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Radiodiagnosis

A STUDY TO DIAGNOSE PROSTATIC NEOPLASM ON THE BASIS OF TRANS-RECTAL ULTRASOUND-GUIDED PROSTATIC BIOPSY

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ABSTRACT

Background: Presently gold standard to differentiate and diagnose the prostatic non-neoplasm and neoplasm, is a Transrectal ultrasound (TRUS) guided biopsy of the prostate.

Objectives: To differentiate and diagnose the different types of prostatic diseases – non-neoplastic {benign prostatic hyperplasia (BPH), prostatitis and prostatic abscess} and neoplastic diseases by TRUS-guided biopsy of the prostate in patients with increased serum prostatic specific antigen (PSA) levels with or without symptoms of Prostatomegaly.

Patients and methods: This is a prospective study carried out on all patients (60 patients) having symptoms suggestive of prostatic diseases with increased serum PSA, presented in the Department of Radiology, SAIMS, Indore from March 2016 to Feb 2017. All these patients were subjected to DRE, serum prostate-specific antigen testing in their referring department. These patients underwent TRUS-guided prostate biopsies to diagnose the prostatic diseases. Increased serum PSA level randomly was divided into mild (≥ 4 to 10ng/ml), moderate (≥ 10.1 to 20 ng/ml) and marked elevations (20.1 ng/ml & more). In most cases, twelve cores tissue were taken and sent in 12 separate formalin bottles. These bottles were sent to the pathology department.

Result: In our study, the mean age of all patients was 66.47± 8.88years; (range from 48 to 85 years). On the basis of our study, there is no significant difference in an age in these two group.

The mean serum PSA value was 31.49± 23.70 ng/ml. The mean PSA was significantly higher in the cancer group than in the benign group. Out of total 60 cases, 36(60%) cases were having neoplastic lesions, however, the remaining 24 (40%) showed non-neoplastic lesions.

Conclusions: The detection rate of prostate cancer is similar to that reported previously from around the world and rises with an increase in serum PSA level.

KEYWORDS : Transrectal ultrasound guided biopsy, prostatic diseases

Introduction

Prostate Carcinoma is the second most common malignant tumor in men over the age of 60-65 years, first is lung cancer, followed by esophagus, larynx, and liver. As well as it is also the second only to lung cancer as a leading cause of cancer-related deaths in men. [1]

In last few decades, the incidence of prostate cancer has steadily increased. The incidence of prostatic diseases, benign prostatic hyperplasia and carcinoma also increase with age [2]. That's why prostatic diseases are important growing health problems as well as creating a challenge to urologists, radiologists and pathologist.[3,4]

In the pathogenesis of the prostatic carcinoma, there are several factors suspected to play a role like - age, race, family history, hormone levels, and environmental influences.[1]

Enlargement of the gland causes problems related to urinary obstruction as the anatomic location of the prostate gland at the bladder neck. [5].

The incidence of prostate diseases also depends on racial and regional differences. In approximately 70% cases of prostate Carcinoma in Asian men involves the peripheral zone of the gland, mainly in the posterior location[1].

The prostate diseases diagnosis needs clinical history, physical examination - digital rectal examination (DRE), serum prostate-specific antigen (PSA) estimation and transrectal ultrasound (TRUS) and TRUS-guided needle biopsies of the prostate[2,6]. The gold standard for the diagnosis of the prostatic cancer is tissue biopsies [4]. For the early diagnosis of prostate cancer, a TRUS-guided needle biopsy is the standard method in most urology centers in the world [2].

According to the recent literature by Chun et al[7], the current optimal number of sample for the initial prostate biopsy should include not less than 10 cores. At our institution, patients with an elevated serum PSA level we are doing 12-core Transrectal Ultrasound-Guided Prostate Needle Biopsy (TRUS) as the initial procedure. Extended saturation repeat biopsy of up to 32 cores may be indicated in younger men with negative previous biopsies and with a persistent suspicion of having prostate carcinoma [7].

Aim and Objectives

A study to Diagnose Prostatic neoplasm on the Basis of Trans-Rectal ultrasound-guided prostatic biopsy

Material and Methods

This study was carried out in the Department of Radiodiagnosis, SAIMS, Indore, from March 2016 to February 2017. Patients were usually referred from the urology department; few patients were also referred from the other departments, with presenting complaints usually related to prostatism. We have included all patients referred to us (60 cases) in this study. The age group was between 48 and 85 years. Their detailed physical examination and Digital Rectal Examination, as well as appropriate, laboratory investigations like the determination of serum PSA, were performed by their referring departments. Informed consent was obtained from all participants and a full explanation was given to them about the procedure.

We have done TRUS-guided needle biopsies of the prostate gland only in those patients who were referred with serum PSA levels ≥ 4 ng/ml with or without abnormal DRE suspicious for prostate cancer.

Prior to the TRUS biopsy, prophylactically all the patients were treated with oral as well as IV antibiotics, as prevention against infection. Bowel preparation was also done, like using a rectal enema.

This study was performed using Philips IU22 Ultrasound machine under Transrectal probe guidance. Biopsies were obtained with the patient in right lateral decubitus position and the prostate was imaged in the sagittal plane. Only first-time biopsies were included. Repeat biopsies were not included in the analysis.

Perianal and periprostatic local anesthesia was given just prior to biopsy. Biopsies were obtained using 25 cm 18 gauge automatic biopsy gun. Mostly twelve cores biopsy tissue samples were taken in each patient.

All twelve core tissue biopsy specimens were sent in separate formalin bottles (marked as 1 to 12 number) to the Department of Histopathology, SAIMS, Indore for processing and for detailed microscopic examination.

Demographic, clinical and laboratory data of each patient was taken from the clinical charts. Original biopsy reports were used for histopathological features.

In our study, neoplastic lesion includes adenocarcinoma, however benign prostatic hyperplasia (BPH), prostatitis and prostatic abscess were considered under - non-neoplastic lesions.

Statistical Analysis

Simple descriptive statistics such as mean ± SD were used for continuous variables such as age and laboratory parameters. Percentages were used for categorical data. For comparisons of prostate cancer and the non-cancer group, a p-value of less than 0.05 was considered significant. Unpaired T-test was used.

Results

In our study, the mean age of all patients was 66.47± 8.88years; (range from 48 to 85 years). Non-neoplastic lesions were found in 36 (60%) out of 60 cases with mean age 66.36±8.61years and 24 (40%) were malignant with mean age 66.63±9.46 years (Table 3), this shows there is no significance in an age in these two group.

The mean serum PSA value was 31.49± 23.70 ng/ml. The mean PSA was significantly higher in the cancer group (p-value = 0.0021) than in the benign group (Table 3). Out of total 60 cases, 36(60%) cases were having neoplastic lesions (adenocarcinoma), however, the remaining 24 (40%) showed non-neoplastic lesions which include benign prostatic hyperplasia with or without associated nonspecific prostatitis and prostatic abscess.

In our study, markedly high levels of serum PSA level (>20.1ng/ml & more) was seen in total 32(53.33%)cases. Out of these, neoplastic etiology (prostatic adenocarcinoma) was found in 16 cases, and 16 cases also showed non-neoplastic etiology. Moderately elevated (≥10.1to20ng/ml) PSA level was fond in 16 (26.67%) cases out of total 60 patients. Among these 16 cases, neoplastic etiology was found in 4 cases and 12 cases had non-neoplastic etiology (Table 1). As serum PSA level increases the rate of cancer detection also significantly increases.

Table 1: Distribution of cases (neoplastic and non-neoplastic) on the basis of PSA level

Grading of PSA	Neoplastic	Non-neoplastic	
mild (≥ 4 to 10ng/ml)	4(16.67%)	8(22.22%)	12(20%)
moderate(≥10.1to20ng/ml)	4(16.67%)	12(33.33%)	16(26.67%)
marked elevations (>20.1ng/ml & more)	16(66.67%)	16(44.44%)	32(53.33%)
Total	24(40%)	36(60%)	60

Table 2: Distribution of cases (neoplastic and non-neoplastic) on the bases Age group

Age range (years)	Neoplastic	Non-neoplastic	total
<50	2(8.33%)	0	2
51–60	4(16.67%)	14(38.89%)	18
61–70	8(33.33%)	14(38.89%)	22
> 71	10(41.67%)	8(22.22%)	18
Total	24(40%)	36(60%)	60

Table 3:

Parameter	Neoplastic	Non- neoplastic	p-value
Age in yrs (mean±SD)	66.63±9.46	66.36±8.61	0.9114
PSA level (ng/ml) (mean±SD)	39.15± 32.12	20.48±10.98	0.0021

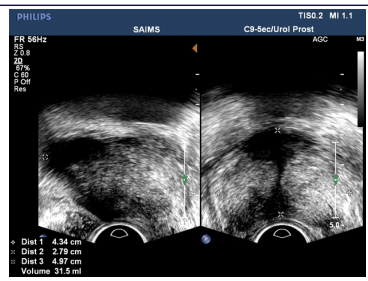

Figure-1 Prostatic volume

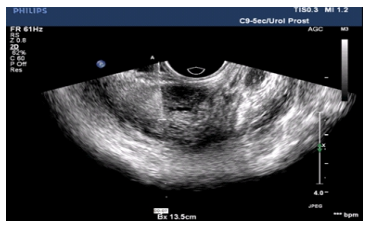

Figure 2

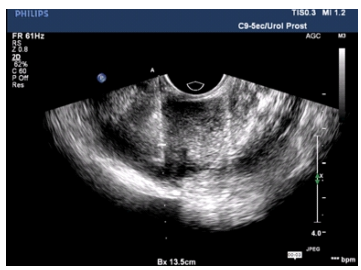

Figure 3

Figure 2 & 3 – Prostatic tissue biopsy taken by automatic biopsy gun

Traditionally TRUS is considered as the important imaging investigation for the prostate, which gives important information as regards benign and malignant conditions. Due to the widespread availability of diagnostic tools like - DRE, TRUS, and PSA measurement, prostate cancer is frequently diagnosed at an early stage, results into increase the life expectancy of the patient [8].

In our study, the prostatic neoplastic frequency increases as age increases, so it is associated with mainly with elderly men (1). This was also reported by Jemal et al. [6].

Increased serum PSA level (> 4 ng/ml) can imply the presence of prostate neoplasm, however, patients with BPH and inflammatory prostate disorders can also present with increased serum PSA levels, as reported by Thompson et al. [9] and Schroder et al. [10]

Prostate cancer was observed in 40%, 42% and 31% of the TRUS-guided biopsies in Dai B et al[11], Levine et al[12] and Presti et al[13] studies respectively. The most of these studies included patients with raised serum PSA along with or without prostatism, as in our study. On the other hand, these studies employed different levels of serum PSA and different biopsy strategies, that's why these studies show minimal differences in cancer diagnosis rates.

Out of 60 cases, 36 cases (60%) cases showed non-neoplastic etiology with mean age 66.36±8.61years, however, neoplastic etiology was found in rest 24 cases (40%) having mean age group 66.63±9.46years. We have graded PSA level in mild, moderate and marked elevations. In the present study, markedly raised serum PSA level (≥ 20.1 ng/ml) is seen 16 cases non-neoplastic lesions24 (40%) on TRUS-guided biopsies. Out of total 24 cases of neoplastic etiology majority of cases-16 cases (66.67%) had markedly raised serum PSA level (≥ 20.1 ng/ml). However, a good number of non-neoplastic etiology cases 16(44.44%) were also found in markedly raised serum PSA level (≥ 20.1 ng/ml).

On the basis of these findings it's difficult to say that simply a rise in serum PSA levels ≥ 5 ng/ml is associated with a patient has prostate neoplasm, because non-neoplastic conditions can also be associated with increased serum PSA levels[14,15].

Conclusion

The most useful front line methods for assessing the individual's risk of prostate cancer are DRE, serum PSA level and ultrasonography (transrectal or transabdominal).

However, on the basis of our study and previous similar studies, we cannot differentiate neoplastic from non-neoplastic prostatic lesions, only by doing frontline methods. The next and final step to differentiate neoplastic and non-neoplastic etiology of the prostate is transrectal ultrasonographic guided biopsy, which is an investigation of choice.

The detection rate of prostate cancer is similar to that reported previously from around the world and rises with an increase in serum PSA level and correlate very well.

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