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Original Research Article

A Retrospective Study Assessing Serum Prostate Specific Antigen Levels in Patients with Prostate Lesions

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Abstract

Aim: The aim of the present study was to assess the serum prostate specific antigen levels in patients with prostate lesions.

Methods: This was a retrospective record based study in which we retrieved all the prostatic specimens including Transurethral urethral resection of prostate (TURP) specimens and prostatic core biopsies, received at the Department of Pathology, DMCH, Darbhanga, Bihar, India over period of one year. Out of total 140 prostatic specimens received during the study period, total of 100 cases satisfied the inclusion criteria.

Results: Out of total 100 cases, 86 (86%) were benign lesions which included 56 cases BPH alone, 24 cases of BPH with prostatitis while single 4 cases each for BPH with granulomatous prostatitis and basal cell hyperplasia. Mean PSA value for benign lesions was 6.57 ng/ml. There were 14 malignant lesions which included 12 cases of Prostatic adenocarcinomas (PCa) and a 2 cases of metastatic Transitonal cell carcinoma (TCC) of bladder. Mean PSA for PCa cases were 35.05 ng/ml. Single case of high grade prostatic intraepithelial neoplasia (HGPIN) also detected. The distribution of various prostatic lesions along with their PSA values was shown. Maximum prostatic lesions came under 0-4 PSA values. While maximum benign cases presented in seventh decade while maximum PCa cases presented in eighth decade of life in this study.

Conclusion: We concluded that the most common prostatic lesions are benign predominantly BPH. PCa are the commonest malignancies. Common age group at the time of presentation of prostatic pathologies was 60-70 years. Elevated levels of PSA >20 ng/ml are commonly observed in PCa.

Keywords: Serum Prostate, Specific Antigen Levels, Prostate Lesions.

Introduction

The term prostate enlargement encompasses benign hyperplasia of prostate (BPH) and carcinoma of prostate. Prostate specific antigen (PSA) is a glycoprotein that is expressed by both normal and neoplastic prostate tissue. PSA has a half-life of 2.2 days, and levels elevated by different benign conditions will have variable recovery times. Historically a concentration above 4 ng/ml was considered abnormal. Prostate cancer prevention trial (PCPT) study, which included biopsy regardless of PSA level, demonstrated that there is no level of PSA below which prostate cancer risk falls to zero. Overall, the positive predictive value for a PSA level >4.0 ng/mlis approximately 30 percent, meaning that slightly less than one in three men with an elevated PSA will have prostate cancer detected on biopsy. A negative predictive value of 85 percent for a PSA value ≤4.0 ng/ml was inferred from this trial. [1] PSA levels are indicative of a continuum of risk-the higher the level, the higher the risk. These observations indicate that there is not a clear cut point between "normal" and "abnormal" PSA levels. [2]

Prostatic pathologies are commonly seen in elderly men with benign prostatic hyperplasia (BPH) being the commonest. [3] Prostatomegaly is a leading cause of symptom associated with lower urinary tract obstruction in men above 50 years of life. The most common cause of prostatomegaly is BPH, but many cases of prostatic malignancy were also found. [4,5] The prostate gland has three major glandular regions- the central zone, peripheral zone, and the transition zone, which differ biochemically and histologically. The transition zone is the main site of origin of benign prostate hyperplasia. The peripheral zone is the most common site for developing prostate carcinomas. [6] PSA is most important and clinically useful biomarker for prostate. [7] Normal levels of PSA are usually <4 ng/mL, but they vary according to

the age of patients. [8] PSA is not a tumor-specific antigen as it is increased in both benign and malignant conditions but more significantly increased by malignant tissue. [9] The cell integrity is lost due to many pathological processes which cause the release of prostate-specific antigen (PSA) into circulation. [10-12] The cell damage occurs due to bacterial infection, prostate infarction, and malignancy. [13] The development of carcinoma prostate is caused by many mutation and epigenetic changes, leading to an activation of tumor suppressor genes and activation of oncogenes. [14]

The aim of the present study was to assess the serum prostate specific antigen levels in patients with prostate lesions.

Materials and Methods

This was a retrospective record based study in which we retrieved all the prostatic specimens including Transurethral urethral resection of prostate (TURP) specimens and prostatic core biopsies, received at the Department of Pathology, DMCH, Darbhanga, Bihar, India over period of one year. Out of total 140 prostatic specimens received during the study period, total of 100 cases satisfied the inclusion criteria.

Serum PSA levels were evaluated in department of biochemistry using immunometric assay on ViTROS ECi Immunodiagnostic Systems (Ortho Clinical Diagnostics) on venous blood samples. Cases without in house serum PSA levels and inadequate biopsies were excluded. Out of total 70 prostatic specimens received during the study period, total of 50 cases satisfied the inclusion criteria.

Spectrum of histopathological lesions included BPH, BPH with Prostatitis, BPH with granulomatous prostatitis, basal cell hyperplasia, High grade prostatic intraepithelial neoplasia (HGPIN), Prostatic Adenocarcinoma (PCa) and Metastatic transitional cell carcinoma. All the diagnosed lesions were correlated with serum PSA levels. No follow up data was available.

Fischer's exact chi-square test was applied. All calculations were done using microsoft excel while statistical test performed using Open Epi software.

Results

Table 1: Age specific distribution of total prostatic lesions and distribution of prostatic lesions

Agein years	**No. of cases (%)**
41-50	4 (4)
51-60	16 (16)
61-70	46 (46)
71-80	30 (30)
81-90	4 (4)
Prostatic lesions	
Benign (N=86)	
BPH alone	56
BPH with prostatitis	22
BPH with granulomatous prostatitis	4
BPH with basal cell hyperplasia	4
Malignant (N=14)	
Prostatic adenocarcinomas	12
Transitonal cell carcinoma (TCC) of bladder	2
High grade prostatic intraepithelial neoplasia	2

Mean age at the time of diagnosis was 66.84 years with age ranging from 48-80 years. Most common age group was between 61-70 years accounting for 46 (46%) of all cases. Out of total 100 cases, 86 (86%) were benign lesions which included 56 cases BPH alone, 24 cases of BPH with prostatitis while single 4 cases each for BPH with granulomatous prostatitis and basal cell hyperplasia. Mean PSA value for benign lesions was 6.57 ng/ml. There were 14 malignant lesions which included 12 cases of Prostatic adenocarcinomas (PCa) and a 2 cases of metastatic Transitonal cell carcinoma (TCC) of bladder. Mean PSA for PCa cases were 35.05 ng/ml. Single case of high grade prostatic intraepithelial neoplasia (HGPIN) also detected.

While maximum benign cases presented in seventh decade while maximum PCa cases presented in eighth decade of life in this study.

Discussion

The incidence of prostate cancer is rising worldwide as a consequence of transition of world adult population into elderly population resulting in a great apprehension in patients as well as clinicians if they encounter increased prostate specific antigen (PSA) levels. This is attributed to the improvement of health services, and more importantly understanding the sensitivity and specificity of PSA levels in diagnosing various prostate diseases with the help of prostate specific antigen (PSA) testing. The rationale for screening

is the detection of early disease (organ confined) which is amenable to cure. [15,16]

Mean age at the time of diagnosis was 66.84 years with age ranging from 48-80 years. Most common age group was between 61-70 years accounting for 46 (46%) of all cases. This was comparable with results of Lakhey et al [17] (mean 67.61, n=91), Vani et al (mean age 63.9), Javed R et al [18], Jayapradeep et al [19] and Banerjee et al [20] (most cases in age group 61-70 years). Out of total 100 cases, 86 (86%) were benign lesions which included 56 cases BPH alone, 24 cases of BPH with prostatitis while single 4 cases each for BPH with granulomatous prostatitis and basal cell hyperplasia. Mean PSA value for benign lesions was 6.57 ng/ml. There were 14 malignant lesions which included 12 cases of Prostatic adenocarcinomas (PCa) and a 2 cases of metastatic Transitonal cell carcinoma (TCC) of bladder. Mean PSA for PCa cases were 35.05 ng/ml. Single case of high grade prostatic intraepithelial neoplasia (HGPIN) also detected. The results are comparable with study by Wadgaonkar et al where they found similar results in the form of 83.75% BPH with and without prostatitis cases, 13.75% PCa, 1.25% metastatic TCC and PIN each. [22]

Table 2: Distribution of prostatic lesions with serum PSA

Sr. PSA (ng/ml)	BPH	BPH with Prostatitis	BPH with Granulomatous Prostatitis	BCH	HG PIN	PCa	Metastatic TCC	Total
0-4	30	14	0	0	2	2	2	50
4-10	12	4	2	0	0	4	0	22
10- 20	8	8	0	2	0	0	0	18
>20	2	0	0	0	0	8	0	10
Total	52	26	2	2	2	14	2	50

The distribution of various prostatic lesions along with their PSA values was shown. Maximum prostatic lesions came under 0-4 PSA values.

Table 3: Distribution of benign lesions with serum PSA in different age group

Sr. PSA(ng/ml)	41-50	51-60	61-70	71-80	81-90	Total
<4	2	8	22	16	2	50
4-10	0	4	8	8	0	20
10-20	0	4	8	2	0	14
>20	0	0	2	0	0	2
Total	2	16	40	26	2	86

Table 4: Distribution of prostatic adenocarcinoma with PSA in different age group

Sr. PSA(ng/ml)	41-50	51-60	61-70	71-80	Total
<4	0	0	2	0	2
4-10	2	2	0	0	4
10-20	0	0	0	0	0
>20	0	0	2	4	6
Total	2	2	4	4	12

Mean PSA for PCa cases were 35.05 ng/ml. Single case of high grade prostatic intraepithelial neoplasia (HGPIN) also detected. The distribution of various prostatic lesions along with their PSA values was shown. Maximum prostatic lesions came under 0-4 PSA values. While maximum benign cases presented in seventh decade while maximum PCa cases presented in eighth decade of life in this study. While PSA level measurement is currently the best single test for early prostate cancer detection, digital rectal examination can also identify men with the disease. Studies done by Bretton et al [23] and Catalona et al [24] have suggested that combining both tests improves the overall rate of prostate cancer detection when compared to either test alone. In our study all the cases with abnormal digital rectal examination had abnormal PSA value and 79.4 % of the cases had malignant lesion on biopsy.

In clinical practice, biopsies are generally performed only when the results of a PSA test or Digital rectal examination (DRE) is abnormal. This leads to misdiagnosis of most small Prostatic cancers present in many older men. Patients with lower urinary tract symptoms (LUTS) who have Serum PSA levels higher than 4 ng/ml are primarily advised to undergo prostate biopsy to rule out cancer. But PSA is organ specific but not cancer specific, so the presence of other prostate diseases such as benign prostatic hyperplasia (BPH), and Prostatitis may influence its effectiveness for cancer detection. An early detection of the cause of LUTS is necessary to offer selective treatment to the concerned subjects.

Conclusion

We concluded that the most common prostatic lesions are benign predominantly BPH. PCa are the commonest malignancies. Common age group at the time of presentation of prostatic pathologies was 60-70 years. Elevated levels of PSA >20 ng/ml are commonly observed in PCa. So higher PSA must warrant a careful histopathological examination for PCa as chances of finding malignancy increase. However lower or normal PSA values also does not rule out PCa.

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