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Original Article

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Comparative Study on Cancer Yielding Rate Between sextant vs Ten Cores TRUS Biopsy

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Abstract

Background: *The standard sextant biopsy protocol misses about 15% of cancer when compared with results obtained from a more extensive biopsy procedure. The number of systematic biopsies has increased over the years, with 10–12 cores currently accepted as the minimum standard.*

Objectives: *To compare the detection rate of carcinoma prostate through standard sextant biopsy and extended 10-core biopsy in Bangladeshi male subjects.*

Methods: *This prospective experimental study was conducted in the Department of Urology of Dhaka Medical College Hospital, Dhaka from January 2007 to May 2008 including a total of 69 male patients aged over 56 years having normal digital rectal examination (DRE) findings with serum PSA level of 4 ng/mL or greater or having abnormal findings on DRE irrespective of serum PSA level. The subjects underwent transrectal ultrasound (TRUS) and biopsies were taken systematically. Biopsy results were interpreted according to different sextant biopsy protocols and also following extended 10-core biopsy protocol. Data collection sheet containing the selected points were filled up. Data were analysed using SPSS version 12. The test statistic used to analyse the data were descriptive statistics and McNemar's test. The level of significance was set at 0.05 and p <0.005 was considered significant.*

Result: *Out of the total 69 subjects, 29 (42%) were diagnosed to have prostate cancer following biopsy. In the standard mid lobar sextant protocol the cancer detection was lowest (79.3%) while it was highest (89.7%) when lateral zone biopsy was performed. The extended 10-core biopsy regimen had higher cancer detection rate than any of the standard sextant protocols and it was 96.6%. The difference in the cancer detection rates between the two schemes was statistically significant (p <0.001).*

Conclusion: *The sextant biopsy is inadequate in detecting carcinoma prostate and extended 10-core biopsy protocol including the apex, midlobar mid gland, lateral mid gland and lateral base with more extensive sampling of the lateral aspects of the prostate is superior.*

Keywords: Ultra-mini, percutaneous nephrolithotomy, total tubeless

Key words: *carcinoma prostate, extended 10-core biopsy, sextant biopsy.*

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Introduction

Prostate cancer represents the second most common cancer in men worldwide and the fifth most common cause of cancer death in men.[1] The incidence and mortality of prostate cancer worldwide correlate with increasing age with the average age at the time of diagnosis being 66 years.[2]

Currently, most cases of prostate cancer are identified by screening in asymptomatic men. Prostatic biopsy is recommended if abnormalities are found on digital rectal examination (DRE) or serum prostate-specific antigen (PSA) is elevated. In this regard transrectal ultrasound (TRUS) guided, systematic needle biopsy is the most reliable method for accurate sampling of prostatic tissue.[3]

For several decades, prostate biopsy has been performed via a transrectal approach utilising ultrasound guidance (TRUS). Many of the early studies regarding prostate cancer screening showed that initial prostate biopsies followed a sextant (6 core) protocol. However, over time, the sensitivity of a 6-core prostate biopsy has been proved to be suboptimal and at present, six cores are considered inadequate in routine prostate biopsy for cancer detection.[4] The major tumour mass is peripheral in location in clinical stage T2 prostatic carcinomas and in 85% of non-palpable tumours diagnosed on needle biopsy.[5] Thus in the traditional sextant biopsy method about 15% of cancer is left undetected compared with results obtained from a more extensive biopsy procedure.[6] The number of systematic biopsies has increased over the years, with 10–12 cores currently accepted as the minimum standard.[7,8] It has been evident in a number of studies that adding more lateral peripheral biopsies to the conventional sextant biopsy technique has increased the cancer detection rate significantly and has also contributed in early detection of prostate cancer.[8-10]

The aim of this study was to evaluate the extended 10-core transrectal ultrasonography guided prostate biopsy protocol with the traditional sextant (6-core) biopsy protocol in detection of prostate cancer.

Methods

This prospective experimental comparative study was carried out in the Department of Urology of Dhaka Medical College Hospital, Dhaka, Bangladesh, from January 2007 to May 2008 with the objective to evaluate the different biopsy protocol for detection of carcinoma prostate. All male patients aged over 56 years having lower urinary tract symptoms (LUTS) attending to urology OPD were evaluated by history, clinical examination including digital rectal examination (DRE), transrectal ultrasonogram (TRUS) and prostate specific antigen (PSA) to identify the potential candidates for prostate biopsy. All the patients were properly counselled before proceeding to operative procedure and informed written consent was taken from each patient as per instructions of the ethical committee. Subjects with abnormal DRE findings such as discrete nodule or focal indurations in prostate or diffusely hard prostate irrespective of serum PSA level and subjects with serum PSA level of 4 ng/mL or greater even with normal DRE findings were included in this study. Patient with any anorectal pathology or painful anal conditions, bleeding disorder, active infection (UTI or prostatitis, etc.) were excluded. Patients with history of previous prostate biopsy or prostate surgery or with history of having radiation in pelvis or perineum were also excluded.

Preparation of the patient

Anti-thrombolytic drug was withdrawn 7 days before prostate biopsy. Urine was made sterile according to culture sensitivity report. Bowel preparation was done with low residual diet for previous day, laxative in previous night and rectal wash or by enema simplex before prostate biopsy. Oral fluoroquinolone (Ciprofloxacin) and metronidazole were given at least 2 hours before the procedure and continued for at least 5 days after prostate biopsy.

Digital rectal examination (DRE) was done with well lubricated gloved finger. Then TRUS was done with biplanar 7.5 MHz endocavitary side viewing ultrasound probe. For improved patient tolerance local anaesthesia was applied with 5cc 1% lidocaine, infiltrated between the base and seminal vesicle bilaterally with a 25 G spinal needle. Prostate was

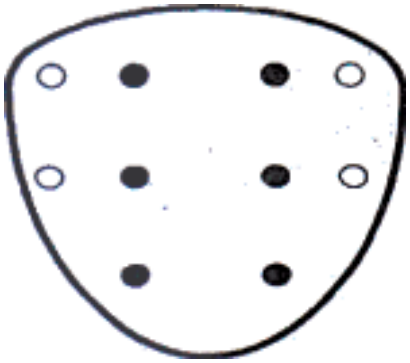

Fig. 1: *Biopsy sites of sextant (black circle) and lateral core (empty circle)*[11]

measured in 3 dimensions and the volume was estimated. All hypoechoic lesions were noted. Compatible needle guide and additional condom were applied to cover TRUS probe and needle guide. Biopsies were taken by using disposable core biopsy instrument (Bard Monopty Gun) with 18G needle.

In Sextant protocol biopsies were obtained in the midlobar parasagittal plane, halfway between the lateral edge and midline of the prostate gland, at the base, mid gland and apex. For extended 10-core biopsy additional four lateral biopsies were taken from just medial to the lateral border of prostate at base and mid gland level bilaterally. Additionally biopsies of all hypoechoic lesions were also performed. Tissue was preserved in 10% formalin, each core in separate container, and sent for histopathology. Patients were discharged after 2 hour observation with advice to come for a follow up with histopathology report and an interview with leading questions on morbidity was taken. Patients were prescribed antibiotics for 5 days.

Data were collected from history, findings of clinical examination, results of investigations before prostate biopsy, during observations, and at the time of follow up with histopathology report leading questions were asked about morbidity. Data collection sheet containing the selected points were filled up. Data were analysed using SPSS version 12. The test statistic used to analyze the data were descriptive statistics and McNemar's test. The level of significance was set at 0.05 and p <0.005 was considered significant.

Results

A total of 69 patients having abnormal digital rectal examination (DRE) and/or prostate specific antigen (PSA) 4 or > 4 ng/mL were subjected to transrectal ultrasound and systematic biopsy. Mean age of the study subjects was 71.86 ± 9.54 years with age range of 56 to 100 years and the largest group (37.7%) was within 61-70 years age group. (Table I)

Table I: *Distribution of study subjects by age (N = 69)*

Age (years)	Frequency	Percentage
<60	11	15.9
61-70	26	37.7
71-80	22	31.9
> 80	10	14.5

On digital rectal examination (DRE), 52% subjects had no hard nodule (Table II). Serum PSA level was greater than 10 ng/mL in 53.6% of the patients and the rest (46.4%) had serum PSA level of d" 10 ng/mL. (Table III)

Table II: *Distribution of study subjects by DRE (N = 69)*

DRE findings	Frequency	Percentage
Hard nodule	33	48
No hard nodule	36	52

Table III: *Distribution of study subjects by serum PSA (N = 69)*

Serum PSA (ng/mL)	Frequency	Percentage
>10	37	53.6
≤10	32	46.4

On Transrectal ultrasound (TRUS), out of the 69 patients, 74% had prostate volume of e" 50 cc. it also revealed that 81.2% of the patients had isoechoeic lesion, 14.5% had hypoechoeic and only 4.3% had hyperechoeic lesion. (Table IV)

Table IV: *Distribution of study subjects by TRUS findings (N = 69)*

TRUS findings	Frequency	Percentage
Prostate volume (cc)		
≥ 50	51	74
< 50	18	26
Lesion echogenicity		
Isoechoeic	56	81.2
Hypoechoeic	10	14.5
Hyperechoeic	03	4.3

Table V shows the histopathological diagnosis of the patients. Out of the total 69 patients 29 (42%) were diagnosed as having prostate cancer on histopathology and the rest had other benign forms of prostatic lesions.

Table V: Distribution of study subjects by histopathological diagnosis (N = 69)

Histopathological diagnosis	Frequency	Percentage
Prostate cancer	29	42
Benign lesion	40	58

For taking biopsy, different sextant biopsy protocol and extended 10-core biopsy protocol was followed. Detection rate of cancer varied according to sites of biopsy. It was observed to be highest (89.7%) when lateral zone biopsy (Apex/Lat. mid-gland/Lat. base) was performed; while it was lowest (79.3%) when traditional mid lobar sextant regimen (Apex/mid-gland/base) or standard sextant biopsy protocol was followed. In all other sextant schemes the detection rates were almost same. (Table VI)

Table VI: *Cancer detection rates in various sextant biopsy protocol (n = 29)*

Various sextant biopsy protocol	Cancer detection	
	Frequency	Percentage
Apex/Mid gland/Base	23	79.3
Apex/Lat. mid gland/Lat. Base	26	89.7
Apex/mid gland/Lat. Base	25	86.8
Mid gland/Lat. mid gland/ Lat. base	25	86.8
Apex/Mid gland/Lat. mid gland	24	82.8

Detection rate was highest when lateral and peripheral zones were included in the extended 10-core biopsy protocol. The standard sextant protocol detected only 79.3% cases, it was 89.7% when lateral zones were included in sextant protocol; whereas it was 96.6% in the extended 10-core biopsy regimen.

Table VII: *Cancer detection rates of various biopsy protocol (n = 29)*

Biopsy protocol	Cancer detection	
	Frequency	Percentage
Sextant biopsy protocol		
Mid zone (standard)	23	79.3
Lateral zone	26	89.7
Extended 10-core biopsy protocol	28	96.6

The difference in the cancer detection rates between the standard sextant biopsy and extended 10-core biopsy protocol was statistically significant ($p<0.001$). (Table VIII).

Table VIII: *Agreement between standard sextant and extended 10-core biopsy protocol (n = 29)*

Standard protocol sextant biopsy	Extended 10-protocol core biopsy		Total
	Yes	No	
Yes	22	01	23 (79.3%)
No	06	00	6 (20.7%)
Total	28 (96.6%)	1 (3.4%)	29

Data were analysed using McNemar % and level of significance was 0.05

Discussion

Over the last decades, prostate biopsy techniques have undergone considerable evolution. In 1989 Hodge et al.[12] demonstrated the superiority of systematic para-sagittal sextant (6-core) biopsy over targeted or lesion directed biopsies. This is still being practiced by most urologists worldwide. Recently, many researchers have shown an improvement in the cancer detection rate if an extended biopsy protocol is employed.[8-10] These extended biopsy protocols range from eight to twenty-six cores.[13] 10 or 12 cores are now the standard in the UK and Europe, carried out in a systematic way according to number.[7] However, the optimal biopsy technique in terms of the number of biopsies is still controversial.

Several studies have been carried out throughout the world to evaluate and compare the detection rates of different biopsy protocols. For many years the importance of including lateral and peripheral zones in biopsy protocols are being emphasized as inadequacy of the sextant protocol has become obvious. Norberg et al.[6] showed that the sextant biopsy could not diagnose 15% of the prostate cancer in a series. The standard sextant technique is inaccurate mainly because it under-samples the peripheral zone of the prostate. In modified sextant technique, biopsy from peripheral zone appears to improve the cancer detection rate. In the present study, standard sextant technique could diagnose 79.3% of cancer. In modified sextant biopsy from peripheral zone this rate increased up to 89.7% and with extended 10-core biopsy protocol the rate was 96.6%. Stamatiou et al.[14] also suggested that the 10+ systematic TRUS-guided prostate biopsy improves the detection rate of prostate cancer compared to the sextant biopsy technique alone.

In a clinical trial Eskicorapci et al.[8] concluded that adding 4 lateral peripheral biopsies to the conventional

sextant biopsy (10-core biopsy strategy) technique had increased the cancer detection rate by 25.5% without significant morbidity and without increasing the number of insignificant cancers. In a prospective study by Ravery et al.,[15] overall extensive protocol resulted in 6.6% improvement in the detection rate when compared to the sextant method. They concluded that increasing number of biopsy cores and increasing peripheral zone sampling resulted in a significant improvement in the detection of prostate cancer. Studies done by Arger et al., Matalaga et al. and Naya et al. and another large randomized clinical trial by Mariappan et al. also have shown that extended biopsy techniques utilizing additional cores directed to the peripheral zone have improved prostate cancer detection rather than six cores.[16-19] In the present study, in extended core biopsy cancer detection rate also increased. The cancer detection rate is increased up to 96.6% when lateral cores are taken in account.

The addition of lateral and peripheral zone biopsies has been shown to yield an approximately 5% to 35% increase in sensitivity. The vast majority of the extra cancers were detected in the far-lateral mid-lobar region, an area well sampled by the technique of laterally directed sextant biopsy.[3] The present study confirms that the extended 10-core biopsy protocol is superior to the standard midlobar sextant biopsy scheme. The increased detection rate might be due to the fact that prostate cancer more commonly originates from peripheral zones.[20]

Conclusion

The six systematic biopsies are inadequate and more extensive sampling of the lateral aspects of the prostate should routinely be performed. These additional biopsies increases the detection rate significantly. So urologists in our country may utilize this protocol with confidence. A large study may be done to yield more effective result.

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