Incidence of prostate cancer among patients with prostate-related urinary symptoms: A single institution series in 10 years

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Abstract

Purpose: The aim of the study is to correlate between the value of digital rectal examination (DRE), serum prostate-specific antigen (PSA), and transrectal ultrasound (TRUS) as predictors for diagnosing prostate cancer in patients with voiding symptoms.

Materials and Methods: A total of 1610 male patients seen over a period of 10 years in a single institution had prostate-related voiding problems. Routine studies including DRE and serum PSA were done to all patients. TRUS and TRUS biopsy were performed for patients with suspected prostatic cancer based on abnormal DRE findings and/or serum PSA levels.

Results: TRUS biopsy revealed prostate cancer in 206 out of 1610 patients with prostate-related voiding problems (13%), 40% had abnormal PSA and 28% had abnormal DRE. Combined abnormal PSA and DRE revealed cancer in 63% of patients. This percentage increased to 90% when TRUS was also abnormal, but dropped to 54% when TRUS was normal.

Conclusions: DRE together with serum PSA and TRUS have the highest predictable values for diagnosis of prostate cancer among patients with voiding symptoms. In the absence of abnormal TRUS, PSA and DRE together are more predictable than either alone. Serum PSA alone is more predictable than DRE. Random prostate biopsies should be performed in the presence of high serum PSA, and/or abnormal findings by DRE in male patients with urinary symptoms suggestive of the prostate disease.

Keywords: Digital rectal examination, prostate biopsies, prostate cancer, prostatic specific antigen, transrectal ultrasound, voiding symptoms

INTRODUCTION

The prostate-specific antigen (PSA) test is a blood test that measures levels of a protein produced by the prostate gland. Men with prostate cancer usually have elevated levels of the PSA, but elevated levels do not always mean cancer. Other medical conditions may also cause PSA levels to rise. In some cases, an elevated PSA level may not always indicate prostate cancer. Cells in the prostate gland produce PSA and levels typically remain below 4 ng/mL.

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Most men with prostate cancer have PSA levels above 4 ng/mL, but about 15% of men with a PSA level below 4 ng/mL are also diagnosed with prostate cancer.[9] This means that a PSA test alone cannot rule out or diagnose prostate cancer but can identify, whether a man is at higher risk of having or developing the disease. Serum PSA and digital rectal examination (DRE) are important diagnostic tools for patients with symptomatic prostate cancer. However, abnormal findings are not considered conclusive as each of them lacks both sensitivity and specificity for a definitive diagnosis.[3] Both PSA and DRE, when combined, are considered more reliable in obtaining enough evidence to warrant transrectal ultrasound (TRUS) biopsy for confirmation of the presence of cancer.[2,3] Malignant nodules in the prostate can either be interpreted by DRE as benign or can be missed.[4] The sensitivity and specificity of DRE, for the diagnosis of prostate cancer, was reported to be 69%–89% and 84%–98%, respectively.[5,6]

Serum PSA levels <4 ng/mL are considered normal,[7] even though the occasional presence of cancer as low as 2.6 ng/mL can occur.[8] When patients with serum PSA levels higher than 4 ng/mL were subjected to TRUS biopsy irrespective of DRE findings, only 25% had cancer.[9] PSA does not only reflect changes due to cancer but also changes due to inflammation, trauma, or benign proliferation.

In this study, when PSA was 4 ng/mL or higher, and DRE findings were suspicious of cancer in symptomatic patients above the age of 50 years, TRUS-guided biopsy of the prostate was performed for the detection of prostate cancer.

**MATERIALS AND METHODS**

This was a retrospective study that included 2610 male patients aged 50 years and older who were examined for prostate-related voiding problems. They were seen in the outpatient clinic or in the emergency room at King Fahd Hospital of Imam Abdulrahman Bin Faisal University between December 2007 and January 2018. The prostatic disease was suspected from the complaint, clinical examination, and results of the investigations. All patients had DRE, serum PSA, and pelvic ultrasound. TRUS and TRUS-guided prostatic biopsies were done in the presence of suspicious DRE and/or serum PSA findings. TRUS was performed with antimicrobial prophylaxis and pain management. The biopsies were taken at random as well as from suspicious nodules that were detected by DRE or ultrasound. TRUS was done by in real-time (B-K Medical, Denmark), with all probes using 10 MHz transducers. TRUS biopsy specimens were obtained with an 18 G needle and biopsy gun from Teutonia Technology. Twelve-core biopsy specimens were taken. If there were any abnormal areas detected by DRE or TRUS, these were incorporated into one of the 12 cores.

**RESULTS**

The number of patients who presented with prostate-related voiding symptoms during the study was 1610. Prostate cancer was suspected by DRE and/or PSA findings in 520 patients. They underwent TRUS and TRUS biopsy, and malignancy was confirmed in 206 patients. Those patients (n = 206) represented 13% of the patients who had prostate-related voiding problems and 40% of those with suspicious prostatic malignancy [Table 1]. The 1090 patients who had normal DRE and PSA findings were excluded from the study.

Patients with normal and abnormal DRE, PSA, and TRUS were referred to as (−ve) and (+ve), respectively. DRE was considered abnormal in the presence of areas with increased firmness or presence of hard nodules in the prostate. Serum PSA levels of 4 ng/mL or more were considered abnormal with a probability of prostate cancer.

Among the 520 patients with suspected prostate cancer, 484 (93%) had abnormal PSA with 192 (40%) of them with confirmed prostate cancer by TRUS biopsy. Abnormal DRE was detected in 428 (82%) patients, and 120 (28%) of them had prostate cancer [Table 2]. Those patients were divided into three groups based on the status of PSA and DRE. In Group 1, 245 out of 520 patients (47%) had abnormal findings in both PSA and DRE. Abnormal PSA with normal DRE (Group 2) was recorded in 239 (46%), while the remaining 36 (6.9%) in Group 3 had normal PSA and abnormal DRE [Table 3]. TRUS biopsy to the three groups confirmed the presence of prostate cancer in 154 (63%), 37 (15.5%), and 3 (8.3%) patients, respectively [Table 3].

**Table 1: Patients in this study**

| Patients                               | Number | Prostate Cancer |
|----------------------------------------|--------|----------------|
| Prostate-related voiding symptoms       | 1610   | 13%            |
| Suspected prostate cancer               | 520    | 40%            |
| Confirmed prostate cancer               | 206    | 100%           |

**Table 2: Confirmed cancer in relevance to DRE and PSA, separately**

| Patients          | PSA +ve       | DRE +ve       |
|-------------------|---------------|---------------|
| Suspected cancer  | 484/520 (93%) | 428/520 (82%) |
| Confirmed cancer  | 192/484 (40%) | 120/428 (28%) |
Tables 4 and 5 show changes in the incidence of prostate cancer in the three groups based on TRUS findings. In the presence of abnormal TRUS readings [Table 4], confirmed cancer was recorded in 90%, 17%, and 9%, respectively, while cancer in the presence of normal TRUS was confirmed in 54%, 15%, and 0%, respectively [Table 5].

**DISCUSSION**

Even though Saudi Arabia has been known to have a low incidence of prostate cancer as compared to the western world,[10] more recent studies suggest a steady increase in incidence.[11] Serum PSA and DRE have been the basic tools for screening of prostate cancer among the Saudi population and were also utilized in this study to select patients with prostate-related urinary symptoms as high risk for having prostate cancer. Over a 10 years’ period, 206 patients were diagnosed with prostate cancer out of 1610 with prostate-related urinary symptoms. This comprised a 13% incidence which is higher than the 2.5% incidence of prostate cancer among 2100 healthy Saudi males in a screening study performed by Rabah and Arafa.[12] This study included patients with presentations suggestive of prostatic cancer and was not a screening study.

When DRE and PSA tests are used in prostate cancer screening, detection rates are higher with PSA testing than with DRE, and highest with both tests done together.[13] This trend was also noticed among the patients with the prostate-related urinary symptoms. Prostate cancer was present in 40% of patients with abnormal PSA. This figure dropped to 28% with abnormal DRE and was more pronounced (63%) when both PSA and DRE were abnormal. The highest prediction of prostate cancer was obtained (90%) when PSA, DRE, and TRUS were all abnormal [Tables 4 and 6]. The incidence of prostate cancer dropped to 54% when TRUS was normal in the presence of abnormal PSA and DRE [Tables 5 and 6].

When PSA and DRE recorded together showed abnormal findings in only one of them, the incidence of cancer was 15% in the presence of abnormal PSA alone, and 8% in the presence of abnormal DRE. Similar results were obtained when TRUS was added to the equation ranging between 17% and 8%. Based on these findings, it is recommended to perform TRUS biopsy in the presence of prostate-related urinary symptoms in the presence of at least one abnormal parameter, be it PSA or DRE, and irrespective of the TRUS findings. This recommendation is not in conflict with the AUA guidelines where PSA and DRE restrictions only apply to screen tests.[13,14]

**CONCLUSIONS**

PSA is a protein produced by prostate gland. Prostate cancer patients usually have elevated levels of this protein, but heightened levels do not always mean cancer.

The diagnosis of prostate cancer is most predictable when PSA and DRE together with TRUS yield suspicious findings of malignancy. Abnormal PSA is more predictable than abnormal DRE, and abnormal PSA and DRE combined are even more predictable. Nevertheless, TRUS biopsy should be done in the presence of prostate-like voiding symptoms in the presence of abnormality in at least one of those parameters.

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**Conflicts of interest**

There are no conflicts of interest.
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