ORIGINAL RESEARCH PAPER

Volume-6 | Issue-11 | November-2017 | ISSN No 2277 - 8179 | IF : 4.176 | IC Value : 78.46

INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

TRANSRECTAL ULTRASONOGRAPHY (TRUS)-GUIDED BIOPSY IN THE EVALUATION OF CARCINOMA OF PROSTATE-AN INSTITUTIONAL EXPERIENCE.

Radiology

Phani Chakravarty Mutnuru Assistant Professor, Dept of Radiology, Nizam's Institute Of Medical Sciences, Punjagutta, Hyderabad-500082, Telangana, India.

Lakshmi Manasa Perubhotla* Assistant Professor, Dept of Pathology, Mediciti Institute of Medical Sciences, Medchal, Ghanpur, Hyderabad-501401, Telangana, India. *Corresponding Author

Rahul Devraj Professor, Dept of Urology, Nizam's Institute Of Medical Sciences, Punjagutta, Hyderabad-500082, Telangana, India.

ABSTRACT

Introduction: Carcinoma of prostate is one of the most common cancers and ranks as the second most common cause of cancer death in men. The most common histologic type is adenocarcinoma and prostate cancer screening consists of measurement of PSA concentration in serum and digital rectal examination. Positivity in one of these tests make patients candidates for further diagnostic evaluation with a transrectal ultrasonography–guided prostate biopsy.

Aim : The study was undertaken to define the role of TRUS biopsy of prostate for the diagnosis of carcinoma of prostate and to correlate histopathological findings with serum PSA levels, abnormal DRE(digital rectal examination) and clinical suspicion.

Materials & Methods: TRUS guided biopsy was done using a rectal probe (7.5 MHz) on a E-Saote MyLab 60 ultrasound-colour Doppler system over a period of two years in 92 patients. We followed 8 core biopsy technique for specimen collection.

Results: Out of 92 patients, 45 patients were diagnosed as malignant, 43 patients were diagnosed as non-malignant and 4 patients were diagnosed as inconclusive.

Conclusion: TRUS guided prostate biopsy remains an essential tool for the diagnosis of carcinoma of prostate and individualization of management decisions.

KEYWORDS

Prostate, TRUS biopsy, serum PSA.

Introduction

Carcinoma of prostate is one of the most common cancers and ranks as the second most common cause of cancer death in men. 28% of all new cancer diagnoses and 11% of cancer-related deaths in USA population are due to carcinoma of prostate. In India, incidence of carcinoma of prostate is 4.6 / 100000, whereas in USA it is 104.3 / 100000[1]. Previously prostate cancers were often diagnosed at an advanced stage due to lack of widespread use of serum PSA (Prostate specific antigen). But now, majority (92%) of new cases are clinically localized at the time of diagnosis due to screening methods and the 5-year relative survival rate approaches 100% [1].

The most common histologic type is adenocarcinoma which is encountered in approximately 95 percent of patients and peripheral zone is the most common site. Around 70 percent of the prostatic cancer originates in the peripheral zone, 10 to 20 percent in the transitional zone, and 5 to 10 percent in the central zone[2]. Multicentricity of the prostate cancer is also quite common.

Prostate cancer screening consists of measurement of PSA concentration in serum and digital rectal examination. Positivity in one of these tests make patients candidates for further diagnostic evaluation with a transrectal ultrasonography–guided prostate biopsy.

In 1989, Hodge et al.[3] described TRUS-guided systematic 6 core (Sextant) prostate biopsy. They revealed inadequacy of biopsies targeted at areas of clinical suspicion, and demonstrated that systematic biopsies significantly increase diagnostic sensitivity of the detection of prostate cancer.

With the introduction of systemic biopsy era, important changes and developments have been made within years.

Clinical staging with digital rectal examination (DRE), serum PSA and biopsy tumor grade (Gleason score) remains the standard of practice for staging. The Gleason scoring system, which was first described in 1966, is based on the architectural growth patterns of prostatic adenocarcinoma. It is the best predictor of tumor aggressiveness, which can be obtained only with histopathologic analysis of biopsy samples [4]. Thus, TRUS guided prostate biopsy remains an essential component of the diagnostic work-up.

Aim

The study was undertaken to define the role of TRUS biopsy of prostate for the diagnosis of carcinoma of prostate and to correlate histopathological findings with serum PSA levels, abnormal DRE (digital rectal examination) and clinical suspicion.

Materials & Methods

A prospective longitudinal study was conducted in a tertiary care hospital in Department of Radiology, Hyderabad, India over a period of two years in a selected population of 92 patients.

Inclusion criteria: The study population included male patients of all ages who were being evaluated for abnormal digital rectal examination or for abnormal serum PSA and were referred from Department of Urology.

Exclusion criteria: Uncooperative patients and patients with uncorrectable bleeding diathesis were excluded from this study.

Technique:

The individual information, clinical history, biochemical and ultrasonographic findings of every patient were recorded in a prescribed format. A patient population of all ages was selected .

Patient preparation: In all patients a five day course of an oral Fluoroquinolone + Tinidazole starting three days before the biopsy was given. Aspirin and non-steroidal anti-inflammatory drugs (NSAIDS) were discontinued for seven and three days respectively. Patients with platelet count of > 50000/mm^2 and normal coagulation profile (Normal Prothrombin time & Partial thromboplastin time) were selected. Patients on anticoagulation therapy were not biopsied until the anticoagulant dosage was adjusted or held to allow the coagulation status to normalize.

Self-administered cleansing enema was given in all patients prior to the biopsy to eliminate gas and remove feces. Informed consent was taken from all patients

Procedure : TRUS guided biopsies were conducted in an atmosphere of privacy. The patients were positioned in left lateral decubitus position. Inj. Gentamycin 80 mg was given

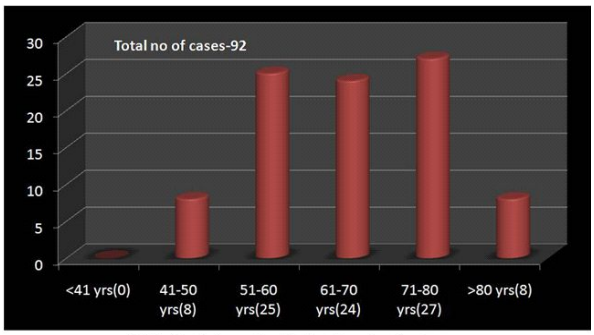
intramuscularly in all patients. A topical anaesthetic ointment was applied to the rectum. All cases were done using a rectal probe (7.5

MHz) on a E-Saote MyLab 60 ultrasound-colour Doppler system. Prostate was assessed at the level of the seminal vesicles, base, mid-prostate and apex. We followed Octant technique that is 8 core biopsy from prostate. An 18-gauge biopsy needle loaded in automatic biopsy device was used and multiple 1.5cm prostate biopsy specimens were taken in each patient. The average time spent by each patient in procedure was approximately 20 min.

Ethics
All procedures done were in accordance with the standards of the Institutional Ethics Committee.

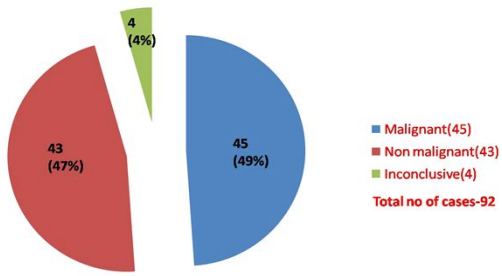
Statistical analysis
The results were presented in number for the data in tables. All the data was analysed using SPSS software version 22.0 (SPSS Inc., Armonk, NY, USA).

Results
In this study, we did TRUS guided biopsy of prostate in 92 patients between the age group of 41-90 years with mean age of 62.5 years. Patients between age group of 71-80 years constitute the dominant group (29.3%) [Table/Fig-1].



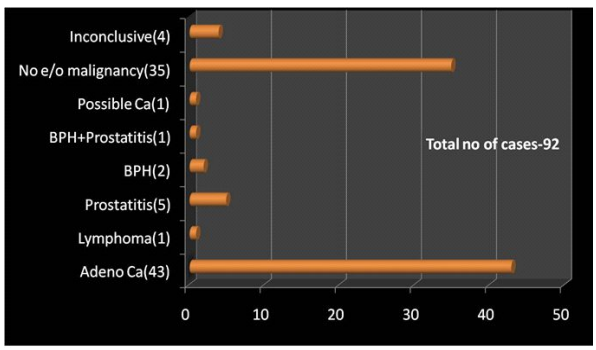
Table/Fig-1: Age wise distribution of patients.

45(49%) patients were diagnosed as malignant, 43(47%) patients were diagnosed as non-malignant and 4(4%) patients were diagnosed as inconclusive [Table/Fig-2].



Table/Fig-2:Shows number and percent wise pattern of malignant and non malignant cases

Final histopathological diagnosis was adenocarcinoma in 43 patients, lymphoma in 1 patient, prostatitis in 5 patients, benign prostatic hyperplasia in 2 patients, benign prostatic hyperplasia with prostatitis in 1 patient, possible carcinoma in 1 patient. No evidence of malignancy noted in 35 patients. The results were inconclusive in 4 patients[Table/Fig-3].



Table/Fig-3: Shows final histopathological diagnosis

In all cases either abnormal DRE(digital rectal examination) or clinical suspicion or abnormal PSA was present[Table/Fig-4].

Diagnosis	Total No (92)	PSA > 4 ng/ml	PSA > 10 ng/ml	Clinical suspicion / abnormal DRE
Adeno Ca	43	15	28	++
Lymphoma	01	01	-	++
BPH	02	-	-	+
Prostatitis	05	05	-	+
BPH+Prostatitis	01	01	-	+
Possibly Ca	01	01	-	+
No e/o malignancy	35	19	-	+
Inconclusive	04	04	-	+

Table/Fig-4: Shows final diagnosis in correlation with PSA , Clinical suspicion or abnormal DRE

Discussion
Carcinoma of prostate is the second most common cause of cancer and the sixth leading cause of cancer death among men worldwide. The worldwide prostate carcinoma burden is expected to grow to 1.7 million new cases and 499000 new deaths by 2030 simply due to the growth of aging global population[5]. The incidence rate of this cancer is constantly and rapidly increasing in India due to increased awareness, changing life styles, increased migration of rural population to the urban areas and easy access to medical facility that results in picking of more cases of prostate cancer[6].

The screening of carcinoma of prostate consists of measuring of serum PSA (Normal- <4 ng/ml) and DRE (digital rectal examination). Patients with abnormality in either of above are candidates for further diagnostic evaluation with a transrectal ultrasonography (TRUS)–guided prostate biopsy. Unlike other imaging-guided biopsy procedures performed in body, TRUS–guided prostate biopsy is not a targeted biopsy procedure, because most prostate tumors are not visualized in ultrasound or are indistinguishable from benign prostatic hyperplasia and even from normal prostatic tissue. So systemic fashioned biopsies are more useful than target oriented biopsies in detection of carcinoma of prostate[7].

The 'Sextant protocol' which is the classic prostate sampling technique was described first by Hodge et al. In this technique six samples were obtained, three in the right lobe and three in the left lobe, in equally spaced regions along a parasagittal line drawn halfway between the midline and lateral border, from the base through the middle to the apex of the gland[3]. In the 1990s, 'modified sextant technique' was introduced to improve the diagnostic yield. In this, the needle is directed more laterally at the level of the middle prostate to allow sampling of the more peripheral zone[8]. Later 'extended biopsies' were introduced in which 8, 10 or 12 specimens are obtained from prostate to improve detection rate of carcinoma of prostate. Some authors advocate sampling in the transition zone along with the peripheral zone[9]), others have concluded that transition zone sampling is of limited benefit [8]). In our practice, we followed octant technique that is 8 samples were obtained at all three levels in the peripheral zone.

In this study, we did TRUS guided biopsy of prostate in 92 patients between the age group of 41-90 years with mean age of 62.5 years over a period of two years. Patients between age group of 71-80 years constitute the dominant group (29.3%)[Table/Fig-1]. In our study the chances of having carcinoma of prostate were more as the patient age increases.

45(49%) patients were diagnosed as malignant, 43(47%) patients were ruled out any malignancy. However 4(4%) patients were diagnosed as inconclusive[Table/Fig-2].

Adenocarcinoma was the dominant diagnosis with a total of 43 cases (95.5% of malignant cases). One case was diagnosed as lymphoma and another one was diagnosed as possibly carcinoma by histopathological study. No evidence of malignancy noted in 35 patients, whereas

prostatitis was seen in 5 patients, benign prostatic hyperplasia seen in 2 patients and benign prostatic hyperplasia with prostatitis noted in 1 patient[Table/Fig-3].

In our study, elevated serum PSA was noted in 74 patients[Table/Fig-

4]. All malignant cases that were proved by histopathology showed elevated serum PSA (> 4 ng/ml in 17 patients and >10ng/ml in 28 patients). Also all inconclusive cases (4 in no) also showed elevated serum PSA.

In 35 patients with no evidence of malignancy, 19 patients showed slightly elevated serum PSA (Range = 4-10 ng/ml). All patients with prostatitis (5 in no) and prostatitis with BPH (1 in no) showed slightly elevated serum PSA (Range = 4-10 ng/ml).

Abnormal DRE (digital rectal examination) findings were seen in 62 patients. Out of these 40 were diagnosed to be malignant (64.4%), 2 were inconclusive (3.2%) and 20 were non malignant(32.2%).

Abnormal clinical suspicion (haematuria, frequent or painful micturition, etc) were seen in 70 patients. 23 non malignant(32.8%), 2 inconclusive (2.8%) and all 45 malignant (64.3%) cases had abnormal clinically suspicious findings.

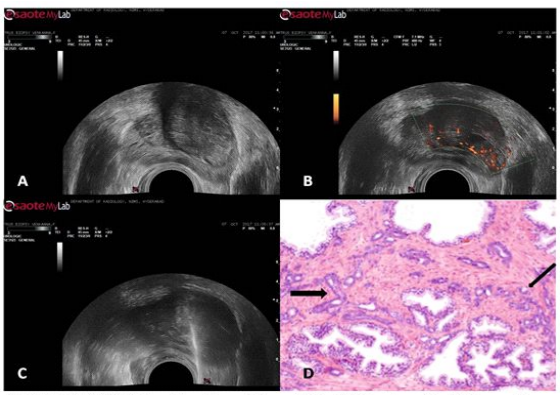
Post procedure, 16 patients had haematuria and 4 patients had rectal bleeding in our study which resolved within two days. These findings were in accordance with guidelines adapted from NCCN Guidelines Prostate Cancer Early Detection. V.s.2010.

In our study, TRUS guided biopsy of prostate had significantly contributed in the evaluation of carcinoma of prostate. It is particularly useful in differentiating benign causes from malignant pathology when serum PSA values are in borderline range (4-10ng/ml). This technique has the advantages of being fast, easily available, cost effective and the results are highly accurate [7]. The disadvantages are post procedural pain, haematuria and rectal bleeding.

Limitations:

First, the serum PSA level has a low specificity for the detection of prostate cancer. Benign conditions like prostatitis and benign prostatic hyperplasia can result in rise of serum PSA and frequently leads to unnecessary biopsy. Even in patients with low PSA values, clinically significant prostate disease may be present[10]. In our study, 25 patients with raised serum PSA turned to negative for malignancy.

Second, abnormal regions of prostate are usually not visualized by transrectal ultrasonography and rarely a prostate lesion is directly seen. As a result the sensitivity of TRUS guided biopsy has low sensitivity (39-52%), even though specificity is high (Approximately 80%)[11]. In our study only 4 patients had definite visible lesions in prostate [Table/Fig-5].



Table/Fig-5: A) TRUS shows large hypoechoic nodule in left lobe of prostate, B) Increased vascularity within the lesion, C) TRUS guided biopsy was done, D) Prostatic adenocarcinoma with infiltrative small acini(arrows) between normal glands.(H&EX100)

Last, some regions like anterior part of the prostate are undersampled at TRUS–guided biopsy, even though these areas may harbor clinically significant tumors[12]. In a series of 547 prostatectomy specimens, tumors were found in the anterior part of the prostate in 21% patients[13].

Conclusion:

TRUS guided prostate biopsy remains an essential tool for the diagnosis of carcinoma of prostate and individualization of management decisions. The best predictor of tumor aggressiveness is the Gleason score, which can be obtained only with histopathologic analysis of biopsy samples. Thus, TRUS guided biopsy of prostate remains an essential component of the diagnostic work-up.

Conflict of interest: None identified.

References

1. Jemal A, Siegel R, Xu J, Ward E. Cancer statistics, 2010. CA Cancer J Clin2010;60(5):277–300.
2. Loch T. Urologic imaging for localised prostate cancer in 2007. World J Urol 2007;25:121–9.
3. Hodge KK, McNeal JE, Terris MK, Stamey TA. Random system−atic versus directed ultrasound guided transrectal core biopsies of the prostate. J Urol 1989;142:71-4;discussion 74-5.
4. Andrén O, Fall K, Franzén L, Andersson SO, Johansson JE, Rubin MA. How well does the Gleason score predict prostate cancer death? a 20-year followup of a population based cohort in Sweden. J Urol 2006;175(4):1337–40.
5. Ferlay J., Shin H.R., Bray F. International Agency for Research on Cancer; Lyon, France: 2010. GLOBOCAN 2008, Cancer Incidence and Mortality Worldwide: IARC Cancer Base No. 10.
6. Shalu Jain, Sunita Saxena,Anup Kumar. Epidemiology of prostate cancer in India. Meta Gene. 2014 Dec; 2: 596–605.
7. Joseph H. Yacoub, Sadhna Verma, Jonathan S. Moulton,Scott Eggener,Aytekin Oto. Imaging-guided Prostate Biopsy: Conventional and Emerging Techniques. RadioGraphics 2012;32:819–837.
8. Raja J, Ramachandran N, Munneke G, Patel U. Current status of transrectal ultrasound-guided prostate biopsy in the diagnosis of prostate cancer. Clin Radiol 2006;61(2):142–53.
9. Durkan GC, Sheikh N, Johnson P, Hildreth AJ, Greene DR. Improving prostate cancer detection with an extended-core transrectal ultrasonography-guided prostate biopsy protocol. BJU Int 2002;89(1):33–39.
10. Thompson IM, Pauler DK, Goodman PJ, et al.. Prevalence of prostate cancer among men with a prostate-specific antigen level < or =4.0 ng per milliliter. N Engl J Med 2004;350(22):2239–46.
11. Pondman KM, Fütterer JJ, ten Haken B, et al.. MR-guided biopsy of the prostate: an overview of techniques and a systematic review. Eur Urol 2008;54(3):517–27.
12. Lawrentschuk N, Haider MA, Daljeet N, et al.. 'Prostatic evasive anterior tumours': the role of magnetic resonance imaging. BJU Int 2010;105(9): 1231–36.
13. Bott SRJ, Young MPA, Kellett MJ, Parkinson MC; contributors to the UCL Hospitals' Trust Radical Prostatectomy Database. Anterior prostate cancer: is it more difficult to diagnose? BJU Int 2002;89(9): 886–89.