



Original Research Article

Transrectal Ultrasound Guided Needle Core Biopsy of Prostatic Lesions

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ABSTRACT

Introduction: Transrectal ultrasound (TRUS)-guided needle core biopsies of prostate are considered the gold standard for the diagnosis of the prostatic cancer. The prostate specific antigen assay, digital rectal examination and Transrectal ultrasonography of prostate provide tools for detecting prostate cancer at a very early stage, when it is still organ-confined and thus curable.

Aims and Objectives: The aim is to study Transrectal Ultrasound guided needle core biopsy of Prostatic lesions. To study histomorphology of the prostatic lesions and correlate with findings of transrectal ultrasound of prostate. To grade the prostate carcinoma on microscopy by Gleason grading system.

Materials and methods: A prospective study carried out in, department of pathology, kakatiya medical college, Warangal from October 2008 to October 2010. 70 men underwent TRUS-guided prostate biopsies. The material was obtained from patients who presented with urologic symptoms in the form of irritative and obstructive. In most cases; six cores were taken per case. Each core was individually labeled and submitted for histopathological study.

Results: A total of 70 patients were evaluated, out of which 45.7% were between the age group 61-70. The most common symptoms presented was frequency of urination followed by hesitancy. Out of 70 patients: 31 (44.28%) had infiltrating adenocarcinoma, 14 (20%) benign prostatic hyperplasia, 13 (18.59%) prostatic intraepithelial neoplasia (PIN)-2 low grade, 11 high grade PIN, 2 (2.85%) were Atypical adenomatous hyperplasia, 10 (14.28%) were benign prostatic hyperplasia with prostatitis. Gleason score of 7 (3+4) was found in 51.61% (13/31) of patients.

Conclusion: Transrectal prostatic ultrasound is a minimally invasive and painless investigation that provides objective data on the topography of the prostate. Patients discomfort is minimal. This method allows good evaluation of seminal vesicles and surrounding tissues of the prostate. Systematic sextant technique of prostate biopsy significantly increased the diagnostic yield in identifying prostatic carcinoma with raised serum PSA (prostate specific antigen) levels. Sextant technique is safe and efficacious. Serum PSA testing is the gold standard method to screen prostate carcinoma and is widely accepted in management of cancer prostate. Serum PSA is the best predictor of cancer than suspicious findings on DRE (digital rectal examination) or TRUS

Key words: Prostate, TRUS, PSA.

INTRODUCTION

The Prostate (derived from Greek *προστάτης* - word *prostates*, literally means "one who stands before", "protector", "guardian")^[1] is a compound tubuloalveolar exocrine gland of the male reproductive system in most mammals.^[2] Prostate despite being a small organ in volume, has the ability to undergo extensive pathophysiological changes. The Prostate gland can be affected by benign, malignant and inflammatory conditions. Carcinoma of Prostate is now recognized as one of the significant medical problem. It is the second most common cause of cancer death in men, outnumbering lung and colorectal cancer.

Transrectal ultrasound (TRUS)-guided needle core sextant biopsies of prostate are considered the gold standard for the diagnosis of the prostatic cancer.^[3] Earlier, diagnosis of prostatic pathology was determined by clinical symptomatology, physical examination, other laboratory investigations and imaging studies, were of limited value. Now, Transrectal ultrasonography of prostate has become an exciting imaging technique with important clinical implications. TRUS-guided prostatic biopsies are routine procedures in daily urological practice for detecting prostate cancer. The prostate specific antigen assay, digital rectal examination and Transrectal ultrasonography of prostate provide tools for detecting prostate cancer at a very early stage, when it is still organ-confined and thus curable.

MATERIALS AND METHODS

A prospective study was done for duration of 2yrs i.e, from October 2008 to October 2010 on Transrectal Ultrasound guided needle core biopsy of prostatic lesions in MGM Hospital Warangal and Private Diagnostic centre. All the cases have been referred to the pathology department from urology department and TRUS-guided

needle core biopsy of prostatic lesions were done by the radiology department in our hospital. Indications for TRUS - guided prostate biopsy were: Abnormal digital rectal examination and/or a serum PSA more than 4 ng/mL. The material was obtained from patients who presented with urologic symptoms in the form of irritative and obstructive.

Inclusion criteria: Patients with clinical symptoms of prostatomegaly with abnormal or suspicious digital rectal examination and raised serum PSA levels (>4ng/ml).

Exclusion criteria: Patients with clinical symptoms of prostatomegaly with normal digital rectal examination and normal serum PSA levels (1-4ng/ml). Clinical history and general examination were recorded.

Method of preparation: All patients provided signed informed consent. The procedure of transrectal ultrasound guided prostate biopsy was explained to patient to make him less apprehensive. All the patients were investigated on Toshiba core vision pro ultrasound machine and the scans were performed with the patient lying in left lateral position. Digital rectal examination was done for all the patients before biopsy. In some cases it revealed non tender, smooth rectal mucosal wall and in some cases it revealed evidence of palpable nodules in the prostate. Serum PSA levels of all patients was estimated before biopsy. Antibiotics Ciprofloxacin and Metronidazole were given orally for 3 days before biopsy. This was continued for 7 days after biopsy and Dulcolax given for 2 days. Rectal preparation involved the administration of a phosphate enema on the morning of the biopsy.

Procedure: Lidocaine gel 2 % was used for local anesthesia. An 18-G core biopsy needle mounted on a spring-loaded automatic biopsy gun, 2cc disposable syringe and a screw capped bottles containing fixative (formalin) were used.

The Patient was placed in left lateral position. 5-10 mL of 1% lidocaine was infiltrated into the neurovascular bundles at the base of the prostate or into the gland at the biopsy site. The automatic biopsy gun with 18 gauge needle through the ultrasound probe was used. Biopsy was done by the radiologist; both probe and gun were controlled by him. With the gun cocked, the needle is packed in the guide ensuring that tip is safely inside the guide. The probe and contained needle are moved to the target. A simple swift motion advances the gun and needle tip to the surface of the lesion .Once triggered needle advances approximately 2-3cm with the push of a button. The inner needle advances and the outer needle cuts the tissue core and traps it in the bevelled chamber of the inner needle. All the patients underwent a sextant core biopsy(1core from the base, mid, and apex bilaterally).All patients were instructed to come to the hospital if fever developed or if they experienced any weakness, flushing or chills.

Specimen handling: The cores were sent in separate site designated containers. The biopsy cores transferred directly onto cassette or a piece of filter/blotting paper before placing into fixative solution. This will minimize damage/fragmentation of the samples. They were placed in fixative- 10% neutral buffered formalin .The biopsy cores obtained were adequate (core length of > 2.6cm was considered adequate). Cores were identified according to the side (right/left) of the gland that they originated from. The preparation of specimens included embedding and sectioning and staining. Flat embedding was done in order to allow sectioning at multiple levels through the entire length of the core. (This will maximize the amount of tissue for evaluation because cores can often become curved after fixation).Cores have been optimally sectioned in order to identify even

small foci of cancer, 3-4 serial sections /slide. Slides were stained with haematoxylin and eosin (H&E). Further serial sections were cut in case of suspicious focus/inconclusive features.

RESULTS

In our study Transrectal ultrasound guided needle core sextant biopsy was done, and we have evaluated 70 patients between age groups <40 years to 90 years from October 2008 to October 2010 in MGM hospital Warangal and a private diagnostic centre.

Age: Out of 70 patients, 32 patients (45.7%) were between the ages 61-70 years, the least affected age group in this study was < 40yrs (Table 1).

The most common symptom presented was frequency of urination (25.7%) followed by hesitancy and straining during micturition (Table 2)

TABLE 1. Age wise distribution of cases

Age	No. of cases	%
< 40 years	2	2.85%
40-50 years	4	5.71%
51-60years	9	12.96%
61-70years	32	45.7%
71-80years	20	28.5%
81-90years	3	4.28%
Total	70	100%

TABLE 2. Frequency of clinical symptoms.

Symptoms	No. of cases	%
Hesitancy	5	7.24%
Hesitancy +straining during micturition	16	22.8%
Dribbling after urination +hematuria	2	2.8%
Decreased urine out put	1	1.4%
Frequency of urination	18	25.7%
Frequency of urination+nocturia	8	11.86%
Nocturia	10	14.2%
Burning micturition	1	1.4%
Unable to Pass urine	3	4.2%
Pain during Micturition	3	4.2%
Difficulty in starting urine	1	1.4%
Hesitancy +nocturia	2	2.8%
TOTAL	70	100

Transrectal Ultrasonography: Out of 70 patients: 19 (27.14%)patients showed

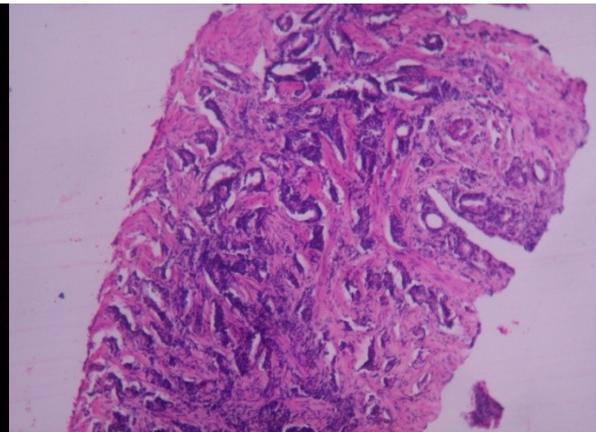
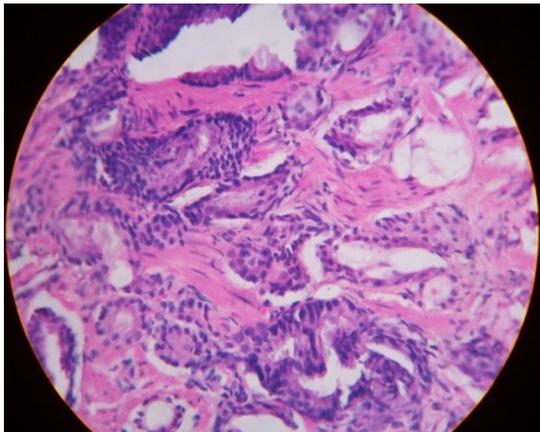
variable degrees of enlargement of the prostate and were diagnosed as Benign prostatic hyperplasia. 5 (7.14%) patients were diagnosed as chronic prostatitis which showed irregular calcific densities both in central and peripheral zone. These patients had tender prostate gland on digital rectal examination. 46 (65.7%) patients showed evidence of hypoechoic lesions in the peripheral zone and were diagnosed as Prostatic carcinoma.

Prostatic Lesions: Out of 70 patients: 31 (44.28%) were infiltrating adenocarcinoma, 14 (20%) were benign prostatic hyperplasia, 13 (18.59%) were prostatic intraepithelial neoplasia-2 low grade, 11 high grade PIN, 2 (2.85%) were Atypical adenomatous hyperplasia, 10 (14.28%) were benign prostatic hyperplasia with prostatitis.

Out of 14 patients with BPH, 13 patients (92.85%) showed serum PSA levels of range 5-10 g/ml 10 patients of BPH with prostatitis showed serum PSA levels of

range 5-10 ng/ml. Out of 13 patients with PIN, 8 patients (61.5%) showed serum PSA levels of range 26-30 ng/ml, 2 patients of Atypical adenomatous hyperplasia showed serum PSA levels of range 16-25ng/ml. Out of 31 patients with adenocarcinoma prostate 2 patients with serum PSA levels 5-15ng, 4 patients with serum PSA levels 16-25ng/ml, 4 (12.90%) showed serum PSA levels of range 26-30 ng/ml, 17 patients (54.83%) showed serum PSA levels of range 31-35ng/ml, 1 patient with serum PSA levels 41-45ng/ml, 3 (9.67%) showed serum PSA levels of range >45ng/ml

Gleason Score: A Gleason score of 7(3+4) was found in 51.61% (13/31) of patients (fig 1). A Gleason score of 8(4+4) was found in 25.8% (8/31) of patients. A Gleason score of 9 (4+5) was found in 9.67% (3/31) of patients. A Gleason score of 6 (3+3) was found in 6.45% (2/31) of patients. A Gleason score of 10 (5+5) was found in 6.45% (2/31) of patients.



High power 40x- Prostatic carcinoma Gleason Grade 3.

Low power 10x- Prostate carcinoma Gleason grade 4.

Fig.1. GLEASON SCORE 3+4=7

DISCUSSION

Currently sextant transrectal ultrasound guided biopsy of the prostate, as described by Hodge et al is the standard technique used to diagnose prostate cancer.

^[3] According to this technique, three biopsy cores are taken from each side (right and left) of the prostate, 1 cm apart along the parasagittal area. Absolute indications for biopsy were abnormal DRE and raised PSA

levels (9ng/ml) findings. Prostate cancer detection rate by biopsy in this study was 44.28% and most of them were with advanced prostate cancer and with a Gleason score of 7 or more (51.61%). This can be compared with various other authors as given below.

Prostate cancer detection rates with extended corebiopsy in various studies. (Table 3) ^[4-8]

Study	No. of cores	Cancer detection rate
Eskew et al,1997	6	26.1%
	13	40.3%
Naughton et al,2000	6	26%
	12	27%
Presti et al ,2000	6	33.3%
	8	39.7%
	10	40.2%
Babaian et al,2000	6	20%
	11	30%
Durkan et al 1997	6	33%
In Present study	6	44.28%

Prostate cancer detection rates with TRUS in various studies

In this study cancer detection rate with TRUS is 62.8%, while Lee et al reported 2.6 % cancer detection rate with TRUS and Cooner et al reported 12.6% cancer detection rate respectively. ^[9,10]

Prostatic lesions in various studies: In this study out of 70 patients 31(44.28%) had infiltrating adenocarcinoma, 14 (20%) benign prostatic hyperplasia,13(18.59%) prostatic intraepithelial neoplasia-2 low grade,11 high grade PIN ,2 (2.85%) Atypical adenomatous hyperplasia 10 (14.28%) benign prostatic hyperplasia with prostatitis. In Gupta et al study Out of 142 patients: 34 (24%) were infiltrating adenocarcinoma, 59(41.5%) were benign prostatic hyperplasia, 3(2.1%) were prostatic intraepithelial neoplasia 7 (4.9%) were Atypical adenomatous hyperplasia,1(0.7%) Chronic granulomatous prostatitis and 38(26.8%) benign prostatic hyperplasia with prostatitis. ^[11]

Cancer detection rate in relation to serum psa levels in various studies

In the Present study with serum PSA levels 4-10 ng/mL, TRUS-guided biopsy detected cancer in 3.22% cases, while the detection rate was 9.76 % with serum PSA levels 10-20 ng/mL and 87.02% with serum PSA levels above 20 ng/mL.

In Ahmed Alghazo et al study with serum PSA levels between 4-10 ng/mL, TRUS-guided biopsy detected cancer in 20.6 % cases while the detection rate was 32.4 % and 47 % when serum PSA was 10-20 ng/mL and above 20 ng/mL, respectively. ^[12]

In Hyeon Jeong et al study with serum PSA level 10-20 ng/ml Cancer detection rate was 34%. ^[13]

Gleason score in various studies: In this study a Gleason score of 7 was noted in 51.61% cases. Gupta et al revealed a Gleason score of 7 in 62% of cases. ^[11]

Song et al revealed in studies of American men a Gleason Score of 6 or less in more than 60% of patients. ^[13]

CONCLUSION

Transrectal prostatic ultrasound is a minimally invasive and painless investigation that provides objective data on the topography of the prostate. It is an excellent method for detailed evaluation of prostate gland since the prostate is closer to the high frequency transducer and the baseline sonographic evaluation can be extended to trucut biopsy when imaging findings reveals a suspicious lesion in the patient with elevated serum PSA levels. Patients discomfort is minimal. This method allows good evaluation of seminal vesicles and surrounding tissues of the prostate. Systematic sextant technique of prostate biopsy significantly increased the diagnostic yield in identifying prostatic carcinoma with raised serum PSA levels as 44.28% of cancer detection rate observed in my study.

Sextant technique is safe and efficacious. Serum PSA testing is the gold standard method to screen prostate carcinoma and is widely accepted in management of cancer prostate. Serum PSA is the best predictor of cancer than suspicious findings on DRE or TRUS. Gleason grading system is the predominant method for grading prostate carcinoma which is based entirely on architectural growth patterns on histology. The lower the Gleason score, the less aggressive is the cancer and better is the prognosis.

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