

Most common histopathological patterns of the Minas Gerais Association of the Centers of Nephrology

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SUMMARY

INTRODUCTION: We analyzed the distribution and frequency of glomerular diseases in patients biopsied between 1992 and 2016 in centers that make up the AMICEN (Minas Gerais Association of Nephrology Centers).

METHODS: We analyzed the biopsy reports of patients from 9 AMICEN nephrology centers. We took note of their age, gender, ultrasound use, post-biopsy resting time, whether the kidney was native or a graft, number of glomeruli and indication for the biopsy. The kidney biopsy findings were broken down into four categories: glomerular and non-glomerular diseases, normal kidneys and insufficient material for analysis. Those patients diagnosed with glomerular diseases were further divided into having primary or secondary glomerular diseases.

RESULTS: We obtained 582 biopsy reports. The median age was 38 years (1 to 85). The number of glomeruli varied between 0 and 70 (median = 13.0). In total, 97.8% of the biopsies were ultrasound guided. The main indication was nephrotic syndrome (36.9%), followed by hematuria-proteinuria association (16.2%). Primary glomerular diseases proved to be the most frequent (75.3%), followed by secondary diseases (24.7%). Among the primary glomerular diseases, FSGS was found at a higher frequency (28.8%), while among the secondary diseases, SLE was the most prevalent (42.4%). Regarding prevalence findings, those for both primary and secondary diseases were similar to those found in the large Brazilian registries published thus far.

CONCLUSION: Glomerular disease registries are an important tool to identify the prevalence of such disease in regions of interest and can serve as an instrument to guide public policy decisions concerning the prevention of terminal kidney diseases.

KEYWORDS: Epidemiology. Biopsy. Glomerulonephritis. Kidney Diseases.

INTRODUCTION

Renal biopsy has been used in clinical practice for approximately 50 years.¹ Its initial description as a diagnostic method dates back to 1951 after Iversen and Brun developed the percutaneous technique.^{2,3} This diagnostic modality has proven to be a valuable

tool in establishing not only a diagnosis of certainty but also in evaluating disease severity and prognosis, as well as guiding the treatment of renal diseases.⁴

There has been growing interest in the prevalence of histopathological patterns of kidney diseases in

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Brazil and in the world. Some countries have a national registry of kidney histopathology. In Brazil, several attempts, although fragmented, have been made to gather such data.

Thus, we decided to contribute by trying to establish the epidemiology of the histopathological patterns found in kidney biopsies coming from “Zona da Mata” and “Campos das Vertentes” in the state of Minas Gerais, Brazil. We analyzed the distribution and frequency of glomerulopathies of patients biopsied between 1992 and 2016 in AMICEN member centers (Figure 1) and compared them with publications from national and international registries.¹⁻¹⁸

METHODS

This is a cross-sectional study in which we analyzed biopsy reports of patients from 9 centers with nephrology units members of AMICEN. The kidney biopsies come from adults and children outpatients from “Zona da Mata” and “Campos das Vertentes” in the state of Minas Gerais, Brazil. The area covered by the study was mainly the Zona da Mata, with an estimated area of 35748 km², a population of 2.175.254 inhabitants, with a density of 60 in/km, a gross domestic product (GDP) per capita of US \$ 2,575 and a Human Development Index (HDI) of 0.76, and the “Campos das Vertentes”, with an area of 12 564 km², a population of 546,007 inhabitants, Gross domestic products (GDP) per capita of U \$ 1470 and an Human development Index (HDI) of 0.77, both in the State of Minas Gerais.

This study was approved by the Human Research Ethical Board at the São João de Deus Hospital/Fundação Geraldo Corrêa (number: 2.208.247).

The data were plotted onto a table, and supplementary information was obtained directly from the doctors of the respective clinics. After collection, the data were computed using Microsoft Office Excel 2016 software, and the results were obtained after the data were transferred to Statistical Package for Social Sciences (SPSS) 19.0 (SPSS, IBM Company, Chicago, IL). By these means, we carried out a descriptive analysis of the information collected, using data values of central tendency, variability, and frequency. Within the data gathered, we identified age, gender, ultrasound use, resting time after the biopsy, number of glomeruli and type of indication. Regarding kidney biopsy findings, the data were broken down into four categories: glomerular and

non-glomerular diseases, normal kidneys, and insufficient material for analysis. The patients diagnosed with glomerulopathies were split into primary and secondary glomerulopathies. After splitting them, we analyzed the most frequent pathologies in each of these two groups.

RESULTS

In the period from 1992 to 2016, we carried out a renal biopsy study involving 672 patients from 9 nephrology centers that are associated with AMICEN. Of these, 49 were excluded because they had transplanted kidneys, as were another 41 lacking confirmed glomerular disease, thus leaving 582 biopsies remaining.

The median age was 38 years; the youngest patient was 1 year old and the eldest 85 of age. Regarding the number of glomeruli, the lowest was zero, and the highest was 70, with a median of 13.0. In total, 97.8% of the biopsies were ultrasound guided. As far as patient resting time after the biopsy was concerned, we obtained data from 487 cases, of which 63.1% remained under observation for a period between 6 and 12 hours, and 20.6% for a period between 12 and 24 hours. Additionally, 49.1% of the biopsies were performed in females and 50.9% in males. In most cases (99.1%), the material was sufficient for analysis.

As noted in Table 1, the main reason for biopsy indication was nephrotic syndrome, which corresponded to 215 cases (36.9%), followed by proteinuria/hematuria association in 94 (16.2%), hematuria alone in 34 (5.8%), acute kidney injury (AKI) in 20 (3.4%), chronic glomerulonephritis in 11 (1.9%), hematuria associated with hypertension in 2 (0.3%), and other causes in 206 (35.4%). The primary glomerulopathy was present in 438 cases (75.3%), and secondary glomerulopathy was present in 144 cases (24.7%), yield-

TABLE 1 – INDICATION OF RENAL BIOPSY

| | Frequency | % |
|----------------------------|-----------|-------|
| Nephrotic syndrome | 215 | 36.9 |
| Hematuria+ Proteinuria | 94 | 16.2 |
| Isolated Hematuria | 34 | 5.8 |
| AKI* | 20 | 3.4 |
| Chronic glomerulonephritis | 11 | 1.9 |
| Hematuria+ hypertension | 2 | 0.3 |
| Others | 206 | 35.4 |
| Total | 582 | 100.0 |

*Acute Kidney Injury

ing a total of 582 cases of glomerular involvement.

Table 2 shows that 75.3% of the primary glomerulopathies could be classified as FSGS in 126 cases (28.8%), minimal change disease (MCD) in 84 cases (19.2%), IgA nephropathy in 80 cases (18.3%), membranous GN in 74 cases (16.9%), rapidly progressive GN in 27 cases (6.2%), diffuse glomerular sclerosis in 24 cases (5.5%), membranoproliferative GN (MPGN) in 15 cases (3.4%), and anti-GBM GN in 2 cases (0.5%). Other causes were found in 6 cases (1.4%).

Of the 144 cases with secondary glomerulopathy (Table 3), which represented 24.7% of the total, 61 cases (42.4%) had lupus nephritis. The second most common cause was diabetic nephropathy, which was found in 18 cases (12.5%), followed by thrombotic microangiopathy in 9 cases (6.3%), post-infectious GN in 5.6% and amyloidosis in 8 cases (5.6%). Diffuse HIV-related proliferative GN was found in 1 patient (0.7%). Other causes were found in 39 patients (27.1%).

DISCUSSION

In this study, we evaluated the different histopathological patterns in 582 patients from 9 centers of nephrology that make up AMICEN.

AKI was a reason for renal biopsy in a small percentage of our sample (3.4%). This is because most of the patients came from outpatient clinics adults and children.

As in other studies, primary glomerulopathies corresponded to the most frequent lesions, with FSGS being the most prevalent and found in 28.8% of cases.^{17,18} These data are in line with those report-

ed in the Paulista Registry of Glomerulopathy¹⁰ and a review of 9617 histopathological findings from kidney biopsies performed in Brazil.¹¹ However, this is in disagreement with the Italian⁷ and Spanish⁹ registries, in which the most reported histologic type of primary glomerulopathy was IgAN.

IgAN was the third most frequent cause of primary glomerulopathy found in this study, corresponding to 18.3%. These data are similar to those reported in the Paulista Glomerulopathy Registry¹⁰ and in a survey on the frequency of kidney biopsies performed in Brazil,¹¹ in which IgA nephropathy was also the third most frequently found histopathological pattern.^{14,17} However, we must admit that several Brazilian nephrology centers belonging to AMICEN do not biopsy patients with hematuria alone, but only if they also present proteinuria, hypertension, or kidney function impairment. If these centers would biopsy their patients, it is very likely that the most common form of primary glomerulopathy found would be IgAN.

In this study, we found that MGN represented 16.9% of primary glomerulopathy cases, ranking fourth among the subgroups of primary glomerulopathies. Such data are in disagreement with a study carried out in the southern region of Brazil,¹⁴ the Paulista Glomerulopathy Registry,¹⁰ and the review of diagnoses by renal biopsy in Brazil¹¹.

Worldwide, especially in developed countries, there has been a reduction in the frequency of cases of infection-related glomerulopathies, such as membranoproliferative GN and post-infectious GN. In this study, we found that membranoproliferative GN was the seventh most common histopathological pattern among primary glomerulopathies, corresponding to

TABLE 2 – PRIMARY GLOMERULOPATHIES

| | Frequency | % |
|------------------------------|-----------|-------|
| FSGS | 126 | 28.8 |
| MCD | 84 | 19.2 |
| IgAN | 80 | 18.3 |
| MGN | 74 | 16.9 |
| RPGN | 27 | 6.2 |
| Diffuse Glomerular Sclerosis | 24 | 5.5 |
| MPGN | 15 | 3.4 |
| Anti-GBM GN | 2 | 0.5 |
| Other primary GN | 6 | 1.4 |
| Total | 438 | 100.0 |

FSGS: Focal Segmental Glomerulosclerosis; MCD: Minimal Change Disease; IgAN: IgA Nephropathy; MGN: Membranous Glomerulonephritis; RPGN: Rapidly Progressive Glomerulonephritis; MPGN: Membranoproliferative Glomerulonephritis; Anti-GBM GN: Anti- Glomerular Basement Membrane Glomerulonephritis; Other primary GN: Other primary Glomerulonephritis

TABLE 3 – SECONDARY GLOMERULOPATHIES

| | Frequency | % |
|----------------------------|-----------|-------|
| SLE | 61 | 42.4 |
| DM | 18 | 12.5 |
| Thrombotic microangiopathy | 9 | 6.3 |
| Post-infectious GN | 8 | 5.6 |
| Amyloidosis | 8 | 5.6 |
| HIV-related GN | 1 | 0.7 |
| Other secondary GN | 39 | 27.1 |
| Total | 144 | 100.0 |

SLE: Systemic Lupus Erythematosus; DM: Diabetes Mellitus; GN: Glomerulonephritis

only 3.4% of cases, while post-infectious GN corresponded to 5.6% of secondary glomerulopathy cases. Such data are in disagreement with the Pernambuco Registry of Glomerulopathies (REPEG).¹⁷

Lupus nephropathy was the most common type of secondary glomerulopathy found, corresponding to 42.4% of cases. The low prevalence of diabetic nephropathy in our sample stems from the fact that we only biopsied diabetic nephropathy patients when they presented with a high degree of atypia. On the contrary, diabetic nephropathy would probably be regarded as the main cause of secondary GN in our population.

CONCLUSION

This study provides data regarding the frequency of histopathological findings from renal biopsies of 9 nephrology centers in the state of Minas Gerais. We found that FSGS was the most frequent primary glomerulopathy while lupus nephropathy was the main type of secondary glomerulopathy and that a

low incidence of glomerulonephritis was associated with infectious conditions.

Creating and expanding these registries to identify the epidemiology of kidney diseases in our country will help create policies that can fight these diseases early in life in order to prevent an increase in the number of patients with chronic kidney failure, which is an important public health problem.

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RESUMO

INTRODUÇÃO: Analisamos a distribuição e frequência de doenças glomerulares de pacientes biopsiados entre 1992 e 2016 em centros que compõem a Amicen (Associação de Minas Gerais de Nefrologia).

MÉTODOS: Analisamos os relatórios de biópsia de pacientes de nove centros de nefrologia da Amicen. Observamos idade, gênero, uso de ultrassom, tempo de descanso pós-biópsia, se o rim era nativo ou um enxerto, número de glomérulos e indicação para a biópsia. Os achados da biópsia do rim foram divididos em quatro categorias: doenças glomerulares e não glomerulares, rins normais e material insuficiente para análise. Os pacientes diagnosticados com doenças glomerulares foram ainda divididos em doenças glomerulares primárias ou secundárias.

RESULTADOS: Obtivemos 582 relatórios de biópsia. A idade mediana foi de 38 anos (1 a 85). O número de glomérulos variou entre zero e 70 (mediana = 13,0). No total, 97,8% das biópsias foram guiadas por ultrassom. A principal indicação foi síndrome nefrótica (36,9%), seguida de associação hematúria-proteinúria (16,2%). As doenças glomerulares primárias revelaram-se as mais frequentes (75,3%), seguidas de doenças secundárias (24,7%). Entre as doenças glomerulares primárias, o FSGS foi encontrado em maior frequência (28,8%), enquanto nas doenças secundárias, o lúpus eritematoso sistêmico foi o mais prevalente (42,4%). Quanto aos achados de prevalência, aqueles para doenças primárias e secundárias foram semelhantes aos encontrados nos grandes registros brasileiros publicados até o momento.

CONCLUSÃO: Os registros de doenças glomerulares são uma ferramenta importante para identificar a prevalência dessas doenças em regiões de interesse e pode servir como um instrumento para orientar decisões de políticas públicas relativas à prevenção de doenças renais terminais.

Palavras-chave: Epidemiologia. Biópsia. Glomerulonefrite. Nefropatias.

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