

Prostatic Hypertrophy: Correlation between Digital Rectal Examination, Ultrasound, PSA Assay, and Histopathological Findings in Bangui

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Abstract

Prostatic diseases represent the most frequent causes of morbidity and mortality in urological consultations among men, most often from the age of 50, and constitute a public health problem. The aim of this study was to contribute to improving the etiological diagnosis of prostatic hypertrophy. **Patients and Methods:** This was a cross-sectional study conducted from January 1 to December 31, 2020, at the Sino-Central African Friendship University Hospital (CHU) in Bangui, involving patients presenting with lower urinary tract symptoms in whom homogeneous or heterogeneous prostatic hypertrophy was identified on ultrasonography. Additional inclusion criteria included documentation of digital rectal examination, PSA measurement, and histological analysis of the surgical specimen. **Results:** A total of 51 patients were included in this study. Clinical symptoms were dominated by pollakiuria in 72.6% of cases. Ultrasonography was less sensitive and less specific (with a sensitivity of 44.4% and a specificity of 57.7%) for the diagnosis of benign prostatic hypertrophy or prostate cancer. The homogeneous or heterogeneous ultrasonographic appearance of the prostate, as well as PSA levels greater than 100 ng/mL, were not specific for prostate cancer. Digital rectal examination demonstrated high sensitivity

(92.9%) and high specificity (88.9%). **Conclusion:** Prostatic hypertrophy is a very common condition in urological consultations and constitutes a public health problem. Clinical manifestations were dominated by pollakiuria. Digital rectal examination remains the key clinical assessment. Elevated PSA levels and ultrasonography alone cannot reliably differentiate between benign and malignant prostatic hypertrophy; considered the gold standard, histopathological examination remains the reference diagnostic test.

Keywords

Hypertrophy, Prostate, Digital Rectal Examination, Ultrasonography, PSA, Histopathology, Bangui

1. Introduction

Prostatic diseases represent the leading reasons for consultation among elderly men, most often from the age of 50, in urological practice [1]. Among these conditions, benign prostatic hypertrophy is responsible for high morbidity [2].

After the age of 60, more than 50% of men present histological changes of the prostate consistent with benign prostatic hypertrophy or prostate cancer. Prostate cancer ranks fourth after lung, gastric, and colorectal cancers [3] and is the third leading cause of cancer-related mortality among men in France, after lung and colorectal cancers [4].

In Africa, retrospective studies conducted over a five-year period in Mali and the Central African Republic on the anatomopathological and clinical aspects of prostate tumors reported that benign prostatic hypertrophy accounted for 83.3% and 75.8% of cases, respectively, whereas prostate cancer represented 16.7% and 24.2% [5] [6]. Prostatic adenoma and prostate cancer are often diagnosed late and are most frequently revealed by complications, particularly acute urinary retention. Diagnostic tools for these conditions include clinical examination—essentially digital rectal examination—ultrasonography, and measurement of prostate-specific antigen (PSA). However, the reference examination remains a histopathological analysis following prostate biopsy. The combination of these four diagnostic modalities allows for etiological diagnosis and improved patient management.

In the Central African Republic, prostate needle biopsy is not routinely performed due to difficulties in acquiring Vim-Silverman needles. In this context, ultrasonography and PSA measurement are widely used. However, the contribution of these investigations to the etiological diagnosis of benign or malignant prostatic hypertrophy has not been clearly established. Hence, this study was undertaken with the objective of contributing to the improvement of the quality of etiological diagnosis of prostatic hypertrophy and, specifically, to describe the epidemiological and clinical profile of patients with prostatic hypertrophy; to establish correlations between clinical findings, ultrasonographic features, PSA levels, and histological results of lesions; and to determine the etiological diagnosis of prostatic hypertro-

phy.

2. Patients and Methods

This was a cross-sectional study conducted over a 12-month period, from January 1 to December 31, 2020, partly at the Sino-Central African Friendship University Hospital and at the National Laboratory of Clinical Biology and Public Health in Bangui. The study involved patients presenting with lower urinary tract symptoms who underwent digital rectal examination performed by a urologist. These patients also exhibited homogeneous or heterogeneous prostatic hypertrophy on ultrasonography performed by a radiologist. In the absence of prostate biopsy and appropriate equipment, surgical specimens were also analyzed.

Thus, the inclusion criteria were documentation of digital rectal examination, homogeneous or heterogeneous prostatic hypertrophy on ultrasonography, PSA measurement, and histological analysis of the surgical specimen. Among the 382 patients who presented with prostatic hypertrophy on ultrasonography, 331 were excluded because they did not meet the other three inclusion criteria.

Data were collected from ultrasound request forms, PSA results, and histopathological reports containing the variables studied, then analyzed and processed using EPI INFO software version 3.5.3. An “irregular” prostate on digital rectal examination (DRE) was considered suggestive of malignancy rather than benign disease, whereas on ultrasonography, heterogeneous prostatic hypertrophy was not specific for malignancy. Data confidentiality was ensured. The names of patients and referring physicians did not appear in any document related to the results of this study.

3. Results

According to the inclusion criteria, 51 patients were selected out of 382 who underwent prostatic ultrasonography, corresponding to a frequency of 13.3%. The mean age of the patients was 67.8 years, with a range from 52 to 93 years. The 60-69-year age group was the most represented, accounting for 41.2% (Figure 1).

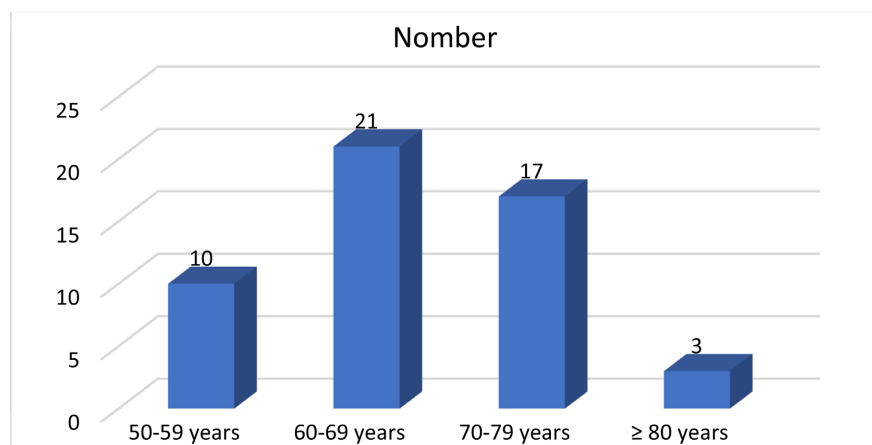


Figure 1. Distribution of patients according to age group.

In this study, 68.5% of patients were retired, 58.8% were in monogamous marriages compared with 41.2% in polygamous marriages, and 51.6% had a family history of prostatic hypertrophy.

The main clinical manifestations were symptoms of obstructive urinary syndrome, including pollakiuria (72.6%), acute urinary retention (17.7%), and urinary urgency (3.9%).

The comparison between digital rectal examination and histopathological findings showed that, on digital rectal examination, when the prostate was regular, 76.5% of patients had benign prostatic hypertrophy, whereas when it was irregular, 15.7% of patients had prostate cancer (**Table 1**).

Table 1. Distribution of patients according to digital rectal examination findings.

Digital Rectal Examination	Histopathological Examination		Total
	BPH n (%)	Cancer n (%)	
Regular prostatic hypertrophy	1 (1.9)	39 (76.5)	40 (78.4)
Irregular prostatic hypertrophy	3 (5.9)	8 (15.7)	11 (21.6)
Total	4 (7.8)	47 (92.2)	51 (100)

$$\chi^2 = 29.3; df = 1; p < 0.001.$$

The diagnostic performance of digital rectal examination was as follows:

$$\text{Sensitivity: } 39/42 \times 100 = 92.8\%$$

$$\text{Specificity: } 8/9 \times 100 = 88.9\%$$

$$\text{Positive predictive value: } 39/40 \times 100 = 97.5\%$$

$$\text{Negative predictive value: } 8/11 \times 100 = 72.7\%$$

Digital rectal examination proved to be a sensitive and specific diagnostic tool.

The comparison between ultrasonography and histopathological examination showed that when the echostructure was heterogeneous, 17.6% of patients had prostate cancer, whereas when the echostructure was homogeneous, 82.4% of patients had benign prostatic hypertrophy (**Table 2**).

Table 2. Comparison between ultrasonography and histopathological examination.

Ultrasonography	Histopathology		Total
	Adenocarcinoma n (%)	Adenomyoma n (%)	
Heterogeneous hypertrophy	4 (7.8)	19 (37.3)	23 (45.1)
Homogeneous hypertrophy	5 (9.8)	23 (45.1)	28 (54.9)
Total	9 (17.6)	42 (82.4)	51 (100)

The diagnostic performance of ultrasonography was as follows:

$$\text{Sensitivity: } 4/9 \times 100 = 44.4\%$$

$$\text{Specificity: } 23/42 \times 100 = 54.8\%$$

$$\text{Positive predictive value: } 4/23 \times 100 = 17.4\%$$

Negative predictive value: $23/28 \times 100 = 82.1\%$

Ultrasonography was less sensitive and less specific than histopathological examination in the diagnosis of benign prostatic hypertrophy and prostate cancer (Figure 2).

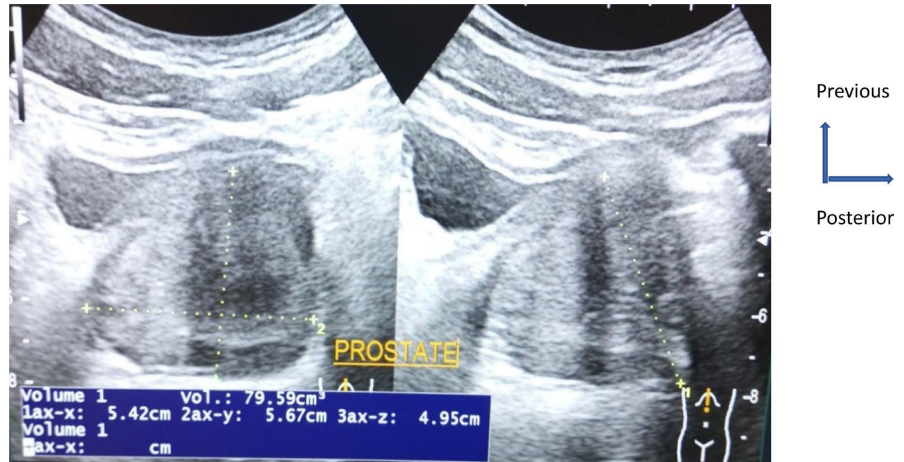


Figure 2. Prostatic ultrasound image obtained at the Department of Radiology of the Sino-Central African Friendship University Hospital in Bangui, performed via the suprapubic approach, showing prostatic hypertrophy with homogeneous echotexture and regular contours.

The higher the PSA level, the greater the proportion of cancer cases. However, for values greater than 100 ng/mL, 50% of patients presented with benign prostatic hypertrophy and 50% with prostate cancer (Table 3).

Table 3. Comparison between PSA levels and histopathological findings.

PSA level	Histopathology	
	Benign prostatic hypertrophy n (%)	Cancer n(%)
<4 ng/ml	32 (86.5)	5 (13.5%)
4 - 30 ng/ml	4 (80%)	1 (20%)
31 - 100 ng/ml	4 (80%)	1 (20%)
>100 ng/ml	2 (50%)	2 (50%)

$\chi^2 = 3.5$; $df = 3$; $p < 0.3$. Difference not statistically significant.

4. Discussion

This study is the first of its kind to be conducted at the Sino-Central African Friendship University Hospital in Bangui. It presents certain limitations, notably delays in obtaining results for patients, and the inability of some patients to provide complete data. Nevertheless, it provides valuable information on the different ultrasonographic aspects of the prostate. In this study, histopathological analysis was considered the reference examination. This excluded patients who did not undergo surgical intervention, particularly cases of prostatitis.

According to the inclusion criteria, 51 patients were included, corresponding to a frequency of 13.6%. The mean age of the patients was 67.8 years, with extremes ranging from 52 to 93 years. The 60 - 69-year age group was the most represented, accounting for 41.2% of cases. This age range is comparable to that reported by other authors [4] [6] [7], who found mean ages ranging from 64 to 70 years. In contrast, Traoré *et al.* [5] reported a slightly higher mean age of 71.5 years. These findings confirm that prostatic hypertrophy is a disease of elderly men.

The majority of patients (68.6%) were retired. Darre *et al.* [4] and Fannier *et al.* [8] reported similar findings, although with lower proportions of 38% and 21%, respectively. Most of our patients (58.8%) were monogamous, compared with 41.2% who were polygamous. Based on these results, prostatic hypertrophy does not appear to be related to marital status.

It should be emphasized that slightly more than half of the patients had a family history of prostatic hypertrophy. Fraundorfer *et al.* [9] reported that hereditary forms transmitted across successive generations account for 3.6% of cases. Hereditary transmission may occur not only through an autosomal dominant pattern but also via a sex-linked mechanism involving the X chromosome.

Pollakiuria and/or dysuria were the predominant symptoms among these patients. These findings are consistent with reports in the literature [10]-[12].

Regarding digital rectal examination, prostatic hypertrophy was regular in 78.4% of cases and irregular in 21.6%. These results are similar to those reported by Ilic *et al.* [13]. Conversely, Apko *et al.* [3] reported a higher frequency of irregular nodular hypertrophy. This may be related to more frequent histological changes of the prostate in patients aged 50 years and older. A correlation was observed between regular or irregular prostatic hypertrophy on digital rectal examination and histopathological findings. Indeed, regular prostatic hypertrophy correlated more strongly with benign tumors, whereas irregular hypertrophy was more frequently associated with prostate cancer. These findings are consistent with those reported by Benata *et al.* [14].

On ultrasonographic examination, among the 51 patients included in this study, homogeneous prostatic hypertrophy compatible with benign tumors accounted for 54.9% of cases, whereas heterogeneous, nodular, or calcified hypertrophy compatible with prostate cancer accounted for 45.1%. Histological examination of surgical specimens revealed 82.4% prostatic adenomyoma (benign prostatic hypertrophy) and 17.6% prostatic adenocarcinoma. In terms of diagnostic performance, ultrasonography showed a sensitivity of 44.4% and a specificity of 54.7%, with a positive predictive value of 17.4% and a negative predictive value of 82.1%. This discrepancy highlights the limitations of ultrasonography. It remains primarily an orientation examination, allowing the detection of prostatic hypertrophy, while confirmation of its benign or malignant nature relies on histopathological examination, in agreement with findings reported by other authors [5] [8] [9].

In this series, 72.6% of patients had normal PSA values in both benign prostatic

hypertrophy and prostate cancer, whereas 27.4% had elevated PSA levels in both malignant and benign prostatic tumors. Passionner *et al.* [15] reported similar findings, with 77.8% normal PSA values in benign prostatic hypertrophy and 22.2% pathological PSA values in prostate cancer. Traoré *et al.* [5] described comparable results.

5. Conclusion

Prostatic hypertrophy is a very common condition in urological consultations among men aged 50 years and older and represents a public health problem. Clinical manifestations are mainly dominated by pollakiuria and/or dysuria. Digital rectal examination remains the key clinical assessment. Elevated PSA levels and ultrasonography alone cannot reliably determine whether prostatic hypertrophy is benign or malignant. Confirmation of benignity or malignancy relies on histopathological examination.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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