Original Research

Correlation of serum prostate-specific antigen level in various prostate pathology in elderly men

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Abstract

Background: Carcinoma of prostate is one of common tumors of old age in men. With digital rectal examination (DRE) prostate-specific antigen (PSA) is a major screening tool for prostate cancer. While Trans Rectal Ultra Sound (TRUS)-guided needle biopsies of prostate are considered gold standard for the diagnosis of prostate cancers.

Objectives: To determine the spectrum of pathological lesions in TRUS-guided needle biopsies of prostate in men with increased serum PSA levels (≥ 4 ng/ml) with or without symptoms of prostatism.

Material and Methods: The study was carried out at the Department of Histopathology, B. J. Medical College Civil Hospital, Ahmedabad from January 2015 to October 2015. The study included 110 cases. Serum PSA level and histopathological examination of prostatic biopsies were performed and correlated. Raised serum PSA level were arbitrarily divided into mild (≥ 4–10 ng/ml), moderate (≥ 10.1–20 ng/ml), and marked elevations (≥ 20.1 to highest).

Results: The mean age of patients was 66.9 ± 9.4 years. Out of 110 cases, 69 (62.72%) cases were benign and 41 (37.2%) were malignant. Among malignant lesions, all cancers were of moderate to high Gleason grades and scores. Mild serum PSA rise was seen in 63 (57.27%) patients, among these 52 (84.1%) showed benign lesions and 10 (15.9%) malignant. Moderate serum PSA rise was seen in 26 (23.6%) cases, among 12 (46.15%) showed benign and 14 (53.8%) malignant. Briefly, 21 (19.1%) patients had serum PSA level > 20.1 ng/ml. Among these 4 (19.04%) cases were benign and 17 (80.9%) were malignant. Malignant lesions included prostatic adenocarcinoma. Benign lesions included benign prostatic hyperplasia, prostatitis.

Conclusion: In the present study, serum PSA level is one of the most useful front line methods for assessing individual's risk of prostate cancer. In addition, elevated level more than 4.0 ng/ml with TURS-guided needle biopsy is most useful and accurate diagnostic method for prostate.

KEY WORDS: Benign prostate hyperplasia, prostatitis, serum prostate-specific antigen (PSA), adenocarcinoma, Gleason score

Introduction

Prostatic carcinoma is an important growing health problem, presenting a challenge to urologists, radiologists and pathologist.[1,2] The incidence of prostatic diseases, benign prostatic hyperplasia, and carcinoma increases with age.[3]

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Prostate cancer is the leading cause of new cancer in men and is second only to lung cancer as a leading cause of cancer-related deaths in men.[4] Prostate cancer is the most common cancer of men in USA and 10th common malignancy in India.[1,2] Several factors, including age, race, family history, hormone levels, and environmental influences are suspected to play a role in pathogenesis.[5]

Because of the location of prostate gland at bladder neck, enlargement of the gland leads to problems related to urinary obstruction.[16] The incidence of prostatic diseases, benign prostatic hyperplasia, and carcinoma increases with age.[16]

Prostate-specific antigen (PSA) is the most useful tumor marker in diagnosis and first line test in screening.[3,4] The increase in serum PSA depends on differentiation of tumor cells. Gleason grading is one of the most powerful predictors

of biological behavior and influential factors used in determining treatment. PSA, when combined with Gleason score and clinical stage, improves the prediction of pathological stage for prostate carcinoma.[5]

The present study includes description of incidence of various lesions of prostate, their clinical manifestations, serum PSA level, classification, and grading of prostate tumors.

The diagnosis requires careful history, physical examination including digital rectal examination (DRE), serum PSA estimation and transrectal ultrasound (TRUS), and TRUS-guided needle biopsies of the prostate.

Among these, the latter are considered the gold standard for the tissue diagnosis of the prostatic cancer. To correlate the serum PSA level findings with histopathological diagnosis.[6]

Aim and Objectives

- To determine the age distribution of patients with prostatic lesion.
- To study prevalence of distribution of various prostatic lesions, admitted in Civil Hospital, Ahmedabad.
- To determine histological types related with PSA.

Material and Methods

Patients

The present study was carried out at the Department of Histopathology, B.J.M.C., Civil Hospital Ahmedabad, from January 2015 to October 2015. The study included 110 cases between 50 and 76 years of age group, who presented to with or without complaints of prostatism. Their detailed physical examination and DRE were performed, followed by appropriate laboratory investigations including determination of serum PSA. Serum PSA levels were calculated and correlated with various clinical and biopsy findings.

Biopsy Technique

TRUS-guided needle biopsies of the prostate gland were performed only in those patients who had serum PSA levels ≥ 4 ng/ml and/or abnormal DRE suspicious for prostate cancer. Ultrasound guidance was provided by a diagnostic ultrasound machine with, biplaner transrectal probe. Biopsies were obtained with patient in right or left lateral decubitus position and the prostate was imaged in the sagittal plane.[7,8] Only first time biopsies were included. Repeat biopsies were not included in the analysis.

Pathologic Study

The biopsy specimens were processed and studied at the Department of Histopathology, B.J.M.C. Gross examination of the biopsies included precise length and diameter and color of the cores. The biopsies were processed for paraffin embedding, cut at 3–5 μm and stained by hematoxylin and eosin (H&E) for detailed microscopic examination.

The histopathological grading and scoring by Gleason system was carried out in all cases of adenocarcinoma of prostate, criteria for the grading and scoring of needle biopsies of the prostate.[10]

Statistical Analysis

Simple descriptive statistics such as mean ± SD were used for continuous variables such as age and clinical and laboratory parameters.

Percentages were used for categorical data.

Results

The main clinical features of all patients are shown in Table 1 in variable combination.

In the present study, the mean age of all patients was 66.9 ± 9.4 years. Out of 110 cases, 69 (62.72%) cases showed benign lesions with mean age 57.7 ± 4.86 years and 41 (37.2%) were malignant with mean age 65.70 ± 5.64 years (Table 2).

Out of 110 cases, 41 (37.2%) revealed adenocarcinoma and the remaining 69 (62.72%) showed adenomyomatous hyperplasia (Figure 1) with or without associated active prostatitis (Figure 2, Table 3). Six patients with chronic granulomatous inflammation showed no caseation necrosis and negative results for acid fast bacilli on Ziel–Nelson staining and thus were labeled as idiopathic granulomatous prostatitis (Figure 3).

The mean serum PSA value was 13.36 ± 8.6 ng/ml; total range was 4–36 ng/ml. The mean PSA was significantly higher in the cancer group than in the benign. The rate of cancer detection increased significantly with the increase in serum PSA level. Briefly, 21 out of 110 patients (19.09%) had serum PSA ≥ 20.1 ng/ml. Of these, 17 (80.95%) patients had prostatic adenocarcinoma, and 4 (19.04%) benign changes (Table 4).

Raised serum PSA level were arbitrarily divided into mild (≥ 4–10 ng/ml), moderate (≥ 10.1–20 ng/ml), and marked elevations (≥ 20.1 to highest) (Table 5).

Table 1: Main presenting symptoms of the patients

Clinical features	No of cases (%)
Retention of urine	30 (27.27%)
Weak stream	22 (20%)
Frequency	15 (13.63%)
Urgency	13 (11.81%)
Hematuria	12 (10.90%)
Nocturia	10 (9.09%)
Hesitancy	8 (7.27%)

Table 2: Age-wise distribution of cases

Age range (years)	Benign lesion, no. of cases (%)	Malignant lesion, no. of cases (%)
50–60	18 (16.36%)	4 (3.63%)
61–70	40 (36.36%)	22 (20%)
> 70	11 (10%)	15 (13.63%)

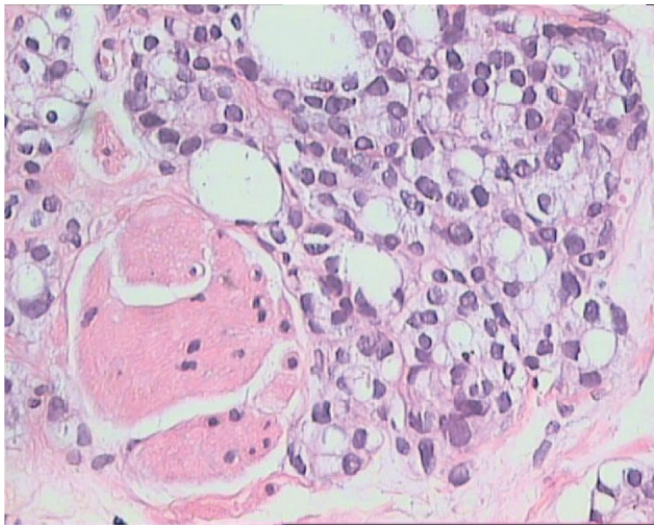

Figure 1: High-magnification image showing a few glandular lumina with focal areas of loss of glandular differentiation, a pattern consistent with Gleason grade 4 adenocarcinoma of the prostate (H & E, 400×)

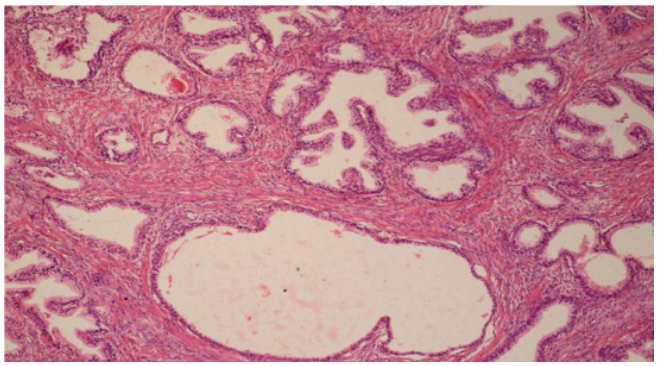

Figure 2: Benign prostatic hyperplasia with glandular and stromal proliferation and dilated gland (H & E, 100×)

Discussion

Carcinoma of prostate is common cancer in India because of increasing life expectancy and relatively better diagnostic method. The gold standard triad for diagnosing prostate cancer comprised DRE, PSA level, and transrectal ultrasonography.[11] It is a report on the spectrum of pathological lesions found in TRUS-guided biopsies of the prostate in men with elevated serum PSA and/or symptoms of prostatism from B.J.M.C., Ahmedabad.

In the present study, mean age of all patients was found 66.9 ± 9.4 years. Out of 110 cases, 69 cases (62.72%) cases showed benign prostatic lesions with mean age 57.7 ± 4.86 years and 41 cases (37.2%) malignant lesions with mean age 65.70 ± 5.64 years. Briefly, 21 out of 110 patients (19.09%) had serum PSA ≥ 20.1 ng/ml. Of these, 17 (80.95%) patients had prostatic adenocarcinoma, and 4 (19.04%) benign changes which indicate that marked raised serum PSA level was found in malignant prostatic lesions. In our study, most patients were symptomatic; 92% presented with lower urinary tract symptoms (LUTS) commonly known as prostatism. Very few patients (8%) presented for screening of the prostate

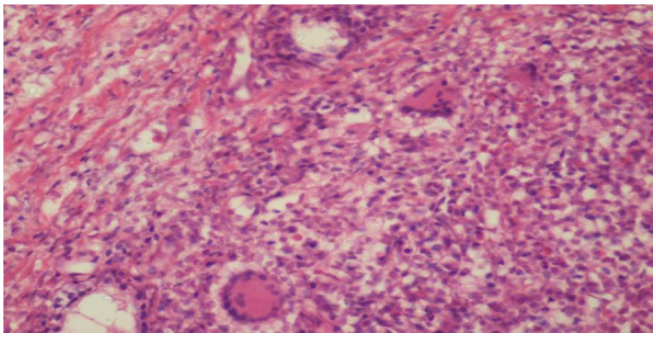

Figure 3: Granulomatous prostatitis showing epitheloid cell granulomas and giant cells (H & E, 400×)

Table 3: Number of cases according to histopathology diagnosis

Histopathological diagnosis	No. of cases (%)
Adenocarcinoma	41 (37.27%)
BPH	35 (31.81%)
Chronic nonspecific prostatitis	15 (13.63%)
Acute; prostatitis	6 (5.48%)
PIN	2 (1.81%)
Chronic granulomatous prostatitis	6 (5.45%)
Others (foreign body granuloma, nonspecific)	5 (4.54%)

Table 4: Number of cases with raised serum PSA level

Cases	Serum PSA level (mild raised) > 4–10 ng/ml, 63 cases	Serum PSA level (moderate raised) > 10.1–20 ng/ml, 26 cases	Serum PSA level (severe raised) > 20.1 ng/ml, 21 cases
Benign cases	53 (84.1%)	12 (46.15%)	4 (19.97%)
Malignant cases	10 (15.9%)	14 (53.8%)	80.99%)

Table 5: Histopathological characteristics of prostate cancer observed in 48 patients with raised serum prostate specific antigen levels

Patients	No. of cases (%)
Biopsy Gleason grade	
3	10 (24.39%)
4	20 (48.78%)
5	11 (26.82%)
Biopsy Gleason score	
6	6 (14.63%)
7	10 (24.39%)
8	9 (21.95%)
9	13 (31.70%)
10	3 (7.31%)
Positive biopsy cores	
1	4 (9.75%)
2	2 (4.87%)
3	3 (7.31%)
4	3 (7.31%)
5	6 (14.33%)
8	2 (4.8%)

cancer at asymptomatic stage. This is understandable given the low level of awareness of this cancer among the general population.

In a study from China, cancer detection rate was 40%.[6] In the study by Levine et al[13] cancer was detected in 31% of cases. Presti et al[14] observed prostate cancer in 42% of the TRUS-guided biopsies. All these studies included patients with raised serum PSA associated with or without prostatism, as in our study. However, different levels of serum PSA and different biopsy strategies were employed in these studies, which are reflected in slight differences in cancer detection rates. The overall cancer detection rate in TRUS-guided biopsies in our series was 37.2%. Marked raised serum PSA level > 10 ng/ml, in study by Khitij et al[18] malignant prostatic lesions were 63.7%, in study by Mwalyoma et al[19] malignant lesions were 94.7%, in study of Sladana Zivkovic et al[20] study malignant lesions were 70.0%. In the present study with marked raised serum PSA level were found in 75.60% which was comparable with other studies. This is an interesting finding which shows that patients with markedly elevated serum PSA levels are more likely to harbor adenocarcinoma in their biopsies than benign changes, as in previous studies[6] (Table 6).

Serum PSA determination has certain limitations for the diagnosis of prostate cancer. Serum PSA levels are slightly elevated in cases of BPH because of prostate tissue-specific protease property of PSA. In a significant number of patients with raised serum PSA, TRUS-guided biopsies showed benign hyperplastic or inflammatory lesions rather than cancer. The proportion of benign lesions was greater in patients with mild or moderate elevations of serum PSA. In contrast, cancer was more frequent in cases with marked elevations in serum PSA.

Conclusion

In the present study, the commonest pathology encountered in the prostates studied was benign lesion (62.72%). Incidence of carcinoma was 41 cases (37.2%). Briefly, 69 (62.72%) cases showed benign lesions with mean age 57.7 ± 4.86 and 41 (37.2%) were malignant with mean age 65.70 ± 5.64. In TRUS biopsies of prostate in patients with symptoms of prostatism and high serum PSA, the mean serum PSA was 24.63 ± 9.4 ng/ml in adenocarcinoma. In benign prostatic lesion mean serum PSA level was 6.16 ± 2.4 ng/ml. In the present study serum PSA level are the most useful front line methods for assessing and individual's risk of prostate cancer. In addition elevated level more than 4.0 ng/ml with TURS-guided needle biopsy is most useful and accurate diagnostic method for prostate.

Table 6: Benign and malignant prostatic lesion: comparison between PSA level with other study

PSA range (ng/ml)	Benign prostatic hyperplasia (%)			Malignant prostatic lesion (%)			
	Kshitijet al[18]	Ishtiaq AliKhan et al[19]	Presentstudy	Kshitij et al[18]	Mwalyoma et al[19]	Sladana Zivkovic et al[20]	Presentstudy
0–4	71.6		–	10.5		2.50	–
4–10	22.6	74	76.81	26.3	5.3	27.50	24.39
> 10	3.0	26	23.18	63.7	94.7	70.0	75.60

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