

Ultrasound transrectal biopsy of prostate is an important diagnostic procedure for prostate cancer

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Abstract

Aim: Prostate cancer is a leading cause of morbidity and mortality in men. Therefore, its timely diagnosis and subsequent treatment is very important in clinical practice. We aimed to evaluate the diagnostic results and complications of transrectal ultrasound biopsy in a group of patients with elevated prostate-specific antigen (PSA) levels in Albania.

Methods: The present study was carried out among 300 patients showing up at the ambulatory services of the Regional Hospital of Shkodra, the main district in north Albania, during 2009-2013. All included patients had elevated PSA levels (≥ 4 ng/ml). Following abnormal PSA readings, 300 biopsies of the prostate were carried out through an ambulatory-based procedure using transrectal biopsy with 16-gauge biopsy needle via Madison transrectal probe. Biopsy readings and its complications were documented.

Results: Prostate cancer was diagnosed in 53 patients (17.6%). Benign prostatic hyperplasia (BPH) was present in 212 (70.7%) of the cases, whereas the remaining cases were diagnosed with chronic prostatitis and prostate intraductal neoplasia (PIN). The most common complication of biopsy was hemospermia (present in 81 patients, or 27%). Urinary retention occurred in 25 patients (8.3%), but it was temporary. Urinary sepsis needing hospitalization of the patient and treatment with systemic antibiotics occurred in three patients (1% of the cases).

Conclusions: Transrectal biopsy of the prostate represents an important and necessary tool in the diagnosis of the prostate cancer. The complications of the biopsy were not frequent, were mild and manageable, except for urinary sepsis which can be dominated with systemic ciprofloxacin during hospitalization.

Keywords: Albania, prostate cancer, PSA, transrectal ultrasound biopsy.

Introduction

Cancer constitutes a leading cause of death worldwide (1). Aging populations, a trend visible across all population groups will likely increase the cancer burden in the future (1). Besides aging, the increasing prevalence of cancer risk factors such as smoking, overweight, unhealthy diet, postponement of childbearing and lower parity have their own impact in cancer incidence and mortality rates (1). Therefore, cancer is a real concern in developed countries. However, the adoption of “western” lifestyle across many less developed nations means that cancer will be increasingly important for these communities too (1). Actually, less developed countries host approximately 60% of total global cancer cases and deaths (1).

Among men, prostate cancer is the second most frequent cancer and the sixth leading cause of death from cancer worldwide and, in 2008, it was responsible for up to a quarter of million deaths and millions of disability adjusted life years (2). In USA and Europe, the incidence of prostate cancer typically increased during early 1990s and then leveled off (3), probably due to the introduction of early detection techniques such as prostate-specific antigen (PSA) (4-6). Early detection (4-6) and treatment (7-9) of prostate cancer led to a reduction of mortality rates as well (6,10). However, prostate cancer incidence and mortality increase significantly with age, with a substantial increase of risk beyond the age 60 (11,12).

PSA increases the detection of prostate cancer by as much as 81% compared to digital rectal examination but it has low sensitivity and specificity in detecting the disease at early stages (12). Usually, elevated PSA levels indicate the need for the biopsy of prostate tissue in order to rule out or confirm a potential neoplasm (13,14). Some complications of prostate biopsy include hemospermia (15), urinary tract infections (16,17) and urinary sepsis (18).

During 1995-1999, the age-standardized mortality rates from prostate cancer (all ages) were the highest in Norway, Sweden, Iceland and Denmark

(22.04, 20.99, 19.59 and 19.11 deaths per 100,000 population, respectively) and the lowest in Albania, Russian Federation, Macedonia, Ukraine and Moldova (8.44, 7.72, 7.65, 7.28 and 5.1 deaths per 100,000 population, respectively) (3). However, more than ten years after, the cancer risk factors in Albania have increased considerably as evidenced by the 2008-2009 National Demographic and Health Survey showing a “western-type” lifestyle pattern (19) and the Institute of Statistics that notes a considerable increase of the proportion of people aged 65 years or older in this country in 2011 (20). This implies that prostate cancer could be on the rise in this Southeast European population urging for greater efforts to early detection and prompt treatment of this condition.

Information about the prevalence of prostate cancer among patients with elevated PSA levels and data about results of transrectal biopsy of prostate and the complications of such procedure in Albania are scarcely documented. In this context, the aim of the present study was to evaluate the results of prostate biopsy and its complications in a group of patients with elevated PSA levels in Shkodra, the main district in north Albania.

Methods

This study included 300 patients who showed up at the ambulatory services of the Regional Hospital of Shkodra, during 2009-2013. The included patients had abnormally high levels of prostate-specific antigen (PSA), defined as $PSA \geq 4$ ng/ml. Because an elevated PSA level might suggest the presence of prostate neoplasm (13,14), these patients underwent prostate biopsy in order to confirm or rule out this condition. The prostate biopsy was carried out through a transrectal ambulatory-based procedure using a 16-gauge biopsy needle via Madison transrectal probe.

Biopsies were carried out with special focus to hypoechoic lesions, periprostatic zone and apex of the prostate, oriented by transrectal probe (21-24). The retrieved material was examined by a skilled

pathologist and the results were correlated with PSA level and rectal examination (25-27).

Patients were also monitored and asked to refer the presence of any post biopsy complication such as rectal hemorrhage, presence of hemospermia, urinary difficulties or obstructions and fever. In cases where hemospermia was detected, patients were informed that this is a temporary complication of the biopsy procedure that usually does not require any further treatment because of its self-limiting nature. The same information was disseminated regarding eventual rectal hemorrhage as well.

In case of urinary retention, a urinary catheter was placed and was held in place for three days. In case of repeated urinary retention and, based on the findings of respective biopsy, we recommended radical prostate surgery when cancer was diagnosed in biopsy or transurethral resection of the prostate (TURP) for other conditions, such as enlarged prostate (alternatively known as benign prostatic hyperplasia (BPH)).

In case of urinary sepsis, presenting with high fever and chills after biopsy procedure, the patient was hospitalized and treated with systemic antibiotics (quinolones). Under this treatment, the fever was resolved within few days and the patient recovered. For each participating subject we were able to collect

the information about his/her age as well, as an important risk factor for prostate cancer or other prostatic conditions.

Absolute numbers and respective percentages were calculated and reported in order to calculate the prevalence of prostate cancer and/or other prostatic conditions following the prostate biopsy, including complications. The arithmetic mean and standard deviation was calculated for the age and PSA level according to study-group. In order to check whether mean values differed significantly between groups, the one-way ANOVA statistical test was performed. Differences were considered statistically significant if the p-value was ≤ 0.05 . All the statistical analyses were computed using SPSS, version 16.0.

Results

This study included 300 patients. Table 1 presents the results of the biopsy test and complications resulting from this procedure. The most common diagnosis after biopsy was the benign prostate hypertrophy (BPH) being present in 70.7% of the patients. The prevalence of prostate cancer was 17.7% as it was detected in 53 patients, followed by chronic prostatitis and high grade PIN with 8.3% and 3.3% of the cases, respectively (Table 1).

Table 1. Diagnosis and complications of biopsy among study subjects

Variable	Absolute number	Percentage
Diagnosis from biopsy		
Benign prostate hypertrophy	212	70.7
Prostate cancer	53	17.7
Chronic prostatitis	25	8.3
High grade PIN	10	3.3
Biopsy complications		
Hemospermia	252	84.0
Rectal hemorrhage	20	6.7
Urinary retention	25	8.3
Urinary sepsis	3	1.0

As regards complications of biopsy, the most common complication was hemospermia present in 252 patients (84.0%), followed by urinary retention,

rectal hemorrhage and urinary sepsis with 8.3%, 6.7% and 1.0% of cases, respectively (Table 2). Table 2 presents the average age of patients (in

years) and the average level of PSA (expressed in ng/ml). The average age of study subjects was 69 ± 8.9 years. Patients diagnosed with benign prostate hypertrophy after biopsy were younger compared to prostate cancer patients or those diagnosed with high grade PIN (average age 67 years vs. 76 years and 72 years, respectively), but very similar to chronic prostatitis patients (average age 67 years vs. 68 years old, respectively).

Prostate cancer and high grade PIN patients were significantly older compared to BPH and chronic prostatitis patients (Table 2).

The average PSA level among all study subjects was 14.09 ± 4.14 ng/ml (Table 2). As shown in Table 1, prostate cancer patients and those diagnosed with chronic prostatitis had significantly higher PSA levels compared to BPH patients and those diagnosed with high grade PIN ($P < 0.001$).

Table 2. Average age and average PSA level in study subjects

	Mean age (years)	P	Average PSA level (ng/ml)	P
Total patients	$69 \pm 8.9^*$		14.09 ± 4.14	
Diagnosis from biopsy				
Benign prostate hypertrophy	67 ± 8.2		13.53 ± 3.87	
Prostate cancer	76 ± 10.3	$<0.001^\dagger$	18.01 ± 6.91	<0.001
Chronic prostatitis	68 ± 7.8		17.45 ± 5.80	
High grade PIN	72 ± 6.1		12.25 ± 4.38	

* Mean value (arithmetic mean) \pm standard deviation.

† Value of the statistical significance (p-value) according to one-way ANOVA test.

Discussion

This is one of the few papers reporting about the results of biopsy and its related complications in a relatively large group of patients with elevated PSA levels in Shkodra, the main region in north Albania. Current findings suggest that in patients with elevated PSA levels, the most common condition affecting these levels is the benign prostate hypertrophy (BPH) present in more than two-thirds of such patients. However, prostate cancer was detected in 17.7% of patients with elevated PSA levels. In addition, patients with prostate cancer were significantly older and had significantly higher mean PSA levels compared to their counterparts. However, patients with chronic prostatitis had also high mean PSA levels compared to high grade PIN and BPH patients. The most common complication was hemospermia affecting virtually nine out of ten patients undergoing prostate biopsy whereas urinary retention and urinary sepsis were present in 8.3% and 1.0% of the cases, respectively.

Based on the findings of this study, we noticed that the factor most commonly associated with elevated PSA levels is the benign prostatic hypertrophy whereas prostate cancer was found only in 18% of cases with elevated PSA level. This stresses the fact that we need to carry out on average six biopsies among elevated PSA level patients in order to detect on case with prostatic cancer. There is need to highlight this finding due to the necessity to diagnose prostate cancer at earlier stages like T1 or T2.

Our findings are in accordance with those reported in the international literature. For example, we noticed that prostate cancer was more common among older patients and association has been reported in literature as well (11,12,28). The risk of developing prostate cancer among men aged 40-59 years old and 60-79 years old is approximately 400 and 2500 times higher compared to men aged less than 39 years old (29,30). As mentioned earlier, the diagnosis of more cases of prostate cancer in advanced aged men is due to higher

life-expectancy and use of PSA screening.

Also the fact the PSA level is high in BPH patients is well-known in literature (31,32) and BPH might increase the PSA level two-to-three times from its normal value (33). In our study we found that around 71% of patients with elevated PSA level were diagnosed, in fact, with BPH at biopsy, thus coming in line with international results that suggest BPH as one of most common factors contributing to rising of PSA levels. Also, we demonstrated the PSA level was highest (in terms of the mean value) among patients diagnosed with prostate cancer in biopsy. This finding aligns well with reports from international literature as well that suggest PSA level to be highly correlated with the risk of having prostate cancer (34,35).

However, using PSA level as guidance toward other examinations in order to detect prostate cancer is controversial since PSA has low sensitivity and specificity to detect the disease at early stages and it may lead to unnecessary biopsies, over detection and over treatment (36,37). Moreover, there are suggestions that men with a life expectancy of less than ten years should not be screened (36).

Regardless the related controversies and based on the findings of the current survey, we can argue that there is need to be active regarding the detection and diagnosis of the prostate cancer in Albania. The actual information indicates that most of the patients diagnosed with prostate cancer in the Regional Hospital of Shkodra are at advanced stages of the disease (stage T3 or T4) and even with bone metastasis. The fact that neoplasms are usually diagnosed at later advanced stages of the disease in Albania has been reported earlier, as well (38). Therefore, in this context, it is imperative to recommend patients with elevated PSA level and with suspicious digital rectal examination to undergo the needle biopsy of the prostate. It is a fact that, the more

biopsies will be carried out, the more cases with cancer will be diagnosed and therefore the system must be prepared to handle the excess number of cases detected and in need of treatment. However, there is no excuse not to try to diagnose prostate cancer in an earlier stage and still localized because in this cases the chances of cure are greatest (37).

This conclusion is also supported by the finding that complications of the biopsy are overwhelmingly not life threatening, self-limiting and treatable (15-18). Among these complications, sepsis seems to pose the most serious threat to the health and life of patients undergoing transrectal prostate biopsy (39). The incidence of complications after needle biopsy of prostate vary between 0.1% to 7% of cases (40) and the risk of hospitalization ranges from 0.6% to 4.1% of cases (41). Therefore, our findings are in accordance with figures reported in the international literature as we detected sepsis and hospitalization risks in 1% of cases included in this study. Also, among our study subjects hemospermia, the most common side effect of needle prostate biopsy, was present in 84% of cases, in line with other international reports in which this conditions affects up to 90% of patients following prostate biopsy (15). Lastly, the fact that six biopsies are needed in order to detect one single prostate cancer case is also justifiable in cost-benefit terms.

Conclusion

Transrectal needle biopsy of the prostate represents an important and necessary tool in the diagnosis of the prostate cancer in Albania, especially in the context that, currently, most cancer cases are diagnosed at advanced stages of the disease. The complications of the biopsy were not frequent, were mild and manageable, except for urinary sepsis which can be dominated with systemic ciprofloxacin during hospitalization.

Conflicts of interest: None declared.

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