy in glomerulonephritis

Masoud Pezeshki Rad (MD)[1], Mina Taghavi (MD)[1*], Jahanbakhsh Hashemi (MD)[1], Farzaneh Sharifipour (MD)[2], Abbasali Zeraati (MD)[2]

[1]*Department of Radiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran*
[2]*Department of Nephrology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran*

**ARTICLE INFO**

**Article type**
Review article

**Article history**
Received: 25 Dec 2013
Revised: 7 Jan 2014
Accepted: 9 Jan 2014

**Keywords**
Children
Epilepsy
Seizure

**ABSTRACT**

Glomerulonephritis (GN) is responsible for 25-30% of end-stage renal disease (ESRD) among all causes. Renal biopsy is important to determine the GN treatment method and its prognosis. In some cases, renal biopsy is required for definitive diagnosis. Biopsies were used as a diagnostic method in different disease from 1930. They were performed blindly and at bedside. Complication rate varies from 2 to 20% in different reports. Percutaneous renal biopsy is a routine diagnostic procedure in nephrology nowadays, and it should be individualized for each patient depending on their age, BMI, coagulation status and the availability of skilled radiologist. In this paper, we review image-guided renal biopsy in glomerulonephritis.

Please cite this paper as:
Pezeshki Rad M, Taghavi M, Hashemi J, Sharifipour F, Zeraati A. Renal biopsy in glomerulonephritis. Rev Clin Med. 2014;1(2):71-74.

## Introduction

Glomerulonephritis (GN) is one of the major clinical disorders in nephrology patients, which imposes high cost and growing concern for healthcare systems. Immune complex formation and its glomerular deposition lead to GN, which causes kidney enlargement in some cases and glomerular swelling. Percutaneous needle biopsy is an important procedure in diagnosis and assessment of the severity of kidney diseases. For complete evaluation of patients with Glomerulonephritis, clinical, laboratory and histopathological examination of kidney tissue are necessary. Histopathological assessment of kidney tissue plays a fundamental role in confirming the exact diagnosis, assessing and grading or staging the severity of

***Corresponding author:** Mina Taghavi.
*Department of Radiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran*
***E-mail:** mina_t82@yahoo.com*
***Tel:** 051-38022534*

glomerular involvement. GN is responsible for 25-30% of end-stage renal disease (ESRD) among all causes (1). Renal biopsy is important to determine GN treatment method and its prognosis. In some cases, renal biopsy is required for definitive diagnosis. Best candidates for renal biopsy are those with positive family history of renal disease, atypical manifestations such as nephritic syndrome, massive proteinuria and rapid creatinine raise. Histological assessment might indicate focal, diffuse or mesangial proliferative GN or endocapillary proliferative changes (1).

## *Biopsy*

Various biopsies were used as a diagnostic method from 1930, which was performed blindly by physicians at bedside. At this time, the location of target organ (for example liver) was determined by physical examination. Needle entrance site was usually specified by palpation. Topical anesthetics were not used in all cases, because biopsies were performed quickly in one second during breath holding period. Complications were common after such kind of biopsies and complete blood count (CBC), platelet and coagulation status assessments were not checked routinely at that time (1,2).

The usefulness of guided biopsies was shown by Alf Lundquist in 1970. At that time, B-mode ultrasound (US) was performed before biopsy to determine the exact location of selected organ and to mark biopsy site on body surface. This biopsy method was also blind, but its performance and accuracy were higher than old biopsy methods. Due to lack of technology and image quality in 1970s, only large lesions could be selected for biopsy. In past time, biopsies were performed by two people, one for needle work and another for vacuuming. Lundquist promoted biopsy method by introducing guided procedures and application of the very latest biopsy needle at that time. Not only this procedure was safer but also needed just one person for suctioning during biopsy.

Although it appears that percutaneous guided biopsy method might be more expensive than blind method, considering alternative costs such as hospitalization, fixing blind biopsy complications and needed surgery in some cases, showed that guided biopsy had cost beneficence. It seems necessary to mention that guided procedure expenses depend on guiding equipment, for example, ultrasound is much cheaper than MRI (3).

Improving image quality and new adventures in imaging techniques like computer tomography (CT) scan introduced a new chance for guided procedures and promoted diagnosis and treatment of diseases. Introduction of new biopsy needles and methods such as core needle biopsy and fine needle biopsy (FNA) improved histopathological diagnosis of various disorders (2).

## *Renal biopsy*

Iversen and Brun performed the first percutaneous renal biopsy in 1951. Kark and Muehrcke introduced their technique in Chicago in 1954. Renal biopsy is a diagnostic procedure, which is performed for various goals in different patients. Nowadays, renal biopsy is a valuable assessment, which has an important role in nephrology and pathology researches particularly in Glomerulonephritis (4).

Kidney image guided procedures was performed in percutaneous aspiration and drainage of cysts for decades. Guiding method was fluoroscopy at first step, which then changed to ultrasound (US) and CT scan. By improving CT scan and US imaging quality, definite differentiation between

renal simple cyst and solid mass became possible which eliminated the need for biopsy. Guided investigations for hydronephrosis and abscesses are available in hospitals all around the world nowadays (5).

### *Technique for kidney biopsy*

In the first stage, obtaining an informed consent from patient is essential. Taking a careful history of pervious hemorrhagic disorders is necessary. Radiographies should be reviewed closely. Patients` medications should be considered before procedure. CBC and coagulation status should be evaluated before biopsy as well. After renal parenchymal biopsy, patients should be admitted at least one night. Reviewing past radiographs could provide a better concept to choose the appropriate biopsy approach for each patient. Determining the exact location of target organ is crucial to select the proper patient`s position and needle direction. It is also a time-saving method, which plays an important role in reduction of complication rate. The best radiologic modalities in obtaining a good view for guided biopsy are CT scan, MRI and US (1). Check of vital signs and pulse oximetry should be performed during biopsy procedure. Sedative drugs and analgesics are administered as required (1,5).

### *Biopsy adequacy*

Various studies proposed that renal biopsy is the gold standard in kidney diseases, but it has its disadvantages such as complications and inadequate sample. Incidence of complications varies from 2 to 20% in different reports (7,12).

Antonopoulos showed that in transplanted kidney, US-guided biopsy and blind biopsy methods did not differ in regard to providing adequate sample (3).

Gallego revealed that renal biopsies were the most reliable diagnostic method in kidney parenchymal disorders (8). Nass confirmed that bedside biopsy could be performed adequately and safely in all patients with normal coagulation tests and platelet number (9). Farrell resulted that US-guided biopsy with an automated needle was safer and more satisfying for both patients and operators. Skilled operators could provide adequate sample from kidney tissue in most of the cases (10).

Horvatić showed that ultrasound is a reliable method in localizing target organ (kidney) for percutaneous procedures in addition to providing a cost benefit approach to assess biopsy complications such as perirenal hematoma (11).

Maya concluded that US-guided renal biopsy was safer and more effective compared to blind biopsy and could decrease the number of patients who needed hospitalization after procedure (6). Sinha confirmed that real-time ultrasound-guided renal biopsy was safe and accurate in children who needed post-biopsy close observation between 6 and 24 hours (12).

## Conclusion

Percutaneous renal biopsy is a routine diagnostic procedure in nephrology patients, and it should be individualized for each patient, depending on their age, body mass index (BMI), coagulation status and availability of skilled radiologist.

## Acknowledgement

We would like to thank Clinical Research Development Center of Ghaem Hospital for their assistant in this manuscript. This study was supported by a grant from the Vice Chancellor for Research of the Mashhad University of Medical Sciences for the research project as a medical student thesis.

## Conflict of Interest

The authors declare no conflict of interest.

## References


1. Haaga J, Haaga T, Wu H. CT and MR imaging of whole body. 5th ed. Philadelphia: Mosby; 2005.
2. Kasper DL, Braunwald E, Fauci AS, et al. Harrison's Principles of Internal Medicine. 18th ed. New York: McGraw-Hill; 2011.
3. Antonopoulos IM, Nahas WC, Mazzucchi E, et al. Comparison of palpation-guided and ultrasound-guided biopsies in transplanted kidneys. Clin Transplant. 2001;15:393-396.
4. Atapour A, Taheri D, Shahidi S, et al. Evaluating the Adequacy of Adults Renal Biopsy Specimens Conducted by Different Methods. Journal of Isfahan Medical School. 2011;28:1879-1886.
5. William L, Whittier S. Indications for and complications of renal biopsy. 2013. uptodate. Available at: http://www.uptodate.com/contents/indications-for-and-complications-of-renal-biopsy. Accessed Dec 31, 2013.
6. Maya ID, Allon M. Percutaneous renal biopsy: comparison of blind and real-time ultrasound-guided technique. Semin Dial. 2007;20:355-358.
7. Nyman RS, Cappelen-Smith J, Alfurayh O, et al. Yield and complications in percutaneous renal biopsy. a comparison between ultrasound-guided gun-biopsy and manual techniques in native and transplant kidneys. Acta Radiol. 1997;38:431-346.
8. de la Morena GJ, Llorente AC. Renal mass biopsy: results and safety in 2009. Actas Urol Esp. 2009;33:499-504.
9. Nass K, O'Neill WC. Bedside renal biopsy: ultrasound guidance by the nephrologist. Am J Kidney Dis. 1999;34:955-959.
10. Farrell RJ, Smiddy PF, Pilkington RM, et al. Guided versus blind liver biopsy for chronic hepatitis C: clinical benefits and costs. J Hepatol. 1999;30:580-587.
11. Horvatić I, Hrkać A, Zivko M, et al. Value of ultrasound-guided percutaneous renal biopsy in diagnosis of the renal diseases. Acta Med Croatica. 2007;61:399-403.
12. Sinha MD, Lewis MA, Bradbury MG, et al. Percutaneous real-time ultrasound-guided renal biopsy by automated biopsy gun in children: safety and complications. J Nephrol. 2006;19:41-44.