



Complications of Renal Biopsy A Single Centre Experience

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Abstract

Introduction: Renal biopsy is a procedure in which a sample of renal tissue is obtained for diagnosis of renal diseases. Major complications of renal biopsy include gross hematuria or retroperitoneal hematoma requiring blood transfusion, invasive procedure or surgical intervention and rarely sepsis.

Aims and Objectives:-To study the complications of renal biopsy.

Materials and Methods: In this prospective study 345 patients underwent renal biopsy over 2.5 years from 2009 to 2012.

Results: In this prospective study 345 renal biopsies were performed in 210 males (60.9%) and 135 females (39.1%). The mean age of males were 36 ± 14.3 and in females mean age was 29.6 ± 12.8 the most common age group biopsied was between 19-45yrs of age both among males (58.6%) and females (66.7) respectively. The number of patients below 18yrs of age were 63 (18.3%), 33 male and 30 female. Patients above the age of 45 were 69 (20%) 54 males and 15 females. Pain was the most common complication in our study out of 345 patients 141 (40.9%) complained of some sort of pain during initial 24hrs of hospital stay. Second most common complication was gross hematuria 69 patients (20%), hematoma in 9.3%, pyelonephritis in 0.9%, AV fistula 0.9%. There was increased incidence of gross hematuria and hypotension in patients with prolonged prothrombin time with P value=0.035.

Conclusion: The complications do occur with renal biopsy, but with proper pre and post procedure management they can be reduced significantly if not eliminated at all. In our study prolonged prothrombin time was associated with increased risk of hypotension and hematuria.

Keywords:-Renal, biopsy, complications.

Introduction

The procedure of obtaining and examining a small tissue sample from the kidney is known renal

biopsy. Percutaneous renal biopsy was first described in the early 1950s by Iversen and Brun^[1] and Alwall^[2] In the following years the technique

increased its diagnostic potential with the development of immunofluorescence microscopy and electron microscopy. Thus, renal biopsy became a crucial means for establishing the knowledge of histopathology, pathogenesis and classification of renal disease ^[3]. At present with the use of real time ultrasound and automated needles >99% biopsies are diagnostic ^[4]. There is no doubt that percutaneous renal biopsy is extremely useful in clinical nephrology to establish an accurate diagnosis, to obtain data of prognostic value and to choose the most appropriate treatment for most patients affected by renal disease. Nevertheless, the morbidity and occasional mortality associated with this procedure require a careful evaluation of the risk to benefit ratio for each patient. This evaluation, however, is quite subjective ^[5,6]. Thus, it is not surprising that the indications for kidney biopsy vary considerably among nephrologists ^[7,8].

Although minor complications can occur in as high as 19.5% patients ^[9], however serious complications are infrequent. Factors that have been found to predispose to complications after PRB include renal insufficiency (>1.2 mg/dl), poorly controlled hypertension (diastolic BP >90 to 110 mmHg), and a prolonged bleeding time ^[10,11]. The significant complications related to renal biopsy are hemorrhage, development of arteriovenous fistulas, and to a lesser extent sepsis, the risks of complication vary from center to center and between practitioners but can be estimated to be between 3.5% and 13%, with the majority being minor complications (approximately 3% to 9%) ^[12,13,14]. Hematuria with drop in hemoglobin of ≥ 1 g/dl after biopsy is common and has been reported to occur in almost 50% of patients ^[15,16,17].

Aims and Objectives: - To study complications of renal biopsy.

Materials and Methods

This prospective study was conducted in department of nephrology Sher-i-kashmir institute

of medical sciences. 345 patients who underwent renal biopsy in two and half years from 2009 to 2012.

Subjects: Patients who presented with clinical and/or laboratory features of renal disease were subjected to renal biopsy. All these patients were subjected to ultrasound guided Percutaneous Renal biopsy after ruling out cause of renal disease by other noninvasive methods. The information which was collected before biopsy included, Age, Sex, History of illness, Blood Pressure, KFT, Bleeding time clotting time, activated partial thromboplastin time, Partial thromboplastin time, complete blood count, 24 hour urinary protein, routine urine examination, hepatitis B, C and HIV serology.

The indications for the biopsy were as listed below:

1. Proteinuria and Hematuria.
2. Subnephrotic Proteinuria.
3. Nephrotic syndrome.
4. ATN not recovering in 4 weeks.
5. Systemic Disease (e.g Vasculitis).
6. Subnephrotic Proteinuria with azotemia.
7. Post renal transplant azotemia.
8. Gross hematuria.

Procedure:- Percutaneous renal biopsy was performed with an automated spring loaded device with needle size of 14 to 18 G. The skin and subcutaneous tissue was anesthetized with lidocaine followed by deeper anesthesia with a spinal needle. The depth was noted with an ultrasonogram and was confirmed with spinal needle. All the biopsies were done under the guidance of ultrasonogram. The biopsy needle was then introduced to the depth and engaged if the renal tissue was not obtained a deeper biopsy was performed. The biopsy was repeated until an adequate amount of tissue was obtained (usually three specimens). After the procedure patient was advised to lie flat on bed on his back and no activity was allowed for six hours and was observed for 24hrs for any complication. Patient

blood pressure for initial 3 hours was monitored every 30 minutes then hourly for 5 hours then 4 hourly for 16 hrs. Patient was monitored for Hematuria, pain, fever, and any other complication post biopsy Hemoglobin was done after 24hrs of biopsy to see for drop in hemoglobin. Patient was reviewed after one week on OPD basis and USG abdomen was done to rule out AV fistula.

Results

In this prospective study 345 renal biopsies were performed 210 males (60.9%) and 135 females (39.1%). The mean age of males were 36 ± 14.3 and in females mean age was 29.6 ± 12.8 the most common age group biopsied was between 19-45yrs of age both among males (58.6%) and females (66.7). The number of patients below 18yrs of age were 63 (18.3%), 33 male and 30 female. Patients above the age of 45 were 69 (20%) 54 male and 15 females (Table-1).

Table 1. Showing age and gender distribution

Age (yr)	Male		Female		Total	
	N	%	N	%	N	%
≤ 18	33	15.7	30	22.2	63	18.3%
19 to 45	123	58.6	90	66.7	213	61.7%
> 45	54	25.7	15	11.1	69	20.0%
Total	210	60.9	135	39.1	345	100.%
mean \pm SD	36.0 ± 14.3 (9, 70)		29.6 ± 12.8 (13, 60)		33.5 ± 14.0 (9, 70)	

In our study of 345 patients the indication for renal biopsy was Proteinuria and Hematuria (22%) isolated subnephrotic proteinuria (22.6%) Nephrotic syndrome (21.7%) ARP (5; 2%) systemic disease (3.5%) Subnephrotic Proteinuria with azotemia (20%) and post renal transplant azotemia.

Pain was the most common complication in our study out of 345 patients 141 (40.9%) complained of some sort of pain during first 24hrs of hospital stay however only 26% patients needed analgesia while rest were able to tolerate pain which was mostly posture related,

The second most common complication was gross hematuria in 69 patients (20%) which was evident in initial 12 hrs in almost all 69 patients post biopsy. 51 patients (14.8%) had greater than 2g drop in haemoglobin however the hematuria settled within 24hrs in 54 patient after biopsy the hematuria persisted in 15 patients (4.3%) for more than 24hrs and these patients had drop of hemoglobin by more than 2g/dl and needed blood transfusion for stabilizing hemodynamics. Gross hematuria for more than 24hrs especially if patient becomes hemodynamically unstable is considered as major complication of renal biopsy. The study revealed that patients with prolonged PT

(prothrombin time) have increased incidence of drop in hemoglobin and hypotension (Table-2).

Table 2. Showing complications of renal biopsy in our study

Complication	No. of patients	%
Gross Hematuria	69	20.0
Pain	141	40.9
Infection	3	0.9
Hematoma	33	9.6
A V Fistula	3	0.9
Hypotension	15	4.3
Need for Blood Transfusion	15	4.3

Discussion

In our study there was no mortality and no need for an invasive procedure, like nephrectomy, or embolisation. Nonetheless, complications did occur in 20% of biopsies, and 5.2% of complications were considered major, primarily because of the need for transfusion after biopsy in 4.3 % (Table-3) cases, and sepsis in 0.9% patients (Table-2). Lefaucheur et al [8] reported 6 to 7% incidence of major complications that is need for blood transfusion and/or need of surgical procedure to stabilize the patient.

Table 3. Showing pre and post biopsy hemoglobin .greater than 2 g/dl drop in hemoglobin was noticed in 14.8% patients.

		No.of patients	%	p value
Baseline Hemoglobin (gm %)		10.98 ± 2.38 (7.0, 16.3)		0.000 (Sig)
Post Biopsy Hemoglobin (gm %)		10.15 ± 2.19 (5.1, 15.3)		
Drop in Hb	Unchanged	48	13.9	
	<1 .0	177	51.3	
	1.0 to 2.0	69	20.0	
	> 2.0	51	14.8	

Post biopsy hemoglobin remained unchanged in 48 patients (13.9%). Drop in hemoglobin less than 1g/dl was noticed in 177 patients (51.3%), 1-2 g/dl drop in hemoglobin was seen in 69 patients (20%) and significant drop of more 2g/dl was noticed in 51 patients (14.8%), however most of these patients remained hemodynamically stable only 15 patients needed transfusion because of hypotension. Ishikawa et al ^[18] reported the incidence of drop in hemoglobin more than 1g/dl in 20.8% patients which is consistent with our study.

In a study by William et.al ^[7] a post-biopsy decrease in hemoglobin of ≥ 1.0 g/dl was observed in 46% (222 of 478) of cases and a decrease of ≥ 2.0 g/dl was observed in 9.6% (46 of 478) of cases. In biopsies with a complication, a post-biopsy decrease in hemoglobin of ≥ 1.0 g/dl was observed in 89% (63 of 71) of cases (uncomplicated *versus* complicated, $P < 0.0001$) and a decrease of ≥ 2.0 g/dl was observed in 48% (34 of 71) of cases (uncomplicated *versus* complicated, $P < 0.0001$). These results reveal little less incidence of greater than 2 gram/dl drop in haemoglobin than our study.

Hematoma: was the third most common complication in our study, 33 patients (9.6%) developed post biopsy hematoma (Table-2). The incidence of hematoma has been reported as high as 33 % ^[19]. None of the patients required any surgical procedure after biopsy which is reported in international literature as 0.1% ^[7]

Arteriovenous fistula: - as a complication of renal biopsy was seen in 3 patients (0.9%) (Table-2). The incidence of AV fistula as a complication of renal biopsy has been reported as 0.4% ^[19].

Infection: - in the form of pyelonephritis was seen in 3 patients (0.9%) in our study. This patient was a 40 year old male and two females in 30s who after in first week after biopsy presented with chills and rigors with high grade fever and abdominal pain. All the three patients managed with i/v antibiotics improved and were discharged within two weeks of hospital stay (Table-2). The incidence of infection as a complication has been reported as 3.9% ^[20].

Table 4. Showing relation between complications and Age, Gender, Hypertension PT. it shows patients with prolonged PT have significantly higher incidence of blood loss ($p=0.035$).

			Gross Hematuria	Pain	Infection	Hematoma	AV Fistula	Hypotension	Need for Blood Transfusion
Age (yr)	<=18	N	18	27	0	3	3	6	3
		%	28.6	42.9	0.0	4.8	4.8	9.5	4.8
	19 to 45	N	45	84	3	21	0	9	9
		%	21.1	39.4	1.4	9.9	0.0	4.2	4.2
	> 45	N	6	60	0	9	0	0	3
		%	8.7	43.5	0.0	13.0	0.0	0.0	4.3
		P value	0.243	0.924	0.734	0.644	0.107	0.304	0.994
Gender	Male	N	39	84	3	21	0	9	12
		%	18.6	40.0	1.4	10.0	0.0	4.3	5.7
	Female	N	30	57	0	12	3	6	3
		%	22.2	42.2	0.0	8.9	2.2	4.4	2.2
		P value	0.634	0.814	0.423	0.844	0.212	0.968	0.372
Hypertension	Yes	N	30	63	0	15	3	9	12
		%	17.9	37.5	0.0	8.9	1.8	5.4	7.1
	No	N	39	78	3	18	0	6	3
		%	22.0	44.1	1.7	10.2	0.0	3.4	1.7
		P value	0.577	0.476	0.330	0.822	0.305	0.607	0.154
Prothrombin Time	> 13	N	15	51	0	12	3	9	12
		%	12.2	41.5	0.0	9.8	2.4	7.3	9.8
	< = 13	N	54	90	3	21	0	6	3
		%	24.3	40.5	1.4	9.5	0.0	2.7	1.4
		P value	0.121	0.924	0.457	0.959	0.179	0.247	0.035

Conclusion

Renal biopsy is one of the most important diagnostic modality with nephrologists. The complications do occur with the procedure, but with proper pre and post procedure management they can be reduced significantly if not eliminated. in our study There was increased incidence of gross hematuria and hypotension in patients with prolonged PT with P value=0.035. There was no mortality in our study and no surgical intervention was needed for any complication.

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