The Significance and Role of Transrectal Ultrasonography in Detection of Prostatic Carcinoma.

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A longitudinal study was carried out at the Department of Radiology , Oncology and Urology , Kind Edward Medical College, Lahore (Pakistan) with the collaboration of PMRC Research Centre, Mayo Hospital Lahore. 25 patients with average age of 55 years and a clinical suspicion of Ca prostate were examined by TRUS and a provisional diagnosis of Ca made which was subsequently proven by a histopathology.
TRUS yielded erosion of prostatic capsule and more than 7mm focal defects in the peripheral zone in 19(76%) patients, less than 7mm focal defects were present in two (8%) patients. Four patients (16%) had more than 7mm hyperechoic and hypoechoic foci in the central zone of prostate in five (20%) cases seminal vesicles were eroded by carcinoma of the prostate. Transrectal Ultrasonography revealed a high yield of Ca prostate and proved its veracity to be a significant method for early detection and management of Ca prostate.
Key words: TRUS, transrectal ultrasonography, ca prostate

Early diagnosis and staging of prostatic cancer was a debatable issue in the past, however with advent of the modern and more sophisticated techniques such as Transrectal Ultrasonography (TRUS), the early detection and staging of prostatic cancer has become very much possible. Although CAT scanning and TRUS had proved to be disappointing in the past in detection of Ca prostate 1(Suckov et al 1977), the current literature has produced sufficient evidence reporting the efficacy, precision and overall improved yield of Ca prostate in Japan by using TRUS technique (Heradee et al 1979). The incidence of Ca prostate is quite common in elderly Pakistani subjects, it is however asymptomatic in its early stages and is usually diagnosed when advanced and is incurable 3-4. The physical examination has been found to be unhelp in the staging of the disease, however 12 to 16 percent of the cases presumptive of localized disease on physical examination, had evidence of involvement of periprostatic tissue and seminal vesicles when radical prostectomy was done5-6. Yet the yield of the patients with lymphatic metastasis in the absence of bone metastasis and local tissue involvement was significantly high which usually caused errors in staging of the diseases7-8. As the results of the (DRE) did not help much as for as early detection and accuracy in staging was concerned, there was a need to explore a sound and safe technique which may fulfill our objective not only to detect but to assess the extent of the disease and response to treatment. Transrectal Ultrasonography (TRUS) therefore helped in evaluation of these patients and the yield of Ca prostate achieved by using this technique is discussed in the results

Material and Methods

This study was intended to verify the role of transrectal Ultrasonography in detection of carcinoma prostate, subsequently proven by histopathology.

Bruel & Kjaeer 1946 model scanner with 4 MHz to 7 MHz transducer was used in all the above 25 subjects to perform transrectal ultrasonography. The rectal probe was coupled to a photosonic scanner which incorporated a digital scan converter and microprocessor. The entire clinical work was carried out at the Department of Urology in collaboration with Department of Radiology , King Edward Medical College, Lahore (Pakistan), A total of (25) patients having an average age of 55 years and above, were examined. All the patients were proven cases of adenocarcinoma prostate by histopathology. The palpable hard nodules were excised for H/P by digital rectal examination of the prostate. These patients presented bladder outlet obstruction. These patients were registered on the basis of physical examination, history and investigations which included urine, blood routine examination , blood sugar, acid phosphates (P) and serum alkaline phosphates. The symptoms of prostatic enlargement were recorded . Digital rectal examination of prostate was completed in all these patients with empty bladder, knee elbow position. Tone of anal sphincter was noted and size of prostate was evaluated upto 25 gms prostate was taken as small and more than 40 gms as large size. Detection of hard nodule or hard consistency of gland and fixation of mucus membrane were considered highly suspicious of malignancy.

All the scans were performed with Bruel and Kjaer model 1846 Scanner and 4 MHz transducer. No bowel preparation was done prior to TRUS. The patients were advised to defecate before this test and come with full bladder. The patients were placed on left lateral position on the examination table. Prior to the insertion of probe lubrication of anus and rectum was done and digital rectal examination of prostate was performed to exclude any other, pathology. Tip of probe was covered with a rubber condom. The air in the condom was completely removed. The surface of condom was covered with a gel and probe

was gently inserted into the anus. The balloon was inflated with 50 to 70 ml of tap water, when the probe was inserted upto 7-9 cm into the rectum.

Scanning was carried out from the base of bladder, seminal vesicles towards the apex of the prostate in 0.5 cm increments. The gland was seen in all three dimensions. The prostatic volume in cubic centimeter (cm3) was estimated by summating the calculated areas of prostate. Since the specific gravity of prostatic tissue is between 1 and 1.05gm/cm3 (Watancabc 1975). Prostatic volume, multiplied by the specific gravity gives the weight in grams. Each lobe of prostate was critically observed and its symmetry echogenecity and focal defects were noticed. The echogenecity of focal defects was divided into hypoechoic or hyperechoic in comparison to normal peripheral zone of prostate gland. Structure of prostate was examined in all three zones i.e. peripheral. Central and transition zone. Foci more than 7mm size were considered positive for carcinoma prostate. Transrethral resection of prostate (TRUP) was performed in these patients. The resected tissue was subjected to histopathological examination.

Results

A total of twenty five patients having age of 55 years and above were registered in this study. They were evaluated by taking the history, physical examination and finally subjected to TRUS for ultimate diagnosis of Ca prostate. The age distribution of the patients in given in Table 1.

Table 1 Distribution of age in n=25 cases with c.a. prostate m=70 years. SD=10.63 years.

Age Group(Years)	No. of Patients	%age
55-64	07	28
65-74	10	40
75-98	8	32

The age variable fell in the range between 55-98 years with M value + 10.63 years of the Three(3) main age groups the highest number 10(40%) of patients were observed in group 2(65-74 years), Eight(32%) in age group 25-98 and seven 7(28%) in age group (55-64 years) respectively.

The clinical history of the patients showed 21 cases (84%) had acute urinary retention with 2.2 days mean duration 1 patient presented chronic retention of urine with a duration of two months. One patient had haematuria with prostatic symptoms. Eighteen were smokers, one diabetic and one had ischaemic heart disease for 10 years, 2 patients had chronic bronchitis for almost one year.

The prostate was found moderately enlarged in 17(68%) patients and of large size in 7 (28%) patients. Only 1 patient had prostate smaller in size. Surface of the prostate was found nodular in 23(92%) patients and smooth in 2(8%) cases. The consistency of the prostate was hard in 23(92%) cases, stony hard in 1 patient and firm in 1 case only. Mucous membrane was fixed in 19(76%) patients. Median groove was impalpable in 15(60%) cases. There was no tenderness or discharge on DRE in any cases however the sphincter tone was normal in almost all the patients.

Table –2 Reflected the figures as noted by original rectal examination (DRE) of the patients (n=25)
Digital rectal examination findings in carcinoma of prostate.

DRE of prostate	No. of patients	%age
Tone of anal sphincter	25	100
Normal Size		
Small	1	1
Moderate	17	68
Large	7	28
Surface		
Smooth	2	8
Irregular	23	92
Consistency		
Firm	1	4
Hard	23	92
Stoney hard	1	4
Mucous membrane		
Mobile	6	24
Fixed	19	76
Median groove		
Palpable	10	40
Not palpable	15	60
Tenderness		
Present	–	–
Absent	25	100
Discharge		
Present	–	–
Absent	25	100

Discussion

The magnitude of success in detection of Ca prostate by TRUS was tremendous. Results by TRSU have a favorable status when compared with other screening tests. It is sensitive enough to detect even small tumors of the prostate which are some or how overlooked on digital rectal examination .1249 subjects above 50 years of age were studied under a screening programme by Brewer Ketab in 1992. In patients having PSA level more than 4ng/ml, TRUS guided prostatic biopsies were performed. The detection rate of cancer by this technique was significantly high 60.7%, verifying the commendable advantage and diagnostic ability of this technique.

A total number of 25 proven cases of Ca prostate by H/P were evaluated by Transrectal Ultrasonography in this study. TRUS is considered to be a valid tool in the diagnosis and management of Urological disorders. Its significance is doubled when TRUS detectes carcinoma prostate in subjects found clinically normal by other investigations. It has a proven sensitivity for measuring the prostatic size, registering the invasion of the prostatic capsule and seminal vesicles by advance carcinoma. The

pathological staging determined by radical prostectomy specimens correlated with the clinical staging as determined by transrectal ultrasound. The diagnostic capacity of TRUS is achieved by the addition of Gray scale technique and the appreciation of prostatic cancer as hypoechoic areas.

Detection of cancer of prostate by using Transrectal Ultrasonography revealed a high percentages (97%) of sensitivity by Chodak et, al 1986. TRUS is reported to be a sensitive test for microscopic cancer that is greater than 2mm or an average diameter of 7mm. In such cases the TRUS results are reported to be from 22% to 41% . In positive cases of C.A. prostate having lesions of 7mm size, the sensitivity of TRUS was 92%.

Our study on 25 patients revealed a high percentage 23(92%) patients had abnormal ultrasound. The indication for biopsy was usually after on prostatic examination. The TRUS positive rate of sensitively was shown to be 8%. our results are comparable with the results of Chodak study conducted in 1986. The TRUS enable the detection of cancer of prostate, differentiating malignant and benign tissues as the difference of sound transmission evidently differentiates the two. The presence of diffuse tumors can not be detected by this technique with currently available instrumentation.

Computerized axial tomography[15] is another useful technique in detection of prostate cancer and involvement of the prostatic capsule and metastatic involvement of para aortic lymph nodes. However It was found that TRUS provided more histopathological information in cases of carcinoma prostate[16].TRUS has value in assessment of patients with known malignancy to detect tumor involvement of the prostatic tissue and to evaluate response to hormonal therapy. C.T. may detect tumor metastasis to a bony pelvis and lumber vertebrae, however local spread and lymph node metastasis can be detected accurately and reliably by other methods. The need for open surgical staging may be avoided. It is concluded that Transrectal ultrasonography is useful in early detection and management of Ca prostate. It is a safe and useful investigation for the early diagnosis and staging of the prostatic cancer.

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