

Original Article

A comparison of complications following transperineal and transrectal prostate biopsy in Rajavithi Hospital

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Keywords:

Transrectal, transperineal, biopsy, complications, MRI fusion biopsy

Abstract

Objective: Prostate cancer is one of the most prevalent cancers globally. While transrectal ultrasound-guided biopsy remains the gold standard, it carries several risks of complication. Recent advancements in 3D magnetic resonance imaging have improved cancer detection rates and reduced the incidence and severity of complications. Since 2021, Rajavithi Hospital has implemented this technology, yielding promising results but lacking comprehensive data regarding complications. The objective of this study is to compare the complications associated with prostate biopsy via the perineum versus the rectum and investigate the factors related to the occurrence of complications from prostate biopsy.

Materials and Methods: This retrospective study was performed using data from patients who underwent MRI fusion prostate biopsy in the Division of Urology, Department of Surgery, Rajavithi Hospital between 2021 and 2024. Data were collected from medical records, including age, digital rectal examination, PIRADS score, history of previous biopsy, biopsy core, Gleason score, prostate volume, PSA, and methods.

Results: A total of 200 patients underwent prostate biopsy, with 150 patients (75.0%) receiving the procedure via the transperineal route and 50 patients (25.0%) via the transrectal route. A total of 34 patients experienced complications: 26 in the transperineal approach group and 8 in the transrectal approach group. A urinary tract infection (UTI) was reported in several cases after the transrectal procedure, but the findings were not statistically significant ($p = 0.250$). Complications such as gross hematuria, LUTS, pain, hematochezia, hematospermia, and AUR occurred variably without statistical significance.

Conclusion: This study found no significant difference in complications associated with prostate biopsy via the perineum and the rectum. The most common complication from both methods is lower urinary tract symptoms (LUTS).

Insight Urol 2025;46(2):119-24. doi: 10.52786/isu.a.114

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Manuscript received: June 25, 2025

Revision received: October 13, 2025

Accepted after revision: November 21, 2025

Introduction

Prostate cancer is one of the most common cancers among men, accounting for approximately 21.0% of all cancer cases. In Thailand, it ranks as the fourth most common cancer in males. The mortality rate associated with prostate cancer is reported as being 10.0%.¹

Since 1991, the mortality rate from prostate cancer has gradually declined, because of several factors: earlier screening through prostate-specific antigen (PSA) testing, advancements in treatment, and the emergence of other causes of mortality during prostate cancer treatment.²

The utilization of PSA testing in conjunction with prostate biopsy has significantly influenced the incidence and mortality rates of prostate cancer. In the United States, the screening has led to an increase in prostate cancer detection rates from 7.8% to 12.9%, while the mortality rate from prostate cancer has decreased from 3.0% to 1.8%.¹

Currently, the U.S. Preventive Services Task Force (USPSTF) recommends PSA screening for men aged 55 to 69 years (Grade C) and advises against routine screening for men over 70 years (Grade D) to mitigate unnecessary treatment in cases of low-risk prostate cancer.³

A method for prostate biopsy using ultrasound, which initially recommended the collection of six tissue samples, has evolved to a standard collection of twelve samples.⁴ Prostate biopsy via the transrectal approach utilizes an 18-gauge needle, which is guided by an ultrasound probe. In contrast, the transperineal approach is indicated for patients without a rectum, such as those who have undergone surgical procedures or have congenital abnormalities. A lower risk of post-procedural infection has been demonstrated in the latter approach.

The advancement of multiparametric magnetic resonance imaging (mpMRI) has enhanced the ability to detect prostate cancer lesions. Additionally, mpMRI fusion with prostate biopsy has improved the efficacy of tissue sampling with regard to increased sensitivity in comparison to transrectal ultrasound (TRUS) biopsy (93.0% vs. 48.0%) and a higher negative predictive value (89.0% vs. 74.0%). However, this technique has resulted in decreased specificity (41.0% vs. 96.0%) and positive predictive value (51.0% vs. 90.0%).⁵ Overall, mpMRI fusion with prostate biopsy shows a greater detection rate of clinically

significant cancers while reducing the incidence of clinically insignificant cancers in comparison to traditional methods.⁶

Infection is the most common complication after prostate biopsy, with rates ranging from 0.1% to 7.0%. Sepsis has been shown to occur at rates between 0.3% and 3.1%.⁷ Most infections manifest as symptomatic urinary tract infections or mild fever. Hospitalization rates due to infection increased from 0.6% to 4.1%^{8,9}, but mortality rates remained within the typical range for general infections.^{10,11} A primary factor contributing to severe infections is the presence of fluoroquinolone-resistant bacteria in fecal matter.¹²

Hemorrhage is another frequent complication following prostate biopsy.¹³ Studies indicate that patients experience hematuria in 23.0% to 63.0% of cases post-biopsy, with urinary retention having an incidence of 0.7% urinary due to blood clots. Rectal bleeding occurs in 2.1% to 21.7% of patients, typically presenting as minor bleeding that responds well to pressure. Additionally, some patients report hematospermia, with frequency ranging from 9.8% to 50.4%, which may be clinically insignificant but often causes anxiety among patients^{14,15}. Urinary retention occurs in approximately 0.2% to 0.4% of patients following the procedure.

The aim of this study is to compare complications from prostate biopsy through the perineum versus the rectum and identify factors linked to these complications.

Materials and Methods

This retrospective study included all patients who underwent mpMRI fusion prostate biopsy between 2021 and 2024 at Rajavithi Hospital in Bangkok, Thailand. Medical records of inpatient notes, outpatient notes and operative notes were reviewed.

The data collected included age, digital rectal examination (DRE), PIRADS score, history of previous biopsy, biopsy core, Gleason score, prostate volume, PSA levels, and approach. Data pertinent to complications was also collected from medical records within 14 days of the procedure. This study was approved by the Ethics and Research Committee of Rajavithi Hospital. Incomplete data from medical records were excluded in this study.

Statistical analysis

Data analyses were performed using SPSS, version 22.0 (SPSS Inc., Chicago, IL, USA). The categorical variables were presented as number and percentages. Comparisons between the two groups were analyzed using the chi-squared or Fisher's exact test. A p-value less than 0.05 was considered to be statistically significant.

Results

A comparison of complications between transperineal and transrectal biopsy approaches is shown in Table 1. The study included 150 patients in the transperineal group and 50 patients in the transrectal group. Complications were reported in 26 cases from the transperineal group (17.3%),

while 8 cases were reported in the transrectal group (16.0%). No urinary tract infections (UTIs) were documented in the transperineal group. However, 1 case was recorded in the transrectal group (2.0%). Gross hematuria occurred in 4 cases within the transperineal group (2.6%) and 1 case in the transrectal group (2.0%). The most common complication in the transperineal group was lower urinary tract symptoms (LUTS), with an overall incidence of 8.0%. These symptoms included urgency and dysuria, with the latter being more prevalent. In contrast, the most frequent complications in the transrectal group were urgency and urinary retention, each affecting 4.0% of patients. One case of both hematochezia and hematospermia were observed in the transrectal

Table 1. Comparison of complications following transperineal and transrectal prostate biopsy.

Factors	Methods of biopsy		P-value
	Transperineal (n =150) n (%)	Transrectal prostate (n = 50) n (%)	
Complication			0.828 ^a
Yes	26 (17.3)	8 (16.0)	
No	124 (82.7)	42 (84)	
Gross hematuria			1.000 ^b
Yes	4 (2.7)	1 (2.0)	
No	146 (97.3)	49 (98.0)	
Hematochezia			0.250 ^b
Yes	0 (0.0)	1 (2.0)	
No	150 (100.0)	49 (98.0)	
Hematospermia			1.000 ^b
Yes	4 (2.7)	1 (2.0)	
No	146 (97.3)	49 (98.0)	
UTI			0.250 ^b
Yes	0 (0.0)	1 (2.0)	
No	150 (100.0)	49 (98.0)	
AUR			1.000 ^b
Yes	6 (4.0)	2 (4.0)	
No	144 (96.0)	48 (96.0)	
LUTS			0.524 ^b
Yes	12 (8.0)	2 (4.0)	
No	138 (92.0)	48 (96.0)	
Pain			1.000 ^b
Yes	2 (1.3)	0 (0.0)	
No	148 (98.7)	50 (100.0)	
Scrotal hematoma			1.000 ^b
Yes	1 (0.6)	0 (0.0)	
No	149 (99.4)	50 (100.0)	

Values are represented as n (%), ^a = The p-value from Pearson Chi-Square, ^b = The p-value from Fisher's Exact Test, * significant at p < 0.05

UTI = urinary tract infection, AUR = acute urinary retention

group (2.0%). No hematochezia was found in the transperineal group. However, hematospermia was noted in 4 cases within the transperineal group (2.6%). Additionally, pain and scrotal hematoma were reported solely in the transperineal group, with an incidence of 2 cases (1.3%) and 1 case (0.6%), respectively.

Based on the data presented in Table 1, there were no statistically significant differences in the incidence of complications between the transperineal and transrectal biopsy groups.

The associated factors of complications are shown in table 2. DRE was the sole factor associ-

ated with complications, with normal DRE leading to more complications compared to abnormal DRE. (21.5% and 7.7% respectively) ($p = 0.015$)

Discussion

200 patients who underwent mpMRI fusion prostate biopsy at Rajavithi Hospital were analyzed, 150 patients were placed in the transperineal group and 50 patients in the transrectal group. There was an incidence of 26 complications observed in the transperineal group (17.3%) and 8 cases in the transrectal group (16.0%). The most common complication in both groups was LUTS.

Table 2. Factors associated with complications following transperineal and transrectal prostate biopsy.

Factors	Complications		P-value
	No (n = 166) n (%)	Yes (n = 34) n (%)	
Age Group (years)			0.052 ^a
50-59	13 (81.3)	3 (18.8)	
60-69	67 (76.1)	21 (23.9)	
≥ 70	86 (89.6)	10 (10.4)	
UD			0.772 ^a
None	29 (82.9)	6 (17.1)	
DM	35 (79.5)	9 (20.5)	
None DM	102 (84.3)	19 (15.7)	
History of prior biopsy			0.651 ^a
No	52 (81.3)	12 (18.80)	
Yes	114 (83.8)	22 (16.2)	
DRE			0.015 ^{a*}
Unsuspected	106 (78.5)	29 (21.5)	
Suspected	60 (92.3)	5 (7.7)	
PSA			0.075 ^b
< 4	4 (100.0)	0 (0.0)	
4-9	63 (75.9)	20 (24.1)	
≥ 10	99 (87.6)	14 (12.4)	
Number of core biopsy			0.381 ^b
< 20	20 (90.9)	2 (9.1)	
≥ 20	146 (82.0)	32 (18.0)	
PIRADS			0.759 ^b
< 3	4 (100.0)	0 (0.0)	
3	46 (79.3)	12 (20.7)	
4	63 (85.1)	11 (14.9)	
5	53 (82.8)	11 (17.2)	
Volume			0.472 ^a
≥ 25	13 (92.9)	1 (7.1)	
> 25	153 (82.3)	33 (17.7)	

Values are represented as n (%), ^a = The p-value from Pearson Chi-Square, ^b = The p-value from Fisher's Exact Test, * significant at $p < 0.05$

UD = underlying diseases, DM = diabetes melitus, PSA = prostate-specific antigen, DRE = digital rectal examination

Urinary retention was a second common complication in the transrectal group. These differences did not reach statistical significance. These findings suggest that both biopsy techniques carry similar risks of complications, leading clinicians to make decisions based on other factors such as patient preference, clinical indications, and procedural considerations rather than concerns about complication rates.

According to a study by Andrea Alberti et al. in 2023¹⁶ which demonstrated that most complications following mpMRI fusion transrectal prostate biopsy were classified as Clavien-Dindo (CD) grade 1 including hematuria, hematochezia, hematospermia, and multiple conditions and as CD grade 2 including urinary retention and infection. Similarly, in our study most complications were CD grade 1 and only 3 cases were CD grade 2. The study same by Alberti et al. also indicated that age over 70 years and a body mass index (BMI) greater than 25 kg/m² were significant predictors of post-procedural complications. But in our study, a surprising finding was that normal DRE was significantly associated with more complications. We hypothesized that a normal DRE may lead to a higher number of core biopsies in comparison to patients with initial abnormal findings. The data revealed that among the 135 patients with normal DRE, 126 patients (93.3%) had more than 20 core biopsies collected. In contrast, among the 65 patients with abnormal DRE, 52 patients (80.0%) had more than 20 core biopsies collected. However the analysis of the number of biopsy cores did not show a statistically significant relationship with complications. This lack of significance could be due to the small number of complication cases. We concluded that mpMRI fusion transrectal prostate biopsy is a safe procedure with a low risk of severe complications when performed by experienced professionals.

In a study conducted by Sebastian Berg et al. in 2023, complications following mpMRI fusion prostate biopsy via the transperineal approach were compared to those from the transrectal approach. The study specifically included patients at low risk of infection-related complications and concluded that transrectal prostate biopsy is associated with a higher incidence of infection-related complications in comparison to transperineal biopsy.¹⁷ In our study there was only 1 case of infection related complications, observed

in transrectal group. No statistically significant difference in infection-related complications was observed between the two groups, even when patients with low infection risks were not excluded from the analysis. In practical hospital settings, urologists often prescribe a seven-day course of antibiotics due to the socioeconomic challenges of many patients, which limits their access to medical services. This practice may lead to a lower-than-anticipated incidence of infection-related complications. We suggest that either method can be applied based on the discretion and expertise of the surgeon.

A comparative study conducted by Po-Fan Hsieh et al. reported a higher incidence of urinary retention among patients undergoing transperineal biopsy in comparison to those receiving transrectal biopsy (18.5% vs. 4.7%, $p = 0.009$).¹⁸ However, our findings indicated that equivalent rates of urinary retention occurred following both transperineal and transrectal biopsy procedures (4.0% vs. 4.0%). Consequently, it is advisable to inform patients about the risks for urinary retention in both procedures, which should not influence the discretion of the surgeon in selecting the approach.

There are some limitations in this study, for example the various procedures were performed by many urologists and residents therefore, the levels of expertise and experience were not equal. Moreover, this study was carried out in a single center meaning the findings may not be transferable.

Conclusion

In this study, there were no statistically significant differences in complications between the two groups. We recommended that either method can be employed according to the judgment and expertise of the surgeon.

Conflict of Interest

The authors declare no conflict of interest.

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