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Original Research

Utility of ultrasonography in the detection of prostate cancer cases

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ABSTRACT:

Background: Prostate cancer is a type of cancer that occurs in the prostate, a small walnut-shaped gland in men that produces seminal fluid. The present study was conducted to assess the role of USG in the diagnosis of prostate cancer. **Materials & Methods:** 56 male patients with prostate cancers underwent transrectal ultrasound using transducers end-firing probes scanning at frequencies of 5–10 MHz. **Results:** The age group 25–45 years had 26 and 45–65 years had 30 male patients. The difference was non-significant ($P > 0.05$). Gleason grading was indolent well-differentiated tumor seen in 38, intermediate risk in 12 and clinically aggressive in 6 cases. The complications seen with TRUS were rectal bleeding <2 days in 2 patients, prostatitis in 3, hematospermia in 1, fever in 2, urosepsis in 1, and epididymitis in 2 patients. The difference was significant ($P < 0.05$). TRUS had specificity of 88.2%, sensitivity of 95.2%, PPV of 98.6% and NPV of 56.8%. **Conclusion:** Ultrasound specifically transrectal ultrasound (TRUS), plays a significant role in the detection and diagnosis of prostate cancer. Our results showed the high efficiency of USG.

Key words: Gleason grading, Prostate cancer, USG

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INTRODUCTION

Prostate cancer is a type of cancer that occurs in the prostate, a small walnut-shaped gland in men that produces seminal fluid. It is one of the most common cancers among men, especially older men.¹ Prostate cancer typically grows slowly and may not cause noticeable symptoms for many years. In some cases, however, it can be aggressive and spread quickly. With over 180,000 new cases identified and 26,000 cancer-related deaths predicted in the United States in 2016, prostate cancer is the second most frequent cancer globally.² The known incidence of prostate cancer has significantly increased since the late 1980s with the advent of prostate-specific antigen (PSA) screening, peaking in 1992 as a result of early identification in asymptomatic men. Age, race, genetics, and dietary factors are among the risk factors for prostate cancer. Men over 50 are more likely to be diagnosed with prostate cancer than any other age group, with the disease's frequency rising sharply beyond that point.³ Prior to the widespread availability of transrectal ultrasonography (TRUS) and PSA testing, the

majority of patients had locally advanced tumors that caused them to exhibit symptoms specific to their disease.⁴ These cancers were identified by DRE, and most were diagnosed at stage T2 or above.⁵ With the widespread use of PSA testing and TRUS-guided biopsy, the majority of cases (>90%) are now detected at an asymptomatic early stage (stage T1), with nearly half of all newly diagnosed patients falling into the "favourable risk" group.⁶ Scale in gray.⁶ For the assessment of the prostate gland, the most popular radiologic examination is TRUS, an affordable and easily accessible imaging technique. Prostate tumors are primarily hypoechoic (60%–80%) on TRUS, isoechoic (30%–40%), and hyperechoic (about 1.5%).⁷ The present study was conducted to assess the utility of USG in the diagnosis of prostate cancer.

MATERIALS & METHODS

The present study comprised 56 male patients with prostate cancers. The written informed consent was obtained from all patients.

Data such as name, age etc. was recorded. A comprehensive physical and clinical assessment was carried out. Everybody had transrectal ultrasounds using transducers end-firing probes that scanned between 5 and 10 MHz in frequency. Prior to the procedure, the patient's bladder was rendered empty. Preventive antibiotics were given. Following the

placement of the patient in the left lateral decubitus or lithotomy posture, the prostate was covered with local anesthetic and an endorectal probe containing a biopsy guide was inserted. The Gleason grade was also noted. TRUS side effects were also noted. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Age group (years)	Number	P value
25-45	26	0.85
45-65	30	

Table I shows that the age group 25-45 years had 26 and 45-65 years had 30 male patients. The difference was non-significant ($P > 0.05$).

Table II Assessment of parameters

Parameters	Variables	Number	P value
Gleason grading	Indolent well-differentiated tumour	38	0.04
	intermediate risk	12	
	clinically aggressive	6	
Complications	Rectal bleeding <2 days	2	0.71
	Prostatitis	3	
	Hematospermia	1	
	Fever	2	
	Urosepsis	1	
	Epididymitis	2	

Table II, graph I show that Gleason grading was indolent well-differentiated tumor seen in 38, intermediate risk in 12 and clinically aggressive in 6 cases. The complications seen with TRUS were rectal bleeding <2 days in 2 patients, prostatitis in 3, hematospermia in 1, fever in 2, urosepsis in 1, and epididymitis in 2 patients. The difference was significant ($P < 0.05$).

Graph I Assessment of parameters

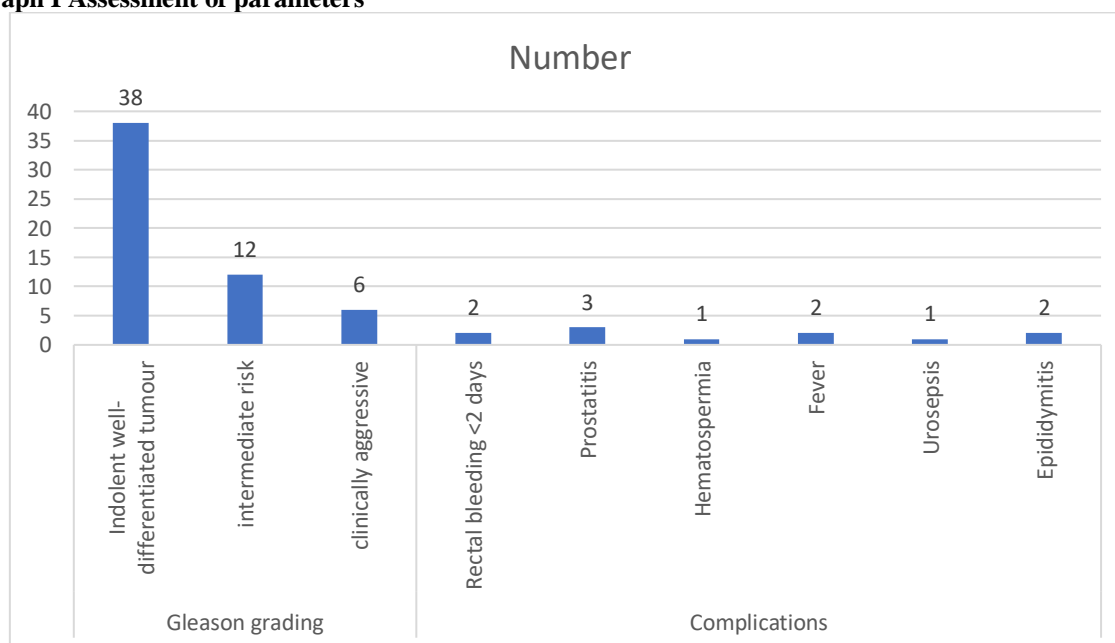


Table III Efficacy of TRUS

Efficacy	Percentage
Specificity	88.2%
Sensitivity	95.4%

PPV	98.6%
NPV	56.8%

Table III shows that TRUS had specificity of 88.2%, sensitivity of 95.2%, PPV of 98.6% and NPV of 56.8%.

DISCUSSION

Prostate cancer (PCa) is the most common solid neoplasm among males in the United States. In the diagnosis of PCa, grayscale transrectal ultrasound (TRUS) has generally been used for prostate biopsies.⁸ Ultrasound is superior to other imaging modalities in accessibility, non-invasiveness and cost. TRUS can make better images of the prostate than transabdominal ultrasound. Thus, TRUS is essential in the diagnosis and treatment of PCa.⁹ However, it is difficult to detect PCa by using standard grayscale or Doppler imaging TRUS because PCa lesions cannot be isolated with sufficient accuracy. Therefore, a systematic multisite biopsy guided by TRUS is the standard procedure for biopsy of the prostate gland.^{10,11} The present study was conducted to assess the utility of USG in the diagnosis of prostate cancer.

We found that the age group 25-45 years had 26 and 45-65 years had 30 male patients. Lopes PM et al¹² evaluated the contribution of transrectal prostate ultrasound in the screening for prostate neoplasias and in the guidance of prostate biopsies. In a total of 155 cases, the prevalence of malignancy was of 53%. Suspicious nodules were detected in 34 patients, and 25 were malignant (positive predictive value of 74%). The specificity and sensitivity for suspicious nodules were 88% and 31% respectively. Comparatively with the randomly obtained sextant specimens, the rate of findings of neoplasia was higher in the specimens obtained with puncture directed to the nodule ($p = 0.032$). No statistically significant difference was observed in the Gleason score for both types of specimens.

We found that Gleason grading was indolent well-differentiated tumor seen in 38, intermediate risk in 12 and clinically aggressive in 6 cases. The complications seen with TRUS were rectal bleeding <2 days in 2 patients, prostatitis in 3, hematospermia in 1, fever in 2, urosepsis in 1, and epididymitis in 2 patients. Lui et al¹³ included 187 men who were classified into 4 categories based on clinical presentation. Category 1 included 26 men with palpable nodularity and an elevated prostate specific antigen (PSA), of whom 16 (61.5%) had positive biopsies but none was positive only in the transition zone biopsies. Category 2 consisted of 49 men with sonographic abnormalities in the transition zone, of whom 15 (30.6%) had positive biopsies, including 2 (13.3%) with only positive transition zone biopsies. Category 3 consisted of 65 men with normal rectal examination and elevated PSA level, of whom 24 (36.9%) had biopsies positive for cancer, including 8 (33.3%) with only positive transition zone biopsies. Category 4 consisted of 47 men with a clinical presentation highly suspicious of prostatic malignancy but no cancer on prior systematic sextant biopsies, of

whom 17 (37.7%) had positive biopsies, including 9 (53.0%) with only positive transition zone biopsies. They concluded that transition zone biopsies are useful in patients with a high suspicion of prostate cancer and negative prior systematic sextant biopsies. We observed that TRUS had specificity of 88.2%, sensitivity of 95.2%, PPV of 98.6% and NPV of 56.8%. In their investigation, Crouzet S. et al¹⁴ included 172 individuals who were scheduled for prostate biopsies because of probable PCA. Patients had two additional target biopsy cores for two hypoechoic lesions and twelve core target biopsies for hypoechoic lesions in twelve different prostatic regions. By applying a red/green/blue scoring approach via an embedded function in the photo archiving and transmission system, they assessed the grayscale value of the image. PCA was performed on 67 (52.8%) of the 127 individuals (median age = 68.5 years, median prostate-specific antigen level = 6.19 ng/mL). 327 (18.4%) of the 1778 biopsy lesions were PCA lesions. There were no variations in the grayscale values between benign lesions and PCA; however, a significant factor was detected in the grayscale value for hypoechoic lesions, which ranged from 28.0 to 57.0. Goossen et al¹⁵ enrolled 29 patients with proven prostate malignancy underwent an ultrasound examination prior to surgery. Three evaluation protocols divided the prostate into several areas of interest: into two areas using the Left-Right (LR) and Dorsal-Ventral (DV) protocols and into four areas using the Quadrant-protocol (Q). The enhancement parameters of the areas of interest were compared to identify the most affected area. The results were compared to the histopathological findings. For the LR-protocol, the minimal time to peak proved to be the most predictive parameter for selecting the major malignant area. 78% of the patients were diagnosed correctly ($N=23$). Accurate localization of the major malignancy in either the ventral or dorsal side of the prostate was not feasible using the current protocol.

CONCLUSION

Authors found that ultrasound specifically transrectal ultrasound (TRUS), plays a significant role in the detection and diagnosis of prostate cancer. Our results showed the high efficiency of USG.

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