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TRANSRECTAL ULTRASOUND GUIDED BIOPSY OF THE PROSTATE

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Transrectal ultrasonography is a useful method of imaging the prostate gland. Endorectal ultrasonography may be used in the assessment of the enlarged or nodular prostrate. Benign prostatic hyperplasia, prostatitis and prostatic cancer can be evaluated by this technique. In the management of patients with prostatic cancer, transrectal ultrasound scanning is invaluable in the diagnosis, staging, treatment and follow-up of the disease. We at Jinnah Hospital/Lahore General Hospital Lahore are using this technique for the imaging of prostate for the last many years. In this paper we will describe our experience regarding the value of transrectal ultrasound guided biopsy of the prostate in the diagnosis of prostatic cancer. A consecutive series of 200 ultrasound-guided biopsies of the prostate have been analysed. In 121 patients, in whom malignancy was suspected by both digital examination and ultrasound, 72 cancers were confirmed histologically. In 33 patients in whom digital rectal examination suggested cancer but ultrasound was normal, 3 cancers were confirmed. In 30 patients with a normal digital examination but a suspicious ultrasound appearance, 5 cancers were proven.

Key Words: Transrectal ultrasonography of the prostate; Prostatic biopsy; Imaging of the prostate by ultrasound.

INTRODUCTION

Cancer of the prostate affects a large percentage of elderly men. It is one of the commonest malignancies all over the world'. Prostatic cancer is a significant source of morbidity and mortality among men. Unfortunately, majority of these patients present with advanced and therefore incurable disease [3].

The traditional method of evaluating the prostate gland is digital rectal examination (DRE). However, the effectiveness of DRE is limited by its subjective nature and its ability to palpate only the posterior portion of the gland [8].

Transrectal ultrasonography of the prostate has been recently advanced as a technique that can more objectively and completely evaluate the prostate gland[314]. Transrectal ultrasound provides the most reliable technique for imaging early prostate cancer, since digital rectal examination, computed tomography and magnetic resonance imaging cannot reliably identify small tumors [4,21,22].

The diagnosis of prostatic cancer can be established through histologic tissue sampling obtained by needle biopsy. Commonly transrectal and transperineal approaches by a palpating finger are used. However, both these procedures are blind and biopsy may not be from a representative area. Moreover, the above two approaches are associated with a certain number of complications [6,15-20].

Transrectal ultrasonography is a useful technique in the placement of a biopsy needle within a specific suspicious area of the prostate. Transrectal ultrasound guided biopsy has become an important element in the diagnostic work up of prostatic cancer [9,13,19]. A special needle guide attachment can be mounted directly on the transrectal proble and biopsies can be performed via the transrectal or transperineal route [23, 33].

Holm and Gammelgaard [13] first described the technique of transperineal biopsy of the prostate guided by transrectal ultrasound imaging. Fornage and his associates[7] described a technique using longitudinal ultrasound guidance. Transperineal biopsy guided by the combination of transverse and longitudinal imaging was subsequently described by Lee and Coworkers[17].

MATERIALS AND METHODS

From January 1991 to December 1995, two hundred and fifteen patients ranging in age from 52 to 92 years (mean age 72.19 years) were included in the study. The study was conducted at the Departments of urology, Jinnah Hospital and Lahore General Hospital, Lahore.

The initial assessment of all the patients were done by digital rectal examination and transrectal ultrasound. On the day of the examination, the patients were asked to attend with full bladder. Digital rectal examination was performed on each patient to make the initial clinical.

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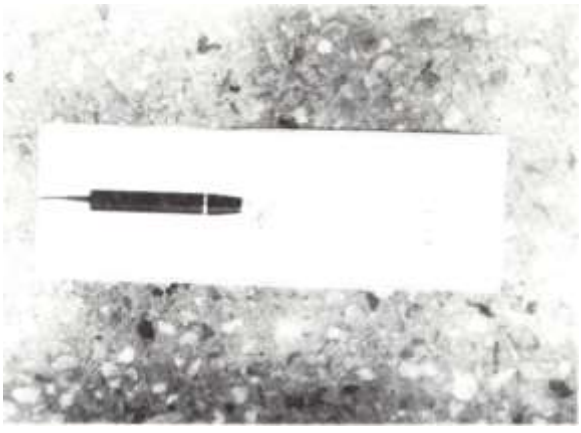

Fig-1: The endosonic probe assembled for transrectal scanning. It produces transverse images.

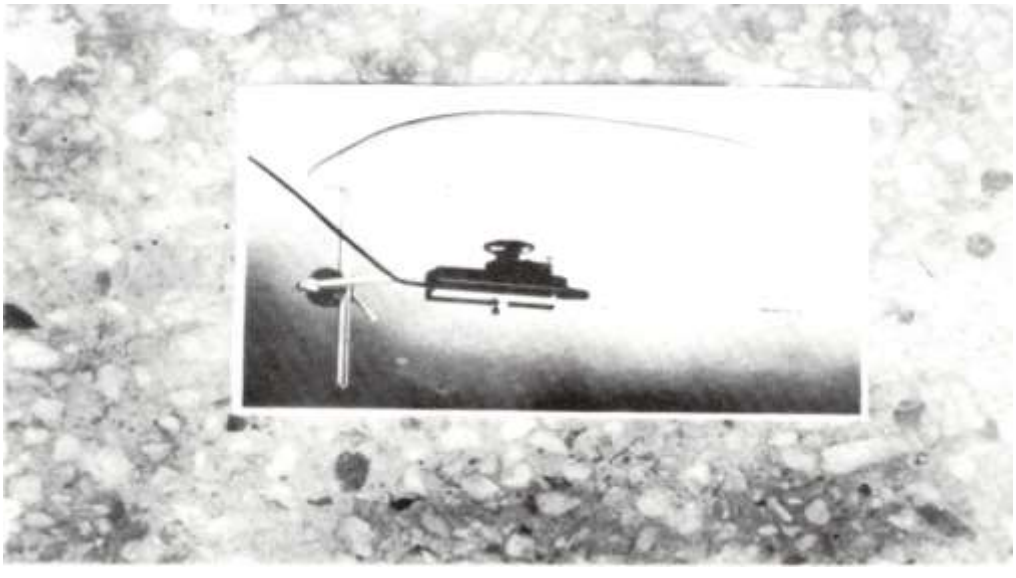

Fig-2: The endosonic probe mounted on the steppin unit.

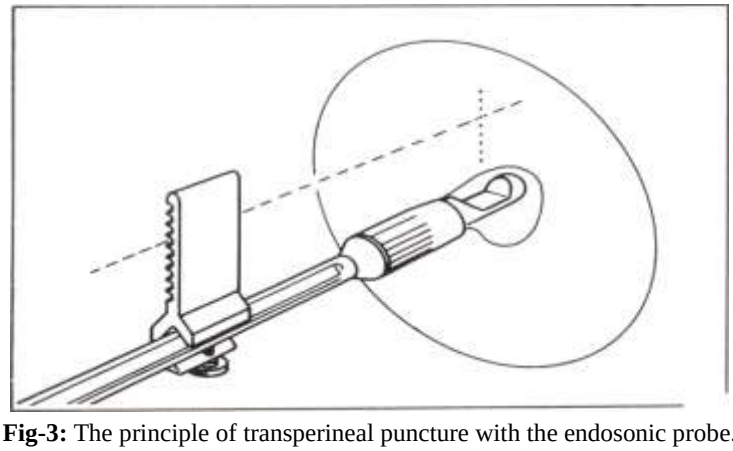

Fig-3: The principle of transperineal puncture with the endosonic probe.

Biopsies were performed on patients with an abnormality indicative of malignancy found on digital rectal examination and/or transrectal ultrasound. A further 16 patients in whom a diagnosis of prostatic cancer had been previously established were also biopsied.

Transrectal ultrasound guided biopsies were obtained in all patients by a standard technique described by Holm and Gammelgaar (1981). A survey scan of the prostate gland was performed with the patient in the left lateral position on a urological endoscopy table and the site for biopsy was decided. The patient was then placed in the lithotomy position with the legs supported on rests. The perineum was cleaned with antiseptic (Betadine) and the region was draped with sterile towels. The multichannel biopsy guide attachment was fixed to the transducer (Fig-3). Local anaesthesia was infiltrated deep in the perineum up to the prostate with 20 ml of 1 percent lidocaine. After the infiltration of the perineal skin with local anaesthetic, the biopsy needle was inserted through one of the channels of the biopsy guide in the perineum. A small incision was made for easy passage of the biopsy needle. When; the needle was in the target area, a strong echo was seen on the screen indicating correct positioning of the needle before the biopsy. The biopsy samples were obtained from the abnormal area with a 14 gauge "Tru-Cut" needle. The specimens were immediately placed in individual containers and delivered to pathology laboratory for processing. Patients were given five doses of ciprofloxacin to be taken one each before biopsy and over subsequent 48 hours.

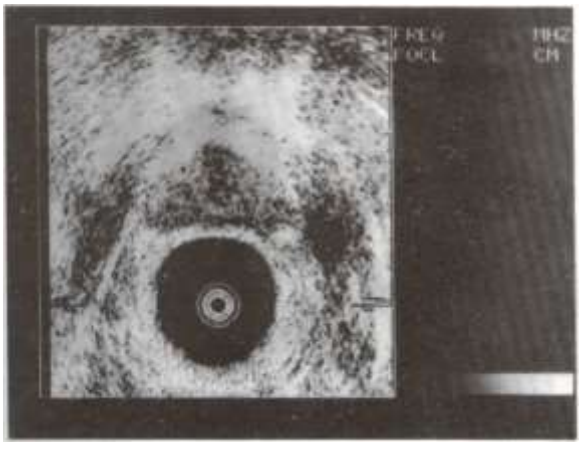

Fig-4: Ultrasound scan of normal prostate.

RESULTS

A total of two hundred and fifteen patients (215) were biopsied using transrectal ultrasound guidance. Clinical data and transrectal ultrasound scans were available on 202 of these patients. However, the final number of the patients available for the study was 200. These patients were divided into the following four groups: Group-I:

Thirty-three (33) patients were included in this group having an abnormality indicative of malignancy (firm or hard gland or nodule) on digital rectal examination but benign appearance on ultrasound scan.

Group-II:

One hundred and twenty-one patients (121) having an abnormality on both digital rectal examination and transrectal ultrasound were included in group- II.

Group-III:

Thirty (30) patients with a benign gland on digital rectal examination but a suspicious gland on transrectal ultrasound were included in Group- III.

Group-IV:

Group-IV comprised of sixteen (16) patients with histological proven prostatic cancers. The histological results in Group-I to Group-Ill are demonstrated in Table-I.

Table-1: Histological Results in Group-I to III (January 1991 To December 1995)

Group	I	II	III	Total
Patients	33	121	30	184
Malignant	3 (9.0%)	72 (59.5%)	5 (16.6%)	80
Prostatitis	2 (6.0%)	5 (4.1%)	0 (0%)	7
Benign Normal	28 (84.8%)	44 (36.3%)	25 (83.3%)	97

None of the above patients had to be admitted to the hospital, none died and there was no case of clinically significant bleeding or infection. There were 3 cases of haematospermia following biopsy.

DISCUSSION

The diagnosis of prostatic cancer based on clinical examination alone is often difficult[2]. Transrectal ultrasound scanning of the prostate is now a well-established technique to differentiate various prostatic pathological conditions[11] ,[13,25]. With improved equipment and better imaging, more detailed information from the interior of the gland is obtained (Fig-4) Advanced carcinoma of the prostate with capsular invasion is demonstrated easily because of changes in capsular echoes. Our experience with transrectal ultrasound imaging of the prostate in the last five years has shown that the interpretations of the scans in early prostatic cancer is difficult.

Our understanding of the ultrasonic appearance of prostate has improved, particularly the appearance of prostatic cancer. Initially it was considered that prostatic cancer was mainly echogenic" but it is now widely accepted that the most are echo-poor[10,17]. It was possible only when the ultrasound guided biopsy technique commenced that the workers realized that the area of cancer was normally echo-poor. (Fig-5,6,7 and 8).

Fig-5: Endorectal axial sonogram showing prostatic cancer. Transrectal ultrasound of the prostate in axial orientation demonstrates a hypoechoic area in the posterior portion of the prostate.

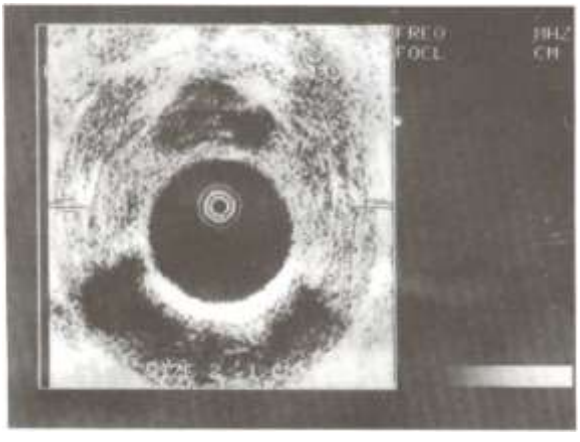

Fig-6: Transrectal axial sonogram showing small confined prostatic cancer. There is small hypoechoic area in the left posterior quadrant.

A nodule feet during digital rectal examination of the prostate may represent an early confined cancer. However, Jewett has shown that at least 50% of these prostatic nodules were benign. It may not be possible to differentiate between a benign and malignant nodule upon digital rectal examination. Transperineal needle biopsy of the prostatic nodules guided by index finger has an error rate of approximately 30%[15]. It was hoped that ultrasonically guided needle biopsy would improve the accuracy of diagnosis of prostatic nodules. Histological results in our series reveal that

Fig-7: Confined cancer of prostate. There is a small hypoechoic area in the right posterior quadrant.

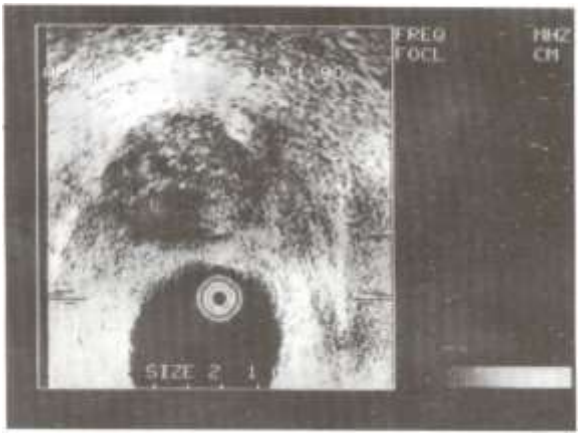

Fig-8: Axial endrorectal sonogram showing unconfined prostatic cancer.

of the 121 patients in whom both digital rectal examination and ultrasound suggested malignancy, 72 cancers were proven (60%). Of 33 patients in whom digital rectal examination suggested possible malignancy but ultrasound was normal, only 3 cancers were proven. In those patients (n = 30) in whom ultrasound suggested possible malignancy but palpation was normal, 5 cancers were detected.

The scans in our series were performed with a 7 MHz frequency and most authors now advocate the use of 7 MHz frequency for ultrasound imaging of the prostate. The increased resolution provided by this higher frequency gives better demonstration of prostatic anatomy and pathology. Transrectal ultrasound imaging of the prostate with 7 MHz frequency transducers may demonstrates cancer at a stage when they are not digitally palpable. Lee and his associates[17] have presented an analysis of 256 hypoechoic lesions of the prostate found by TURS using a 7 MHz transducer. They have evaluated these patients by the following methods.

a. Digital rectal examination.
b. Measurement of prostatic specific antigen.
c. Transrectal ultrasound guided biopsy of the hypoechoic area.

The positive predictive value for TRUS was 41% increased to 61% if the patient had a palpable abnormality on DRE, 52% if the PSA levels were abnormal and 71% if both the DRE results and PSA levels were abnormal. Lee and coworkers have also shown in their series that no cancers were detected in hypoechoic lesions measuring 1cm or less if both DRE and PSA levels were normal. These results showed that correlation of digital examination, transrectal ultrasound measurements and serum PSA levels is necessary to assess the prostate for the potential malignancy.

Lee and coworkers[17] in their study performed ultrasound guided biopsies via a transrectal route than a transperineal route. Trop- Pedersen and associates[23] have also performed ultrasound guided prostatic biopsies via transrectal route without serious complication.

Recently there has been considerable interest in use of transrectal route for ultrasound guided prostate biopsy. The transrectal route has many technical advantages over the transperineal rout. Which are as follow:

- The path of biopsy needle is much shorter via transrectal route than the transperineal route.
- The deviation of the needle within the prostate is less likely to occur.
- There is no need of any skin preparation and local anaesthesia is not required.
- The procedure is quicker and is also better tolerated by the patient.

Keeping in view the results of our study, we now believe that digital rectal examination and transrectal ultrasound imaging of the prostate are complementary. The close correlation between the finding of digital rectal examination, transrectal ultrasonography and serum PSA estimations is necessary to evaluate the prostate fully and to decide which patients need biopsy. This is in agreement with the most published reports [3,5,9,10,16,18,19,23,25].

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