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Original Research Article**Role of Transrectal ultrasonography and per rectal examination in the evaluation of prostatic disease: A comparative study****Praveenkumar P¹ and Chanabasappa V Chavadi²**¹Department of Radiology, Navodaya Medical College, Raichur, Karnataka, India²Department of Radiology, Kasturba Medical College, Mangalore, Manipal university, India***Correspondence Info:**

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E-mail: pralingsoo@rediffmail.com**Abstract**

The present prospective study was carried out at a hospital attached to the Navodaya Medical College, Raichur, Karnataka. A total 50 cases of clinically suspected and digital rectal examination suggestive of prostatic diseases were scanned by transrectal ultrasound using endorectal probe of frequency 6.5MHZ attached to ultrasound machine. The confirmation of transrectal ultrasound findings were done by histopathological examination of prostatic biopsy or whole mount section of the surgical specimen obtained after radical prostatectomy or transurethral resection of prostate. We can conclude from the study results that, transrectal ultrasound examination is more accurate in identifying adjacent organ invasion in prostatic malignancies and doesn't require fully distended bladder as compared to transabdominal ultrasound examination and the transrectal ultrasound procedure is well tolerated by most of the patients and also the procedure is more cost effective compared to other investigations like computed tomography and magnetic resonance imaging.

Keywords: prostatic disease, transrectal ultrasonography, per rectal examination, prostatic biopsy**1.Introduction**

There are series of investigations used in prostatic evaluation, among them only few were stood the test of confidence. Many conventional imaging techniques like plain radiography, computed tomography, radionuclide scintigraphy and transabdominal sonography were proved to be ineffective in detection of many prostatic conditions specially cancer at an early stage. Despite earlier claims, to the contrary, MR imaging was also not proved to be effective in accurately differentiating prostatic cancer from benign conditions. With improved technology in ultrasound equipment designed for transrectal use, high resolution images of prostate can be obtained on a regular basis.

So, currently digital rectal examination & serum PSA levels are used for screening of prostatic cancer, while transrectal ultrasound and MRI are used for diagnosis of different prostatic conditions, to

know the extent of carcinoma and to guide prostatic biopsy.

Transrectal ultrasonography was developed by Wantabe in early 1970's and was introduced in Europe by workers in South Wales in 1979. Transrectal ultrasound has received increasing attention recently because of its potential for early detection of prostate cancer. It provides greater detail of zonal anatomy of prostate & echo pattern of the gland and its various lesions. Posterior portion of the gland is better delineated where most of prostate carcinoma arises. Besides this, assessment of adjacent structures like seminal vesicles, rectum and urinary bladder for invasion by prostate cancer could be done precisely by transrectal ultrasonography.

A large variety of equipments are available for transrectal sonography including high frequency transducers (5 to 10 MHz), that provide purely axial or sagittal view and those that provide images in both

dimensions (biplanar scanners) or in a variety of planes (multiplanar scanners). Viewing prostate and seminal vesicles in two or more than two dimensions is important diagnostically and so, biplanar and multiplanar instruments are preferred. Axial sections of prostate provide anatomical detail of gland, symmetry, zonal anatomy and seminal vesicles. Sagittal sections are ideal for imaging urethra and its surrounding tissues as well as configuration of the prostate at the bladder base.

Research has concentrated on the integration of TRUS findings with digital rectal examination (DRE) and PSA levels together with use of newer techniques such as Colour Doppler, ultrasound contrast agents and MRI for establishing the diagnosis of prostatic disorders along with histopathological correlation.

So, our study was an effort at establishing the role of transrectal ultrasonography in evaluation of prostatic diseases as compared with per rectal examination and its role in differentiating benign and malignant prostatic diseases.

1.1 Aims and Objectives

- 1) To find out the efficacy of transrectal ultrasonography in evaluation of prostatic diseases as compared with per rectal examination.
- 2) To find out the role of transrectal ultrasonography in differentiating benign and malignant prostatic diseases.

3. Results

In our study total 50 cases of clinically suspected and digital rectal examination suggestive of prostatic diseases were scanned by transrectal ultrasound and following observations are made. Out of 50cases final diagnosis was obtained in all 50 cases. The confirmation of transrectal ultrasound findings were done by histopathological examination of prostatic biopsy or whole mount section of the surgical specimen obtained after radical prostatectomy or transurethral resection of prostate.

The following observations are made in our study.

Table 1: Capsular Status

Capsular status	No. of cases				(%)
	BPH	Ca prostate	Prostatitis	Prostatic cyst	
Regular& continuous	23	8	3	1	70
Irregular& interrupted	3	2	-	-	30

As shown in table 1, regular and continuous capsule is seen most commonly in 70% of cases, was

seen mainly in BPH (23 patients – 65.70%) and carcinoma prostate (8patients – 22.85%).

Irregular and interrupted capsule is seen in 30% of patients, was seen mainly in carcinoma prostate (12patients – 80%) and BPH (3patients – 20%).

Table 2: Local invasion and distant metastasis in carcinoma prostate (n = 20)

Structures involved	No. of cases	Percentage (%)
Seminal vesicles	4	20.0
Bladder base	7	35.0
Rectum	1	5
Distant metastasis (Bone & Abdominal organs)	6	30.0

As shown in table 2, among extraprostatic spread, bladder base involvement was most common (7 out of 18cases of extraprostatic spread – 38.80%) followed by distant metastasis to lumbar vertebrae, pelvic bones and abdominal organs like liver, etc (6 out of 18 cases of carcinoma of prostate – 33.3%). Seminal vesicles are involved in 4patients (20.00%) and rectum in 1 case (5.0%).

Table 3: Clinical versus TRUS diagnosis

Diagnosis	No. of cases diagnosed clinically	No of cases diagnosed on TRUS
BPH	20	22
Ca prostate	28	24
Prostatitis	1	3
Prostatic cyst	1	1

As shown in table 3, among 28 cases clinically diagnosed carcinoma prostate, TRUS could diagnose only 24 cases as carcinoma prostate. Among remaining 4 cases, 2 were diagnosed as BPH and 2cases as prostatitis.

Thus TRUS was found to be more accurate than clinical examination alone for the diagnosis of carcinoma of prostate.

Table 4: Clinical versus histopathological diagnosis

Diagnosis	Clinically diagnosed cases	HPE diagnosed cases
BPH	20	26
Ca prostate	28	20
Prostatitis	1	3
Prostatic cyst	1	1

As shown in table 4, among 28cases clinically diagnosed cases of Ca prostate, 20were proved to be BPH on HPE studies. Out of remaining 8 cases, 6were proved to be BPH and two cases as prostatitis.

Table 5: TRUS versus histopathological diagnosis

Diagnosis	No. of cases diagnosed on TRUS	No. of cases diagnosed on HPE / other
BPH	22	26
Ca prostate	24	20
Prostatitis	3	3
Prostatic cyst	1	1

As shown in table 5, among 24 cases diagnosed as carcinoma prostate on TRUS, 20 were proved to be carcinoma prostate on histopathological examination and remaining were proved to be BPH. Among 3 cases diagnosed as prostatitis, all were proved to be prostatitis and one case of prostatic cyst was confirmed.

Table 6: Clinical Vs TRUS Vs HPE Diagnosis

Diagnosis	Clinical diagnosis	TRUS diagnosis	HPE diagnosis
BPH	20	22	26
Ca prostate	28	24	20
Prostatitis	1	3	3
Prostatic cyst	1	1	1

As shown in table 6, among 28 clinically diagnosed cases of ca prostate, TRUS diagnosed ca prostate in 24 cases but only 20 cases proved to be carcinoma prostate on histopathological examination.

Among 26 cases of histopathologically proven cases of BPH, TRUS can diagnose BPH in 22 cases but only 20 cases could be diagnosed based on clinical and DRE findings.

Thus, transrectal ultrasound examination was more accurate than clinical diagnosis of different prostatic diseases especially carcinoma of prostate.

4. Discussion

In this prospective study, total 50 cases of clinically suspected and digital rectal examination suggestive of prostatic diseases were scanned by transrectal ultrasound using endorectal probe of frequency 6.5MHZ attached to ultrasound machine present in our hospital attached to the Navodaya Medical College, Raichur.

Apart from transrectal ultrasound, other radiological investigations like plain radiograms (of pelvis, lumbosacral and thoracic spine), abdominal ultrasound, CT scan of abdomen & pelvis and bone scintigraphy were performed to detect or rule out metastasis from prostatic carcinoma. Serum PSA levels were performed in all necessary cases if patients could afford the cost of test.

Finally our transrectal ultrasound findings were compared with histopathological examination of prostatic biopsy or whole mount section of the

surgical specimen obtained after radical prostatectomy or transurethral resection of prostate.

4.1 Capsular status

Capsular status was assessed in the present study. Regular or continuous outline was observed in 35 cases (70%). Majority of BPH cases i.e. 23 out of 26 patients (88.4%) had continuous and regular capsule. Only 11.6% cases of BPH had irregular or interrupted capsule. Out of 20 cases of carcinoma of prostate 12 cases (60.00%) had irregular and interrupted / capsular breach; 8 cases (40%) had regular and continuous capsule.

Brooman *et al*[1] the most reliable sign of prostatic cancer ultrasonically is the presence of capsular breach detectable either by apparent absence of capsule or some times by irregular echodense areas which appears to extend through the capsule. Distortion of symmetry of capsule is also very suspicious of neoplasm.

Monzer and Yousef[2] using suprapubic USG found capsular breach in 9/18 (50%) cases whereas normal regular in 8/18 (44.4%) and capsule not visualized in 5.6% cases.

Monzer and Yousef[2] found continuous capsule in 46 / 51 (91 %) cases of pathologically proved BPH and interrupted in 5 / 51 (10%).

Mathew *et al*[3] found normal continuous capsule in 93% patients with BPH. Griffiths *et al*[4], prostatic capsule appeared breached in 55% cases of carcinoma prostate. Our observation suggests that if there is loss of capsular integrity, the high suspicion of carcinoma is to be considered.

4.2 Incidence of local invasion and distant metastases

In the present study local invasion of bladder base seen in 7 cases of 20 i.e. 35.00%, the seminal vesicle invasion 4 of 20 (20.00%), rectal wall invasion in 1 of 20 cases (5.0%). Distant metastases to the liver present in 2 cases (10.00%) and to vertebral body and pelvic bones were seen in 6 cases (30.00 %).

Griffiths *et al*[4] noted abnormal seminal vesicle infiltration by prostatic cancer in 10% cases, normal seminal vesicle seen in 61 %, only one seminal vesicle seen in 8%. Neither seminal vesicle seen in 21 %.

In the present study, 5 cases with local invasion were having associated findings of distant metastasis to bones and liver. In case of local invasion one should always look for the metastatic lesions.

4.3 Statistics

The sensitivity of TRUS for diagnosis of carcinoma prostate in present study was found to be 85.0 % with specificity of 76.00%. The percentage of false positive was found to be 14.00% and percentage of false negative was found 6.0%.

The sensitivity & specificity of TRUS for diagnosis of prostatic cyst and prostatitis was 100% in our study.

Mathew *et al*[5] found diagnostic accuracy rate of 50-90% by transperineal and transrectal biopsy of prostate.

The study carried by Fred *et al*[6] using TRUS, 33 carcinomas cases were detected and of those 33 cases, 31 (94%) were histologically confirmed. Most of their patient had land enlargement due to both BPH and carcinoma and hypoechoic lesions were present in peripheral zone.

The study carried out by Dahnert *et al*[7] sensitivity of TRUS for carcinoma was found to be 70% and specificity 78%.

Peggy *et al*[8] studied 228 patients, the sensitivity was confirmed by histopathological evaluation in 121 cases and was found to be 90% and specificity was 60%.

The relative low specificity reflects the difficulty in the interpretation of the lesion and the overlapping of the echogenic pattern of the lesion may be the cause therefore. Since TRUS has higher sensitivity (85.0%) and lower specificity (76.0%) the percentage of false negatives was lower (6.0%) than the percentage of false positives (14.0%).

5. Conclusions

1. Ultrasound examination is more accurate for diagnosis of various benign and malignant lesions of prostate compared to digital rectal examination and transabdominal ultrasound examination.
2. Transrectal ultrasound examination is more accurate in identifying adjacent organ invasion in prostatic malignancies as compared to transabdominal ultrasound examination.
3. Transrectal ultrasound do not require fully distended bladder in contrast to transabdominal ultrasound examination and the transrectal ultrasound procedure is well tolerated by most of the patients.
4. The procedure is more cost effective compared to other investigations like computed tomography and magnetic resonance imaging.

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