ORIGINAL ARTICLE

Transperineal versus transrectal prostate biopsy: Our findings in a tertiary health institution

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Abstract

Context and Objective: Prostate cancer is a major public health issue. Its incidence is rising, especially in Nigeria. Prompt diagnosis is necessary by histology. Transperineal and transrectal approaches to prostate biopsy are well-documented. Both methods are fraught with complications though, most times minor. Studies carried out to compare both methods were carried out mainly on Caucasians, generating conflicting results. This study aims to compare the complication rates and tissue yield of these two methods in Nigerian men.

Materials and Methods: Seventy-five patients completed the study. Forty-five patients had transperineal prostate biopsy (TPbx), while 30 patients had transrectal prostate biopsy. Pain perception for all patients was determined by visual analog scale; whereas the complications were ascertained by a validated purpose designed questionnaire administered on the 7th and 30th day post operatively.

Results: The risk of rectal bleeding was higher for transrectal prostate biopsy compared to transperineal (Odds ratio: 0.03; 95% confidence interval (CI): 0.001–0.450; P = 0.012). TPbx was more painful than transrectal (P < 0.0001; df: 75; t: 4.98; 95%CI of difference in mean: −2.98−[−1.28]). There was no statistical difference between transperineal and transrectal prostate biopsy in hemospermia, fever, prostatic abscess, urethral bleeding, acute retention and tissue yield.

Conclusion: TPbx is more painful than transrectal prostate biopsy though with a significantly reduced risk of rectal bleeding. There appears to be no significant difference with respect to risk of fever, urethral bleeding, hematospermia, prostatic abscess and acute retention. Both routes provided sufficient prostate tissue for histology.

Key words: Comparative analysis, transperineal prostate biopsy, transrectal prostate biopsy

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Introduction

Prostate cancer (PC) constitute a major public health issue[1,2] accounting for a greater percentage of the neoplastic lesion in men.[3] The incidence of PC is on the rise[4,5] necessitating the need to screen. Serum prostate specific antigen (PSA) has been widely adopted for screening, with the aim of detecting early disease. Following elevated PSA, a histological diagnosis is required in order to guide treatment. Over the years, different methods were adopted to biopsy the prostate for histology.

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Initially, it was by digital guided prostate biopsy[6] which may be transperineal or transrectal. Later, this was replaced by ultrasound guided prostate biopsy. Recently, the extended approaches through either ultrasound guided transrectal or transperineal routes have been adopted.[7]

In most developing countries, patients tend to present late.[8] Most times, on presentation digital rectal examination (DRE) is already abnormal with elevated PSA. Unfortunately, in most centers in these resource poor settings, there is a paucity

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of transrectal ultrasound (TRUS) to guide prostate biopsy and urologists still rely on digital guidance for prostate biopsy. Though, this may be argued to occasionally miss the lesions, some studies have demonstrated no significant difference between TRUS guidance and digital guidance to direct systematic biopsies of the prostate, especially if there are obvious lesions on DREs.[9,10] They concluded that the value of routine TRUS in screening program in such situations is doubtful.

However, for patients with elevated PSA but have normal DRE findings, such individuals are usually referred to the few centers with TRUS so as to have their repeat biopsies if the digital guided biopsy is negative.

Transrectal prostate biopsy is the commonest procedure for PC detection. Transperineal prostate biopsy (TPbx) is rarely used.[11] Interestingly, only few institutions still perform transperineal prostate biopsy,[12,13] though a prospective study has proven its superiority over transrectal prostate biopsy in cancer detection.[14] There are different reasons in support of transrectal prostate biopsy against transrectal. These arguments bothered on rate of complications, comfort of the patient and tissue yield. Few studies[15] have compared transrectal, and transperineal prostate biopsies, and these were done mainly on Caucasians. As such there is a knowledge gap in African blacks on the best approach to prostate biopsy. This study aims to fill this gap by comparing rate of complications, tissue yield and procedure related pain of transperineal with transrectal biopsy.

Materials and Methods

This study was carried out by the urology division of Enugu State University Teaching Hospital, which is located in Enugu, Nigeria. A total of 100 patients who presented to the urology clinic was enrolled into this study between January and December 2011.

The sample size was calculated using a statistical formula shown below:

$$N = \frac{Z^2 PQ}{\delta^2}(\text{DEFF}) \quad [16]$$

Where N = Minimum sample size for a comparative study design.

Z = The standard normal deviation corresponding to 95% level of significance. The value obtained from a normal distribution table is 1.96.

P = Prevalence rate obtained from Ezenwa *et al*. study[5] =13.3% =0.133.

Q = (1–P)

δ = Absolute precision that is, value required (in percentage points) which in actual term describes the maximum difference between the population rate and the sample rate that can be tolerated; taken for this study to be 10% (0.1).

DEFF = Estimated design effect = 1

$$1.96^2 \times 0.133 \times 0.867 \times 1 = 44$$

(Sample size calculation is for one arm of the study; total sample size required for the study is 88)

$$N = \frac{}{0.1^2}$$

One hundred patients were randomly allocated to two groups. Once a patient met the indication for biopsy, he was assigned to a particular group based on a "lucky dip." The two groups (A and B) were wrapped differently in pieces of paper and placed in an envelop; each envelop has ten equal wraps of group A and B. The patient dips and picks, whatever group picked, the patient gets assigned to it. The selected wrap is replaced before another patient does his lucky dip. The Inclusion criteria were: Patients with PSA greater than 4 ng/ml or abnormal DRE findings. The exclusion criteria were: Patients who were uraemic or had uncontrolled hypertension or bleeding diathesis or patients on anticoagulants or antiplatelets medications.

A detailed history was taken from all participants to identify any predilection for bleeding or any history of being on anticoagulant medications (i.e. warfarin, or heparin) or antiplatelet drugs like aspirin. In the period of the study, no patient presented with ecchymosis that is commoner among hemophiliacs. All the patients had routine investigations which included full blood count, serum urea, and creatinine and clotting profile for all patients with a history of anticoagulant or antiplatelet medications.

Twenty-five patients were lost to follow up. Twenty patients never showed up on the 30th day post operative, while five patients presented 3 months after biopsy on account of financial constraint. Seventy-five patients completed the study. The study was approved by Enugu State University Teaching Hospital Ethical committee. Informed consent was obtained from all patients recruited for the study.

These procedures were done by two urologists who have seven years urological experience. Prior to the biopsy the patients were educated on the use of visual analog scale (VAS) to ascertain their level of pain following biopsy.

The VAS is a psychometric response scale which in this study, respondents had to specify their level of agreement to a statement by indicating a position along a continuous line between two end-points (0 and 10). The zero end points signify no discomfort while the ten end points signify

most-severe pains. There is evidence showing that VAS have superior metrical characteristics than discrete scales, thus a wider range of statistical methods can be applied to the measurements.[17]

The respondents were also educated on the possible symptoms that may arise as complications from the biopsy procedure.

Procedure

The position adopted for biopsy in this study was lithotomy. Intravenous (IV) ciprofoxacin 200 mg, IV metronidazole 400 mg.[18] and IV (pentazocine 30 mg) were given to patients in both groups (A and B). The perineum was cleaned and draped.

For transrectal prostate biopsy, 10 mls of 2% plain xylocaine was infiltrated in the periprostatic tissue at 3, 4, 8, 9 and 12 O'clock positions using size 21G hypodermic needle. With the aid of a spring loaded disposable 18G biopsy needle, eight core tissue were taken guided by a finger in the rectum. For the transperineal prostate biopsy, 15 ml of 2% plain xylocaine was infiltrated into the perineum adjacent to the prostate including the periprostatic tissue using a 21G hypodermic needle. With the aid of a spring loaded disposable 18G biopsy needle, eight core tissues were taken through the perineum, guided by a finger in the rectum.

Immediately after the biopsy, the patient quantifies his pains with the aid of the VAS. He is later discharged home on a 5 day course of oral ciprofloxacin 500 mg bd and tabs metronidazole 400 mg tds. The patient visits the clinic on the 7th and 30th day after the procedure where a validated purpose designed questionnaire is administered to measure complications associated with the procedure. Tissue yield is measured by histology report confirming adequacy of tissue and reporting a histological diagnosis; while any bleeding per rectum that occurred after the procedure or within a month after the procedure was considered as post procedure rectal bleeding or rectal bleeding during the procedure resulting in haemodynamic changes.

The data generated in the study was analyzed by STATA; Level of significance was set at a two-tailed $P < 0.05$. The data were tested for normality using Skewness and Kurtosis test; pnorm was used to test for normality of residuals. The VAS for both groups was tested by *t*-test for a significant difference in mean; while the remaining variables were tested for a significant difference using the odds ratio (OR).

Results

Sixty-five percent of the participants were farmers and uneducated, 13% of the participants who are civil servants were educated.

The mean age of the 75 patients recruited for the study was 64.01 ± 10.1 years. The mean VAS in the study is 7.178 ± 2.09. For TRbx, the mean VAS score was 5.9 ± 1.5; while the mean VAS score for TPbx was 8.02 ± 2.[Table 1] Subjecting these VAS scores to paired Student's *t*-test for a significant difference in mean, revealed a statistical significant difference between the two procedures ($P < 0.0001$;df: 75; *t*: 4.98; 95% confidence interval (CI) of difference in mean: −2.98−[−1.28])

Complications associated with prostatic biopsy are shown in Table 2. The risk of developing fever is not significantly different between the two groups, 13.6% for TPbx versus 13.3% for TRbx (OR: 1.38; 95%CI: 0.32–6.02; $P = 0.66$). The risk of rectal bleeding was higher for transrectal prostate biopsy compared to transperineal prostate biopsy (OR: 0.03; 95%CI: 0.001–0.45; $P = 0.012$). The "number needed to treat" for TPbx to avoid rectal bleeding is 4 (RR: 2.98; 95%CI: 2.0–4.31; $P < 0.001$). With respect to the rest of the complications considered, there was no statistically significant difference between TRbx and TPbx [Table 2].

Table 2: Multivariate analysis

Variables	OR	95% CI for OR		P value
		Lower	Upper	
TPbx versus TRbx				
Fever	1.38	0.32	6.02	0.664
Haemospermia	0.67	0.13	34.7	0.84
Rectal bleeding	0.03	0.001	0.45	0.012*
Prostatic abscess	0.67	0.013	34.7	0.84
Urethral bleeding	2.3	0.56	9.1	0.26
Blood transfusion	0.67	0.01	34.7	0.84

*$P<0.05$ statistically significant. CI=Confidence interval; OR=Odds ratio; TRbx=Transrectal prostate biopsy, TPbx=Transperineal prostate biopsy

Table 1: The descriptive table of participants showing age and VAS

Route of biopsy										
Variables	Transrectal					Transperineal				
	Observation	Mean	SD	Minimum	Maximum	Observation	Mean	SD	Minimum	Maximum
Age	30	61.14	9.54	50	79	45	65.9	10.1	50	85
VAS	30	5.90	1.5	3	9	45	8.02	2.0	3	10

VAS=Visual analogue scale, SD=Standard deviation

Discussion

The mean VAS >5 for transrectal biopsy in this study is similar to the observations made by Damiano *et al*.[19] in their study on TRUS guided prostate biopsy. Apparently, TPbx appears more painful than TRbx in the study. This finding is different from the observation of Hara *et al*.[20] in their study, whereby they concluded there was no significant difference in perception of pains. A closer look at their study showed they used spinal anesthesia for TPbx unlike in our study where a local infiltration of the perineum with periprostatic block was adopted. This implies that local infiltration of the perineum with periprostatic anaesthesia will not achieve sufficient anesthesia for TPbx. As such, unlike transrectal biopsy, it may be necessary to embrace other forms of anesthesia like pudendal block, caudal block or spinal anesthesia in order to achieve good pain control.[20,21] This opinion is not supported by some studies that found periprostatic block effective as well in TPbx.[7,22] The adequacy of periprostatic anaesthesia for TRbx was demonstrated by Maccagnano *et al*.[23] in their study using 1 or 2% lidocaine (10 ml). They concluded that it was the most effective anesthetic technique for TRbx.

Additionally, most complications following prostate biopsy are minor and self-limiting.[24] However, the rates of complications varied between the two methods of prostate biopsy in this study. With respect to post-procedure pyrexia, its rate was higher for transperineal compared to transrectal. The OR of 1.38 implied an increased risk of fever in TPbx compared to TRbx. However, the observed difference lacked statistical significance as reflected in the *P* value and 95%CI, which has a value >1. The fever noted in the study were low grade in agreement with similar findings by Rietbergen *et al*.[25] The findings of 10.3% and 13.64% rates of fever following transrectal and TPbx is lower than the observed rate in the study done by Rosario *et al*.[26]

Moreover, urethral bleeding was more pronounced in TPbx than transrectal in this study though the difference lacked statistical significance. However, urethral bleeding is not usually associated with hemodynamic changes,[27] it could be a source of concern to patients and their relatives.

Furthermore, there was no case of rectal bleeding following TPbx in this study compared to TRbx in which 27.59% had rectal bleeding. This observed difference was proven to be statistically significant buttressing the fact that there is increased the risk of rectal bleeding via the transrectal route. This observation may be useful to the urologist when evaluating patients who have poorly controlled hypertension or obstructive nephropathy. Such patients usually have a higher risk of rectal bleeding and may benefit from TPbx. Rosario *et al*.[26] in their study noted that 36.8% of patients had rectal bleeding following prostate biopsy. This value exceeded that of TRbx in this study. Occasionally rectal bleeding could be massive necessitating blood transfusion and sometimes embolization.[28] In our series we experienced no case of massive rectal bleeding, which required blood transfusion.[29]

Surprisingly, there were no observed cases of hemospermia for both TRbx and TPbx. Though, in the literature, it is acknowledged that it is rare.[29] Our study participants are elderly and generally less sexually active which may account for the absence of any observed case of hemospermia. In addition, the caliber of the needle used (18G) may be contributory. Though, this has been refuted by Cicione *et al*.[30] who compared the outcomes of a 16G and 18G biopsy needle and found out no significant difference in outcome.

Generally, most studies that compared TRbx and TPbx concluded there was no significant difference in complication rates.[20,22,31] A systematic review by Shen *et al*.[15] also, revealed there was no significant difference in cancer detection between TRbx and TPbx irrespective of DRE findings or PSA level prior to biopsy. With respect to complications, there was no significant difference in the incidence of major or minor complications between the two groups. A limitation of this review is that a few randomized controlled studies were considered.

This result should be reproducible in ultrasound guided biopsies considering that some studies have shown no significant difference in outcomes between digital guided and ultrasound guided biopsies.[9,10,32]

This study is limited by its inability to make provisions for the losses to follow up; however, its findings should stimulate an elaborate multi centered randomized clinical trial to evaluate the differences in both procedures considering that there are very few published randomized studies available in the literature.

Conclusion

Transperineal prostate biopsy is more painful than transrectal prostate biopsy though with a significantly reduced risk of rectal bleeding. There appears to be no significant difference with respect to risk of fever, urethral bleeding, hematospermia, prostatic abscess and acute retention. Both routes provide sufficient prostate tissue for histology.

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