Comparison of Different Rectal Cleansing Methods for Reducing Post-Procedural Infectious Complications After Transrectal Ultrasound-Guided Prostate Biopsy

Jong Eun Lee¹, Sang Soo Shin², Taek Won Kang³, Jin Woong Kim¹, Suk Hee Heo², Yong Yeon Jeong²

Purpose: To compare the efficacy of three different rectal cleansing methods for reducing post-procedural infectious complications after transrectal ultrasound (TRUS)-guided prostate biopsy.

Materials and Methods: A total of 451 consecutive patients who underwent TRUS-guided prostate biopsy were prospectively included in this study. All patients received targeted antimicrobial prophylaxis and underwent bowel preparation through laxative administration. The patients were divided into three groups on the basis of the method of rectal cleansing immediately before the procedure. Group I patients (n=165) underwent cleansing of the perianal skin using povidone-iodine cotton balls; group II patients (n=116) received an injection of povidone-iodine solution (0.1 g/mL) into the anal and lower rectal canals; and group III patients (n=170) received direct manual cleansing of the mucosal surface of the anus and lower rectum using povidone-iodine cotton balls. The three groups were compared regarding the incidence of post-procedural infectious complications, re-hospitalization rates, and mean length of hospital stay using one-way ANOVA, the Chi-square test, and multiple logistic regression analysis.

Results: Post-procedural infectious complications occurred in %11.2, %21.8, and %6.5 of groups I, II, and III, respectively (P < .001). The incidence of overall infectious complications was significantly lower in group II (%95 CI: 0.958–0.232, OR = 0.472, P = .038) and group III (%95 CI: 0.555–0.129, OR = 0.267, P < .001) than in group I. Re-hospitalization rates were %2.6, %9.7, and %0.6 in groups I, II, and III, respectively (P < .001). The incidence of re-hospitalization was significantly lower in group II (%95 CI: 0.869–0.070, OR = 0.247, P = .029) and group III (%95 CI: 0.421–0.007, OR = 0.055, P = .005) than in group I. The mean length of hospital stay was significantly longer in group I than in group III (P = .009).

Conclusion: Combined with targeted antimicrobial prophylaxis, direct manual cleansing of the mucosal surface of the anus and lower rectum using povidone-iodine cotton balls was most effective in preventing post-procedural infectious complications among the three different rectal cleansing methods.

Keywords: biopsy; infection; prostate; sepsis; transrectal

INTRODUCTION

Transrectal ultrasound (TRUS)-guided prostate biopsy in patients with suspected prostate cancer is currently the gold-standard procedure for prostate cancer diagnosis.(1) Although it is generally recognized as safe and well tolerated, TRUS-guided prostate biopsy is an invasive method of obtaining prostate tissue samples that may occasionally cause serious complications. Whereas the reported overall complication rates after prostate biopsy vary widely in previous studies, ranging from 2% to 10.4%, the rates of infectious complication requiring hospitalization range from 0% to 6.3%.(2-4) Indeed, infectious complications are a leading cause of prolonged hospital stay and financial burden after prostate biopsy. Therefore, numerous strategies have been proposed to minimize those complications.(3-5) As it was shown to be effective in reducing the rate of infectious complications before colorectal surgery,(8) rectal cleansing before prostate biopsy, along with prophylactic antibiotics, is well known to reduce the risk of infectious complications.(9) A recent systematic review and meta-analysis revealed that rectal cleansing using povidone-iodine before prostate biopsy significantly reduced the rate of infectious complications compared to the control group.(10) When a combination of povidone-iodine and prophylactic antibiotics is used, these effects are further accentuated.(4,10) However, as optimal rectal cleansing methods have not been standardized, various protocols have been used.(11-13) Raman et al. reported that soaking the rectum and painting the perianal area with povidone-iodine gauze before prostate biopsy reduced the post-biopsy infectious complications rate from 4.3% to 0.6%.(2) In a study by AbuGhosh et al., the anterior rectal mucosa was directly cleansed using an examiner’s finger and a thin layer of gauze soaked in

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povidone-iodine (13). To the best of our knowledge, the effectiveness of these various methods of rectal cleansing has not been meticulously compared. Therefore, the aim of this study was to compare the efficacy of different rectal cleansing measures for reducing post-procedural infectious complications after TRUS-guided prostate biopsy.

**MATERIALS AND METHODS**

**Patients**

This study was approved by our institutional review board, and written informed consent was obtained from all patients. During a one-year study period, 456 consecutive patients from a single tertiary center who underwent TRUS-guided prostate biopsy under hospitalization were prospectively included in this study. Among them, five patients who did not undergo rectal swab culture for the targeted antimicrobial prophylaxis because of the following reasons were excluded from the study: (1) four patients were already hospitalized for the evaluation of bone metastasis of unknown origin, and (2) one patient was already on antibiotic treatment because of a severe urinary tract infection (UTI). Finally, 451 patients were enrolled in this study. The indications for biopsy were as follows: (1) prostate specific antigen (PSA) value greater than 4 ng/mL (n = 407, 90.2%); (2) concerning findings on digital rectal examination such as a nodule, induration, and asymmetry or concerning abnormal lesions on TRUS or prostate MR imaging (n = 16, 3.5%); (3) the presence of both (1) and (2) (n = 24, 5.3%); and (4) atypia on a previous prostate needle biopsy (n = 4, 0.9%). During the study period, one of three different rectal cleansing methods was used just prior to the procedure. The rectal cleansing method was applied differently every month for the evaluation of bone metastasis of unknown origin, and (2) one patient was already on antibiotic treatment because of a severe urinary tract infection (UTI). Finally, 451 patients were enrolled in this study. 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**Pre-procedural Preparations**

All patients were admitted to the hospital one day prior to the procedure. They received targeted antimicrobial prophylaxis on the basis of the rectal swab culture results. The rectal swab samples were obtained two weeks before the biopsy and cultured on MacConkey’s agar (KOMED) containing 1 μg/mL ciprofloxacin overnight at 37°C in ambient air. All isolates were subjected to organism identification and antimicrobial susceptibility testing using an automated microbial system (VITEK® 2). If quinolone resistance was not observed in the results of the rectal swab culture, the patients received antibiotic prophylaxis consisting of a total of three intravenous injections of ciprofloxacin (400 mg) at morning and evening of day of biopsy, and the morning after the procedure. However, in cases of quinolone resistance, the patients received a total of three intravenous injections of piperacillin/tazobactam (500 mg) before and after the procedure. All patients also underwent bowel preparation using laxatives the day before the procedure. To minimize pain during the procedure, intravenous dripping of 100 mL of physiologic saline mixed with ketamine (10 mg/mL) was started one hour prior to the biopsy.

**Biopsy Protocol**

The patient was positioned in the left lateral decubitus position with their knees bent. All patients underwent rectal cleansing using one of three different methods immediately before the procedure. TRUS-guided prostate biopsy was performed using an 18-gauge fully automated biopsy gun with a needle length of 20 cm, cutting notch size of 1.6 cm, and stroke length of 22 mm (Acecut; CIVCO Medical Solutions, Kalona, IA, USA) under ultrasonographic guidance (LOGIC E9; GE Healthcare, Milwaukee, WI, USA) by one experienced radiologist. During the procedure, the biopsy needle was inserted via a steering device attached to the 5.0 to 7.5 MHz transducer to visualize the needle path parallel to the electronic guideline provided by the US images. A total of eight tissue specimens were taken from the prostate gland, with two cores in each of the
four regions (right upper, right lower, left upper, and left lower) of the prostate gland. Further, in cases with a suspicious focal lesion in the middle part in both prostate glands on ultrasound images, tissue samples were additionally obtained at those portions. Immediately after the core tissues were extracted, manual compression of the prostate gland using the US probe was performed to prevent possible post-procedural bleeding. In addition, color Doppler US was performed to carefully check for any significant post-biopsy bleeding. The patients were discharged the day after the procedure if there were no complications, and they were routinely followed up on an outpatient basis within one month after discharge. In cases of unexpected complications, they were re-admitted via the emergency department.

**Data Analysis**

The electronic medical records of three groups were meticulously analyzed, including demographic data, prostate volume, PSA level, presence of infectious and non-infectious complications, and underlying disease including diabetes mellitus (DM), by one urologist who was blinded to the information regarding the rectal cleansing method applied to the patients. Moreover, past history of Foley catheter insertion within one month before the procedure, antimicrobial use within three months, UTI or prostatitis within three months, hospitalization within six months, prostate biopsy within one year, and fluoroquinolone (FQ) resistance were also investigated. The presence or absence of FQ resistance was determined by the culture results of the rectal swab samples obtained two weeks before the biopsy. Infectious complications after biopsy were considered present if the patients showed asymptomatic bacteriuria or pyuria, symptomatic UTI or prostatitis with or without fever (>37.8°C), bacteremia, sepsis, or systemic inflammatory response syndrome (SIRS) at any time up to one month after the procedure. SIRS was defined by the presence of two of the following clinical findings: body temperature higher than 38°C or lower than 36°C, heart rate higher than 90/min, hyperventilation evidenced by a respiratory rate higher than 20/min or PaCO2 lower than 32 mmHg, and white blood cell count higher than 12,000/μL or lower than 4,000/μL. Re-hospitalization was defined as readmission to the hospital due to infectious complications related to the TRUS-guided prostate biopsy. Any additional hospitalization due to other diseases was not included in the data analysis. The length of hospital stay was defined as the total number of days spent in the hospital, excluding hospitalized time due to medical conditions other than the TRUS-guided biopsy. Non-infectious complications after the procedure included pain, hematuria, hematospermia, rectal bleeding, and acute urinary retention (AUR). The intensity of pain was measured on the evening of the biopsy using the numeric pain rating scale (NRS).

**Table 1. Demographics and clinical characteristics of patients.**

<table>
<thead>
<tr>
<th></th>
<th>Group I (N = 165)</th>
<th>Group II (N = 116)</th>
<th>Group III (N = 170)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, year; mean ± SD</td>
<td>68.63 ± 11</td>
<td>68.94 ± 5.2</td>
<td>67.49 ± 8.54</td>
<td>.282</td>
</tr>
<tr>
<td>Prostate volume, cc; mean ± SD</td>
<td>45.48 ± 27</td>
<td>41.57 ± 22.51</td>
<td>36.72 ± 15.59</td>
<td>.001</td>
</tr>
<tr>
<td>PSA level, ng/mL; median (IQR)</td>
<td>6.4 (3.6-10.5)</td>
<td>6.0 (4.2-10.1)</td>
<td>6.7 (4.3-11.9)</td>
<td>.083</td>
</tr>
<tr>
<td>Diabetes mellitus (%)</td>
<td>30 (18.2)</td>
<td>23 (15.9)</td>
<td>33 (19.4)</td>
<td>.922</td>
</tr>
<tr>
<td>Chronic kidney disease (%)</td>
<td>12 (7.3)</td>
<td>15 (12.9)</td>
<td>29 (17.1)</td>
<td>.025</td>
</tr>
<tr>
<td>Foley catheter insertion state (%)</td>
<td>6 (3.6)</td>
<td>2 (1.7)</td>
<td>3 (1.8)</td>
<td>.457</td>
</tr>
<tr>
<td>Recent antimicrobial use (%)</td>
<td>27 (16.4)</td>
<td>24 (20.7)</td>
<td>24 (14.1)</td>
<td>.339</td>
</tr>
<tr>
<td>Recent hospitalization (%)</td>
<td>16 (9.7)</td>
<td>9 (7.8)</td>
<td>10 (5.9)</td>
<td>.427</td>
</tr>
<tr>
<td>Recent history of UTI or prostatitis (%)</td>
<td>10 (6.1)</td>
<td>9 (7.8)</td>
<td>13 (7.6)</td>
<td>.809</td>
</tr>
<tr>
<td>Recent history of prostate biopsy (%)</td>
<td>1 (0.6)</td>
<td>1 (0.9)</td>
<td>3 (1.8)</td>
<td>.574</td>
</tr>
<tr>
<td>FQ resistance (%)</td>
<td>55 (33.3)</td>
<td>53 (45.7)</td>
<td>89 (52.8)</td>
<td>.002</td>
</tr>
<tr>
<td>Overall FQ resistance</td>
<td>43.7%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Abbreviations:** PSA, Prostate Specific Antigen; IQR, Interquartile Range; UTI, Urinary Tract Infection; FQ, Fluoroquinolone; BPH, Benign Prostate Hyperplasia; ASAP, Atypical Small Acinar Proliferation.

**Table 2. Comparison among three groups with respect to post-procedural infectious complications, re-hospitalization, and mean length of hospital stay.**

<table>
<thead>
<tr>
<th></th>
<th>Group I (N = 165)</th>
<th>Group II (N = 116)</th>
<th>Group III (N = 170)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall infectious complications (%)</td>
<td>36 (21.8)</td>
<td>13 (11.2)</td>
<td>11 (6.5)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Asymptomatic bacteriuria/pyuria (%)</td>
<td>7 (4.2)</td>
<td>9 (7.8)</td>
<td>4 (2.4)</td>
<td>.092</td>
</tr>
<tr>
<td>UTI or prostatitis without fever (%)</td>
<td>13 (7.9)</td>
<td>10 (9.0)</td>
<td>6 (3.5)</td>
<td>.015</td>
</tr>
<tr>
<td>UTI or prostatitis with fever (%)</td>
<td>10 (6.1)</td>
<td>10 (9.0)</td>
<td>0 (0)</td>
<td>.001</td>
</tr>
<tr>
<td>Bacteremia or sepsis or SIRS (%)</td>
<td>6 (3.6)</td>
<td>2 (1.7)</td>
<td>1 (0.6)</td>
<td>.133</td>
</tr>
<tr>
<td>Re-hospitalization (%)</td>
<td>16 (9.7)</td>
<td>3 (2.6)</td>
<td>1 (0.6)</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Mean length of hospital stay, days; mean ± SD</td>
<td>3.42 ± 1.43</td>
<td>3.22 ± 1.41</td>
<td>3.04 ± 0.54</td>
<td>.012</td>
</tr>
</tbody>
</table>

**Abbreviations:** UTI, Urinary Tract Infection; SIRS, Systemic Inflammatory Response Syndrome.
The reference category is Group I.

Abbreviations: NPRS, Numeric Pain Rating Scale; AUR, Acute Urinary Retention.

ing scale (NPRS), with an 11-point numeric scale ranging from ‘0’ representing ‘no pain’ to ‘10’ representing ‘worst pain imaginable’. Other non-infectious complications were defined as events that developed at any time during the follow-up period of one month.

Statistical Analysis

Comparison of the incidence of post-procedural complications, re-hospitalization rates, and length of hospital stay among the three groups according to the method of rectal cleansing were assessed using one-way ANOVA for continuous variables and the Pearson Chi-square test for categorical variables. Multiple logistic regression analysis was performed to estimate adjusted odds ratios (ORs) to investigate which factors among the baseline clinical characteristics (rectal cleansing method, age, prostate volume, DM, Foley catheter insertion, recent antimicrobial use, recent hospitalization, recent history of UTI or prostatitis, recent antimicrobial use, recent hospitalization, recent history of UTI or prostatitis, recent antimicrobial use, recent hospitalization, recent history of UTI or prostatitis, recent antimicrobial use, recent hospitalization, recent history of UTI or prostatitis, recent antimicrobial use, recent hospitalization, recent history of UTI or prostatitis) significantly influenced the incidence of post-procedural infectious complications and re-hospitalization rates. All statistical analyses were performed using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corp., Armonk, NY, USA). A P value less than 0.05 was considered significant.

RESULTS

A total of 451 patients enrolled in this study were divided into Group I (n = 165), II (n = 116), and III (n = 170), respectively. The mean age of the patients was 68.28 ± 8.38 years, the mean prostate volume was 21.87 ± 22.88 cc, and the median PSA level (interquartile range) was 6.5 (4.1-10.8) ng/mL. According to the biopsy, the final diagnosis was benign prostate hyperplasia (n=237, 52.5%), prostate cancer (n = 192, 42.6%), atypical small acinar proliferation (ASAP) (n = 16, 3.5%), and others (n=6, 1.3%). The results of the rectal swab culture performed before the biopsy were E. coli (n = 397, 88%), K. pneumonia (n=15, 3.3%), others (n=22, 4.9%), and no bacterial growth (n=17, 3.8%). Overall, FQ resistance was observed in 197 (43.7%) patients. The demographics and clinical characteristics of the patients were compared among the three groups based on a method of rectal cleansing (Table 1). The mean prostate volume was significantly smaller in group III than in groups I and II (P = .001). The incidence of chronic kidney disease was different among the three groups (P = .025). Meanwhile, there were no statistically significant differences among the three groups in terms of age, PSA level, DM, Foley catheter insertion state, recent antimicrobial use, recent hospitalization, recent history of UTI or prostatitis, recent history of prostate biopsy, and biopsy results.

Overall, post-procedural infectious complications occurred in 60 (13.3%) of 451 patients, among which 36 (21.8%), 13 (11.2%), and 11 (6.5%) cases developed in groups I, II, and III, respectively (P < .001) (Table 2). The incidence of overall post-procedural infectious complications was significantly lower in groups II (P = .025) and III (P < .001) than group I. However, there was no significant difference between groups II and III. Infectious complications consisted of asymptomatic bacteriuria or pyuria (n = 20, 4.4%), UTI or prostatitis without fever (n = 20, 4.4%), UTI or prostatitis with fever (n = 11, 2.4%), bacteremia, sepsis, or SIRS (n = 9, 2%). E. coli was the cause of bacteremia in all cases (n = 9), among which 50% were FQ-resistant E. coli. Among various post-procedural infectious complications, UTI or prostatitis occurred more frequently in group I than in groups II and III. Re-hospitalization rates were 9.7%, 2.6%, and 0.6% in groups I, II, and III, respectively (P < .001). Sub-group

| Abbreviations: OR, Odds Ratio; CI, Confidence Interval; UTI, Urinary Tract Infection; FQ, Fluoroquinolone.

The reference category is Group I.
The human gastrointestinal tract normally harbors numerous microbiomes, and the highest concentration of microbiomes is present in the rectum. Damage to the rectal microbiome, has shown a significantly lower incidence of infectious complications compared to the typical transrectal route. According to a study by Grummet el al., the rate of re-hospitalization for infection was zero among 245 patients. Furthermore, a systemic review of the literature published from 2003 to 2013 found that transperineal prostate biopsy resulted in only a 0.076% re-hospitalization rate for sepsis, which is significantly lower than that reported for transrectal prostate biopsy. However, despite the advantage of a decreased rate of serious infectious complications, transperineal prostate biopsy is not widely used because it is difficult to perform under local anesthesia and incurs relatively higher costs, and requires specialized equipment. Therefore, methods that have the potential to minimize the effect of rectal microbiomes in transrectal prostate biopsy are relatively preferred. Several studies reported that bowel preparation using a disinfectant agent such as povidone-iodine significantly reduced post-procedural infectious complications, including a previous study showing that rectal cleansing with the microbe E. coli was significantly lower than reported for transrectal prostate biopsy. However, a prospective randomized trial reported that although rectal cleansing with povidone-iodine before TRUS-guided prostate biopsy had led to a 42% decrease in the relative risk of post-procedural infectious complications, it was not

### Table 5. Influence of various clinical characteristics on re-hospitalization rates

<table>
<thead>
<tr>
<th>Rectal cleansing measures</th>
<th>OR</th>
<th>( P )-value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>0.247</td>
<td>.029</td>
<td>0.070–0.869</td>
</tr>
<tr>
<td>Group II</td>
<td>0.055</td>
<td>.005</td>
<td>0.000–0.421</td>
</tr>
<tr>
<td>Age</td>
<td>0.974</td>
<td>.448</td>
<td>0.914–1.040</td>
</tr>
<tr>
<td>prostate volume</td>
<td>0.970</td>
<td>.555</td>
<td>0.941–1.001</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>2.482</td>
<td>.135</td>
<td>0.753–8.184</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>2.049</td>
<td>.369</td>
<td>0.429–9.789</td>
</tr>
<tr>
<td>Foley catheter insertion state</td>
<td>0.455</td>
<td>.628</td>
<td>0.019–11.001</td>
</tr>
<tr>
<td>Recent antimicrobial use</td>
<td>0.745</td>
<td>.698</td>
<td>0.167–3.331</td>
</tr>
<tr>
<td>Recent hospitalization</td>
<td>0.922</td>
<td>.926</td>
<td>0.166–5.114</td>
</tr>
<tr>
<td>Recent history of UTI or prostatitis</td>
<td>0.934</td>
<td>.086</td>
<td>1.660–21.214</td>
</tr>
<tr>
<td>Recent history of prostate biopsy</td>
<td>0.024</td>
<td>.030</td>
<td>1.322–273.824</td>
</tr>
<tr>
<td>FQ resistance</td>
<td>1.232</td>
<td>.679</td>
<td>0.432–3.513</td>
</tr>
</tbody>
</table>

**Abbreviations:** OR, Odds Ratio; CI, Confidence Interval; UTI, Urinary Tract Infection; FQ, Fluoroquinolone.

The reference category is Group I.
Liss MA, Ehdaie MB, Loeb S, et al. An update is the etiology of most infectious complications following transrectal prostate biopsy. In our study, the causative organisms of sepsis after prostate biopsy prophylaxis versus empirical prophylaxis, in the rate of sepsis between groups receiving targeted procedural infectious complications remains controversial. In our study, the mean prostate volume was significantly smaller in group III. Therefore, there would be a possibility that a difference in baseline prostate size could produce bias or influence on the rate of post-procedural infectious complications. However, in multivariate analysis in our study, no significant association between the prostate volume and infectious complications was found. This result is in agreement with other studies. Our study has several limitations. First, the study design was retrospective. Therefore, it was difficult to definitively assure that all patients underwent the same follow-up assessment. And also, future studies including a randomized clinical trial are needed to validate our results. Second, although urinalysis was performed in all patients, additional evaluation including urine culture, blood culture, or other laboratory studies were performed only in symptomatic patients. Thus, those who were asymptomatic or had mild symptoms did not undergo these additional studies.

CONCLUSIONS

Combined with targeted antimicrobial prophylaxis, direct manual cleansing of the mucosal surface of the anus and lower rectum using povidone-iodine cotton balls was most effective in preventing post-procedural infectious complications among the three different rectal cleansing methods.

ACKNOWLEDGEMENT

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CONFLICT OF INTEREST

The authors report no conflict of interest.

REFERENCES

Rectal cleansing methods in prostate biopsy-Lee et al.


