Pattern of biopsy proven renal diseases at PNS SHIFA, Karachi: A cross-sectional survey

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ARTICLE INFO

Article Type: Original Article

Article History:
Received: 28 March 2013
Accepted: 30 June 2013
ePublished: 10 October 2013

Keywords:
Epidemiology
Renal biopsy
Glomerulonephritis
Nephropathy

ABSTRACT

Introduction: Percutaneous renal biopsy (RB) is an invaluable diagnostic procedure in patients with medical renal diseases.

Objectives: To determine the pattern of biopsy proven renal disease (BPRD) from a tertiary care naval hospital in Karachi, Pakistan.

Methods and Materials: All the renal biopsies in adult patients (≥18 years) performed at our hospital from 2008 to 2012 were retrospectively reviewed. The biopsies were evaluated by light microscopy and immunofluorescence.

Results: A total 60 cases were analyzed. The mean age was 33.3±12.9 years (range: 18 to 72 years). The male to female ratio was 3:1. The most common indication of renal biopsy was nephrotic syndrome (43.3%), followed by renal failure (26.6%) and non-nephrotic proteinuria (23.3%). Primary glomerulonephritides (PGN) were predominant overall lesions, found in 46 (76.6%) of the total biopsies. Among PGN, the most common lesion was focal segmental glomerulosclerosis (FSGS), followed by membranous glomerulonephritis (MGN), IgA nephropathy (IgAN) and chronic sclerosing glomerulonephritis (CSGN) and a variety of rare lesions. Secondary glomerulonephritides (SGN) were found in only three (5%) cases. There were two cases of amyloidosis and one of lupus nephritis (LN). Tubulointerstitial disease (TID) and vascular disease were rare.

Conclusion: This study provides information about the epidemiology of BPRD in a large tertiary care naval center in Southern Pakistan.

Implication for health policy/practice/research/medical education:
Retrospective reviews and analysis of renal biopsies serve a useful function in understanding the epidemiology of medical renal diseases in an area. Although, inherently biased and heavily dependant on biopsy policies, these studies do shed some light on the prevalent renal diseases in a community or region. This study represents such an attempt of determining the most common medical renal diseases in adults from this part of the world.

Please cite this paper as: Sabir S, Mubarak M, Ul-Haq I, Bibi A. Pattern of biopsy proven renal diseases at PNS SHIFA, Karachi: A cross-sectional survey. J Renal Inj Prev 2013; 2(4): 133-137. DOI: 10.12861/jrip.2013.43

Introduction

Percutaneous renal biopsy (RB) is an invaluable diagnostic procedure in patients with medical renal diseases (1). However, the indications of RB and the extent of its pathological evaluation vary from country to country and even from center to center (2,3). Although the analysis of data obtained from RB is not ideal for understanding the epidemiology of renal diseases, it is nevertheless important for identifying the prevalent patterns of renal disease in a certain area (4).

The prevalence of biopsy proven renal diseases (BPRDs) varies according to the geographic region, socioeconomic conditions, race, age, demography and indication of renal biopsies (5-15). Unfortunately, there is no central renal biopsy registry in Pakistan. Population based studies on the prevalence of renal disease in Pakistan are non-existent (4). Very few studies on BPRD have been published from Pakistan and the neighboring countries (2,4,5-10) and some of these have demonstrated an increase in the incidence of focal segmental glomerulosclerosis (FSGS). Moreover,
growing evidence from different published studies across the world indicates a changing pattern of glomerular disease over the last few decades (6,11-24). PNS SHIFA is a tertiary care naval hospital situated in Karachi. The hospital receives patients from southern provinces of Sindh and Balochistan. However, our patients represent mixed demographic data since armed forces personnel and their families from all over Pakistan are posted to our catchment area in addition to the natives. At PNS SHIFA, a nephrologist (SS) performs the renal biopsies along with a radiologist under ultrasound guidance in the radiology department. Till date, we have completed four years of collection of RB data at our hospital, prompting us to carry out this study to understand the pattern of BPRD in our institute which will inform nephrologists and pathologists in future management of such cases.

**Objectives**

This study is the first to report pattern of diagnosis of renal biopsies from any armed forces hospital in Pakistan.

**Methods and Materials**

All the kidney biopsies performed at our Hospital from January 2008 to July 2012 were retrospectively analyzed from request forms, admission records and biopsy reports. The biopsies were carried out at PNS and interpreted at Histopathology Department of Sindh Institute Of Urology and Transplantation (SIUT), Karachi, Pakistan. The following data items were recorded for each patient: age, sex, indication for RB, histopathological diagnosis and relevant laboratory tests such as serum creatinine, 24 hours urinary protein, vireology (HBsAg, anti HCV, HIV) and serology (anti-ds DNA antibody, ANA, C3, C4). The RB specimens obtained were processed and prepared according to standard protocols and examined by a pathologist (MM) with special interest and expertise in nephropathology, as described in our previous study (4). The histopathological evaluation included light microscopy (LM) and immunofluorescence (IF). For LM, 3 sections were stained with Hematoxylin and Eosin (H&E), two with periodic acid Schiff (PAS), one with Masson’s trichrome, and one with Jones silver methenamine. Further special stains were used as and when required. IF study was done by using polyclonal antibodies against human IgG, IgM, IgA, C3, and C1q (Dako, Glostrup, Denmark). The indications for renal biopsy were classified into five clinical syndromes: nephrotic syndrome (NS), non-nephrotic proteinuria (NNP), proteinuria-hematuria, renal failure (RF), and rapidly progressive glomerulonephritis (RPGN). In RF, RB was performed for unexplained RF if kidney sizes were within normal limits. Standard definitions were used for all these biopsy indications (4). Hypertension was considered when blood pressure was higher than 140/90 mmHg. All the biopsies were obtained by percutaneous automated biopsy gun. Written informed consent was obtained prior to obtaining the biopsies in all cases. Standard histological classification was used to diagnose the pathological entities (25).

**Ethical issues**

The research followed the tenets of the Declaration of Helsinki; written informed consent was obtained; and the research was approved by ethical committee of PNS Shifa and SIUT centers.

**Statistical analysis**

Statistical analysis was carried out using IBM compatible SPSS for windows version 13 (SPSS Inc., Chicago, IL, USA). Simple descriptive statistics such as mean±SD were used for continuous variables such as age and clinical and laboratory features. Numbers (percentages) were used for categorical variables.

**Results**

**Patient characteristics**

The demographic characteristics of patients are shown in Table 1. A total of 60 patients with RBs were analyzed retrospectively from 2008 to 2012. Only one biopsy was inadequate, rest all yielded adequate tissue for proper diagnosis and classification of underlying diseases. One patient had dual pathology on RB. Among these, 45 (75%) were males and 15 (25%) were females. The male to female ratio was 3:1. The mean age of patients was 33.3±12.9 years (range: 18-72 years).

The indications for RBs in our study are shown in Table 2. As is evident from this table, the most common indication for renal biopsy was NS, followed by RF, and NNP. Other indications were rare.

**Pathologic Findings**

The frequencies of different renal diseases in percutaneous native renal biopsies in adult patients at our hospital are shown in Table 3. It is evident from this table that the glomerular diseases were most prevalent and among these PGD were overwhelmingly predominant. SGN were less frequent as were TID and vascular diseases. Table 4 shows a comparison of some important renal diseases found in our study with a few previously published local, regional and international studies. It is obvious from this table that the pattern of BPRD observed in our study closely resembles

| Table 1. Demographic characteristics |
|-------------------------------------|
| Total number of patients | 60 |
| Males | 45 (75%) |
| Females | 15 (25%) |
| Male to female ratio | 3:1 |
| Mean age (in years) | 33.3 ± 12.9 |
| Age range (in years) | 18-72 |

| Table 2. Clinical indications for renal biopsies in 60 adults with medical renal diseases |
|-------------------------------------|
| Clinical indications | Number | Percentage |
| Nephrotic syndrome | 26 | 43.3 |
| Renal failure | 16 | 26.6 |
| Non-nephrotic proteinuria | 14 | 23.3 |
| Non-nephrotic proteinuria, hematuria | 2 | 3.3 |
| Rapidly progressive glomerulonephritis | 2 | 3.3 |
| Total | 60 | 100.00 |
Table 3. Breakdown of renal biopsy diagnoses in 60 renal biopsies from adult patients.

| Renal Diseases                  | Number | Overall percentage |
|--------------------------------|--------|--------------------|
| Primary GN                     | 46     | 76.6               |
| FSGS                           | 16     | 26.6               |
| Membranous GN                  | 10     | 16.6               |
| IgAN                           | 7      | 11.6               |
| Chronic sclerosing GN          | 6      | 10                 |
| Minimal change disease         | 3      | 5                  |
| Postinfectious GN              | 1      | 1.6                |
| IgMN                           | 1      | 1.6                |
| MPGN                           | 1      | 1.6                |
| C1q nephropathy                | 1      | 1.6                |
| Secondary GN                   | 3      | 5                  |
| Lupus nephritis                | 1      | 1.6                |
| Amyloidosis                    | 2      | 1.6                |
| Tubulo-interstitial disease    | 7      | 11.6               |
| Tubulo-interstitial nephritis  | 4      | 6.6                |
| Tuberculosis                   | 3      | 5                  |
| Vascular Disease               | 4      | 6.6                |
| Acute cortical necrosis        | 1      | 1.6                |
| Benign nephrosclerosis         | 2      | 3.3                |
| Vasculitides                   | 1      | 1.6                |
| Total                          | 60     | 100                |

FSGS, focal segmental glomerulosclerosis, IgAN, IgA nephropathy, IgM, IgM nephropathy, MPGN, membranoproliferative GN.

Table 4. Comparison of some common diseases in our series with other studies (all figures are in percentages).

| Diseases                    | Our study | Pakistan (4) | India (7) | UAE (8) | Saudi Arabia (9) | Italy (12) |
|-----------------------------|-----------|--------------|-----------|---------|------------------|------------|
| Glomerulonephritides (GN)   | 81.6      | 83.58        | 71        | -       | 76               | -          |
| Primary GN                  | 76.6      | 86.57        | 71        | 77.1    | 68               | 59.95      |
| FSGS                        | 26.6      | 20.89        | 17        | 18.3    | 21.8             | 11.8       |
| Membranous GN               | 16.6      | 16.97        | 9.8       | 20.1    | 21.8             | 20.7       |
| Minimal change disease      | 5         | 5.52         | 11.6      | 18.3    | 26.4             | 7.8        |
| IgA nephropathy             | 11.6      | 1.49         | 8.6       | 6.3     | 1.9              | 34.5       |
| Secondary GN                | 5         | 14.4         | -         | 16.5    | 32               | 25.4       |
| Amyloidosis                 | 1.6       | 4.69         | -         | 33.3    | 32               | -          |
| Lupus nephritis             | 1.6       | 4.80         | 6.5       | 40.7    | -                | -          |
| Diabetic nephropathy        | -         | 20           | -         | 1.10    | -                | -          |
| Tubulo-interstitial disease | 11.6      | 11.22        | 2.5       | -       | 4                | 3          |
| Vascular disease            | 1.6       | 3.92         | -         | -       | -                | 33         |

Discussion

Although there are several limitations in the study, it provides important information about the demographics, clinical syndromes and the pattern of kidney diseases diagnosed by RB during a period of four years at a single tertiary care referral institute in Karachi, Pakistan. The main limitations of the study include its retrospective nature, single center based study, relatively small size of the sample, and somewhat biased biopsy indications in favor of more severe kidney diseases. This makes direct comparisons with different published studies and accurate conclusions somewhat difficult. Nevertheless, it provides a significant insight into the pattern of BPRD prevalent in the catchment area of our hospital.

The demographic and clinical characteristics of our cohort are more or less similar to those reported in other regional studies (4-10). We observed a male predominance in all cases of renal diseases as well as the predominant age affected is the young adult group and that is because our patients in majority belong to armed forces. Similar to other studies, our data showed that nephrotic syndrome was the most frequent clinical presentation in all age groups, accounting for 43.3% of all cases (4,6,9). On the other hand, studies from Japan and Europe reported a higher frequency of minor urinary abnormalities as biopsy indications with consequent differences in the histopathological lesions (11-21).

The underlying pathology of NS is highly variable across the world. In our study, the most common pathological lesion underlying NS was membranous GN (MGN), closely followed by FSGS, while MCD, IgAN and MPGN were rare. This is slightly different from that reported from other local and regional studies (4-10). Many studies from Europe however observed similar findings (11-21). The primary glomerulonephritides (PGD) were the most predominant renal diseases in our study as well as in all recent studies, followed by SGN and TIN (4-10,2-19). The vascular diseases were also less frequent in almost all studies. We did not observe any hereditary GN which may be due to lack of
The author declared no competing interests.

Conflict of interests
The author declared no competing interests.

Ethical considerations
Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the author.

Funding/Support
None.

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