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Place of Benign Nephroangiosclerosis among the Causes of Chronic End-Stage Renal Disease in Conakry

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Abstract

Introduction: The aim of this study was to identify the place of benign nephroangiosclerosis among the causes of end-stage chronic renal failure in the Nephrology Department of the Donka National Hospital. **Methodology:** This was a retrospective study from July 1, 2016, to June 30, 2020, of hypertensive patients at least 3 years old with glomerular filtration rate < 15 ml/mn/1.73 m^2, proteinuria less than or equal to 1 g/24 h, LVH and/or Kirkendall stage I or II hypertensive retinopathy without other associated nephropathies. **Results:** During our study period, benign nephroangiosclerosis ranked second among the presumed causes of CKD, with a prevalence of 28% (57 patients). In this series, the mean age was 48.5 years, with 32 men and 25 women, giving a sex ratio of 1.3. Other etiologies were 40% chronic glomerulonephritis, 13% diabetic nephropathy, 7% vascular and indeterminate nephropathy each, 4% chronic tubulointerstitial nephropathy and 1% polycystic kidney disease. Hypertension was WHO grade III in 20 patients (35%) and less than 6 years old in 36 patients (63%). We found a statistical association between the onset of NASB and the duration of hypertension. We recorded 81% clinical improvement in this series. **Conclusion:** Prevention, screening and treatment of high blood pressure would help reduce hypertensive nephropathy in Africa and more particularly in Guinea.

Keywords

Hypertension, End Stage Renal Disease, Conakry

1. Introduction

Benign nephroangiosclerosis (NASB) is a chronic vascular nephropathy that is the late consequence of long-standing and insufficiently controlled hypertension (hypertension). This pathology can lead to end-stage chronic kidney disease (ESRD). It is the second cause of CKD in France [1].

It is more common in people of African origin living in the United States, the Caribbean or Europe and its prevalence increases with age [2].

In 2016, it was the leading cause of kidney failure in France (24.9%), ahead of diabetic nephropathy (22.9%) [2].

Hypertension affects approximately 25% of the adult population and is the cause of CKD in 21% of patients on renal replacement therapy in the South African registry [3].

In Senegal, the hospital prevalence of benign nephroangiosclerosis was 10.43% from 2012-2016 [4].

In Guinea, hypertension is a public health problem; according to data from the 2009 STEPS national survey, the prevalence of hypertension was 29% in the adult population [5].

The objective was to identify the place of benign nephroangiosclerosis among the causes of end-stage chronic kidney disease in the Nephrology Department of Donka University Hospital.

2. Methods

2.1. Scope of the Study

The Department of Nephrology-Hemodialysis-High Blood Pressure and Systemic Diseases of the Donka National Hospital served as a study setting.

2.2. Study Type

This was a retrospective cross-sectional descriptive study with a duration of 5 years from July 1, 2016 to June 30, 2020 on the records of patients in CKD.

2.3. Recruitment

We selected all records of hypertensive patients at least 3 years of age with a glomerular filtration rate < 15 ml/min/1.73 m^2, proteinuria less than or equal to 1 g/24 h, left ventricular hypertrophy and/or Kirkendall stage I or II hypertensive retinopathy without other associated nephropathies.

We have excluded incomplete files.

Incomplete records, mixed kidney disease and acute renal failure were not included.

2.4. Studied Variables

The study variables were sociodemographic (age, sex), clinical, paraclinical and therapeutic.

The glomerular filtration rate was estimated using the MDRD formula (modification of diet in renal disease).

Benign nephroangiosclerosis at the IRCT stage was selected on the basis of the following clinical and paraclinical elements:

- Long-standing hypertension of at least three [3] years with visceral repercussions (left ventricular hypertrophy, hypertensive retinopathy stage I or II of Kirkendall);

- Chronic renal failure with a GFR < 15 ml/min/1.73 m^2;

- Poor urinary syndrome: absent proteinuria or ≤ 1 g/24 h, without hematuria and without leukocyturia;

- Kidneys of reduced size, symmetrical, with harmonious contours.

The etiological classification of end-stage chronic kidney disease was based on clinical and paraclinical arguments.

- Chronic glomerular nephropathy: defined in the presence of an old and/or repeated oedematous syndrome, glomerular proteinuria ≥ 2 g/24 h associated or not with haematuria.

- Diabetic nephropathy: this is a glomerular nephropathy specific to diabetes. It was retained in the presence of microalbuminuria of 30 to 300 mg/24 h or proteinuria associated with diabetic retinopathy at the back of the eye.

- Chronic tubulointerstitial nephropathy: has been retained in the presence of a history of repeated urinary tract infections, long-term use of nephrotoxic drugs, chronic obstructive pathology, a history of malformative uropathy associated with tubular proteinuria (≤1 g/24 h) and germ-free leukocyturia.

- Vascular nephropathy: groups heterogeneous diseases characterized by damage to the renal vessels. They are retained in the presence of hypertension in the foreground followed by proteinuria ≤ 1 g/24.

- Indeterminate nephropathies: groups together nephropathies for which clinical and paraclinical arguments have not been able to be labelled.

- Polycystic kidney disease: is based on a family history of renal cysts, large kidneys whose contours are deformed by multiple bilateral cysts with or without hepatic cysts.

Hypertension was defined as systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg and graded according to the WHO classification.

Clinical improvement was defined in our context by regression or amendment of clinical symptoms as well as blood pressure balance.

2.5. Data Analysis

Data entry and preparation of tables and figures were carried out using the following software: Word 2010, Excel 2013.

Data analysis was performed using Statistical Package for Social Science (SPSS) version 20. Frequencies were calculated for qualitative variables, while means and standard deviations were calculated for quantitative variables. The Fisher test was used to determine the correlation between variables. The association was considered significant when the p-value was <5%.

2.6. Difficulties and Limitations

The retrospective nature of the study meant that it was not possible to follow the evolution or stabilization of renal function. The main difficulties and limitations encountered were the fact that patients were received for their first nephrological consultation at the end-stage of renal failure, and the incompleteness of the records.

3. Results

At the end of our study, out of 214 patients with chronic renal failure, we identified 206 cases (96%) of end-stage chronic renal failure. In our series, the presumed causes of CKD were chronic glomerulonephritis (CGN) in 40% of cases, benign nephroangiosclerosis 28%, diabetic nephropathy (DN) 13%, indeterminate nephropathy (IN) 7%, chronic tubulointerstitial nephropathy (CTN) 4% and polycystic kidney disease (PKD) 1%.

We noted a male predominance (32 men vs. 25 women) with a sex ratio of 1.3. The mean age of patients in our series was 48.5 years, with extremes of 31 and 72 years, and a predominance of the 35 - 49 age group (Table 1).

Table 1. Socio-demographic characteristics.

Socio-demographic characteristics	Number (n = 57)	Percentage
Age		
20 - 34	6	11
35 - 49	25	44
50 - 64	19	33
65 - 79	7	12
Gender		
Male	32	56
Female	25	44
Profession		
Housewives	19	33
Workers	13	23
Shopkeepers	12	21
Civil servants	10	18
Farmers	3	5
Origin		
Conakry	34	60
Middle Guinea	9	16
Lower Guinea	7	12
Forest Guinea	4	7
Upper Guinea	3	5

Average age: 48.5 years; Extremes: 31 and 72 years; Standard deviation: 11 years.

Altered renal function (98%), vomiting (79%), physical asthenia (75%), anorexia (58%), hiccups (53%) and oliguria (44%) were the main reasons for consultation. On admission, 35% of patients had WHO grade III hypertension, compared with 23% grade II, 21% grade I, and 63% less than six years old.

Kirkendall stage I hypertensive retinopathy was dominant, with a frequency of 53%. 46 patients (81%) had a GFR between 1 and 5 ml/min with a mean of 4 ml/min and extremes of 1 ml/min and 11 ml/min. Thirty-two cases of uremic intoxication, fourteen cases of hyperkalemia and five cases of uremic pericarditis were noted.

Antihypertensive treatment was dominated by dual therapy, the prevalence of which was 60% (100% renin angiotensin aldosterone system blocker). For CKD, 53% benefited from hemodialysis for renal replacement.

Table 2. Distribution of patients according to association of NASB with gender, age, grade of hypertension and duration of hypertension.

Variables		NASB		p-Value
		Yes (n = 57)	No (n = 149)	
Gender	Male	32	81	0.92
	Female	25	68	
Age (year)	20 - 34	6 (11%)	42	0.07
	35 - 49	25 (44%)	49	
	50 - 64	19 (33%)	47	
	65 - 79	7 (12%)	11	
	Normal	12 (21%)	26	
Grade of hypertension	Grade I	12 (21%)	39	0.83
	Grade II	13 (23%)	36	
	Grade III	20 (35%)	48	
Age of hypertension	<1 year	00	59 (n = 149)	0.00
	1 - 5 years	36 (63%)	61 (n = 149)	
	6 - 10 years	17 (30%)	14 (n = 149)	
	11 years and over	4 (7%)	6 (n = 140)	

Table 3. Correlation between complications and clinical course.

Variables		NASB		P-value
		Yes (n = 57)	No (n = 149)	
Complications of CKD	Uremic intoxication	32 (56%)	84 (n = 149)	0.08
	Hyperkalemia	14 (25%)	28 (n = 149)	0.14
	Uremic pericarditis	5 (9 %)	7 (n = 149)	0.36
	OAP	4 (7%)	21 (n = 149)	0.76
	Metabolic acidosis	3 (5%)	11 (n = 149)	0.34
	Uremic coma	1 (2%)	4 (n = 149)	0.80

Continued

Evolution	Improvement	46 (81%)	94 (n = 149)	0.05
	Death	7 (12%)	34 (n = 149)	0.06
	Discharge against medical advice	4 (7%)	21 (n = 149)	0.64

Of the 57 patients with CKD caused by NASB, 81% showed immediate clinical improvement, compared with 12% who died.

We found no association between gender, age or grade of hypertension and the occurrence of benign nephroangiosclerosis. However, an association between the onset of NASB and the age of hypertension was statistically established (P Value = 00) (Table 2).

From an evolutionary point of view, patients with CKD due to NASB had a good immediate clinical evolution, with a p-value of 0.05 (Table 3).

4. Discussion

In Guinea, we have no data on the prevalence of CKD in the general population. This is while the hospital proportions of CKD in the CKD population have steadily increased over the years. In 2014, Bah AO reported 65% [6] versus 68%, as reported in 2015 by Kaba ML [7]. These data cannot reflect the situation of CKD in the general population as very few patients have access to the nephrology service, which is located in the capital.

Benign nephroangiosclerosis ranked second (57 cases) among the probable etiologies of CKD, after CNG (40%), with a hospital prevalence of 27%, followed by ND (13%).

This result is consistent with African and Western data. In most African studies, known causes are by far dominated by NASB, with rates ranging from 25% to 62.1%, followed by ND, with rates ranging from 11% to 20.6% [8]. Furthermore, in France, in the REIN 2008 registry, the proportion of hypertension-related end-stage renal failure was 24.4%, representing the leading cause of end-stage renal failure, just ahead of ND (22.9%). The vast majority of these cases (95.1%) are attributed to chronic hypertension, 3.3% to malignant hypertension and 6.5% to non-hypertensive vascular nephropathy [9].

However, the etiologies of CKD vary from one country to another. In Kinshasa, the main etiologies were hypertensive nephropathy (NH) 26.9% and diabetic nephropathy 25.9% [10]. By contrast, Tunisia reported 45.8% undetermined nephropathy, 21.5% ND and 5.4% NH [11].

Hypertensive nephrosclerosis is highly prevalent in populations of African descent, due to genetic predisposition. Variants of the MYH9/APOL1 gene have recently been identified and are strongly associated with hypertensive nephrosclerosis [12].

The 35 - 49 age group was the most represented, with an average age of 48.5.

Our results are in line with African data, but differ from Western and Eastern data, which vary from country to country. Chronic kidney disease mainly affects

older people, and in France affects 28% of people over 65. In the Taiwan region, it affects only 5% of those aged 20 - 39, compared with 37% of those over 60 [13].

Kaba M.L in Guinea [7] and Ouattara. B in Côte d'Ivoire [14] found mean ages of 44 and 52 respectively.

The young age of the patients reflects the youthfulness of the African population.

Long latent, the signs of chronic renal failure can be ignored or confused with the clinical picture of other pathologies. Symptoms are all the more severe when renal function is profoundly impaired. In our study, the main reasons for consultation were impaired renal function (98%), vomiting (79%), physical asthenia (75%), anorexia (58%), hiccups (53%) and oliguria (44%).

The study of hypertension showed that only 21% of patients had balanced blood pressure, and that 35% had severe hypertension, with the longest-standing condition being less than six years. This result shows that blood pressure control remains a problem in our context, and should be addressed with particular emphasis on therapeutic compliance and blood pressure control.

According to the literature, there is a correlation between increased blood pressure (BP) and rapid decline in renal function [12].

Kirkendall stage I hypertensive retinopathy was 53%. 46 patients (81%) had a GFR between 1 and 5 ml/min with a mean of 4 ml/min and extremes of 1 ml/min and 11 ml/min. Thirty-two cases of uremic intoxication, fourteen cases of hyperkalemia and five cases of uremic pericarditis were noted.

Antihypertensive treatment was dominated by dual therapy, with a prevalence of 60% (100% renin angiotensin aldosterone system blocker). In the case of CKD, 53% received hemodialysis for renal replacement.

These results are comparable to those of Lemrabott A. in 2018, who found impaired renal function as the reason for consultation in 84.3%; grade III hypertension in 39%; 51.3% stage II hypertensive retinopathy and dual therapy in 50.3% [4].

5. Conclusions

Benign nephroangiosclerosis was the second most common cause of CKD in our series (28%). Male predominance was noted, and WHO grade III hypertension was encountered in 35% of cases on admission. We noted a statistically significant association between the duration of hypertension and the occurrence of benign nephroangiosclerosis.

Regular multidisciplinary follow-up of hypertensive patients would considerably reduce the frequency of these complications.

Author Contributions

KMB Barry, AY Diallo MS Baldé developed and drafted the methodology and manuscript. AO Bah, AB Bah, Abdou Niang, Kaba ML, approved the methodology. All authors read and approved the final manuscript.

Conflicts of Interest

There is no conflict of interest.

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