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ORIGINAL RESEARCH

High-risk prostate cancer and very high PSA level: results of transrectal ultrasound-guided prostate biopsy in a Cameroonian population

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Aim: To study the indications, techniques, and results of transrectal ultrasound-guided prostate biopsy (TRUS-Bx) at two reference centres in Cameroon.

Materials and methods: A total of 232 patients underwent TRUS-Bx performed in two health reference centres in Yaoundé, Cameroon. The relationship between age, digital rectal examination (DRE), prostate-specific antigen (PSA) level, and adenocarcinoma of the prostate was evaluated.

Results: The mean age of the patients was 69.59 ± 7.57 years. Concerning the site of biopsy, we noted a frequency of 12 cores: two biopsies at the base, two biopsies at the middle part, and two biopsies at the apex of the prostate and each lobe. Total PSA levels ranged from 4 to 49 700 ng/ml with a mean PSA of 743.86 ± 3 806 ng/ml, and the median PSA was 45 ng/ml (15.09; 119). The main indication for prostate biopsy in our study was a PSA level > 4 ng/ml associated with abnormal DRE, particularly in 126 patients (54.31%). Out of 232 patients, 147 (63.36%) had adenocarcinoma of the prostate. High-risk prostate cancer was found in 131 patients (89.11%). The PSA associated with histopathology showed that PSA > 20 ng/ml is strongly associated with adenocarcinoma of the prostate (p = 0.001). Patients with abnormal DRE were 10 times more likely to have prostate cancer (odds ratio [OR] = 10.015, 95% confidence interval [CI] = 4.9233–20.3743, p = 0.001). Also, the likelihood of having prostate cancer was higher in men with PSA > 4 ng/ml (OR = 6.3465, 95% CI = 3.0450–13.2277, p = 0.001). The complication rate was 8.2%.

Conclusion: TRUS-Bx is a necessary diagnostic tool for prostate cancer. Minor complications can occur, and significantly high PSA levels and high-risk prostate cancer are key characteristics found in the Cameroonian milieu.

Keywords: TRUS, prostate, biopsy, Cameroon

Introduction

According to GLOBOCAN 2020, prostate cancer is the most frequently diagnosed cancer in 112 countries in the world.[1] Regional patterns of mortality rates do not follow those of incidence, with the highest mortality rates in the Caribbean, sub-Saharan Africa, and Micronesia/Polynesia.[1] In France, the number of new cases observed in 2018 was 50 400 and the prevalence was estimated at 643 156 persons in 2017.[2] In Nigeria, Osegbe reported a hospital incidence of 127/100 000 for a mortality of 20 000.[3] In Cameroon, Enow et al.[4] reported an estimated 7.3% frequency of prostate cancer, ranking first among urogenital cancers.

International differences in prostate cancer diagnostic practices are likely the greatest contributor to the variation in prostate cancer incidence rates worldwide.[5] Incidence and disease stage distribution patterns follow biological, genetic, and/or lifestyle factors, but are also influenced by international organisations' recommendations on screening and diagnosis.[6] Despite this, men of African descent are more likely to be diagnosed with more advanced diseases.[7] Rapidly increasing trends have also been found in sub-Saharan Africa, with annual increases ranging from 2% to 10% over the period examined between 1995 and 2018, largely due to the use of PSA testing.[8]

Prostate cancer is usually suspected based on DRE and/or PSA levels. Definitive diagnosis depends on histopathological findings in prostate biopsy cores. While transperineal biopsy of the prostate is increasingly realised in Western countries, TRUS-Bx remains a standard procedure for the diagnosis of prostate cancer and is currently performed widely by radiologists and urologists.[9] Endorectal ultrasound allows biopsies to be taken according to a precise map and to direct the biopsies to the suspected areas. Moreover, TRUS-Bx is an invasive procedure and is therefore subject to the possibility of complications. The aim was to study the indications, techniques, and results of TRUS-Bx at two reference centres in Cameroon.

Materials and methods

This was a descriptive study conducted at the Military Hospital and Fouda Clinic in Yaoundé, Cameroon. The study took place over seven months, from 28 December 2021 to 18 July 2022.

All patients who came to one of the centres with an examination report indicating a prostate biopsy and all those who had a report of histological examination of biopsy cores were included. We excluded all patients with no histological or PSA test, untreated bleeding disorders, severe anaemia and urinary tract infection, and those who did not consent to be included.

The variables studied were socio-demographic, including age, occupation, and level of education. The clinical criteria consisted of the reason for consultation, duration of evolution, and physical signs. Paraclinical parameters consisted of PSA and haemoglobin levels. Pathological data included the biopsy number, biopsy site, histological type, Gleason score, International Society of Urological Pathology (ISUP) classification, and complications of TRUS-Bx after two weeks of follow-up.

Data entry and analysis were performed using Epi Info™ software. As a statistical test, we used chi-square with a significance level of $p < 0.05$. We obtained ethical clearance from the Institutional Committee of Ethics and Research of the Faculty of Medicine and Pharmaceutical Sciences of the University of Douala (Ref N 3293 CEI UDo/D6/2022/T).

Antibiotic prophylaxis was given to patients 24 hours before biopsies to limit the risk of infection. Ofloxacin 200 mg bid was routinely prescribed orally the day before, as well as the morning of the biopsy and continued until the third day after the procedure.

Using an ultrasound machine and a 7 MHz ultrasound probe, which was decontaminated and covered with a condom on which was affixed a sterile needle guidance system, the whole was covered with a second condom and then coated with a sterile ultrasound gel. A single 18-gauge needle mounted on a pistol was used. The rectal enema before each biopsy was performed on all patients of the Military Hospital systematically. At The Fouda Clinic, the participants were encouraged to defecate before being admitted to the biopsy room.

On the day of the biopsy, the patients were psychologically prepared. Patients were installed in the left lateral position, thighs flexed at 90 degrees, followed by asepsis using benzalkonium chloride and chlorhexidine. DRE was done by the urologist and an endorectal probe was inserted. Local anaesthesia was administered via injection of 10 cc of lidocaine 2% in contact with the prostate capsule (5 cc on each side) using an 18 or 20-gauge needle guided by transrectal ultrasound. The path of the prostate was visualised on the screen and the shot was triggered only when the sampling angle was optimal. A 12-core biopsy scheme, including the prostate apex and bilateral far lateral peripheral zones, was performed.

Results

During the study period, we enrolled 245 patients who underwent TRUS-Bx, of which we selected 232. Details are presented in Figure 1.

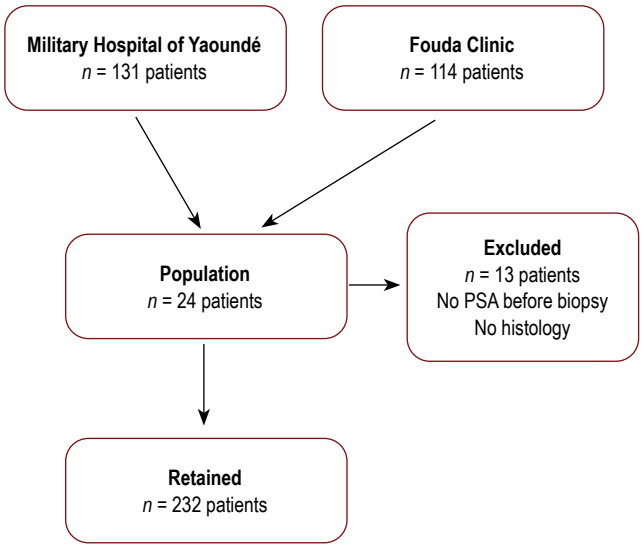

Figure 1: Flow diagram illustrating the study population selection

Demographics

The average age of our study population was 69.59 ± 7.57 years (range 50–94). Retirees represented the largest occupational category at 38.36% ($n = 89$) (Table I).

Clinical characteristics

A total of 60.76% ($n = 141$) of patients presented less than six months after the onset of symptoms. Upon physical examination, 132 (56.90%) patients had no symptoms and 56 (24.13%) presented with an impaired general condition.

DRE was painful in 4.74% ($n = 11$) of patients, soft consistency was more present in 43.11% of cases, while stony and indurated consistencies were found in 35.77% ($n = 83$) and 21.12% ($n = 49$), respectively (Table II).

Paraclinical findings

In the study population, total PSA levels ranged from 4 to 49 700 ng/ml with a mean PSA of 743.86 ± 3 806 ng/ml, and the median PSA was 45 ng/ml (15.09; 119) (Figure 2). The main indication of prostate biopsy was PSA > 4 ng/ml associated with abnormal DRE, particularly in 126 patients (54.31%); the other patients essentially only had a PSA level that was strictly above 4 ng/ml.

Pathological analysis revealed prostate adenocarcinoma in 147 patients (63.36%) followed by adenoma in 66 patients (28.45%). There were 11 patients (4.74%) who had prostatitis and eight (4.74%) who had precancerous prostatic intraepithelial neoplasia (PIN)-like lesions; no atypical small acinar proliferation (ASAP)-type lesions were found (Table III).

Gleason scores ranged from 6 to 10 with a median of 7. The most represented Gleason score was 8, present in 39 (26.53%) specimens. According to the D'Amico classification for risk of recurrence, a high risk was most common in 131 patients (89.11%).

Bivariate analysis

The PSA associated with histopathology showed that a PSA level > 20 ng/ml is strongly associated with adenocarcinoma of the

Table I: Socio-demographics of the population

Variables	Frequency	Percentage (%)
Age group (years)		
< 50	1	0.43
50–60	23	9.91
61–70	**117**	**50.00**
71–80	71	30.60
81–90	20	8.62
> 90	1	0.43
Occupation		
Retirees	**89**	**38.36**
Informal sector	66	28.45
Civil servant	38	16.38
Military	14	6.03
Unemployed	3	1.29
Educational level		
Not attending school	3	1.29
Primary	48	20.69
Secondary	**146**	**62.93**
University	35	15.08

Table II: Findings of DRE

DRE	Frequency	Percentage (%)
Pain		
Yes	11	4.74
No	221	95.26
Volume		
Increased	191	82.32
Normal	41	17.68
Consistency		
Indurated	83	35.77
Stony	49	21.12
Soft	100	43.11
Surroundings		
Regular	218	93.96
Irregular	14	6.03
Nodule		
Yes	17	7.33
No	215	92.6
Faecal impaction		
Yes	5	2.16
No	227	97.84

DRE – digital rectal examination

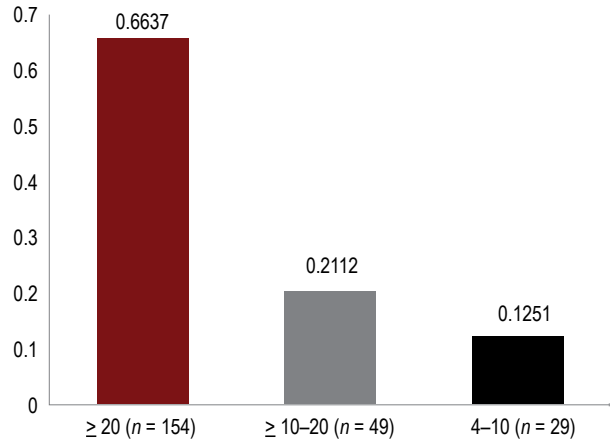

Figure 2: Distribution according to PSA level (ng/ml)

prostate (p = 0.001). The prevalence of prostate adenocarcinoma increases with age (≥ 50 years) as well as that of adenoma (p = 0.001).

Multivariate analysis

Adenocarcinoma is significantly related to the consistency of the prostate; it ranges from 32% in the soft consistency to 49% in stony prostates, and 69% in the indurated consistency (p < 0.001). Variables that were significant in bivariate analysis were put in multivariate analysis and only two were found to be statistically associated with the diagnosis of prostate cancer – abnormal DRE and PSA level. Patients with abnormal DRE were 10 times more likely to have prostate cancer (OR = 10.015, 95% CI = 4.9233–20.3743, p = 0.001). Also, the likelihood of having prostate cancer was higher in men with a PSA level > 4 ng/ml (OR = 6.3465, 95% CI = 3.0450–13.2277, p = 0.001) (Table IV).

Table III: Pathology

Variables	Frequency (n = 147)	Percentage (%)
Gleason score		
6	35	23.81
7 (3 + 4)	25	17.01
7 (4 + 3)	19	12.93
8	**39**	**26.53**
9	19	12.92
10	10	6.80
ISUP group		
Group 1	35	23.81
Group 2	25	17.01
Group 3	19	12.93
Group 4	**39**	**26.53**
Group 5	29	19.73
D'Amico classification		
High risk	**131**	**89.11**
Intermediate risk	15	1.07
Low risk	01	0.6

ISUP – International Society of Urological Pathology

Table IV: Multivariate logistical regression for parameters associated with prostate cancer

Variables	OR	95% CI	p-value
Age > 50 years	1.0331	0.9830–1.0856	0.1990
Abnormal DRE (nodule, indurated, stony)	**10.0154**	**4.9233–20.3743**	**0.001**
PSA level (> 4 ng/ml)	**6.3465**	**3.0450–13.2277**	**0.001**

CI – confidence interval, DRE – digital rectal examination, OR – odds ratio, PSA – prostate-specific antigen

Complications

Complications were reported in 19 (8.2%) patients. Rectal bleeding was the most common in seven (3.01%) patients, fever in three patients (1.3%), and three (1.3%) patients had acute urine retention after the procedure (Table V).

Table V: Complications after the prostate biopsy

Variables	Frequency (n = 232)	Percentage (%)
Good tolerance	**213**	**91.8**
Perineal pain	1	0.43
Fever	3	1.30
Haematuria	2	0.86
Haemospermia	1	0.43
Rectal bleeding	7	3.01
Acute prostatitis	2	0.86
Urinary retention	3	1.30

Discussion

The age of patients ranged from 50 to 94 years with an average of 69.59 ± 7.57 years. This is similar to Mali and Togo where the mean age was 69.91 ± 8.9 and 68.5 ± 9.6, respectively.[10,11] Engbang et al.[12] in Cameroon reported an average age of 66.88 ± 9.58 years. These results confirm that prostate cancer is a pathology of the elderly.

We found suspicious DRE in 149 patients (63.56%). A suspicious DRE is an indication for prostate biopsies even in cases with "normal" PSA levels (< 4 ng/ml) since it has been shown that up to 15% of prostate cancers can be observed, including a significant proportion of high-risk lesions.[13] The high proportion of patients with a positive DRE in our study indicates an advanced form of the disease. In regions where diagnostic means are limited, such as sub-Saharan Africa, the DRE remains a primary diagnostic tool, especially considering the delay in consultation and therefore the delay in diagnosis for populations suffering from prostate cancer.

The mean PSA level was 743.86 ± 3 806 ng/ml. This result is consistent with those of Omisanjo et al.[14] and Kirakoya et al.[15] who reported mean PSA values of 563.2 ± 1 879.2 ng/ml and 746 ng/ml, respectively. These African averages are significantly higher than those obtained in Italy by D'Elia et al.[16] and Efesoy et al.[17] in Turkey who had a mean PSA level of 7.83 ng/ml and 18.6 ng/ml, respectively. These findings highlight the fact that Africans are more likely to have high serum PSA levels, as reported in previous studies.[11]

TRUS-Bx was indicated in 54.31% (*n* = 126) of patients with an abnormal DRE associated with a higher PSA level. In 45.69% (*n* = 106) of cases, an isolated increase in the PSA level was the indication. This is similar to what was found in a study conducted in the United States of America, where the most common indication for prostate needle biopsy was elevated PSA levels (53.2%).[18] Our results differ from those of Ndiaye et al.[19] who reported on 231 cases of prostate biopsy that 23.4% were referred for elevated total PSA level; this study also revealed that digital DRE findings were suspicious in 36.9%.[19] These variations from one country to another could be due to the place given to each diagnostic tool, whether clinical and/or paraclinical. Another reason could be the accessibility of the population to the PSA test, which can be expensive and sometimes unavailable in certain regions.

Adenocarcinoma was the first tumour pathology of the prostate with a frequency of 63.36%. This result is high in comparison to Senegal with 54% of the participants having adenocarcinoma.[19] Limited PSA elevation alone should not prompt immediate biopsy. The PSA level should be verified after a few weeks, in the same laboratory using the same assay under standardised conditions (i.e. no ejaculation, manipulations, or urinary tract infections).[20]

The poorly differentiated stage (Gleason score 8) was the most represented in our setting with 26.53% of cases. This result is close to that of Ndiaye et al.[19] who found that the Gleason score of 8 (4 + 4) was more frequent and represented 35.7% of positive biopsies. This result differs from the study of Engbang et al.[12] in Cameroon, which highlighted the moderately differentiated tumours (Gleason score 7–8) accounting for the majority of cases (56.56%). This would seem to indicate an aggressiveness of prostate cancer in our milieu.

We reported a statistically significant correlation between age (> 50 years) and prostate tumours (p = 0. 001), abnormal DRE and prostate adenocarcinoma (p = 0. 001), as well as PSA level and histology (p = 0. 001). These results are similar to those obtained by an African series, notably those of Mbey et al.[21] in Congo and Ndiaye et al.[19] in Senegal. On multivariate analysis, abnormal DRE coupling with PSA level was significantly associated with adenocarcinoma of the prostate; these observations were also made in Togo.[11] In a study on the determinants of prostate cancer diagnosis, Potter et al.[22] concluded that the combination of PSA level, DRE result, and patient age better defines the probability of a positive biopsy than any factor alone.

The main complications in our study were bleeding and infection with a frequency of 8.62%. This is similar to the results obtained by Ndiaye et al.[19] and Kam et al.[23] with 6.4% and 6.9%, respectively. While several studies argued that prebiopsy rectal preparation reduces the occurrence of complications, other studies reported that the prebiopsy enema was not of significant advantage regarding infectious complications.[19,20,24,25] It is the responsibility of each urology association and country to establish a prebiopsy protocol according to local specificities and conclusive studies.

A meta-analysis of 11 studies comprising 1 753 patients showed significantly reduced infections after TRUS-Bx when using antimicrobial prophylaxis compared to a placebo/control (ratio risk: 0.56, 95% CI: 0.40–0.77).[26] Prophylactic antibiotic therapy for one day, or even a single dose of prophylactic antibiotic therapy, lowers the risk of infectious complications to 1% or less.[27,28] Fluoroquinolones were traditionally used for antibiotic prophylaxis in TRUS-Bx; however, overuse and misuse have increased fluoroquinolone resistance.[20]

Based on the literature review, biopsy is typically well tolerated with a low risk of major complications. Despite this, infectious complications have increased over time. More likely, higher infectious complications can be attributed to the rising antimicrobial resistance documented in the United States of America and abroad.[18] In resource-limited countries, where patients do not have insurance and where self-medication and overuse of antibiotics are common, a short-term prescription of antibiotic prophylaxis before TRUS-Bx should be recommended to avoid an increase in infectious complications related to this procedure.

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Conflict of interest

The authors declare no conflict of interest.

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None.

Ethical approval

Before commencement of the study ethical approval was obtained from the Institutional Ethics Committee for Research on Human Health of the University of Douala (REF Number 3293 CEI-UDo/06/2022/T). Informed written consent was obtained from all patients included in the study.

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