Original Article www.pjkd.com.pk

Frequency of Complications Related to Real Time Ultrasound Guided Renal Biopsy in A Tertiary Care Hospital.

[1]Ghulam Abbas Qadri, [2]Muhammad Mohsin Riaz, [2]Omer Sabir, [2]Mubashar Dilawar, [2]Hafiz Usman Said.

[1]Department of Medicine
Division of Nephrology
Chandka Medical College,
Larkana, Pakistan

[2]Department of Medicine
Division of Nephrology
Fatima Memorial Hospital
Lahore, Pakistan

Abstract:

Introduction: Renal biopsy has a pivotal role in establishing diagnosis, aiding in therapeutic decisions and prognostic assessment in diseases affecting native kidneys or transplants. Renal biopsies are being performed for more than a century and considered the gold standard. Although renal biopsy is considered to be a safe procedure still it includes risk for potential complications such as pain, hematuria and hematoma. Proper patient preparation and evaluation is mandatory to avoid post biopsy complications. Back up of interventional radiology and surgery is important to deal with any complications related to renal biopsy. We conducted a study in consecutive kidney biopsy patients to observe the frequency of complications associated with the procedure.

Methods: patients undergoing renal biopsy were evaluated for baseline characteristics and after informed consent underwent renal biopsy. All patients were observed for 24 hours for any complications and a repeat ultrasound and hemoglobin were done before discharge. It was a descriptive case series.

Results: In our study, out of 340 cases, mean age was 50.55±9.29 years, 48.82%(n=166) were male. The frequency of complications in renal biopsy was recorded as 11.47%(n=39) had pain, 3.23%(n=11) had hematuria while 7.94%(n=27) had hematoma.

Conclusion: Kidney Biopsy is safe and in our study pain and hematoma were found to be the most frequent complications of renal biopsy similar to the international data.

Key words: *Renal biopsy, complications, pain, hematoma, hematuria.*

Corresponding Author

Dr Ghulam Abbas Qadri
FCPS Nephrology
Departement of Nephrology
Chandka Medical College
Larkana, Pakistan
Email: abbasqadri33@yahoo.com

Received: February 29, 2020. Accepted April 12, 2020. PJKD 2020;4(2):245-248

Introduction:

Renal biopsy although an invasive procedure to get the tissue specimen of the kidney. It remains the gold standard to establish a histopathological diagnosis in kidney disease. In most of the cases it establishes the diagnosis, stage the disease and provides information about the potential therapeutic modalities that can be employed.[1]

Real time ultrasound guided renal biopsy is done using biopsy needle under ultrasound guidance.[2-4] Renal biopsy is considered to be a safe and diagnostically useful procedure, however, complications are uncommonly seen. Common complications are pain 4% to 18.2%,hematuria 1.2% to 5.8% and hematoma formation 3.9% to 13.9%.[2,5-8] According to international data the most common complications include pneumothorax, hemothorax, calyceal-peritoneal fistula, page kidney and even death.[5] In local studies reported in the literature, renal biopsy is a safe procedure with low rates of complications.[6-11]

Renal biopsy is a high yield procedure and has impact upon subsequent management. This study is designed to find the frequency of different complications encountered while performing renal biopsies.

Methods:

The study was conducted at Nephrology department of over a period of one year. It was a descriptive case series in which all the patients undergoing the renal biopsy procedure were included after getting proper consent. Renal biopsies were performed for the diagnostic or prognostic purposes i.e. proteinuria, microscopic hematuria (> 3 red blood cells in urine sediment) associated with proteinuria (protein to creatinine ration > 0.3), unexplained rise in creatinine.

The patients with relative or absolute contraindications to renal biopsy were excluded from the procedure and hence not included in the study. These included low platelet counts (< 150,000), deranged coagulation profile (INR > 1.5; APTT 5 seconds above the upper normal limits), uncontrolled hypertension (Systolic BP > 140 mmHg), active urinary tract infection (> 5 puss cells in urine sediment).

Renal biopsy was performed by a consultant with a minimum of three years post graduate experience. A trucut semiautomatic biopsy gun (Dr.J, Tokyo, Japan) was used to perform the procedure. The patient lied prone and after administration of local anesthesia up to two cores of biopsy were obtained using real time ultrasonographic guidance. Post biopsy the patient was kept under observation for 24 hours. Patients were advised strict bed rest for 12 hours post renal biopsy. Urine samples were collected in separate containers each time the patient passed urine post renal biopsy for a period of 24 hours to monitor for presence of gross hematuria.

The major anticipated complications were pain, gross hematuria and perinephric hematoma. The pain was graded on a visual scale from 0 – 10. The gross hematuria was labeled if patient had visible red tinged urine after renal biopsy and peri nephric hematoma was ruled out using ultrasonography 8-10 hours post renal biopsy and measured in centimeters (cm) if present. The ultrasound was performed by the consultant radiologist. Complete blood count to monitor hemoglobin (Hb) levels were also performed 6 hours post renal biopsy.

Statistical analysis: The data was entered and analyzed in SPSS version 20.0. Mean $\pm$ standard deviation was calculated for quantitative variable like age. Frequency and percentages were calculated for qualitative variables like sex, pain, hematuria and hematoma. Stratification of data for age and gender, reason for biopsy was done to control the effect modifiers. Chi-square test was used to see any significant difference between the stratified groups taking p value ≤ 0.05 as significant.

Results:

A total of 340 cases fulfilling inclusion criteria were enrolled. Age distribution is shown in Table 1, majority of patients were biopsied between the age of 51-65 years 56.18% (n=191). Patients were equally distributed according to gender, Table 2.

Frequency of complications post renal biopsy are presented in Table 3, pain and hematoma being commonest. None of the patients had infection post renal biopsy.

Table 1: Age distribution among 340 patients with native kidney biopsy.

Age (in years)	N (%)
18-50	149 (43.82)
51-65	191 (56.18)
Total	**340 (100)**
Mean ±SD	**50.55± 9.29**

Table 2: Gender distribution among 340 kidney biopsy patients.

Gender	No. of patients	%
Male	166	48.82
Female	174	51.18
Total	**340**	**100**

Stratification of data for age and gender, reason for biopsy (nephrotic syndrome only compared to patients with raised serum creatinine with or without having nephrotic syndrome) was done to control the effect modifiers. Chi-square test revealed no significant difference between the stratified groups taking p value ≤ 0.05 as significant. (Table 4-6). Impaired kidney function with or without nephrotic syndrome although not significantly different from the nephrotic syndrome group with normal serum creatinine, in terms of complications, had a trend towards more likelihood of hematoma formation (p=0.07)

Table 3: Frequency of complications in renal biopsy among 340 native kidney biopsy patients.

Complications	N (%)
Pain	39 (11.47)
Hematuria	11 (3.23)
Hematoma	27 (7.94)

Discussion

Main findings of our large series of native kidney biopsy with a follow up ultrasound most frequent complication post biopsy was pain and hematoma that did not require any intervention and resolved itself.

For a variety of renal diseases, renal biopsy has central role in establishing diagnosis, aiding in therapeutic decisions, prognostic assessment and therapy guidance in diseases affecting native kidneys or transplants, as it is considered the gold standard.[1] Along with back up of interventional radiology and surgery, patient preparation and evaluation are mandatory for renal biopsy.[5] Although renal biopsies are being performed for more than a century, it also includes potential complications such pain, hematuria and hematoma.[7]

Table 4: Chi square test for significance of age on complications among 340 native kidney biopsy patients.

Complications in renal biopsy		Age (in years) 18-50	Age (in years) 51-65	P value
Pain	Yes	17	22	1.09
	No	132	169	
Hematuria	Yes	4	7	0.61
	No	145	184	
Hematoma	Yes	9	18	0.25
	No	140	173	

Our results are comparable with complications reported in the literature locally and internationally, where common complications are pain 4% to 18.2%, hematuria 1.2% to 12% and hematoma formation 3.9% to 13.9%.[2,6-11,12-14,16] Recent study by Yaqub et.al. of a cohort of over 400 patients however had a complication rate of 14.2%.[15]

Table 5: Chi square test for significance of age on complications among 340 native kidney biopsy patients.

Complications of Native Kidney Biopsy		Gender		P value
		Male	Female	
Pain	Yes	19	20	0.96
	No	147	154	
Hematuria	Yes	5	6	0.82
	No	161	168	
Hematoma	Yes	11	16	0.38
	No	155	158	

Table No. 6: Chi square test for significance of increased serum creatinine upon complications at the time of native kidney biopsy among 340 patients.

Complications in renal biopsy	Reason for biopsy			P value
	Nephrotic syndrome		*Impaired Kidney Function	
Pain	Yes	18	21	0.14
	No	103	198	
Hematuria	Yes	6	5	0.18
	No	115	214	
Hematoma	Yes	16	11	0.07
	No	105	208	

*with or without nephrotic syndrome.

It must be recognized that renal biopsy is a safe procedure and serious complications are infrequent though morbidity associated, the potential for a serious complication after renal biopsy is significant. Although clinically significant perinephric hematomas occur in fewer of biopsies, perinephric hematomas have been demonstrated at 24 to 72 h after biopsy in >90% of cases evaluated prospectively.[1, 16] The majority of hematomas are asymptomatic and small in size, but in up to 50% of biopsies, they are moderate to large in size.[17, 18] As a result, the present practice of 24-h bed rest and observation after biopsy may be therapeutically important and contribute to the low incidence of clinically significant hematomas. Unfortunately, there are no reliable measures that can predict which patients will go on to have a clinically significant hematoma as radiographic evaluation immediately after biopsy detects <15% of hematomas.[19] In our protocol we performed ultrasonography almost 10 hours post renal biopsy where most of the hematomas could have been picked up by that time.

Golay V et al showed that patients renal biopsy done on outdoor patient basis is cost effective in terms of short stay after renal biopsy.[20] In their study macroscopic hematuria was observed in 13.04% (n=15/115 patients), and a local study by Mansoor et.al it was 12%, while in our patients hematuria was much less.[11] Both studies observation period was short and patient were discharged the same day.[11,20] In our circumstances, a conservative approach of observation for 24 hours is better considering many patients are referred from out of city and a longer travel time may lead to clot dislodgment from the biopsy site with increased turbulence.

In literature the occurrence of gross hematuria is reported in between 0.3% and 14.5%.[21] Another study done in Germany by Franke M et al in pediatric and adolescent patients in native as well as transplant kidney biopsies, showed complication rate of 4.1% which is comparable to our study. [22] Study done in one of leading UK center by Tse Y et al showed complication rate of about 4% in the form of pain and hematuria, these findings also correspond to our results.[23]
Our patients did not have major complications post kidney biopsy such as persistent abdominal or lumbar pain, gross hematuria, new onset of oliguria, tachycardia and hypotension. At the slightest suspicion a kidney ultrasound can exclude the presence of a perirenal or subcapsular haematoma.[2]

We compared the effect of impaired kidney function at the time of biopsy and similar to previous reports no significant difference was noted.[20] Moledina et.al. did not find increase in need of transfusion in patients with impaired renal function.[24] A recently published local study by Yaqub et.al. among 433 native kidney biopsies did not find a higher complication among patients with impaired kidney function.[15] However, since the findings of our study are in accordance with the other studies and will be helpful in building the confidence of our patients regarding how frequently which complication occurs and also the safety of the procedure in our local circumstances.

Conclusion

In conclusion, our study of a large series of native kidney biopsies reveled similar levels of complications as reported locally and internationally. Pain and localized hematoma were the most frequent complications of renal biopsy.

Conflict of Interest: None Declared

References:

1. Korbet SM. Percutaneous renal biopsy. In: Semin Nephrology 2002;22(3):254-67.
2. Chung S, Koh ES, Kim SJ, Yoon HE, Park CW, Chang YS et al. Safety and tissue yield for percutaneous native kidney biopsy according to practitioner and ultrasound technique. BMC Nephrol 2014;15: 96.
3. Moorani Kn, Asim S, Chishty Sh, Sherali AR. Outcome of pediatric renal biopsy with monopty gun technique. J Surg Pak 2010;15: 9-14

4. Mukhtar KN, Mahmood SN, Umair SF. CT guided percutaneous renal biopsy versus ultrasound guided for obtaining adequate tissue. J Pak Med Assoc. 2012; 62:880-82.
5. Floege J, Johnson RJ and Feehally J. Comprehensive Clinical Nephrology 6th ed. Philadelphia Elsevier . Chapter 6: Renal Biopsy; p. 72-79
6. Ahmed AM, Anees M, Riaz A, Satwat Mueed. Percutaneous renal biopsy by automated biopsy gun. J Coll Physicians Sur Pak 2003;13: 263-66.
7. Naveed Mohsin Zaidi, Akhtar Ali, Sultan Zaffar Akhtar. Early complications of percutaneous kidney biopsy during hospital stay. J Postgrad Med Inst 2006;20(4):347-51.
8. Khemchand N Moorani, Sadaf Asim, Saeed Hassan Chishty, Afroze Ramzan Sherali.Outcome of pediatric renal biopsy with monopty gun technique. J Surg Pak 2010;15(1):9-14.
9. Syed Sajid Hussain Shah, Naureen Akhtar, Tausif Ahmed, Faiza Sunbleen. Complications and safety of post percutaneous renal biopsy short stay in paediatric patients. J Ayub Med Coll Abbotabad 2015;27(2):421-24.
10. Syed Sajid Hussain Shah, Naureen Akhtar, Faiza Sunbleen. Safety and efficacy of percutaneous renal biopsy assame day outpatientprocedure. J Uni Med Dent Coll 2015;6(4):27-31.
11. Khurram Mansoor, Ghayyas Khan, Omair Riaz, Amer Siddique, Rizwan Hashim, Nadeem Azam. Evaluation of percutaneous kidney biopsy complications in ambulatory patients - a two year review from a tertiary care centre. Pak Armed Forces Med J 2016;66(4):586-90.
12. Mun~oz1 AT, Valdez-Ortiz R , González-Parra C , Espinoza-Dávila E , Morales-Buenrostro1 LE , Correa-Rotter R. Percutaneous renal biopsy of native kidneys: efficiency, safety and risk factors associated with major complications. Arch Med Sci 2011; 7: 823-31.
13. Aatif T, Maoujoud O, Montasser D, M. Benyahia, Z. Oualim. Glomerular diseases in the Military Hospital of Morocco: Review of a single centre renal biopsy database on adults. Ind J Nephrol 2012; 22: 257-63
14. Tøndel C, Vikse BE, Bostad L, Einar Svarstad. Safety and complications of percutaneous kidney biopsies in 715 children and 8573 adults in Norway 1988–2010. Clin J Am Soc Nephrol 2012; 7: 1591-97.
15. Yaqub S, Ahmed N, Fatima U, Maqbool A, Ashif W, Hussain SA. Complication rate and diagnostic yield of percutaneous native kidney biopsies: a 10-year experience at a Tertiary Care Hospital in Pakistan. Saudi J Kidney Did Transpl 2017; 28: 891.
16. Ralls PW, Barakos JA, Kaptein EM, Friedman PE, Fouladian G Boswell WD et al. Renal biopsy-related hemorrhage: frequency and comparison of CT and sonography. J Compu Asst Tomo 1987; 11: 1031-34.
17. Ginsburg JC, Fransman SL, Singer MA, Cohanim M, Morrin PA. Use of computerized tomography to evaluate bleeding after renal biopsy. Nephron 1980; 26: 240-243.
18. Rosenbaum R, Hoffsten PE, Stanley RJ, Klahr S. Use of computerized tomography to diagnose complications of percutaneous renal biopsy. Kidney Int 1978; 14: 87-92.
19. Doyle AJ, Gregory MC and Terreros DA. Percutaneous native renal biopsy: comparison of a 1.2-mm spring-driven system with a traditional 2-mm hand-driven system. Am J Kidney Dis 1994; 23: 498-503.
20. Golay V, Sarkar D, Thomas P, Trivedi M, Singh A, Roychowdhary A. et al. Safety and feasibility of outpatient percutaneous native kidney biopsy in the developing world: Experience in a large tertiary care centre in Eastern India. Nephrology 2013;18: 36-40.
21. Rollino C, Beltrame G, Ferro M, Quattrocchio G, Quarello F. Isolated microhematuria: biopsy, yes or no? Nefrologia. 2010; 27: 367-373.
22. Franke M, Kramarczyk A, Taylan C, Maintz D, Hoppe B, Koerber F. Ultrasound-guided percutaneous renal biopsy in 295 children and adolescents: role of ultrasound and analysis of complications. Plos One 2014; 9.
23. Tse Y, Yadav P, Herrema I, Ognjanovic M, Moghal N, Coulthard MG. Performing renal biopsies in children under general anaesthesia in the lateral position. Ped Nephrol 2013; 28: 671-73.
24. Moledina DG, Luciano RL, Kukova L, Chan L, Saha A, Nadkarni G, et al. Kidney biopsy–related complications in hospitalized patients with acute kidney disease. Clin J Am Soc Nephrol 2018; 13: 1633-40.