



# Evaluation of Patients with Urinary Tract Infection After Transrectal Ultrasound Guided Prostate Biopsy

Musab Ali Kutluhan,<sup>1</sup> Tuncay Toprak,<sup>1</sup> Ramazan Topaktaş<sup>2</sup>

<sup>1</sup>Department of Urology, Health Sciences University Fatih Sultan Mehmet Training and Research Hospital, Istanbul, Turkey

<sup>2</sup>Department of Urology, Health Sciences University Haydarpaşa Numune Training and Research Hospital, Istanbul, Turkey

## Abstract

**Introduction:** The aim of this study was to evaluate the patients who developed urinary tract infection after transrectal ultrasound guided prostate biopsy and to determine antibiotic resistance profiles in urinary cultures after prostate biopsy.

**Methods:** Between 2015 and 2019, 892 patients who underwent transrectal ultrasound guided prostate biopsy because of suspected rectal examination and/or increased PSA level were retrospectively reviewed. Urine cultures of all patients before biopsy were sterile. All patients received oral ciprofloxacin prophylaxis, starting 3 days before prostate biopsy. Standard 12 quadrant prostate biopsies were performed to all patients. Fourty-five patients who were admitted to the hospital again due to fever, dysuria or sepsis were included in the study. In these cases, microorganisms and resistance status were investigated.

**Results:** Forty patients had complaints of dysuria, 17 had fever with tremors, and 1 had sepsis. No prostate abscess was detected on ultrasound. The rate of urinary tract infection after ciprofloxacin prophylaxis was 5.04% and 1.90% patients had fever after prostate biopsy. Reproduction was detected in 77,7% of urine cultures performed after biopsy. The most commonly isolated microorganisms were Escherichia coli (71.4%), Klebsiella pneumoniae(20%), and Staphylococcus spp (8.5%), respectively. Blood culture was obtained from 37.7% of the patients and the reproduction rate was 64.7%. E. coli was the most frequently isolated agent in blood culture. In urine culture methicillin resistance in staphylococci was 66.6%, Extended Spectrum Beta Lactamase (ESBL) rate in E. coli was 56%, ciprofloxacin resistance was 91,4%, trimethoprim- sulfometaxazole resistance was 54.2% and gentamicin resistance was 25.7%.

**Discussion and Conclusion:** Nearly all patients who developed urinary tract infection after prostate biopsy had ciprofloxacin-resistant microorganisms in urine cultures. Targeted antibiotic use can be considered to reduce post- biopsy infection. Also alternative agents as a prophylaxis can be used.

**Keywords:** Ciprofloxacin; prophylaxis; prostate biopsy; urinary tract infection.

Ultrasound guided prostate biopsy is the standard method for the diagnosis of prostate cancer [1]. However, after prostate biopsy, hematuria, urinary retention, as well as infectious complications such as acute urinary tract infections (UTI), epididymitis, prostatitis and rarely urosepsis might develop [2]. In order to prevent infectious compli-

cations, various prophylactic antibiotics are applied before prostate biopsy [1,3]. For this purpose, fluoroquinolones are the most commonly used prophylaxis worldwide before biopsy [1-3]. The main source of urological infections after biopsy is contamination and inoculation from rectal flora. Most patients scheduled for biopsy have a history of

**Correspondence (İletişim):** Musab Ali Kutluhan, M.D. Sağlık Bilimleri Üniversitesi Fatih Sultan Mehmet Eğitim ve Araştırma Hastanesi, İstanbul, Turkey

**Phone (Telefon):** +90 537 282 66 16 **E-mail (E-posta):** dr.musab151@gmail.com

**Submitted Date (Başvuru Tarihi):** 08.11.2019 **Accepted Date (Kabul Tarihi):** 19.11.2019

Copyright 2019 Haydarpaşa Numune Medical Journal

**OPEN ACCESS** This is an open access article under the CC BY-NC license (<http://creativecommons.org/licenses/by-nc/4.0/>).



recurrent quinolone use [4]. Therefore, it is not surprising that the quinolone resistance of uropathogens is increased. Really soon, an increasing number of reports have been published on increased quinolone resistance in the urological population [5-7]. In this study, we aimed to investigate urinary tract infection rates after transrectal ultrasound guided prostate biopsy and to determine antibiotic resistance profiles in urinary cultures after prostate biopsy.

## Materials and Methods

Between 2015 and 2019, 892 patients who underwent prostate biopsy because of suspected rectal examination and/or increased PSA level were retrospectively reviewed and included in our study. Before the biopsy, urine cultures and microscopic analysis of the urine were performed from all patients. Oral ciprofloxacin was prescribed for 7 days for prophylaxis (500 mg bid starting three days before the biopsy). Bowel cleaning enemas were used the night before the biopsy. No other cleaning agents such as povidone-iodine were used before biopsy. To reduce pain rectal lidocaine gel applied and also ultrasound-guided peri-prostatic nerve blockage was performed by using 10 ml bupivacaine. The procedure was performed with left lateral decubitus position. Standard 12 quadrant prostate biopsies were performed to all patients. There were 45 patients who were applied to the hospital after prostate biopsy with complaints of dysuria, fever or sepsis findings. In these cases, microorganisms growing in urine culture and resistance status were also investigated. Patients who didn't use prophylactic antibiotics and/or bowel cleaning enemas before biopsy were excluded from study. Also patients who didn't have sterile urine culture before biopsy were not included in our study. For statistical analysis of data SPSS 22 program was used. Data were expressed as mean±standard deviation or as a number (percentage).

## Results

A total of 45 male patients who had urinary tract infection after biopsy were included in the study. The mean age of the patients was 59.57±9.94 years. Table 1 shows general demographic characteristics of the patients. Forty patients

Table 1. General demographic characteristics of the patients	
	Patients (n=45)
Age (Mean±SD)	59.57±9.94
DM (%)	24
Prostate abscess	0

DM; Diabetes Mellitus.

had complaints of dysuria, 17 had fever with tremors, and 1 had sepsis. 24% of patients had diabetes mellitus. No prostate abscess was detected on ultrasound. The overall rate of urinary tract infection after ciprofloxacin prophylaxis was 5.04% and 1.90% patients had fever after prostate biopsy. Reproduction was detected in 77.7 of urine cultures of patients who were applied to the hospital after prostate biopsy with complaints of dysuria, fever or sepsis findings. The most commonly isolated microorganisms were Escherichia coli (E. Coli) (71.4%), Klebsiella pneumonia (20%), and Staphylococcus spp (8.5%) respectively. Blood culture was obtained from 37.7% of the patients and the reproduction rate was 64.7%. E. coli was the most frequently isolated agent in blood culture. In urine culture methicillin resistance in staphylococci was 66.6%, Extended Spectrum Beta Lactamase (ESBL) rate in E. coli was 56%, ciprofloxacin resistance was 91.4%, trimethoprim-sulfometaxazole resistance was 54.2% and gentamicin resistance was 25.7%. Table 2 shows urine culture results and resistance status in patients with urinary tract infection after prostate biopsy. There was ESBL positive E.coli growth in blood and urine culture of the patient who had sepsis and the patient was treated with appropriate antibiotherapy and survived.

## Discussion

Transrectal ultrasound-guided prostate biopsy is a frequently applied, reliable and well-tolerated method [8]. However, unwanted complications can be seen despite the precautions taken [9]. Urinary tract infection is one of the most common complications causing significant morbidity after prostate biopsy. Antimicrobial prophylaxis to prevent this complication is recommended as standard procedure [10]. However, the choice of regimens and duration of prophylaxis remains arguable. EAU and AUA guidelines on prostate biopsies differ in terms of antibiotic choices for

**Table 2.** Urine culture results and resistance status in patients with urinary tract infection after prostate biopsy

	Urine culture (n=45) (100%)	Blood culture (n=17) (37.7%)
Reproduction rate (%)	77.7	64.7
Escherichia coli (%)	71.4 (56% ESBL)	72.7 (75% ESBL)
Klebsiellapneumoniae(%)	20 (57.1% ESBL)	27.2 (66.6% ESBL)
Staphylococcus spp(%)	8.5 (66.6% MRSA)	0
ciprofoxacillin resistance (%)	91.4	82.3
Trimethoprim-sulfometaxazole	54.2	58.8
Gentamisin	25.7	35.2

ESBL; Extended spectrum beta lactamase.

prophylaxis [11, 12]. Most commonly used agent as a prophylaxis is fluoroquinolones [13]. In our study, ciprofloxacin was prescribed prophylactically to the patients before prostate biopsy as well. However over the years due to increased prevalence of fluoroquinolones resistance (FQ-R) bacteria in intestinal flora, there is a significant increase in fluoroquinolones resistance. The first study to evaluate this prevalence was performed by Batura et al. in the United Kingdom in 2010 [14]. According to this study 10,6% of patients who had prostate biopsy had ciprofloxacin resistance coliforms in rectal swab. In a study conducted in our country in 2014 FQ-R prevalence rate was 16% [15]. The last study in literature which investigated FQ-R prevalence in rectal swab was conducted by Würnschimmel et al. in Germany in 2019. According to this study FQ-R E.coli was found in 12 (6%) patients out of 200 patients [16]. In our study we didn't get rectal swab so we don't have FQ-R prevalence rate in intestinal flora.

Many different microorganisms can cause infectious complications after prostate biopsy. E. coli is the most commonly isolated bacteria in urine cultures after prostate biopsy [17]. Growing fluoroquinolone resistance has recently led to increasing rates of infective complications. In multi-center studies conducted in our country, quinolone-resistant E.coli strains in urine cultures of patients evaluated with urinary tract infection have been found between 8.3 and 38 percent [18, 19]. In another study conducted in our country by Kandemir et al 83.8% of patients had fluoroquinolone resistance. Also a significant increase in antibiotic resistance after 2008 was implicated in this study [20]. In our study ciprofloxacin resistance was 91.4%. This rate was much higher in our study when compared to literature. This may be related to the inclusion of patients who had a history of frequent fluoroquinolone use before prostate biopsy.

Pain and bleeding are common complications after transrectal prostate biopsy. The risk of major complications (such as sepsis) however is very small. The incidence of infectious complications after transrectal prostate biopsy varies among studies, with a reported hospitalization rate of 0–6.3% [17]. Choi et al. shown that the rate of febrile urinary tract infection was 3.1% after prostate biopsy [21]. In the same study, E. coli was the most common microorganism in urine culture. As in our study, fluoroquinolone resistance was found to be high in this study (82%). In our study the rate of infectious complications was 5.04%.

Bacteria in the rectal flora are inoculated into the prostate and blood during prostate biopsy. Therefore, bacteria and

their antibiotic resistance patterns in rectal flora may be important. Although it has not been confirmed that bacteria present in the rectal flora cause infection after prostate biopsy, the presence of resistant bacteria in the intestinal flora may be considered to increase the risk of infection with resistant bacteria. In order to reduce infection rates targeted antibiotics have been used. In a study conducted by Doherty et al., post-biopsy infection occurred in one (2%) patient in the targeted antibiotic group and five (10%) patients in the empirical antibiotic group [22]. Another study by Liss et al also shown that the rate of post- biopsy sepsis was lower in targeted antibiotic group than empirical antibiotic group (0.44% vs 0.56%) [23]. According to literature targeted antibiotic use seems to have lower post- biopsy infection rates. So rectal swab could be evaluated before prostate biopsy.

Our study has some limitations. Although information regarding antibiotic use was obtained verbally from patients and confirmed using the hospital records system, there remains the possibility that some drugs were taken without a prescription or the patient did not recall taking them. Also resistance rates can also vary depending on the culture methods.

## Discussion

In conclusion, in our study nearly all patients who developed urinary tract infection after prostate biopsy had ciprofloxacin-resistant microorganisms in urine cultures. FQ-resistance is still increasing due to overuse of this group of antibiotics. Targeted antibiotic use can be considered to reduce post- biopsy infection. Also alternative agents as a prophylaxis can be used.

**Peer-review:** Externally peer-reviewed.

**Authorship Contributions:** Concept: M.A.K., Design: T.T., Supervision: T.T., Materials: T.T., Data collection and processing: M.A.K., Analysis and/ or interpretations: M.A.K., Literature search: M.A.K., Writing: M.A.K., Critical review: R.T.

**Conflict of Interest:** None declared.

**Financial Disclosure:** The authors declared that this study received no financial support.

## References

1. Ramey J, Halpern E, Gomella J. Ultrasonography and biopsy of the prostate. Campbell-Walsh Urology. Philadelphia: Saunders; 2007.
2. Simsir A, Kismali E, Mammadov R. et al. Is it possible to predict sepsis, the most serious complication in prostate biopsy? Urol Int. 2010; 84(4): 395- 9.

3. Zaytoun OM, Vargo EH, Rajan R. et al. Emergence of fluoroquinolone-resistant *Escherichia coli* as cause of postprostate biopsy infection: implications for prophylaxis and treatment. *Urology*. 2011; 77(5): 1035- 41.
4. Hamarat MB, Tarhan F, Horuz R. et al. Infective complications in patients after transrectal ultrasound-guided prostate biopsy and the role of ciprofloxacin resistant *Escherichia coli* colonization in rectal flora. *Turkish journal of urology*. 2017; 43(2): 210.
5. Ismail M, Saini A, Nigam R. Ciprofloxacin-resistant infection after transrectal ultrasonography-guided prostate biopsy: should we reassess our practice? *BJU Int*. 2011; 108(3): 305- 6.
6. Rudzinski JK, Kawakami J. Incidence of infectious complications following transrectal ultrasound-guided prostate biopsy in Calgary, Alberta, Canada: a retrospective population-based analysis. *Canadian Urological Association Journal*. 2014; 8(5-6): E301.
7. Liss MA, Chang A, Santos R. et al. Prevalence and significance of fluoroquinolone resistant *Escherichia coli* in patients undergoing transrectal ultrasound guided prostate needle biopsy. *J Urol*. 2011; 185(4): 1283- 8.
8. Lee SH, Chen SM, Ho CR. et al. Risk factors associated with transrectal ultrasound guided prostate needle biopsy in patients with prostate cancer. *Chang Gung Med J*. 2009; 32(6): 623- 7.
9. Efesoy O, Bozlu M, Çayan S. et al. Complications of transrectal ultrasound-guided 12-core prostate biopsy: a single center experience with 2049 patients. *Turkish journal of urology*. 2013; 39(1): 6.
10. Enlund AL, Varenhorst E. Morbidity of ultrasound-guided transrectal core biopsy of the prostate without prophylactic antibiotic therapy. A prospective study in 415 cases. *Br J Urol*. 1997; 79(5): 777- 80.
11. Bonkat G, Bartoletti RR, Bruyere B et al European Urology Guidelines Urological infections: Peri-procedural antibiotic prophylaxis 2019
12. Bertsch J, Hitt E, Hubbard H. et al American Urological Association Guidelines The Prevention and Treatment of the More Common Complications Related to Prostate Biopsy Update 2016
13. Lista F, Rodonda C, Meilan C. et al. Efficacy and safety of fosfomycin-trometamol in the prophylaxis for transrectal prostate biopsy. Prospective randomized comparison with ciprofloxacin. *Actas Urol Esp*, 2014; 38(6): 391- 6
14. Batura D, Rao GG, Nielsen PB. Prevalence of antimicrobial resistance in intestinal flora of patients undergoing prostatic biopsy: implications for prophylaxis and treatment of infections after biopsy. *BJU International*. 2010; 106(7): 1017– 1020
15. Tukenmez Tigen E, Tandogdu Z, Ergonul O, et al. Outcomes of fecal carriage of extended-spectrum  $\beta$ -lactamase after transrectal ultrasound-guided biopsy of the prostate. *Urology*. 2014; 84(5): 1008– 1015
16. Würnschimmel C, Martin LB, Leyh- Bannurah SR. et al Rectal swabs for detecting multidrug resistant bacteria prior to prostate fusion biopsy: A prospective evaluation of risk factor screening and microbiologic findings *Urology* 2019 doi: 10.1016/j.urology.2019.10.008
17. Loeb S, Vellekoop A, Ahmed HU et al: Systematic review of complications of prostate biopsy. *Eur Urol* 2013; 64(6): 876- 92
18. Arslan H, Azap ÖK, Ergönül Ö. et al. Risk factors for ciprofloxacin resistance among *Escherichia coli* strains isolated from community-acquired urinary tract infections in Turkey. *J Antimicrob Chemother*. 2005; 56(5): 914- 8.
19. Atılğan D, Gençten Y, Kölükçü E. et al. Comparison between ciprofloxacin and trimethoprim-sulfamethoxazole in antibiotic prophylaxis for transrectal prostate biopsy. *Turkish journal of urology*. 2015; 41(1): 27.
20. Kandemir Ö, Bozlu M, Efesoy O. et al. The incidence and risk factors of resistant *E. coli* infections after prostate biopsy under fluoroquinolone prophylaxis: a single-centre experience with 2215 patients. *J Chemother*. 2016; 28(4): 284- 8.
21. Choi JW, Kim TH, Chang IH. et al. Febrile urinary tract infection after prostate biopsy and quinolone resistance. *Korean J Urol*. 2014; 55(10): 660- 4.
22. Doherty AF, Ikuerowo SO, Jeje EA. A Prospective Randomized Comparative Study of Targeted versus Empirical Prophylactic Antibiotics in the Prevention of Infective Complications following Transrectal Ultrasound-Guided Prostate Biopsy *Ann Afr Med* 2019; 18(3): 132- 137
23. Liss MA, Kimm W, Moskowitz D. et al Comparative Effectiveness of Targeted vs Empirical Antibiotic Prophylaxis to Prevent Sepsis from Transrectal Prostate Biopsy: A Retrospective Analysis *J Urol* 2015; 194(2): 397- 402.