Original Article

Transperineal biopsy as a new technique versus well-established transrectal biopsy for diagnosis of prostate cancer – A comparative study

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Abstract

Introduction: Transrectal (TR) prostate biopsy has been the gold standard for prostate cancer diagnosis for years. With the emergence of transperineal (TP) prostatic biopsy, there is a shift in practice across medical services to adopt TP biopsy as the primary method of prostatic biopsy.

Objective: The objective of the study is to compare cancer detection rates and complications between TP and TR biopsies in our region providing single-center experience with introduction of TP biopsy.

Patients and Methods: This is a retrospective study utilizing a prospectively designed database comparing consecutive 80 cases of TP biopsy to 80 cases of TR biopsy in a single center.

Results: Prebiopsy PSA was 14.2 ± 24.9 ng/dl in the TP group versus 23.7 ± 71.3 ng/dl in the TR group with $P = 0.108$. Prostate Imaging–Reporting and Data System (PIRAD) 4 and 5 lesions were found in 47 (58.9%) cases of TP biopsy versus 44 (60.3%) of TR group cases and $P = 0.131$. Cancer was detected in 49 (61.25%) patients in the TP group versus 45 (56.25%) in the TR group with no statistically significant difference and $P = 0.665$. No cases of hematochezia was reported in TP group, vs 14 (17.5%) reported in TR group with P value $<.001$. There were no statistically significant differences regarding the incidence of febrile urinary tract infection (UTI), hematuria, and hematospermia in the TP group 0 (0%), 7 (8.75%), and 3 (3.75%) versus 2 (2.50%), 14 (17.50%), and 5 (6.25%) in the TR group with $P = 0.497$, 0.159, and 0.719 consecutively.

Conclusion: TP and TR biopsy have comparable cancer detection rates. TP biopsy has a significantly lower rectal bleeding rate than TR biopsy. There is a trend toward lower febrile UTI in the TP group; however, it did not reach statistical significance.

Keywords: Abbreviations, prostate cancer, prostate cancer transrectal transperineal biopsy, transperineal, transrectal

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INTRODUCTION

Prostate cancer is a major worldwide health problem with wide geographic variation in incidence. The age-standardized incidence rate (ASIR) of prostate cancer in the USA is

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147/100.000. Arab countries report much lower ASIR, with Lebanon having the highest Arab ASIR 37/100.000 and Egypt reporting lowest with ASIR of 7.8/100.000.[1,2]

Transrectal (TR) ultrasound-guided systematic sextant prostate biopsy first introduced in 1989 by Hodge *et al*.[3] has revolutionized the diagnosis of prostate cancer and soon became the gold standard for diagnosis. The technique has been refined over the years, better multi planer ultrasound probes were invented and the number of cores increased for better prostate.

Transperineal (TP) biopsy was first described in the 1970s but has recently revived and became widely adopted in several centers and countries around the world.[4,5] Multiple studies compared TP biopsy to other techniques showed that it is safe, feasible, has superior sensitivity, especially in detecting anterior cancers as well as having low rate of sepsis.[6,7] Introduction of freehand techniques avoided discomfort and complicated setting up brachytherapy stepper and proved to be safe, accurate, and feasible.[8]

Objective

The objective of the study is to compare cancer detection rates and complications in TP and TR biopsies in our region providing single-center experience with introduction of TP biopsy.

PATIENTS AND METHODS

This study was conducted in Sabah Al-Ahmad Urology Centre, Kuwait. We have a well-established TR biopsy unit for 9 years. In 2019, we started TP biopsy. After obtaining approval of the research plan from the central ethical committee, we retrospectively reviewed a cohort of 160 men who underwent prostate biopsy: 80 – consecutive TR biopsy and 80 – consecutive TP biopsy between May 2019 and February 2022.

Patients were referred to the center with high PSA level or suspension of prostate cancer either due to abnormality during rectal examination or suspicious bony lesions.

TP biopsy was done under general anesthesia in surgical theater. Patients were discharged on the same day of surgery. All patients in the TP group were assessed with MPMRI. The procedure was done in lithotomy position. A TRUS probe connected to bk3000™ ultrasound system with Precision Point™ Transperineal Access System (PrecisionPoint™ BXTAccelyon) and loaded with coaxial biopsy needle (BARD Monopty™ Disposable Core Biopsy Instrument 18-gauge - 20 cm). After initial scanning of the prostate a systematic 12- 18 core biopsies are obtained plus 2-5 core biopsies form suspicious areas using cognitive fusion.

TR biopsy was done in an outpatient clinic under local anesthesia. Prebiopsy MPMRI was used for 73 (91.2%) patients. Systematic 12-core TR biopsies were taken in the left decubitus position using a TRUS probe connected to a BK 3000 ultrasound machine and a BARD Monopty Disposable Core Biopsy Instrument 18-gauge × 20 cm.

Data were collected from prospectively designed database for prostatic biopsy. We collected the following data Patients' age, PSA, prostate size, MRI PI-RADS score, date of the biopsy, the biopsy technique (TP or TR), total number of cores taken. We also collected the data from histopathology number and location of cores positive for prostate adenocarcinoma and Gleason score of each. Data regarding complications (hematuria, hematochezia, hematospermia, urinary retention, UTI, and sepsis) were also collected. Data were tabulated and analyzed using Stata 12.0 software (Stata Corporation, College Station, TX, USA), we used Chi-square test and Mann–Whitney test when appropriate and P value of < 0.05 as statistically significant results.

RESULTS

We compared eighty consecutive cases of TP biopsy to eighty consecutive cases of TR biopsy. There was no statistically significant difference regarding prebiopsy data. patients in the TP group are slightly older with a mean age of 65.8 ± 8.5 years versus 65.1 ± 7.4 in the TR group with $P = 0.633$. Prostate volume was higher in the TP group with a mean volume of 75.4 ± 44.1 ml versus 67.5 ± 31 ml in the TR group with $P = 0.34$. Prebiopsy PSA was lower in the TP group with a mean PSA of 14.2 ± 24.9 ng/dl versus 23.7 ± 71.3 ng/dl in the TR group with $P = 0.108$. MRI findings were comparable in both the groups. The number of patients with PIRAD 4 and 5 lesions in MRI were comparable in both groups 47 (58.9%) cases of TP biopsy group versus 44 (60.3%) of TR group cases and P value of 0.131. PSA density was 0.22 ± 0.33 ng/ml in the TP biopsy group versus 0.36 ± 0.69 ng/ml in the TR group and $P = 0.073$ [Table 1].

There is a trend toward higher cancer detection in the TP group. A total of 94 (58.7%) out of 160 patients were diagnosed with prostate cancer. Cancer was detected in 49 (61.25%) patients in the TP group versus 45 (56.25%) in the TR group; however, the difference was statistically insignificant with $P = 0.630$.

There were no statistically significant differences when we used PSA to stratify the two groups. Cancer detection

Table 1: Demographic and clinical data for the two groups

	TP group	TR group	*P*
Age (years)	65.8±8.5	65.1±7.4	0.6325
Prostate volume (mL)	75.4±44.1	67.5±31	0.34
Prebiopsy PSA (ng/dL)	14.2±24.9	23.7±71.3	0.108
PSA <10, *n* (%)	48 (60)	37 (46.25)	
PSA 10–20, *n* (%)	23 (28.8)	25 (31.25)	
PSA >20, *n* (%)	9 (11.2)	18 (22.5)	
PSA density (ng/m)	0.22±0.33	0.36±0.69	0.073
PSA grouped <0.15 and >0.015, *n* (%)			
PSA density <0.15	44 (55)	40 (50)	0.635
PSA density >0.15	36 (45)	40 (50)	
MRI finding, *n* (%)			
No lesions	13 (16.25)	9 (12.33)	0.131
PIRAD 1	0	2 (2.74)	
PIRAD 2	3 (3.75)	8 (10.96)	
PIRAD 3	17 (21.25)	10 (13.70)	
PIRAD 4	24 (30)	16 (21.92)	
PIRAD 5	23 (28.75)	28 (38.36)	

MRI: Magnetic resonance imaging, PSA: Prostate-specific antigens, TP: Transperineal, TR: Transrectal, PIRAD: Prostate imaging–reporting and data system

was similar among the three categories PSA <10 ng/dl, 10–20 ng/dl, and >20 ng/dl. In TP group cancer-positive cases were 26 (54.2%) with PSA < 10 ng/dl, 14 (60.9%) with PSA 10-20 ng/dl, and 9 (100%) with PSA > 20 ng/dl and in TR group positive cases were 18 (48.7%) with PSA < 10 ng/dl, 15 (60%) with PSA 10-20 ng/dl, and 12 (66.7%) with PSA > 20 ng/dl, with and *P* values of 0.665, 1 and 0.071 consecutively.

To determine if any of the two techniques of cancer detection is affected by PIRAD lesion category, we subdivided the patients into three groups: PIRAD 0–2, PIRAD 3, and PIRAD 4 and 5. There were no statistically significant differences in cancer detection rate in the three subgroups. Cancer detection rates stratified by PIRAD score in the TP group, PIRAD 0-2 was 7 (43%), PIRAD 3 was 6 (35.3%), and PIRAD 4&5 was 36 (76.6%) and in TR group were 6 (31%) in PIRAD 0-2, 5 (50%) in PIRAD3, and 30 (68.2%) in PIRAD 4&5 .*P* values were 0.513, 0.687, and 0.482 consecutively.

We used PSA density to stratify the two groups to check if it has effect on cancer detection rate. If PSA density is <1.5, cancer detection was 19 out of 44 (43.18%) in the TP group versus 17/40 (42.50%) in the TR group with $P = 1$. Moreover, if PSA density is >1.5, cancer detection was 30/36 (83.3%) in the TP group versus 28/40 (70%) in the TR group with $P = 0.137$.

We compared the Gleason grade score for cancer detected by TP and TR, and we did not find a statistically significant difference. Patients with Gleason grade group 1 were 9 (18.4%) in the TP group and 10 (22.2%) in the TR group. Patients with Gleason grade group 2 were 12 (24.49%) in the TP group and 9 (20.00%) in the TR group. Patients with Gleason grade group 3 were 17 (34.69%) in the TP group and 6 (20.00%) in the TR group. Patients with Gleason grade group 4 were 6 (12.24%) in the TP group and 6 (13.33%) in the TR group. Patients with Gleason grade group 5 were 5 (10.20%) in the TP group and 11 (24.44%) in the TR group [Table 2].

There were no statistically significant differences regarding hematuria, hematuria, and febrile urinary tract infection. The most reported complication was hematuria. In the TP group, it was reported in 7 (8.75%) patients versus 14 (17.5%) in the TR group with $P = 0.159$. Hematospermia was reported in 3 (3.75%) in the TP group versus 5 (6.25%) in the TR group with $P = 0.719$. Febrile UTI requiring readmission and treatment with injection antibiotic was reported in 2 (2.50%) patients in the TR group versus no patients in the TP group with $P = 0.497$ [Table 3].

While hematochezia was reported in 14 (17.50%) TR group versus no patients in the TP group, the difference was statistically significant with $P = 0.001$.

DISCUSSION

Prostate biopsy lies at the forefront of PC diagnosis and management.[9] Prostate cancer incidence differs widely with geography and ethnicity.[1,2] In this study, we report the results of TP biopsy as a new technique in our center against the well-established TR biopsy. Two meta-analyses and systemic reviews found that there were no significant differences between the two approaches in the overall cancer detection rate.[10,11] In our study, there were no statistically significant difference in cancer detection rates in the two groups, in TP group 61.25% and 56.25% in TR group. This finding is consistent with the previous studies.[12-14]

Previous studies suggested that the TR biopsy poses a higher risk of infection because the fecal bacteria can easily enter the blood from sampling points.[15] The risk of infectious complications after TR biopsy is reported to range from 0.1% to 7%, and the rate of hospital admission due to postbiopsy infection is 0.6%–4.1%.[16] In the present study, rectal bleeding and infection-related complications (febrile UTI and sepsis) were more observed in the TR biopsy group; however, the difference was statistically insignificant. There was a trend toward lower incidence in TP biopsy. This finding is reported by almost every study comparing both techniques[13,17] and highlighted in a meta-analysis by Xiang *et al*.[11] who showed that TP biopsy significantly protects the patient from febrile UTI. In our study, rectal bleeding could be avoided by performing TP biopsy.

Table 2: Outcome of the biopsies

Cancer detection rate	TP group, *n* (%)	TR group, *n* (%)	*P*
Cancer	49 (61.25)	45 (56.25)	0.630
Benign	31 (38.75)	35 (43.75)	
Cancer detection rate by PSA group (cancer/total)			
PSA <10	26/48 (54.17)	18/44 (48.65)	0.665
PSA 10–20	14/23 (60.87)	15/25 (60)	1
PSA >20	9/9 (100)	12/18 (66.67)	0.071
Cancer detection by PIRAD group			
PIRAD 0–2	7/16 (43)	6/19 (31)	0.513
PPIRAD 3	6/17 (35.3)	5/10 (50)	0.687
PIRAD 4 and 5	36/47 (76.6)	30/44 (68.2)	0.482
Cancer detection by PSA density			
Cancer if PSA density <0.15	19/44 (43.18)	17/40 (42.50)	1
Cancer if PSA density >0.15	30/36 (83.3)	28/40 (70)	0.137
Cancer detection by Gleason score			
Total	49	45	
GG1	9 (18.37)	10 (22.22)	0.291
GG2	12 (24.49)	9 (20.00)	
GG3	17 (34.69)	6 (20.00)	
GG4	6 (12.24)	6 (13.33)	
GG5	5 (10.20)	11 (24.44)	

PSA: Prostate-specific antigen, TP: Transperineal, TR: Transrectal, PIRAD: Prostate imaging–reporting and data system

Table 3: Complications

	TP group, *n* (%)	TR group, *n* (%)	*P*
Hematuria	7 (8.75)	14 (17.50)	0.159
Hematochezia	0	14 (17.50)	<0.001
Hematospermia	3 (3.75)	5 (6.25)	0.719
Fever	0	2 (2.50)	0.497
Retention	1 (1.25)	2 (2.50)	1.000

TP: Transperineal, TR: Transrectal

One of the most common complications after prostate biopsy is hematuria, with a reported incidence of 2%–84% depending on the definition, follow-up duration, and methods.[18,19] In our study, the incidence of hematuria was 8.75% and 17.50%, respectively, for patients in the TP and TR groups (7/80 vs. 14/80, $P = 0.159$). All hematuria patients' symptoms were self-limited, and no patients required blood transfusion or active intervention.

There were no significant differences in other reported complications (hematospermia and acute urinary retention) in veins with results reported in different studies.[20]

This study showed that cancer detection rate for TP biopsy in our center is similar to previously reported studies. While the incidence of prostate cancer and prevalence of screening varies widely among countries the TP biopsy cancer detection rate was similar. Finally, TP was the new technique compared to a well-established TR biopsy, and it showed slightly higher cancer detection rates and lower morbidities.

We acknowledge that this work has limitations including lack of randomization, and seven patients in the TR group were not able to undergo MRI. TP biopsy was performed under general anesthesia while TR biopsy was performed under local anesthesia; we were not able to compare the costs of both procedures.

CONCLUSION

In our study, both TP and TR biopsies have comparable cancer detection rates. TP biopsy has a significantly lower rectal bleeding rate than TR biopsy. There is a trend toward lower febrile UTI in the TP group; however, it did not reach statistical significance.

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Conflicts of interest
There are no conflicts of interest.

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