



KIDNEY BIOPSY. CLINICOPATHOLOGICAL FEATURES, COMPLICATIONS, AND EVOLUTION IN A GENERAL HOSPITAL IN PERU

BIOPSIA RENAL. DESCRIPCIÓN CLINICOPATOLÓGICA, COMPLICACIONES Y EVOLUCIÓN EN UN HOSPITAL GENERAL DEL PERÚ

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ABSTRACT

Introducción: Renal biopsy is one of the essential tests for the characterization of chronic kidney disease (CKD). **Objective:** To determine the most frequent primary and secondary glomerulonephritis, complications of renal biopsy, and the number of patients on hemodialysis when undergoing renal biopsy. **Methods:** Observational, descriptive, case series, retrospective, and cross-sectional study carried out at the E. Rebagliati Martins-Perú. The medical records of patients older than 15 years of age who underwent kidney biopsy between 2008-2016 were reviewed. The data were processed using Stata 16.1. **Results:** 2278 medical records were used. They corresponded to 1234 women and 1044 men. The most frequent primary and secondary glomerulonephritis were focal and segmental glomerulosclerosis (FSGS) 683 (29.98%) and systemic lupus erythematosus (SLE) 434 (19.04%) respectively. A total of 1644 biopsied patients were analyzed 36 (2.19%), 241 (14.66%) had major and minor complications respectively. Major complications were more frequent when the procedure was performed by radiology with ultrasound guidance compared to that performed by the nephrologist without ultrasound guidance ($p = 0.03694$). From a total of 1324 patients, 329 underwent kidney biopsy while on hemodialysis, 43 (13.07%) managed to get out of this therapy, and 144 (51.99%) had major or minor complications. **Conclusion:** FSGS and SLE were the most frequent primary and secondary glomerulonephritis, respectively. In 1644 patients the major and minor complications were 36 (2.19%) and 241 (14.66%) respectively. In 1,324 patients, 329 (24.8%) were biopsied while on hemodialysis, and 144 (51.99%) of them had major or minor complications.

Key words: Biopsy; Kidney; Complications; Glomerulonephritis (source: MeSH NLM).

RESUMEN

Introducción: La biopsia renal es uno de los exámenes esenciales para la caracterización de la enfermedad renal crónica (ERC). **Objetivo:** Determinar las glomerulonefritis primarias y secundarias más frecuentes, las complicaciones de la biopsia renal y el número de pacientes en hemodiálisis al ser sometidos a biopsia renal. **Métodos:** Estudio observacional, descriptivo, de serie de casos, retrospectivo y transversal, realizado en el Hospital Nacional E. Rebagliati Matins-Perú. Se revisaron las historias clínicas de pacientes mayores de 15 años de edad sometidos a biopsia renal entre 2008-2016. Los datos fueron procesados en Stata 16,1. **Resultados:** De 2278 historias clínicas, correspondieron a mujeres 1234 y a hombres 1044. Las glomerulonefritis primarias y secundarias más frecuentes fueron glomeruloesclerosis focal y segmentaria (GEFyS) 683 (29,98%) y lupus eritematoso sistémico (LES) 434 (19,04%) respectivamente. De 1644 pacientes biopsiados, 36 (2,19%) y 241 (14,66%), tuvieron complicaciones mayores y menores respectivamente. Las complicaciones mayores fueron más frecuentes cuando el procedimiento lo realizó radiología con guía ecográfica en relación al realizado por el nefrólogo sin guía ecográfica ($p = 0,037$). En 1324 pacientes, 329 fueron sometidos a biopsia renal estando en hemodiálisis; de ellos 43 (13,07%) lograron salir de esta terapia y 144 (51,99%) tuvieron complicaciones mayores o menores. **Conclusión:** La GEFyS y LES fueron las glomerulonefritis primarias y secundarias más frecuentes, respectivamente. En 1644 pacientes las complicaciones mayores y menores fueron 36 (2,19%) y 241 (14,66%) respectivamente. En 1324 pacientes, 329 (24,80%) fueron biopsiados estando en hemodiálisis y de ellos 144 (51,99%) tuvieron complicaciones mayores o menores.

Palabras clave: Biopsia; Riñón; Complicaciones; Glomerulonefritis (fuente: DeCS BIREME).

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INTRODUCTION

Chronic kidney disease (CKD) is a global public health problem with an increased prevalence and incidence, poor outcome, and high associated costs^(1,2,3).

The characterization of CKD in all its stages constitutes an essential part of its management, and it is essential for the development of therapeutic strategies aimed at slowing its progression or avoiding the need for replacement treatment of renal function. Within this reasoning, renal biopsy occupies an expectant place^(4,5,6), especially when it comes to glomerulonephritis.

Like any invasive diagnostic test, renal biopsy is indicated taking into account the following criteria: 1. Making a diagnosis and providing information for treatment. 2. Knowing the natural history of the disease that is suspected to be associated with high morbidity and mortality. 3. The natural history of this disease can be improved with therapy (if this natural history cannot be improved, the biopsy should not be performed). 4. The treatments for these diseases differ according to the kidney biopsy diagnosis (there is no single treatment). 5. The adverse events of the treatment and the risk of the procedure are acceptable according to the current state of health of the patient^(4,5,6).

In patients with CKD, renal biopsy is essential for characterizing the disease according to the stage as well as for the therapeutic management of the patient, who is often on dialysis. Therefore, our objective is to determine the frequency of primary and secondary glomerulonephritis, complications of renal biopsy, and the number of patients on hemodialysis when undergoing a renal biopsy, in children under 15 years of age.

METHODS

Design and study area

An observational, descriptive, case series, retrospective, and cross-sectional study carried out in the Organ Unit of the Nephrology Department of the Hospital Edgardo Rebagliati Martins (HNERM) in the city of Lima, serving 16% of the population attached to the Social Security of Peru (ESSALUD).

Population and sample

The population was made up of all patients older than 15 years of age who underwent renal biopsy between January 1, 2008, to December 31, 2016; The sample was not found since the entire population

was included.

Procedures and variables

Regarding the procedures, the medical records of patients older than 15 years of age who underwent renal biopsy were reviewed.

The collected data were entered into the Excel 2019 program. Later, the statistical software Stata 16.1 was used, and the correct coding of the variables was verified.

The documentation technique was used, a data collection sheet was prepared with each of the variables involved in the study.

The variables were: gender, age, glomerulonephritis (primary and secondary), renal indicators, complications of the renal biopsy according to the operator, patients with hemodialysis, and complications of the renal biopsy in patients with hemodialysis and discharge from hemodialysis.

Major complications considered those patients requiring blood transfusion, requiring surgery, nephrectomy, arteriography, selective endovascular embolization of the bleeding vessel or death; and minor complications to the decrease in Hb > 1 gr / L, macroscopic hematuria, hypotension, pain in the puncture site (all of them without the need for blood transfusion).

Statistical analysis

The frequencies and percentages for the qualitative variables were calculated. Furthermore, an exploration was performed comparing the frequencies of major and minor complications of the renal biopsy when the procedure was performed by the radiologist with ultrasound guidance in relation to that performed by the nephrologist without ultrasound guidance. A significance level of 95% was used.

Ethical considerations

Authorizations were obtained from the heads of the Glomerulus Unit, the Department of Nephrology, the Office of Research and Teaching, and the HNERM Ethics Committee. The dignity, integrity, privacy, and confidentiality of patients have been protected by protecting their data by the Declaration of Helsinki.

RESULTS

2278 medical records of patients undergoing renal biopsy were reviewed, 1234 were women, and 1044



men. The age groups included 431 patients (18.92%) between 15 and 29 years old, 846 (37.14%) between 30 and 44 years old, 389 (17.08%) between 45 and 59 years old, 377 (16, 55%) between 60 and 74 years and 235 (10.32%) over 75 years.

Table 1. Distribution of glomerulonephritis by renal biopsy.

Diagnosis	Number	Percentage
FSGS	683	29.98
Membranous	250	10.97
Membranoproliferative	68	2.99
Mesangial	32	1.40
Minimal changes	11	0.48
SLE	434	19.04
Multiple myeloma	87	3.82
Diabetes mellitus	68	2.99
Rapidly progressive GN	28	1.23
Kidney transplantation	123	5.40
Amyloidosis	86	3.78
HT	102	4.48
Thrombotic microangiopathy	68	2.99
Others	238	10.45
Total	2278	100.00

Focal and segmental glomerulosclerosis (FSGS); Systemic lupus erythematosus (SLE); Glomerulonephritis (GN); Arterial hypertension (HTN).

Table 2. Distribution of glomerulonephritis by renal biopsy according to age.

Diagnosis	15 a 29		30 a 44		45 a 59		60 a 74		75 or more	
	n	%	n	%	n	%	n	%	n	%
FSGS	80	11.71	302	44.22	158	23.13	77	11.27	66	9.66
Membranous	26	10.40	24	9.60	56	22.40	97	38.80	47	18.80
Membranoproliferative	28	41.18	19	27.94	10	14.71	4	5.88	7	10.29
Mesangial	14	43.75	11	34.38	6	18.75	1	3.13	0	0
Minimal changes	10	90.91	1	9.09	0	0	0	0	0	0
SLE	129	29.72	269	61.98	32	7.37	4	0.92	0	0
Multiple myeloma	0	0	3	3.45	4	4.60	41	47.13	39	44.83
Diabetes mellitus	3	4.41	7	10.29	34	50.00	20	29.41	4	5.88
Rapidly progressive GN	12	42.86	11	39.29	3	10.71	2	7.14	0	0
Renal transplant	22	17.89	71	57.72	24	19.51	6	4.88	0	0
Amyloidosis	5	5.81	12	13.95	26	30.23	28	32.56	15	17.44
HTA	4	3.92	8	7.84	14	13.73	56	54.90	20	19.61
Thrombotic microangiopathy	6	8.82	9	13.24	16	23.53	34	50.00	3	4.41
Others	92	38.66	99	41.60	6	2.52	7	2.94	34	14.29
Total	431		846		389		377		235	

**Table 3.** Main renal indicators in patients with renal biopsy.

Diagnosis	Number	Creatinine	Proteinuria	Hb	HTA	
					Yes %	No %
FSGS	683	2.6±1.9	3.2±1.2	11.8±0.6	25	75
Membranous	250	1.8±1.2	4.8±1.1	11.7±0.5	19	81
Membranoproliferative	68	2.4±1.1	3.3±1.0	11.6±0.7	31	69
Mesangial	32	1.3±1.0	2.9±0.7	11.1±0.5	23	77
Minimal changes	11	1.0±0.2	2.5±0.7	11.4±0.4	10	90
SLE	434	3.8±2.2	1.8±0.9	11.2±0.3	29	71
Multiple myeloma	87	3.6±1.9	3.6±1.0	11.1±0.4	13	87
Diabetes mellitus	68	1.2±0.4	4.1±1.1	10.8±0.4	68	32
Rapidly progressive GN	28	4.8±2.3	2.8±0.9	10.6±0.3	13	87
Kidney transplant	123	2.3±1.9	1.8±0.7	10.5±0.5	45	55
Amyloidosis	86	1.4±0.5	2.5±0.7	9.9±0.4	12	88
HT	102	2.4±1.0	2.8±0.6	10.0±0.4	100	0
Thrombotic microangiopathy	68	1.3±0.6	3.0±1.0	11.1±0.3	32	68
Others	238	2.6±0.8	3.9±1.1	11.2±0.3	42	58
Total	2278					

Table 4. Complications of renal biopsy according to the method of performing the procedure.

Complications	n (%)	Radiology	Nephrology	p
Major complications	36(2.19)	25	11	0.037
Minor complications	241(14.66)	133	108	0.386
Total	277(16.85)	158	119	

Of 1644 patients, 36 (2, 19%) and 241 (14.66%), had major and minor complications respectively. Major complications were more frequent when the procedure was performed by radiology with ultrasound guidance compared to that performed by the nephrologist without ultrasound guidance ($p = 0.03694$).

Table 5. Hemodialysis and hemodialysis withdrawal in patients with renal biopsy.

Glomerulonephritis	Hemodialysis (%)	Withdrawal (%)
SLE, vasculitis	112 (34.04)	9 (8.04)
Primary glomerulonephritis	113 (34.35)	18 (15.93)
DBM2	49 (14.89)	4 (8.16)
Others	55 (16.72)	12 (21.82)
Total	329 (100)	43 (13.07)

*Hemodialysis before, during, and up to 90 days after renal biopsy.

**Hemodialysis discharge up to 90 days after renal biopsy.

Table 6. Complications of renal biopsy in hemodialysis patients.

Complications	Hemodialysis (%)	No hemodialysis (%)	Total (%)
major complications	20 (55.56)	16 (44.44)	36 (100)
minor complications	124 (51.45)	117 (48.55)	241 (100)
Total	144 (51.99)	133 (48.01)	277 (100)

*Hemodialysis and non-hemodialysis, before, during, and up to 90 days after renal biopsy.



DISCUSSION

The FSGS is the most frequent primary glomerulonephritis 683 (29.98%) (Table 1) and 460 biopsies corresponded to patients aged between 30 and 59 years of age (67.35%) (Table 2), numbers consistent with published evidence⁽⁷⁻¹⁴⁾.

SLE is the most frequent secondary glomerulonephritis 434 (19.04%) of all renal biopsies (Table 1), 398 (91.71%) patients underwent renal biopsy between 15 and 44 years of age (Table 2) and serum creatinine was $3, 8 \pm 2.2$ (Table 3). A 112 of 434 (25.81%) patients with SLE underwent a renal biopsy with concomitant hemodialysis, finding in this group of patients the lowest percentage of discharge from hemodialysis (8.04%) (Table 5). All these figures make us think that the indications for kidney biopsy will probably have to be reviewed and think about much earlier detection and treatment; with the aim of reducing the progression to chronic kidney disease and the subsequent definitive renal replacement therapy⁽¹⁵⁾.

We found 68 (2.99%) cases with glomerulonephritis corresponding to patients with type 2 diabetes mellitus (DBM2) (Table 1). Kidney biopsy with hemodialysis was performed in 49 patients (72.06%) and 4 (8.06%) came off hemodialysis. The same trend is observed in SLE⁽¹⁶⁾.

In the present study, 612 patients were older than 60 years of age (26.87% of all patients evaluated) (Table 2). Membranous glomerulonephritis, with 144 patients (38.8% between 60 and 74 years and 18.8% between 75 and older), is the most frequent primary glomerulonephritis in this age group. The most frequent secondary glomerulonephritis are multiple myeloma in 80 patients (47.13% between 60 and 74 years of age and 44.83% between 75 and over) and HTN in 76 patients (54.9% between 60 and 74 years and 19, 61% from 75 to more years of age). The increase in secondary causes can be seen, with membranous glomerulonephritis being the most frequent in this age group⁽¹⁷⁾.

In the 45 to 59 age group, FSGS (302 patients) and membranous glomerulonephritis (24 patients) were the most common primary diseases and DBM2 (34 patients) and SLE (32 patients) the most seen secondary (Table 2). The results found to correspond

to that reported in the previous series⁽¹⁰⁾, perhaps the only difference is in the number of patients with DBM2.

Data related to complications of the renal biopsy were found in only 1644 patients. The complications found in the present study have frequencies similar to other series⁽¹⁸⁾. Strikingly is that major complications are more frequent when the procedure is performed by radiology with ultrasound guidance (Table 4). The reason could be the nephrologist's greater experience with the procedure. However, there are no figures in other series in this regard.

In the medical records of only 1324 patients, hemodialysis records were found. 329 of them underwent kidney biopsy while on renal replacement therapy: hemodialysis, and 43 of the 329 (13.07%) managed to get off hemodialysis as a consequence of the evolution of the patient and the treatment received. This is an interesting figure, in the sense that it could translate the late diagnosis and treatment and the need to review the indication for renal biopsy, especially in secondary glomerulonephritis, for example, SLE.

Table 6 shows that 51.99% of renal biopsies performed in hemodialysis patients at the time of the procedure had major or minor complications due to the intervention. Data that should be taken into consideration when considering a renal biopsy in a patient with little chance of recovery of this function.

It was not possible to complete all the information required in all the patients evaluated, due to inadequate and/or incomplete recording of the information in the clinical history, which is clearly a limitation of the present study.

CONCLUSION

The most frequent primary glomerulonephritis was GEFyS with 683 patients (29.88%) and the most evaluated secondary glomerulonephritis was SLE with 434 patients (19.04%). 36 (2.19%) and 241 (14.66%) patients out of 1644 with renal biopsy presented major and minor complications, respectively. In 1,324 patients, 329 (24.8%) underwent kidney biopsy while on hemodialysis, of which 144 (51.99%) had major or minor complications.



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