

THE RATE OF URINARY TRACT INFECTIONS FOLLOWING TRANSRECTAL ULTRASOUND-GUIDED BIOPSY OF PROSTATE IN BABOL, NORTHERN IRAN

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ABSTRACT

BACKGROUND

Symptomatic urinary tract infections following transrectal prostate biopsy are among the most dangerous and important complications of this procedure. Considering the importance of infectious and non-infectious complications after transrectal prostate biopsy, this study was conducted to determine the rate of symptomatic urinary tract infection following transrectal ultrasound-guided biopsy of prostate in Babol, north of Iran.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Shahid Beheshti and Babol Clinic teaching hospitals. All patients with either increased concentrations of prostate-specific antigen (PSA) (>4.0 ng/mL) or abnormal digital rectal examination, who underwent TRUS biopsy during 2010-2017, were included in this research. A case was defined as a patient who received prophylactic antibiotics but presented with UTI symptoms, such as frequency, dysuria, etc. Chi-square test was used to evaluate the association between urinary tract infection and variables of age, PSA level and pathology results. The significance level of all tests was considered 0.05.

RESULTS

Out of 2104 patients enrolled, 141 patients (6.7%) suffered from symptomatic urinary tract infections. The mean age of patients was 68.85 ± 9.59 years. A significant relation was observed between pathology results and the infection (p<0.001), but there was no association between the infection and factors of age and PSA level. After admission, the infected patients received different antibiotics.

CONCLUSION

The prevalence of urinary tract infections following transrectal biopsy of the prostate was high in Babol. Therefore, measures need to be taken to control this complication by health professionals.

KEY WORDS

Urinary Tract Infections, Prostate, Biopsy, Ultrasonography.

HOW TO CITE THIS ARTICLE: Shekarchi B, Bayani M, Khafri S, et al. The rate of urinary tract infections following transrectal ultrasound-guided biopsy of prostate in Babol, Northern Iran. *J. Evolution Med. Dent. Sci.* 2018;7(50):5390-5393, DOI: 10.14260/jemds/2018/1192

BACKGROUND

Prostate cancer is the most common tumor diagnosed among older men and is the sixth cause of cancer-related deaths in men.⁽¹⁾ Prostate-specific antigen (PSA) test and digital rectal examination are usual methods for diagnosis of prostate cancer. However, diagnosis is only through transurethral resection of the prostate (TURP) or open prostatectomy. Prostate biopsy methods include perineal, transrectal and magnetic resonance imaging (MRI) fusion biopsy.

'Financial or Other Competing Interest': The Authors would like to thank the Vice Chancellor for the Research of Babol University of Medical Sciences for Financial Support.

Submission 02-11-2018, Peer Review 26-11-2018, Acceptance 03-12-2018, Published 10-12-2018.

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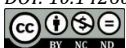
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DOI: 10.14260/jemds/2018/1192



Transrectal ultrasound-guided (TRUS) biopsy is substituted to primary perineal prostate biopsy methods. MRI fusion biopsy is a newer method compared with the other two methods that benefits from MRI and TRUS both and can detect the possible cancer regions better, but it has not become a routine procedure due to being expensive.⁽²⁾ Indications for prostate biopsy is increased PSA and abnormal digital rectal examination.⁽³⁾ In our country, Iran, although we do not have a precise statistics but considering the PSA test, the number of prostate biopsy has significantly increased.

The complications related to prostate biopsy can vary from self-limited to severe and life threatening. The most common complications following prostate biopsy include infection, bleeding, and urinary retention.⁽⁴⁻⁷⁾ The complications related to infection include asymptomatic bacteriuria, urinary system infection and sepsis.⁽⁸⁾ One of the biggest worries of recent reports is increase in admitted men to hospital due to considerable infection following prostate biopsy.⁽⁹⁾ Although several reasons can explain this increased rate, but it seems bacterial resistance and lack of efficient

therapeutic regimen are the most important etiologic factors.⁽¹⁰⁻¹⁵⁾ Considering that the most frequent method of prostate biopsy is through rectum, concerns are mainly about entering rectal bacteria into urinary tract. The studies showed that transient asymptomatic bacteriuria occur in nearly 5% of people underwent biopsy and did not use appropriate antibiotic prophylaxis.⁽⁸⁾ Less than 2-3% of men will have progressive symptomatic urinary tract infection (UTI) (e.g., dysuria, frequency, urgency, etc.), which can be improved with efficient oral antibiotic.⁽⁹⁾ Prophylaxis in the patients undergoing TRUS biopsy is ofloxacin and metronidazole tablets from 3 days before the procedure and ten days after the procedure, plus amikacin injection during the procedure. Despite this prophylaxis regimen, some patients are referred with complaint of fever, chills and UTI.^(16,17)

Considering the importance of symptomatic UTI and its life-threatening outcomes, and also the costs imposed on the patients and community because of complications, we aimed to do an eight-year study on the patients underwent prostate biopsy in Babol, so that we can take a step toward prevention, selection of appropriate therapy and finally improvement of local and national health.

MATERIALS AND METHODS

Locations- This cross-sectional study was conducted during 2010-2017 in the Shahid Beheshti teaching hospital, (affiliated to Babol University of Medical Sciences, Babol, Northern Iran) and Babol Clinic Hospital.

Inclusion and Exclusion Criteria- The inclusion criteria were as follows: All patients with either increased concentrations of PSA (>4.0 ng/mL) or abnormal digital rectal examination, who underwent TRUS biopsy. Among them, we only included those patients who were agreed to participate to this research. Patients whose biopsy pathology results were not available, were excluded from further investigation.

Biopsy Procedure- All biopsies were done by the senior urologist using a standard ultrasound. The patients received prophylactic antibiotics prior to their procedure. The local anaesthesia was induced by lidocaine gel. Duration of the biopsy procedure lasted maximum 15 minutes.

Data Collection- After obtaining informed consent from the patients, the necessary data were collected by a checklist, including demographic information (Sex, age, education, residence, and occupation), clinical symptoms and signs, pathology results (Normal, prostatitis, benign prostate hyperplasia [BPH], prostate cancer) and admission information (Time of refer after biopsy, antibiotics, hospitalization duration and laboratory results). A case was defined as a patient who received prophylactic antibiotics but presented with UTI symptoms, such as frequency, dysuria, etc.

Statistical Analysis- For data analysis, SPSS statistical software was used. The data underwent the descriptive analysis test to provide the number, percentage, and mean±standard deviation (SD). Furthermore, chi-square test was used to evaluate the association between UTI and

variables of age, PSA level and pathology results. A p-value<0.05 was considered statistically significant.

Ethical Issues- The present research was approved by the ethical committee of Babol University of Medical Sciences with code of MUBABOL.REC.1395.46. After explanation of the aim of study for the subjects, we collected the informed consent from them. The patients' information was kept confidential.

RESULTS

In total, 2104 patients were included in this study. Their pathology findings were collected from the pathology center. Out of 2104 subjects, 141 (6.7%) had symptomatic UTI. Patients' characteristics were summarized in Table 1. The mean age of patients was 68.85 ± 9.59 years old. The information of biopsy was not available for 33 patients, however for others, symptoms were started in the first 12 hours of biopsy in 3 patients, in 12-24 hours of biopsy in 48 patients, in 48-72 hours of biopsy in 2 patients and in 72 hours or later of biopsy in 10 patients.

After admission, the infected patients received different medications. Twenty-seven patients (19.1%) were cured by meropenem, 4 patients (2.8%) by fluoroquinolones (ciprofloxacin/ofloxacin), and 1 patient (0.7%) by aminoglycoside. Others were treated by combination antibiotic therapy, that is, 2 patients (1.4%) with fluoroquinolone plus cephalosporin, 21 patients (14.9%) with fluoroquinolone plus aminoglycoside, 2 patients (1.4%) with metronidazole plus cephalosporin, 43 patients (30.5%) with cephalosporin and aminoglycoside, 8 patients (5.7%) with meropenem, fluoroquinolone and metronidazole, 2 patients (1.4%) with meropenem, fluoroquinolone and aminoglycoside, and finally 2 patients (1.4%) with meropenem, cephalosporin and aminoglycoside.

Table 2 shows the relationship between UTI and some variables. As indicated, a significant relation was observed between pathology results and infection according to chi-square test (p<0.001). On the other hand, no any significant associations were seen between infection and variables of age and PSA level.

Variables	Frequency	Percent
Education		
Illiterate	45	40.5
Lower Diploma	34	30.6
Diploma	18	16.2
Higher Diploma	14	12.6
Residence		
Urban	34	25.8
Rural	98	74.2
Occupation		
Self-Employed	90	80.4
Employee	2	1.8
Retired	18	16.1
Unemployed	2	1.8
Times of Onset of Symptoms (Hour)		
<12	3	2.8
12-24	45	41.7
24-48	48	44.4
48-72	2	1.9
>72	10	9.3

Table 1. Characteristics of Included Patients

Variables	Patients Infected with UTI* (n, %)	Patients not Infected with UTI (n, %)	p-Value
Age			
≤64	40 (5.4)	698 (94.6)	0.084
>65	101 (7.4%)	1265 (92.6)	
PSA** Level			
<4	2 (4.1)	47 (95.9)	0.164
4-10	52 (7.8)	612 (92.2)	
>10	76 (10.1)	679 (89.9)	
Pathology Results			
Normal	3 (1.1)	276 (98.9)	<0.001
BPH***	57 (12.3)	407 (87.7)	
Prostate Cancer	39 (6.3)	578 (93.7)	
Prostatitis	21 (4.8)	420 (95.2)	
BPH & Prostate Cancer	0 (0)	6 (100)	
BPH & prostatitis	21 (7.1)	276 (92.9)	

Table 2. Association between Different Factors and Urinary Tract Infection following Transrectal Ultrasound-Guided Prostate Biopsy

* Urinary tract infection, ** Prostate-specific antigen, *** Benign prostate hyperplasia

DISCUSSION

This study was conducted with the aim of evaluating the rate of UTI following prostate biopsy in Babol. As found, 141 of 2104 (6.7%) patients who underwent biopsy had UTI. Shigehara et al.⁽¹⁸⁾ in their study in 2008 on 457 patients stated that 6 patients (1.3%) experienced infection. In their study, Choi et al.⁽¹⁹⁾ Reported that 39 of 1195 (3.1%) Korean patients were infected after biopsy. Also, Marino et al.⁽²⁰⁾ did a three-year study in the United States and declared that 25 of 455 (5.49%) patients reported UTI. Besides, Kandemir et al.⁽²¹⁾ In Turkey in 2016 stated a rate of 6.91% for UTI among 2215 patients underwent TRUS biopsy. These differences can be related to type of bacterium led to infection, antibiotic choice and resistance of the microorganisms to antibiotics. Kandemir et al.⁽²¹⁾ Stated that fluoroquinolone-resistance *Escherichia coli* bacteria, which were responsible for the infection, have significantly increased after 2008 (95.9%) compared with before 2008 (73.5%).

Our results revealed that rate of UTI following TRUS biopsy significantly differ between different pathology results and this rate was significantly more in patients with BPH (12.3%) than in other patients. This finding was in consistent with some studies, but in contrast to some others.⁽²²⁻²⁴⁾

Different studies assessed various factors related to the patients and the TRUS biopsy procedure that may predict which groups of men are more at risk of UTI.^(3,22,24) The known risk factors included underlying comorbidities, especially diabetic mellitus and recent admission.^(3,22) Carignan et al.⁽²²⁾ Demonstrated that patients admitted during the previous month of biopsy were infected to urosepsis more than those who were not admitted. Other potential risk factors were also reported. Simsir et al.⁽²⁵⁾ Showed that the patients who used the urethra catheter for a long time were more at risk of infection after prostate biopsy compared with those who did not use it.

The results of our study showed that 3.3% of the patients had normal PSA level. Considering that one of the indications for prostate biopsy is abnormal PSA level, our results are

reasonable. It has been shown that screening for prostate cancer by PSA level can decrease incidence of metastatic cancers and its mortality by 41% and 20%, respectively.⁽²⁶⁾ Additionally, a population-based screening study in Gutenberg indicated that PSA screening led to increase in cancer prostate by 44% after 14 years of follow-up.⁽²⁷⁾ In opposite of these advantages, screening has also some disadvantages, such as over diagnosis, consequently, false positive results cause unnecessary prostate biopsies which are associated with complications.⁽²⁴⁾ Therefore, we need to pay attention to the patients' symptoms as well and consider the fact that PSA level can increase in different conditions, such as trauma, prostatitis and rectal examination of prostate, and the patients should not undergo prostate biopsy with only high PSA. Ehdai et al.⁽²⁸⁾ Also emphasized that increased PSA following prostatitis can increase complications due to prostate biopsy.

In this investigation, we witnessed that despite the higher rate of infection in patients aged more than 65 years old than in those aged <65 years old, this difference was not significant. This finding was in agreement with other reports.^(3,29)

A limitation of our study was that we could not access some patients' information due to lack of the records or their destruction. We propose to perform a new study with greater sample size at national scale to assess the short- and long-term clinical outcomes of TRUS biopsy. We also suggest addressing the rate of antibiotic resistance in patients undergoing the biopsy.

CONCLUSION

According to our results, the rate of UTI after prostate biopsy was high in our region. Also, a significant positive relation was observed between BPH and UTI following biopsy. Therefore, it seems that evaluation of the patients suffering from BPH in terms of bacteriuria and their treatment can help in reduction of such infection rates. Moreover, considering that we did not see any association between age and UTI, it appears that concerns about complication due to prostate biopsy is unnecessary in the elderly and such group can benefit from biopsy like others.

ACKNOWLEDGMENTS

The authors would like to thank the Vice Chancellor for the Research of Babol University of Medical Sciences for financial support. We are also thankful to Ms. Sekineh Kamali Ahangar, member of Clinical Research Development Center of Shahid Beheshti Hospital, for her help in preparing the manuscript.

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