ISSN: 0975-833X

Availableonlineathttp://www.journalcra.com

International Journal of Current Research
Vol. 11, Issue, 08, pp.5930-5932, August, 2019

DOI: https://doi.org/10.24941/ijcr.36091.08.2019

INTERNATIONAL JOURNAL OFCURRENTRESEARCH

RESEARCH ARTICLE

CORRELATION OF DRE, PSA, TRUS AND TRUS GUIDED BIOPSY IN PROSTATE CANCER – OUR INSTITUTIONAL STUDY

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ARTICLEINFO

Article History:
Received 11th May, 2019
Received in revised form
19th June, 2019
Accepted 15th July, 2019
Published online 31st August, 2019

Key Words:

DRE,
PSA.

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ABSTRACT

Background: 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) guided biopsy as predictors for diagnosing prostate cancer and to find out whether combined modality is better in screening and detection of prostate cancer. **Materials and Methods:** A total of 62 male patients seen over a period of 2 years in a single institution with abnormal DRE, serum PSA levels, TRUS and TRUS guided biopsy and correlated. **Results:** TRUS biopsy revealed prostate cancer in 26 out of 62 patients. 60% of patients with abnormal DRE had cancer prostate and the remainder 40% reported to have benign lesions. And 92% of patients with abnormal PSA levels had cancer prostate on trus biopsy. Combined abnormal PSA and DRE revealed cancer in 88% of patients. This percentage increased to 95% when TRUS was also abnormal, but dropped to 77% when TRUS was normal. **Conclusion:** Digital rectal examination together with serum PSA and TRUS have the highest predictable values for diagnosis of prostate cancer. Serum PSA alone is more predictable than DRE in our study. TRUS guided biopsies should be performed in the presence of high serum PSA, and/or abnormal findings by DRE.

***Citation: Dr. Arasi, K.V., Prof. Dr. Balaji, A.R. and Prof. Dr. Prakash, JVS.*, 2019.** "Correlation of DRE, PSA, trus and trus guided biopsy in prostate cancer – Our institutional study", *International Journal of Current Research*, 11, (08), 5930-5932.

INTRODUCTION

Prostate cancer is the commonest malignancy among males in most parts of the world. Although the incidence of prostate cancer is increasing in the developed world, it remains under-diagnosed in the developing world where it often presents late. Biopsy of the prostate forms the cornerstone in diagnosing and treating this disease. Historically, needle biopsies of the prostate were performed either transrectally or trans-perineally, with digital palpation of the gland and guidance of the biopsy needle per rectum. Three important developments significantly changed the way the prostate cancer was diagnosed in the early 1990s. Firstly, the adoption of a systematic rather than random biopsy scheme as described by Hodge et al. Secondly, the use of a biopsy gun as opposed to hand-operated Tru-cut needles and thirdly, the advent of the transrectal ultrasound (TRUS) probe enabling the clinician to visually guide the biopsy needle. Over the last two decades, TRUS has become the gold standard in performing prostate biopsies. The initial work from Stanford University demonstrated that TRUS biopsies diagnosed cancer in 23 of 43 patients. In a further publication in the same journal, they showed that the yield of prostate cancer was better with six systematic random biopsies of abnormal areas in the prostate.

The benefits of ultrasound in guiding biopsy needles became more apparent as the understanding of prostate anatomy and distribution of carcinoma improved, assisted by McNeal's description of the different zones. Since then much work has been done to determine the optimal sites and numbers of prostate biopsies to maximise cancer detection of what remains a test with a significant sampling error. The consensus today for initial biopsies is to use a minimum of 10–12 laterally directed biopsies from the peripheral zones with the use of TRUS.

Inclusion Criteria: All male patients above 40 years of age with abnormal DRE/ elevated PSA

Exclusion Criteria: Patient with bleeding diathesis and abnormal coagulation profile Patient under 40 years of age Patient with LUTS of non-prostatic origin i.e vesical/urethral calculus, elevated bladder neck, bladder malignancy.

MATERIALS AND METHODS

The study population included a total of 62 male patients seen over a period of 2 years in a single institution with abnormal DRE, serum PSA were subjected to TRUS and TRUS

biopsy at our institution during the study period June 2017 to June 2019. TRUS guided biopsy data were prospectively collected, on a standardised proforma at the time of biopsy and combined with the histological findings. Only patients with complete data sets were included in the study. Clinical parameters included patient demographics including age, reason for intervention, PSA value, and clinical findings on DRE. Absolute PSA values were recorded and subsequently subdivided for the purposes of analyses into five groups: 0–4, 4–9.9, 10–19.9, 20–99.9 and >100 ng/mL. TRUS was performed using a Mindray DP-50 diagnostic ultrasound machine with a 7.5-MHz transrectal probe. Informed consent was obtained and antibiotic prophylaxiswere administered orally 30 min before the procedure. Proctolytic enema was given 4 hours before procedure. Majority of the patients received local anaesthesia with intrarectal instillation of 20 mL of 2% lignocaine jelly. Few patients received periprostatic needle infiltration of local anesthesia. The findings on TRUS were documented for both the right and left lobe as follows: the presence of hypoechoic areas and/or calcifications in the periphery and the centre of the glands as well as the presence of capsular distortion or the visualisation of a palpable irregularity. The prostate gland was assessed in the axial plane where the transverse and antero-posterior measurements were taken at the point of maximum diameter, followed by a paramedian longitudinal measurement in the sagittal plane. The volume was calculated using a standard pre-programmed formula *{π/6 × (transverse diameter) × (antero-posterior diameter) × (superior–inferior diameter)}* based on an ellipsoid shape.

The biopsies were taken with Bard biopsy gun, 17 mm tip. The number of biopsies taken was documented prospectively in the TRUS group as either the routine 12 cores (2 cores from apex, mid-zone and base of prostate on the periphery of either lobe) or the routine 12 cores plus additional biopsies of suspicious areas (on ultrasound or digital examination) and sent for histopathological examination. With the description of zonal anatomy by McNeal and advent of transrectal sonography, the various pathological processes became better defined especially for screening for nonpalpable prostatic carcinoma. Earliest studies in TRUS showed prostatic carcinoma predominantly is an echogenic lesion. Benign lesions like BPH were limited to transition zone and appeared mostly as a diffuse textural changes. In our series prostate carcinoma appeared mostly hypoechoic focal lesion in the peripheral zone in 19 patients out of which all proved correct on histopathology. Two cases were labelled as BPH and proved to be PIN. 5 of the Iso-echoic prostate on TRUS proved to be malignant. There was a positive correlation between TRUS findings suggestive of carcinoma and PSA levels. Patient with excess of 10 nmol/ml had predominantly malignancy. JS Wolf demonstrated increased accuracy of combined staging method using TRUS and PSA. Cooner et al found 45 cases out of 144 screened by TRUS with PSA levels > 10 ng/ml having prostatic carcinoma and concluded that every patient with significantly raised PSA levels should have TRUS examination. PetterLittrays et al suggested close relationship of prostatic volume to PSA levels. Wolf et al showed that the volume of hypoechoic lesion as an independent variable for staging of carcinoma prostate. Use of combination modality screening such as TRUS + PSA showed increased accuracy compared to DRE or TRUS as stand alone modality. Thus TRUS + PSA significantly scores over as a screening combination.

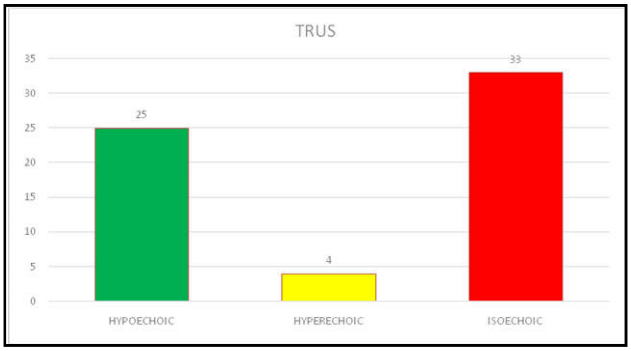

Table 1. Results of trus findings

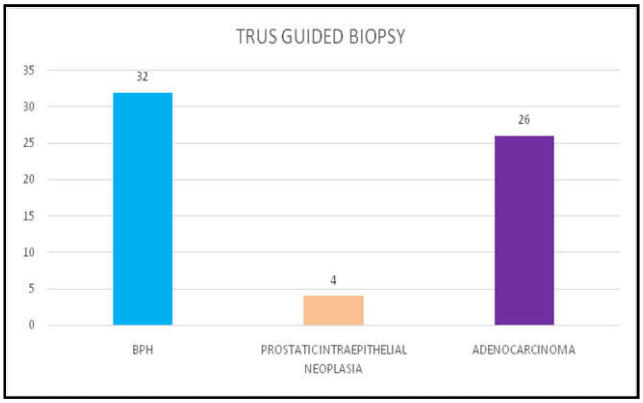

Table 2. Results of trus guided biopsy

Bph	32
Prostatic intraepithelial neoplasia	4
Adenocarcinoma	26

Table 3. Trus findings with hpe correlation

Trus	Hpe [Post Turp]		
	Bph	Pin	Adenocarcinoma
Hypo-echoic	4	2	19
Iso-echoic	26	1	6
Hyper-echoic	0	1	3
Total	30	4	28

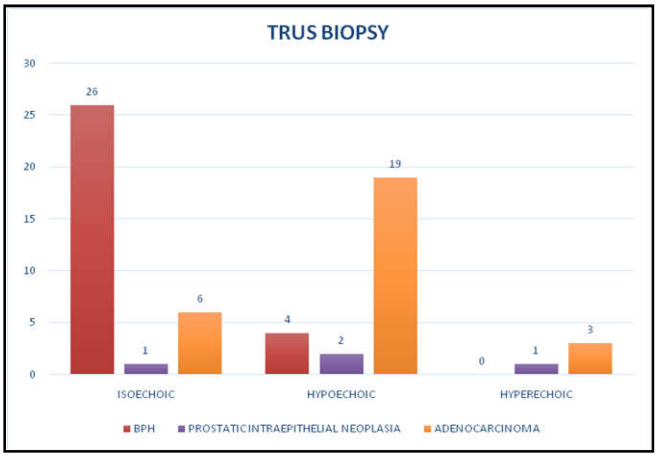

Table 4. Correlation of hpe and serum psa levels

PSA LEVELS (ng/ml)	BENIGN	PIN	MALIGNANT
0 to 4	5	-	-
4 to 9.9	4	-	2
10 to 19.9	16	3	6
20 to 99.9	6	1	14
More than 100	-	-	5

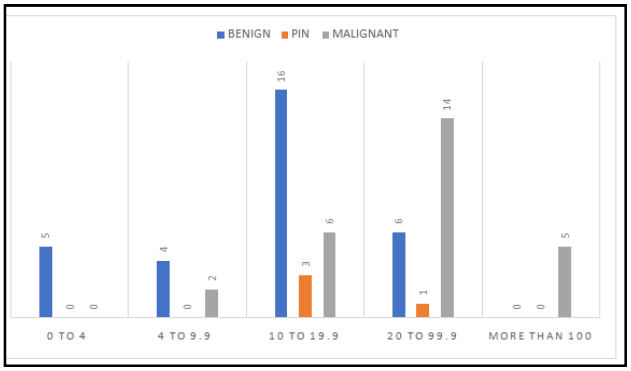

Table 5. Correlation of hpe and psa levels and dre

HPE	PSA > 4	NODULAR DRE	TRUS
BENIGN	25	9	29
PRE-MALIGNANT	4	3	4
MALIGNANT	26	48	27

Wolf et al showed that by combining prospective TRUS evaluation with retrospective PSA analysis, there was increased accuracy of this combined staging / screening method compared to TRUS alone. Data were compiled using MicroSoft Excel® and statistical analysis was performed by a biostatistician on Stata® software using the Mann–Whitney U test for continuous variables and the Pearson's chi-squared test for categorical variables. A two-tailed *p*-value <0.05 was accepted as significant with a power of 80%.

RESULTS

Over a 24-month period complete data sheets and pathology reports were collected in 62 patients who underwent TRUS, TRUS guided biopsies and post-operative specimen HPE at our hospital. Predominant iso-echoic prostate gland (53%) on TRUS were of benign origin concurring with the other studies. Of the 4 lesions that were hyper-echoic (7%) on TRUS, 3 were malignant and one was labelled as High grade PIN [HG PIN}, a premalignant precursor lesion. In the remainder hypo-echoic (40%) lesions, 76% showed malignancy, with 2 lesions labelled as low grade PIN [LG PIN], essentially a benign condition as proved by many other studies and one patient had granulomatous prostatitis on TRUS biopsy and post TURP showed benign adenomatous hypertrophy. In our study, those patients with proven carcinoma prostate on TRUS biopsy, 48 patients had abnormal DRE (Sensitivity- 90.57%, Specificity – 91.67%) and 26 patients had elevated PSA levels (Sensitivity- 72.87%, Specificity- 94.37%).

When all three modalities combined, it further increased the sensitivity to 93.23% and specificity to 97.47% implying combined modality had a better cancer detection rate. Our study conclude that there is a strong correlation between patients with abnormal DRE, elevated PSA and abnormal TRUS findings. 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 related voiding symptoms in the presence of abnormality in at least one of those parameters.

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