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Original Article

Assessment of antimicrobiral prophylaxis in transperineal prostate biopsy: A single-center retrospective study of 485 cases☆

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ABSTRACT

To verify the validity of our antimicrobial prophylaxis regimen for transperineal prostate biopsies, we investigated the rate of infectious complications in this procedure.

We retrospectively investigated the infectious complications in 485 patients who underwent a transperineal prostate biopsy between 2014 and 2016 at our hospital. In the clinic, we use cefazolin (CEZ) for antimicrobial prophylaxis. Infectious complications were assessed up to postoperative day (POD) 30. Patients with infectious complications were further investigated to determine the site of infection, outbreak day, and type of pathogenic bacteria.

The rate of infectious complications was 0.82% (4 out of 485 patients). Three patients developed prostatitis, 1 progressed into septic shock, and 1 patient developed epididymitis. The pathogenic bacteria identified were *Pseudomonas aeruginosa* (1 of 4), *Enterococcus faecalis* (1 of 4) and *Escherichia coli* that harbour extended-spectrum beta lactamase (ESBL-productive *E. coli*) (2 of 4). The earliest outbreak was POD 2 and the latest was POD 14. Infectious complications tended to increase in patients in whom an indwelling urethral catheter was inserted ($p = 0.0567$). However, there were no statistically significant relationships between any risk factor and the occurrence of infectious complications.

We concluded that CEZ is adequate for the prevention of perioperative infectious complications in transperineal prostate biopsies. Furthermore, we reaffirmed the importance of correct perioperative management, including preoperative assessment.

1. Introduction

There is no difference in the rate of cancer detection between the transrectal and transperineal prostate biopsy [1,2]. However, it is well known that transrectal prostate biopsies result in more infectious complications than do transperineal prostate biopsies [3]. Although there are many studies assessing the antimicrobial prophylaxis regimen used for transrectal prostate biopsies [4–6], data on transperineal prostate biopsies are insufficient. Some studies have suggested that antimicrobial prophylaxis in transperineal prostate biopsies is unnecessary [7]. However, there are also studies that do recommend antimicrobial prophylaxis [8,9].

In the essential Japanese guidelines for the prevention of perioperative infections in the urological field: 2015 edition [10], a single dose of 500 mg levofloxacin (LVFX) is the recommendation for transperineal prostate biopsies. On the other hand, the increase in resistant bacteria is becoming a serious problem. Therefore, the routine use of a broad-spectrum antimicrobial agent such as LVFX for antimicrobial prophylaxis is conrtoversial.

In the clinic, we use cefazolin (CEZ) for antimicrobial prophylaxis in transperineal prostate biopsies. The purpose of this study was to investigate the rate of infectious complications in transperineal prostate biopsies carried out at our hospital to verify the validity of our antimicrobial prophylaxis regimen for this procedure.

2. Patients and methods

We retrospectively investigated the infectious complications in all patients who had undergone a transperineal prostate biopsy

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between 2014 and 2016 at our hospital, except for patients who had undergone other surgeries at the same time, such as a lower anterior resection. The number of patients we investigated was 485. This study was approved by the Institutional Review Board (No. 2016–015).

All patients underwent benzalkonium chloride sterilisation of the perineal skin prior to the biopsy. We omitted the use of a preparatory cleaning enema and preoperative hair removal. A Foley catheter was placed in the bladder after the biopsy, which was removed the next morning. Intravenous CEZ (1.0 g) was administered twice daily for one day (induction, 4 h later).

We investigated the infectious complications up to postoperative day (POD) 30. We also analysed the following characteristics; age, American Society of Anaesthesiologists-Physical Status (ASA-PS), serum prostate specific antigen (PSA), prostate volume, number of biopsy cores, and risk factors including an indwelling urethral catheter, dysuria defined as a residual urinary volume ≧100 mL, poorly controlled diabetes mellitus (glycated haemoglobin (HbA1c) ≧8.0%), an immunosuppressed state, and obesity (body mass index (BMI) ≧25). Patients with infectious complications were subsequently investigated to determine the site of infection, outbreak day, and type of pathogenic bacteria.

Statistical analysis was performed using EZR (Easy R). Fisher's exact probability test was used to evaluate each parameter. A p value < 0.05 was considered to be significant.

3. Results

The patient characteristics are shown in Table 1. The rate of an infectious complication was 0.82% (4 of the 485 patients). Further details of the infectious complications are outlined in Table 2. Three patients developed prostatitis, 1 patient progressed into septic shock, and 1 patient developed epididymitis. The pathogenic bacteria identified were as follows; *Pseudomonas aeruginosa* (1 of 4), *Enterococcus faecalis* (1 of 4), and *Escherichia coli* that harbour extended-spectrum beta lactamase (ESBL-productive *E. coli*) (2 of 4). The earliest outbreak was POD 2 and the latest was POD 14.

In this study, the rate of infectious complications tended to increase in patients inserted with an indwelling urethral catheter ($p = 0.0567$), although there was no statistically significant evidence of a relationship between any risk factors of perioperative infectious complications and the occurrence of infectious complications (Table 3). We postulate that we could not extract any statistically significant evidence of a relationship because of the extremely low occurrence of infectious complications.

4. Discussion

In this study, infectious complications occurred in 4 of the 485 patients (0.82%) who underwent a transperineal prostate biopsy. As shown in Table 4, previous studies have reported the rate of infectious complications in transperineal prostate biopsies to be 0% to 3.82% [11–20]. Therefore, the observed rate of infectious complications at our hospital is in line with that observed in previous reports. It is impossible to determine which antimicrobial prophylaxis regimen is better because of differences in the research background; however, it is possible to conclude that our antimicrobial prophylaxis regimen is clinically useful. In addition, there was no statistically significant evidence of a relationship between any risk factor and the occurrence of infectious complications; however, infectious complications tended to increase in patients with an indwelling urethral catheter, dysuria, and obesity. We postulate that we could not extract any statistically significant

Table 1
Characteristics of patients who underwent a transperineal prostate biopsy.

Characteristics	Median	Range
Age	70	41–90
ASA-PS	2	1–3
PSA (ng/mL)	8.41	0.92–3645.79
Prostate volume (mL)	33	11–155
Number of biopsy cores	12	5–21
Risk factor	**n**	**%**
Indwelling urethral catheter	7	1.44
Dysuria	15	3.09
HbA1c≧8.0%	3	0.62
Obesity (BMI≧25)	10	2.06
Immunosuppressive state	6	1.24

Dysuria defined as a residual urinary volume ≧ 100 mL.

Table 3
Statistical relationship between risk factors of perioperative infectious complications and occurrence of infectious complications.

Risk factors	Infection		p value
	Yes	No	
Indwelling urethral catheter			0.0567
Yes	1	6	
No	3	475	
Dysuria			0.0905
Yes	1	14	
No	2	466	
HbA1c≧8.0%			1
Yes	0	3	
No	4	478	
Obesity (BMI≧25)			0.0802
Yes	1	9	
No	3	472	
Immunosuppressive state			1
Yes	0	6	
No	4	475	

Dysuria defined as a residual urinary volume ≧ 100 mL.

Table 2
Infectious complications after transperineal prostate biopsy.

	Infection	Outbreak day	Culture	Risk factors
#1	Prostatitis, Septic shock	POD 2	•Urine; *Pseudomonas aeruginosa* •Blood; *Pseudomonas aeruginosa*	Dysuria
#2	Prostatitis	POD 14	•Urine; *Escherichia coli (ESBLs)*, *Pseudomonas aeruginosa*, *Acinetobacter lwoffii* •Blood; negative	Indwelling urethral catheter
#3	Prostatitis	POD 3	Urine; *Enterococcus faecalis*	none
#4	Epididymitis	POD 9	Urine; *Escherichia coli (ESBLs)*	Obesity (BMI 29.2)

Dysuria defined as a residual urinary volume ≥ 100 mL.