Renal Biopsy Findings in Acute Renal Failure in the Cohort of Patients in the Spanish Registry of Glomerulonephritis

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Background and objectives: Renal biopsy in acute renal failure of unknown origin provides irreplaceable information for diagnosis, treatment, and prognosis. This study analyzed the frequency and clinicopathologic correlations of renal native biopsied acute renal failure in Spain during the period 1994 through 2006.

Design, setting, participants, & measurements: Acute renal failure was defined as a rapid deterioration of glomerular filtration rate, with or without oligoanuria or rapidly progressive renal insufficiency, including acute-on-chronic renal failure. Patients who were younger than 15 yr were considered children, those between 15 and 65 yr adults, and those >65 elderly.

Results: Between 1994 and 2006, data on 14,190 native renal biopsies were collected from 112 renal units in Spain. Of these, 16.1% (2281 biopsies) were diagnosed with acute renal failure. The prevalence of the main clinical syndromes was different in the three age groups: Biopsy-confirmed acute renal failure in children was 5.7%, in adults was 12.5%, and in elderly increased significantly to 32.9%. The prevalence of biopsy-confirmed acute renal failure according to cause was as follows: Vasculitis, 23.3%; acute tubulointerstitial nephritis, 11.3%; and crescentic glomerulonephritis types 1 and 2, 10.1%. The prevalence of the different causes differed significantly according to age group.

Conclusions: The Spanish Registry of Glomerulonephritis provides useful information about renal histopathology in biopsy-confirmed acute renal failure. The prevalence of vasculitis and crescentic glomerulonephritis is high, especially in elderly patients. These data obtained from a national large registry highlight the value of renal biopsy in undetermined acute renal failure.


The study of the epidemiology of biopsy-confirmed renal disease provides useful information about the prevalence of renal disease and its clinical manifestations. Although there are several renal biopsy registries around the world, most describe the distribution of histopathologic findings, and very few analyze in detail the main clinical pictures that indicate renal biopsy, yet knowledge of the epidemiology of renal syndromes is of paramount importance in clinical nephrology.

The Spanish Registry of Glomerulonephritis has recorded individual patient data for all renal biopsies performed since 1994 (1,2). This information enables us to study the epidemiology of renal syndromes and histopathologic data. Renal biopsy in acute renal failure (ARF) of unknown origin provides irreplaceable information for diagnosis, treatment, and prognosis. In this report, we analyze the frequency and clinicopathologic correlations of renal native biopsied ARF in Spain during the period 1994 through 2006.

Materials and Methods

We analyzed the frequency and clinicopathologic correlations of ARF confirmed by native renal biopsy in Spain and the distribution of the different clinicopathologic findings according to age. Patients who were younger than 15 yr were classified as children, those between 15 and 65 yr as adults, and those older than 65 as elderly.

We analyzed the results of renal biopsies during the period 1994 through 2006 and completed one questionnaire for each patient. ARF was defined as a rapid deterioration of the GFR, with or without oligoanuria or rapidly progressive renal insufficiency, including acute-on-chronic renal failure. Nephrotic syndrome was defined as proteinuria >3.5 g per d/1.73 m² and serum albumin <2.5 g/dl. Nephritic syndrome was defined as hematuria, hypertension, oliguria, edema, and reduced GFR. Asymptomatic urinary abnormalities were defined as proteinuria <3.5 g/d and/or hematuria with more than three red blood cells and no clinical manifestations, hypertension as BP >140/90 mmHg or antihypertensive treatment, and chronic renal failure as serum creatinine levels persistently >1.5 mg/dl. Each questionnaire recorded the following variables: Name, hospital, date of birth, gender, presence of arterial hypertension and/or antihypertensive treatment, serum creatinine (mg/dl), creatinine clearance (ml/min), proteinuria (g/d), urinary sediment, main defined clinical syndrome, study methods, and number of glomeruli obtained. Primary glomerulonephritis (GN) is classified into eight groups: Minimal-change disease; FSGS; proliferative endocapillary GN; crescentic GN (presence of crescents in >50% of glomeruli) types 1, 2, and 3; membranoproliferative types 1 and 2 GN; membranous GN, IgA nephropathy; and mesangioproliferative-

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tive non-IgA nephropathy. Secondary GN has also been classified into eight groups: Fibrillary, lupus nephritis, collagenosis (scleroderma and other connective tissue diseases not included in another diagnosis), vasculitis, Goodpasture syndrome, cryoglobulinemic GN, amyloidosis, and light-chain nephropathy. Crescentic type 3 and pauci-immune rapidly progressive GN were included in the vasculitis group. Non-inflammatory renal pathology has been classified into eight groups: Diabetic nephropathy, nephroangiosclerosis, atheroembolic disease, acute tubular necrosis, myeloma kidney, thrombotic microangiopathy, acute tubulointerstitial nephritis (ATIN), and chronic interstitial nephropathy. The remaining causes have been classified into three groups: Unclassified nephropathies, sclerotic kidney, and other miscellaneous pathologies. Biopsies of transplant kidneys were not studied (1,2). Testing for antineutrophil cytoplasmic autoantibodies (ANCA) and anti–glomerular basement membrane in serum was not requested in this study, and we did not collect outcome or follow-up information.

Statistical Analysis

Data were stored in a database (Microsoft Access; Microsoft Corp., Redmond, WA). Statistical analysis was by SPSS for Windows 10.0.6 (SPSS Systat Inc., Chicago, IL). The normal distribution was determined using the Kolmogorov-Smirnov test. The values are expressed as medians when the parameters did not follow a normal (Gaussian) distribution. The χ² and Fisher exact test were used to compare qualitative variables. P < 0.05 (by two-tailed testing) was considered to indicate statistical significance.

Results

Between 1994 and 2006, we collected 14,190 native renal biopsies from 112 renal units in Spain, 99 of which had at least one case of ARF. The renal units are listed in the Acknowledgments.

Sixteen percent (2281 biopsies) were diagnosed with ARF, which is the third indication for renal biopsy after nephrotic syndrome (35.4%) and asymptomatic urinary abnormalities (21.4%), as indicated in Figure 1. The prevalence of ARF over total syndromes as a main indication for renal biopsy increased significantly during the study period (P < 0.0001; Figure 2). The average incidence of ARF was 175 biopsies per year.

The prevalence of the main clinical syndromes was statistically different in the three age groups. For children, ARF represented 5.7% of all renal syndromes, and for adults and elderly patients, this figure increased to 12.5 and 32.9%, respectively (Table 1). When we consider all biopsied ARF, the distribution according to age was also different: 1.9% in children, 52.8% in adults, and 45.3% in elderly patients.

Ninety percent of the patients with biopsy-confirmed ARF had abnormal urinary sediment, mainly hematuria (Figure 3). Men predominated in every age group with an overall ratio of 1.5, and the prevalence of hypertension was high. The median age, proteinuria levels, number of glomeruli obtained, and statistical significance are shown in Table 2. The most important causes of ARF were secondary GN (32.5%), followed by nonglomerular pathology (30.4%), primary GN (28.8%), and other or unclassified nephropathies (8.3%).

The histologic categories of the biopsies are listed in Table 3 and Figure 4. This distribution differs significantly in the three age groups (P < 0.001). Vasculitis (including pauci-immune crescentic or type 3 GN with or without angiitis) was the first cause (23.3%), followed by ATIN (11.3%) and crescentic GN types 1 and 2 (10.1%). Crescentic GN type 1 (anti–glomerular basement membrane antibodies) constituted 12.5% of all crescentic glomerular diseases; type 2 (immune complex related), 20.2%; and type 3, 67.2%. The percentage distribution of the different types of crescentic GN was similar in the three age groups (P = 0.11, data not shown). The prevalence of acute tubular necrosis in our registry is low: 5% of all renal biopsies, with minor differences in the three age groups (Table 3).

In children (n = 43), the predominant conditions were thrombotic microangiopathy (20.9%), followed by crescentic GN types 1 and 2, IgA nephropathy, and vasculitis (11.6% each). The predominant conditions in adults (n = 1191) were vasculitis (18.3%), followed by ATIN (11.8%), IgA nephropathy (11.3%), and crescentic GN types 1 and 2 (9.3%; Table 3, Figure 5). This prevalence did not change during the study period.

Finally, in elderly patients (n = 1023), there was an even greater prevalence of vasculitis that increased to 29.6%, followed by other forms of crescentic GN types 1 and 2 (10.9%) and ATIN (10.9%; Table 3, Figure 6). These values did not change during the study period. These results are summarized in Figure 7, which shows that the prevalence of vasculitis...
increased significantly in the three age groups: Thrombotic microangiopathy decreased in adults and elderly patients and ATIN was slightly lower in children but similar in adults and elderly patients.

**Table 1. Distribution of renal syndromes according to age: 1994 through 2006 data**

| Age (yr) | Nephrotic Syndrome (%) | Nephritic Syndrome (%) | Asymptomatic Urinary Abnormalities (%) | Hypertension (%) | ARF (%) | Chronic Renal Failure (%) | Hematuria (%)
<table>
<thead>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15 (n = 748)</td>
<td>47.3</td>
<td>6.8</td>
<td>22.9</td>
<td>0.3</td>
<td>5.7</td>
<td>3.5</td>
<td>13.5</td>
</tr>
<tr>
<td>15 to 65 (n = 9494)</td>
<td>36.5</td>
<td>5.1</td>
<td>26.9</td>
<td>2.8</td>
<td>12.5</td>
<td>12.3</td>
<td>3.8</td>
</tr>
<tr>
<td>&gt;65 (n = 3111)</td>
<td>36.8</td>
<td>5.8</td>
<td>9.1</td>
<td>0.8</td>
<td>32.9</td>
<td>13.9</td>
<td>0.7</td>
</tr>
<tr>
<td>Total</td>
<td>37.2</td>
<td>5.4</td>
<td>22.5</td>
<td>2.4</td>
<td>16.9</td>
<td>12.2</td>
<td>3.6</td>
</tr>
</tbody>
</table>

aP < 0.0001 (χ² test). ARF, acute renal failure.

**Figure 3. Urinary sediment.**

Discussion

This observational study is the first description of the epidemiology of biopsy-confirmed ARF in native kidneys from a large national registry. Most of the patients have glomerular disease, and our analysis is made only for patients from whom biopsies have been taken because of clinical suspicion of GN or other renal diseases that merit histologic confirmation. Despite the biases common to national registries—biopsy studied by different pathologists, nonhomogeneous biopsy policy, and interpretation of histopathologic findings—the data offered by the Spanish Registry of Glomerulonephritis are representative of histologic findings in ARF. Moreover, the large number of renal biopsies (2281) and the long period of data collection (13 yr) reinforce the value of this database. In all renal syndromes, particularly in ARF, histopathologic findings are of paramount importance for correct diagnosis, prognosis, and even choosing therapy (3,4). Haas et al. (5) reported that in patients who were aged ≥60 yr and underwent renal biopsy, ARF was the main indication of biopsy in 24.3%; moreover, prebiopsy clinical diagnosis was correct in only 33% of cases, biopsy enabled a specific diagnosis to be reached in >90%, and a diagnosis offering the potential for improved outcomes with treatment was made in 73% of cases. The design of our study did not include outcome or follow-up data.

Curiously, the epidemiology of ARF has not been studied in detail. In one of the most interesting studies, Liana et al. (6) reported 748 cases of ARF with an incidence of 209 cases per million people. The most frequent causes of ARF were acute tubular necrosis (45%), prerenal failure (21%), acute-onset chronic renal failure (12.7%), and obstructive ARF (10%). Although the number of renal biopsies performed was low (6.1% of all cases of ARF), it allowed us to diagnose several renal diseases by histopathology. The use of renal biopsy for patients with ARF is usually reserved for the following conditions: (1) absence of an obvious cause; (2) extrarenal manifestations compatible with a systemic disease; (3) proteinuria, hematuria, or cylindruria; (4) ARF of more than 3 wk duration or prolonged anuria; and (5) suspicion of a parenchymatous origin excluding acute tubular necrosis. In our patients, urinary sediment was normal in only 10% of cases and hematuria, cylindruria, and non-nephrotic proteinuria were present in most cases. Moreover, hypertension was more common than in other cases of ARF. Thus, we assumed that in ARF with hypertension, proteinuria, and altered urinary sediment (mainly hematuria) and after excluding obvious cases of acute deterioration of renal function, biopsy provided essential information on histopathology, pathogenesis, and classification (7,8). Although renal biopsy is much safer nowadays thanks to new biopsy guns and ultrasonic guidance, it is necessary to tailor indications and evaluate potentially severe risks (9).

Although there are many renal biopsy registries around the world, most describe the incidence and prevalence of histopathologic findings. Very few analyze in detail the main clinical syndromes that indicate renal biopsy. Renal biopsy registries in Australia (10), Denmark (11,12), Macedonia (13), Hungary (14), Thailand (15), Peru (16), Korea (17), China (18), New Zealand (19), Brazil (20), Saudi Arabia (21), and the Czech Republic (22) do not provide information about ARF as a separate clinical syndrome at the time of renal biopsy. In the Singaporean (23), Dutch (24), Uruguayan (25), and Japanese (26) registries, the clinical indication for renal biopsy was ARF in 7 to 13.6% of cases; however, the definition of clinical syndromes is not clear, and, in most cases, ARF is referred to as nephritic syndrome or rapidly progressive GN. These discrepancies may arise because the definition of ARF is problematic and a precise operational definition of ARF is not available (27). Thus, the term ARF was recently replaced by acute kidney injury, and ARF should be restricted to patients who have acute kidney injury and need renal replacement therapy (28). Moreover, the new Acute Kidney Injury Network has proposed...
uniform standards for diagnosis and classification, which were published in 2007 (29). Unfortunately, according to these standards, our definition of ARF is flawed, thus reflecting the problem of this type of definition in national registries during the study period (1994 to 2006). Although our consideration of ARF is more imprecise than the current definition, the results of our investigation are representative.

Other large national registries include detailed data on renal syndromes and allow comparison with other registries of the importance of renal biopsy in undetermined ARF. A survey by

### Table 2. Distribution of clinical data in biopsied ARF according to age

<table>
<thead>
<tr>
<th>Age (yr)</th>
<th>Male/Female Ratio</th>
<th>Hypertension (%)</th>
<th>Age (yr)</th>
<th>Serum Creatinine (mg/dl)</th>
<th>GFR (ml/min)</th>
<th>Proteinuria (g/24 h)</th>
<th>No. of Glomeruli</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;15 (n = 43)</td>
<td>1.3</td>
<td>37.2</td>
<td>9</td>
<td>2.9</td>
<td>18.0</td>
<td>1.0</td>
<td>18</td>
</tr>
<tr>
<td>15 to 65 (n = 1191)</td>
<td>1.7</td>
<td>53.0</td>
<td>50</td>
<td>5.0</td>
<td>16.0</td>
<td>1.7</td>
<td>12</td>
</tr>
<tr>
<td>&gt;65 (n = 1023)</td>
<td>1.3</td>
<td>58.3</td>
<td>73</td>
<td>5.5</td>
<td>11.0</td>
<td>1.4</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>1.5</td>
<td>53,1</td>
<td>63</td>
<td>5.1</td>
<td>13.1</td>
<td>1.5</td>
<td>12</td>
</tr>
</tbody>
</table>

\( P \) 0.0007\(^b\) <0.003\(^b\) <0.001\(^c\) <0.001\(^c\) <0.0001\(^c\)

\( ^a\)Data are medians.
\( ^b\)\( \chi^2 \) test.
\( ^c\)Kruskal-Wallis nonparametric test.

### Table 3. Distribution of histopathologic diagnoses in biopsied ARF

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Total (%) (n = 2281)</th>
<th>Age (yr)</th>
<th>&lt;15 (%) (n = 43)</th>
<th>15 to 65 (%) (n = 1191)</th>
<th>&gt;65 (%) (n = 1023)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 3 crescentic GN + vasculitis</td>
<td>23.3</td>
<td>11.6</td>
<td>18.3</td>
<td>29.6</td>
<td></td>
</tr>
<tr>
<td>Acute tubulointerstitial nephritis</td>
<td>11.3</td>
<td>9.3</td>
<td>11.8</td>
<td>10.9</td>
<td></td>
</tr>
<tr>
<td>Types 1 and 2 crescentic GN</td>
<td>10.1</td>
<td>11.6</td>
<td>9.3</td>
<td>10.9</td>
<td></td>
</tr>
<tr>
<td>IgA nephropathy</td>
<td>8.8</td>
<td>11.6</td>
<td>11.3</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Acute tubular necrosis</td>
<td>5.0</td>
<td>2.3</td>
<td>4.3</td>
<td>6.0</td>
<td></td>
</tr>
<tr>
<td>Benign nephrosclerosis</td>
<td>3.8</td>
<td>–</td>
<td>4.8</td>
<td>2.6</td>
<td></td>
</tr>
<tr>
<td>Lupus nephritis</td>
<td>3.3</td>
<td>4.7</td>
<td>5.0</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>3.3</td>
<td>9.3</td>
<td>4.0</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>Unclassifiable</td>
<td>3.0</td>
<td>2.3</td>
<td>2.9</td>
<td>3.1</td>
<td></td>
</tr>
<tr>
<td>Thrombotic microangiopathy</td>
<td>2.8</td>
<td>20.9</td>
<td>3.4</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Light-chain cast nephropathy (myeloma kidney)</td>
<td>2.8</td>
<td>–</td>
<td>1.8</td>
<td>4.0</td>
<td></td>
</tr>
<tr>
<td>Membranoproliferative GN</td>
<td>2.7</td>
<td>–</td>
<td>3.2</td>
<td>2.2</td>
<td></td>
</tr>
<tr>
<td>Endocapillary GN</td>
<td>2.5</td>
<td>4.7</td>
<td>2.1</td>
<td>2.8</td>
<td></td>
</tr>
<tr>
<td>Chronic tubulointerstitial nephritis</td>
<td>2.2</td>
<td>–</td>
<td>2.2</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>FSGS</td>
<td>2.1</td>
<td>–</td>
<td>2.6</td>
<td>1.4</td>
<td></td>
</tr>
<tr>
<td>Sclerotic kidney</td>
<td>2.1</td>
<td>4.7</td>
<td>2.1</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>Amyloidosis</td>
<td>2.0</td>
<td>–</td>
<td>1.5</td>
<td>2.4</td>
<td></td>
</tr>
<tr>
<td>Anti–glomerular basement membrane antibody (Goodpasture disease)</td>
<td>2.0</td>
<td>–</td>
<td>2.4</td>
<td>1.6</td>
<td></td>
</tr>
<tr>
<td>Diabetic nephropathy</td>
<td>1.8</td>
<td>–</td>
<td>1.7</td>
<td>2.0</td>
<td></td>
</tr>
<tr>
<td>Non-IgA mesangial GN</td>
<td>1.1</td>
<td>2.3</td>
<td>1.4</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Membranous nephropathy</td>
<td>1.1</td>
<td>–</td>
<td>1.3</td>
<td>0.9</td>
<td></td>
</tr>
<tr>
<td>Atheroembolism</td>
<td>0.8</td>
<td>–</td>
<td>0.4</td>
<td>1.3</td>
<td></td>
</tr>
<tr>
<td>Light-chain disease</td>
<td>0.7</td>
<td>–</td>
<td>0.4</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>Cryoglobulinemia</td>
<td>0.7</td>
<td>2.3</td>
<td>0.8</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Minimal-change disease</td>
<td>0.5</td>
<td>2.3</td>
<td>0.3</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Collagenosis</td>
<td>0.4</td>
<td>–</td>
<td>0.4</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Fibrillary GN</td>
<td>0.1</td>
<td>–</td>
<td>0.2</td>
<td>–</td>
<td></td>
</tr>
</tbody>
</table>

\( ^a\)GN, glomerulonephritis.
the Italian registry (30,31), which collected 15,461 biopsies, revealed the incidence of ARF as a clinical syndrome in the study of renal biopsies to be 9.2%. The most frequent cause of ARF was necrotizing vasculitis (20.1%) followed by crescentic GN (14%), ATIN (11.3%), and acute tubular necrosis (7.9%). In the French registry (32), ARF constitutes 20% of renal biopsy indications, with a decrease in the last period studied. In the United Arab Emirates, a study of renal diseases (33) revealed that biopsied ARF represents 3.5% of all ARF, although the low number of renal biopsies does not permit comparisons with other larger registries. In more recent reports, the frequency of ARF varied from 2.5 to 12.4%. In Romania (34), ARF was present in 12.4% of the population, although this percentage was significantly lower (9.2%) in patients who were younger than 60 yr than in patients who were older than 60 yr (26.6%). Brazilian data (35) showed that ARF affects 2.5% of the population and rapidly progressive GN affects 7.1%; when the two entities are taken as one, the real incidence of ARF is 9.6%. In the Portuguese renal biopsy registry, ARF affected 9.7% (36), and in the large Indian registry (37), ARF affected 9.3 and 5.2% during the two study periods (1971 to 1985 and 1986 to 2002); the decrease may be due to improved health care. In most of these investigations, ARF was preceded by nephrotic syndrome (35), urinary abnormalities (30), recurrent macrohematuria, or nephritic syndrome (34). In our registry (1,2), the main indication was nephrotic syndrome, although ARF constitutes the third indication for renal biopsy (16%). We also found in our database that ARF as a main indication of renal biopsy increased during the last few years of the study; this was probably because biopsy began to be indicated for elderly patients as a consequence of the increase in life expectancy. Thus, in our experience, the percentage of ARF as an indication for renal biopsy increases from 5.4% in children to 11.9% in adults and 31.6% in elderly patients. Many renal diseases are not diagnosed in elderly patients because of comorbidity and the results of serologic tests (ANCA and others), thus creating a new bias in our knowledge of the epidemiology of renal diseases in this age group.

When we analyze histopathology results, there is consensus on two points: (1) The different patterns according to the age group studied and (2) the elevated incidence of systemic or limited renal vasculitis, especially in the elderly. Thus, the report of the Italian National Registry of Renal Biopsies in Children (38) confirms that onset of ARF occurs at <15 yr in

![Figure 4. Causes in all age groups. GN, glomerulonephritis.](image)

![Figure 5. Causes of biopsy-confirmed ARF in adults.](image)

![Figure 6. Causes of biopsy-confirmed ARF in elderly patients.](image)

![Figure 7. Renal histopathology by age group.](image)
5.3% of cases (very similar to our results) and that this is clearly preceded by isolated hematuria, proteinuria, and nephrotic syndrome. In this group of patients, the most frequent diseases are crescentic GN, ATIN, and hemolytic-uremic syndrome. Our results are similar, although we found that hemolytic-uremic syndrome was predominant in children. The Italian registry (30) reported that renal biopsy was indicated as a result of necrotizing vasculitis, chronic GN, acute tubulointerstitial nephritis, and acute tubular necrosis, in percentages similar to ours; however, that study made no distinctions between adult and elderly patients.

In our registry, crescentic proliferation (with or without angiitis) appears in one third (34.7%) of all renal biopsies; these findings are even more evident in the elderly (42.2%) and are consistent with those reported in elderly patients in the detailed investigations of Haas et al. (5) and Uezono et al. (39). When we consider the results of all renal biopsies in Spain during the same period, we see that crescentic GN and vasculitis take sixth place (6.8%), preceded by IgA nephropathy (14.5%), membranous nephropathy (10.6%), FSGS (9.4%), lupus nephritis (9.2%), and minimal-change disease (7.4) (1,2). In the Italian registry, there was an increase in the percentage of patients who were older than 65 yr and required renal biopsy (40). These findings highlight the role of crescentic proliferation in the acute deterioration of renal failure; however, it is widely known that pauci-immune crescentic GN is a form of renal limited vasculitis generally associated with ANCA. Here, the prompt diagnosis with renal biopsy is a key procedure when initiating immunosuppressive treatment to prevent irreversible glomerulosclerosis. In our registry, testing to determine the presence of ANCA was not requested to simplify the data collected and facilitate participation. The second cause of ARF is acute tubulointerstitial nephritis, which must be confirmed in severe cases by renal biopsy so that treatment with steroids and/or immunosuppressive drugs can be started. It is interesting that IgA nephropathy is a significant cause of biopsy-confirmed ARF in adults (approximately 11%), probably caused by hematuria and/or crescentic proliferation. Finally, it is also important to emphasize that the incidence of necrotizing crescentic GN has increased in recent years. In a UK study (41), pauci-immune rapidly progressive GN accounted for nearly 8% of ARF admissions. Apart from the clinical picture, crescentic GN is the third cause of renal disease, preceded only by membranous GN and IgA nephropathy (42); however, the spectrum of intrinsic ARF could be different in less developed countries (43).

The percentage of cases of acute tubular necrosis in our registry is very low (5% of all renal biopsies), because most cases are diagnosed with clinical data and we analyzed only the cases of biopsy-confirmed ARF; however, even profound acute tubular necrosis often has limited pathologic changes, so some cases with acute tubular necrosis might end up being classified under their underlying pathology, such as nephroclerosis or diabetes. Nevertheless, several cases of acute allergic interstitial nephritis, atheroembolism, or another renal disease could have been confused with acute tubular necrosis. This fact stresses the importance of carefully indicating renal biopsy in “atypical” acute tubular necrosis and of developing updated guidelines for renal biopsy (44).

The Spanish Registry of Glomerulonephritis provides useful information about renal histopathology in biopsy-confirmed ARF. ARF associated with proteinuria and/or hematuria is produced by several renal diseases other than acute tubular necrosis, with important prognostic and therapeutic consequences. The prevalence of vasculitis and crescentic GN is high, especially in elderly patients. These data, obtained from a national large registry, stress the value of renal biopsy in undetermined ARF. The follow-up, prognosis, and outcome of this type of ARF must be studied in the future.

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Disclosures
None.

References