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# Is prostate biopsy safe in the elderly?

## *Prostat biyopsisi yaşlılarda güvenli mi?*

Okan Alkış, Aykut Başer, Halil İbrahim İvelik, Bekir Aras, Mehmet Sevim, İbrahim Güven Kartal

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**Abstract**

**Purpose:** The study was aimed to investigate the safety of the transrectal ultrasound-guided prostate needle biopsy in the elderly.

**Material and methods:** Five hundered fifteen patients, who underwent prostate biopsy between 2017-2020, were included in the study. All patients' demographic data, comorbidities, laboratory findings, prostate volumes, prostate biopsy pathology results, and post-biopsy complications were retrospectively analyzed. The patients were divided into 2 groups: group-1 consisting of patients under the age of 65 and group-2 with above the age of 65.

**Results:** There were 244 in group-1 and 271 patients in group-2. The mean age of group-1 was 59.50±3.98, group-2 was 71.45±4.57 years. In group-1, post-biopsy fever was observed in 5 (2%), hematuria in 44 (18%), hemospermia in 79 (32.4%), and rectal bleeding in 7 (2.9%) patients. In group-2, post-biopsy fever was observed in 15 (5.5%), hematuria in 69 (25.5%), hemospermia in 21 (7.7%), and rectal bleeding in 11 (4.1%) patients. The severe sepsis findings were observed in 2 patients (0.2%) in group-1 and 6 (2.2%) in group-2. In the logistic-regression-analysis, it was determined that the risk of complication increased significantly as the age, PSA, and higher PSA density.

**Conclusion:** In our study, it was revealed that the risk of complications was higher in the elderly and that the complications observed may be more seriously. Therefore, we consider that a more careful approach should be taken in elderly patients to prevent the complications related with prostate biopsy.

**Key words:** Aged, needle biopsy, prostate.

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**Özet**

**Amaç:** Bu çalışma prostat kanseri tanısında yaygın olarak kullanılan transrektal ultrason (TRUS) eşliğinde prostat iğne biyopsisinin yaşlı hastalarda ne kadar güvenli olduğunu ortaya koymayı amaçlamaktadır.

**Gereç ve yöntem:** 2017-2020 arasında prostat biyopsisi yapılan 515 hasta çalışmaya dahil edildi. Tüm hastaların demografik verileri, ek hastalıkları, laboratuar bulguları, prostat hacimleri, prostat biyopsisi patoloji sonuçları, biyopsi sonrası gelişen komplikasyonlar retrospektif olarak incelendi. Hastalar 65 yaş altı olanlar grup 1 ve 65 yaş üstü olanlar grup 2 olarak 2 gruba ayrıldı. Her iki grupta prostat biyopsisi sonrası görülen komplikasyonlar karşılaştırıldı.

**Bulgular:** Grup 1'de 244, grup 2'de ise 271 hasta vardı. Grup 1 yaş ortalaması 59,50±3,98, grup 2 yaş ortalaması 71,45±4,57 idi. Grup 1'de 5 hastada biyopsi sonrası ateş (%2), 44 hastada hematüri (%18), 79 hastada hematospermi (%32,4), 7 hastada ise rektal kanama (%2,9) izlendi. Grup 2'de ise 15 hastada biyopsi sonrası ateş (%5,5), 69 hastada hematüri (%25,5), 21 hastada hematospermi (%7,7), 11 hastada rektal kanama (%4,1) görüldü. Ancak bu komplikasyonlar dışında grup 1'de 2 hastada (%0,2), grup 2'de 6 hastada (%2,2) ciddi sepsis bulguları izlendi ve hastalar hospitalize edilerek tedavi edildi. Prostat biyopsisi sonrası komplikasyon görülmesini etkileyen risk faktörlerini incelemek için yapılan logistik regresyon analizinde yaş, PSA ve PSA dansitesi yükseldikçe komplikasyon görülme riskinin anlamlı olarak arttığı tespit edildi.

Okan Alkış, Assis. Prof. Kütahya SBU Faculty of Medicine Department of Urology, Kutahya, Turkey, e-mail: okanalks@hotmail.com (https://orcid.org/0000-0001-6116-9588) (Corresponding Author)

Aykut Başer, Assistant Prof. Hitit University Faculty of Medicine Department of Urology, Corlu, Turkey, e-mail: aykutbaser@mynet.com (https://orcid.org/0000-0003-0457-512X)

Halil İbrahim İvelik, Research Assistant, Kutahya SBU Faculty of Medicine Department of Urology, Kutahya, Turkey, e-mail: halib_live@hotmail.com (https://orcid.org/0000-0001-5298-0045)

Bekir Aras, Assoc. Prof. Kutahya SBU Faculty of Medicine Department of Urology, Kutahya, Turkey, e-mail: bekiraras1@gmail.com (https://orcid.org/0000-0002-7020-8830)

Mehmet Sevim, Assis. Prof. Kutahya SBU Faculty of Medicine Department of Urology, Kutahya, Turkey, e-mail: drmehmetsevim@gmail.com (https://orcid.org/0000-0002-7571-7669)

İbrahim Güven Kartal, Assis. Prof. Kutahya SBU Faculty of Medicine Department of Urology, Kutahya, Turkey, e-mail: igk84@hotmail.com (https://orcid.org/0000-0002-2313-3522)

**Sonuç:** Çalışmada yaşlı hastalarda komplikasyon görülme riskinin daha yüksek olduğunu ve görülen komplikasyonların daha ciddi olabileceği ortaya kondu. Bu nedenle yaşlı hastalarda prostat biyopsisi öncesi ve sonrası komplikasyon gelişimini önlemek için daha dikkatli yaklaşmak gerektiği düşünüldü.

**Anahtar kelimeler:** Yaşlı, iğne biyopsisi, prostat.

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## Introduction

Prostate cancer is the second most common cancer among men. It constitutes approximately 15% of all cancers in men [1]. The diagnosis of prostate cancer, which is quite common, is performed by prostate biopsy. Transrectal ultrasound (TRUS) guided needle biopsy is the gold standard method recommended in the guidelines of the European Association of Urology (EAU) for prostate biopsy [2]. Many complications can be observed after a TRUS-guided prostate biopsy, which is easily administered with local anesthesia. The most common complications are hemospermia (37.4%), hematuria (14.5%), rectal bleeding (2.2%), prostatitis (1%), fever (0.8%) and urinary retention (0.2%) [2]. Most of these complications are mild and regress spontaneously. The most serious and feared complication is urosepsis. Urosepsis, which is a serious but rare complication, was observed between 0.1% and 2.8% in the literature [3-6]. Pre- and post-biopsy prophylactic oral quinolone is recommended to prevent these infectious complications [2]. But nowadays, urinary infection is observed more frequently after biopsy due to the increased antibiotic resistance [5].

According to the definition of the World Health Organization (WHO), people above the age of 65 are considered to be elderly [7]. Comorbidities generally increase in people above the age of 65, and therefore, the risk of complications increases due to frequent medications. The use of anticoagulants also increases the risk of bleeding complications after surgery and other invasive procedures. Furthermore, infection is more frequently observed after all invasive procedures due to the weakening of the immune system in the elderly [8]. A prostate biopsy can be performed in all ages because it is an easy procedure that can be performed with local anesthesia. However, we consider that the risk of postoperative complications is higher in elderly men. In the literature, although many studies are revealing the complications, there is no study comparing the risk of complications in older men with younger patients. From this point of view, we aimed to reveal safety of the biopsy in the elderly.

## Materialas and methods

The data of 515 patients, who underwent TRUS-guided prostate biopsy with suspected prostate cancer after prostate-specific antigen (PSA) screening and digital rectal examination in the urology outpatient clinic between 2017-2020, were retrospectively analyzed after obtaining the ethics committee approval. All patients' demographic data, comorbidities, laboratory findings, prostate volumes, prostate biopsy pathology results, and post-biopsy complications were recorded. Age-adjusted Charlson comorbidity scores (ACCI), which were defined by Charlson ME and determine the morbidity and mortality risk of patients with chronic diseases, were calculated [9]. The patients were divided into 2 groups as group 1 (those under the age of 65) and group 2 (those above the age of ≤65). The complications observed after prostate biopsy in both groups were compared.

Prostate biopsies of all patients were performed after the urine cultures were documented to be sterile. Furthermore, as in EAU guidelines, ciprofloxacin was initiated the day before the biopsy and continued 3 days. All patients underwent TRUS-guided prostate biopsy under local anesthesia. Local anesthesia was administered by performing a periprostatic block with 60 mg 2% prilocaine to both lobes of the TRUS-guided prostate. Then, TRUS-guided 12 core needle biopsy was performed.

Statistical Package for Social Sciences (SPSS) for Windows 22.0 program was used for statistical analysis. Normal distribution of the data was tested by the Kolmogorov-Smirnov

/ Shapiro-Wilks test. Numbers, percentages, mean, and standard deviation expressions were used for descriptive statistics. In the comparison of mean between two independent groups, the Mann Whitney-U tests were used for the data without normal distribution. Chi-square / Fisher exact test was used for the comparison of categorized data. Chi-square / Fisher exact test, Student t-test, and Mann Whitney-U tests were used to examine univariate analyses. In the multivariate analysis, the independent predictors in predicting post-biopsy complication using the factors identified in previous analyses were examined using logistic regression analysis. Hosmer-Lemeshow test was used for model fit. $P<0.05$ was considered for statistical significance.

## Results

There were 244 patients in group 1 and 271 patients in group 2. While the mean age of group 1 was 59.50±3.98, the mean age of group 2 was 71.45±4.57 years. The mean PSA value was 12.49±17.09 in group 1, it was found to be 15.87±24.85 in group 2 ($p=0.104$). The prostate volume of the patients in group 2 (60.06±21.79) were found to be statistically significantly higher compared to group 1 (47.34±15.91) ($p<0.001$). Additionally, PSA density was found to be statistically significantly higher in group 2 ($p<0.008$) (Table 1). The ACCI scores that were calculated by evaluating the age and comorbidities of the patients in group 1 and group 2 were 3.14±1.25 and 5.31±1.36, respectively ($p<<0.001$). Prostate biopsy pathology was found to be BPH (Benign prostatic hyperplasia) in 169 (69.3%) of 244 patients in group 1. In Group 2, BPH was detected in 179 (66.1%) of 271 patients. Although there was a higher rate of prostate cancer in Group 2, no statistically significant difference between the groups in terms of prostate cancer rate ($p=0.437$).

In group 1, post-biopsy fever was observed in 5 patients (2%), hematuria was observed in 44 patients (18%), hemospermia was observed in 79 patients (32.4%), and rectal bleeding was observed in 7 patients (2.9%). And in group 2, post-biopsy fever was observed in 15 (5.5%), hematuria was observed in 69 (25.5%), hemospermia was observed in 21 (7.7%), and rectal bleeding was observed in 11 patients (4.1%). These complications were observed to be mild without requiring any additional treatment. No patient required hospitalization. However, apart from these complications, severe sepsis findings were observed in 2 patients (0.2%) in group 1 and 6 patients (2.2%) in group 2, and the patients were hospitalized. Mortality was not observed. When complications such as hematuria, hemospermia, rectal bleeding, post-biopsy fever, and sepsis were compared in the groups after prostate biopsy, fever and hematuria were found to be statistically significantly higher in group 2 ($p=0.041$, 0.042, respectively). Hemospermia was found to be statistically significantly higher in group 1 ($p<0.001$). When the incidences of rectal bleeding and sepsis were compared between group 1 and group 2, no statistically significant difference was observed ($p=0.463$ and 0.201, respectively) (Table 1).

After the procedure no complication was observed in 304 patients. The mean age of the patients with complications was 64.50±8.12, and the mean age of those without complications was 66.69±6.64 years ($p<0.001$). When the ACCI scores were compared, a significant increase was found in patients without complications ($p=0.025$) (Table 2). No statistically significant difference was found between pre-biopsy PSA, prostate volume, and PSA densities of the patients between the groups ($p=0.581$, 0.275, 0.928, respectively) (Table 2).

In the logistic regression analysis which was performed to examine the risk factors affecting complications after prostate biopsy, it was determined that the risk of complication increased significantly as the age, PSA, and higher PSA density (Table 3).

**Table 1.** Patients' demographics and comparison of post-biopsy complications of groups

| | | Group 1 (<65 years) n=244 Mean±SD | Group 2 (≥65 years) n=271 Mean±SD | *p* |
|---|---|---|---|---|
| Age (year) | | 59,50±3,98 | 71,45±4,57 | **<0.001** |
| Biopsy PSA ( ng/dL ) | | 12.49±17.09 | 15.87±24.85 | 0.104 |
| Prostate Volume ( $mm^3$ ) | | 47.34±15.91 | 60.06±21.79 | **<0.001** |
| PSA Density (ng/dLx $mm^3$ ) | | 0.28±0.37 | 0.30±0.48 | **0.00**8 |
| Charlson Comorbidity Score | | 3.14±1.25 | 5.31±1.36 | **<0.00**1 |
| Pathology result | BPH n (%) | 169 (69.3) | 179 (66.1) | 0.437 |
| | PCa n (%) | 75 (30.7) | 92 (33.9) | |
| Post-Biopsy Fever | Yes n (%) | 5 (2.0) | 15 (5.5) | **0.041** |
| | No n (%) | 239 (98.0) | 256 (94.5) | |
| Post-biopsy hematuria | Yes n (%) | 44 (18.0) | 69 (25.5) | **0.042** |
| | No n (%) | 200 (82.0) | 202 (74.5) | |
| Post-biopsy Hemospermia | Yes n (%) | 79 (32.4) | 21 (7.7) | **<0.001** |
| | No n (%) | 165 (67.6) | 250 (92.3) | |
| Post-biopsy Rectal Bleeding (<24 hours) | Yes n (%) | 7 (2.9) | 11 (4.1) | 0.463 |
| | No n (%) | 237 (97.1) | 260 (95.9) | |
| Post-biopsy Hospitalization (Bacteremia, Septicemia, Sepsis etc.) | Yes n (%) | 2 (0.8) | 6 (2.2) | 0.201 |
| | No n (%) | 242 (99.2) | 265 (97.8) | |

**Table 2.** Comparison of patients with and without complications after prostate biopsy

| | Post-Biopsy Complication | | |
|---|---|---|---|
| | Yes n=211 Mean±SD | No n=304 Mean±SD | *p* |
| Age (years) | 64.50±8.12 | 66.69±6.64 | **<0.001** |
| Biopsy PSA ( ng/dL ) | 13.91±22.99 | 14.52±20.56 | 0.581 |
| Prostate Volume ( $mm^3$ ) | 52.75±18.72 | 54.92±21.20 | 0.275 |
| PSA Density (ng/dLx $mm^3$ ) | 0.26±0.34 | 0.30±0.49 | 0.928 |
| Charlson Comorbidity Score | 4.11±1.92 | 4.40±1.52 | **0.025** |

**Table 3.** The logistic regression analysis which was performed to examine the risk factors affecting complications after prostate biopsy

| Risk Factor | RR (CI 95%) | *p* |
|---|---|---|
| Age Group (<65 years, ≥65 years) | 0.516 (0.321-0.827) | **0.006** |
| Pathology Result (BPH, PCa) | 1.084 (0.731-1.608) | 0.687 |
| Biopsy PSA ( ng/dL ) | 1.041 (1.011-1.073) | **0.008** |
| Prostate Volume ( $mm^3$ ) | 0.989 (0.977-1.001) | 0.066 |
| PSA Density (ng/dLx $mm^3$ ) | 0.100 (0.019-0.532) | **0.007** |
| Charlson Comorbidity Score | 1.024 (0.889 -1.178) | 0.744 |

## Discussion

TRUS-guided prostate needle biopsy, which is frequently used in urology practice to diagnose prostate cancer, can be easily administered in all ages. However, complications such as hematuria, hemospermia, rectal bleeding, and high fever, most of which are not serious regress spontaneously without treatment. Hematuria and hemospermia are more common than others [2, 4, 10]. In their review, Borghesi et al. [10] indicated that the factors affecting the occurrence of hematuria were releated with method, prostate volume, and comorbidities in prostate biopsy. Besides Pinsky et al. [11] reported that the factors that increased the risk of complications after biopsy were prostate volume size and prostatitis. In our study, we determined that hematuria was significantly higher in patients above the age of 65. We considered that possible reasons can be presence of more comorbidities in patients above the age of 65 and consequently more frequent use of anticoagulants.

Dell'Atti et al. [12] investigated the risk factors affecting the occurrence of hemospermia after prostate biopsy. They could not find a relationship between age, PSA elevation, prostate volume, the presence of prostate cancer, and hemospermia. They determined that only calculus of prostate and abnormal digital rectal examination findings were the risk factors for hemospermia. Abdelkhalek et al. [13] emphasised that the incidence of hemospermia was detected incorrectly in the literature since men who could not achieve ejaculation were not excluded. In our study, it was determined hemospermia was significantly higher in patients under 65 years of age. We consider that it was due to the absence of ejaculation in men over 65 years of age. Different results can be obtained by excluding the men without ejaculation. But no records were–found about the erection and ejaculation status of the patients.

In their study, Wenzel et al. [4] found that rectal bleeding after the prostate biopsy was 2.8%. This bleeding usually continues on the first day after the biopsy and then regresses spontaneously. In the EAU guidelines, rectal bleeding was reported to be observed by 2.2% [2]. In our study, we determined that rectal bleeding after the prostate biopsy was slightly higher by 3.49% compared to the literature. Although rectal bleeding was more common in men over 65 years of age we did not find a statistically significant difference. We think complications such as rectal bleeding after biopsy may be observed more frequently due to the higher comorbidities, bleeding disorders, and anticoagulant use in elderly men.

Sepsis is a rare but fearful complication after prostate biopsy due to its high mortality rate [10, 14, 15]. In their study, Brewster et al. [14] investigated the factors that increased the risk of hospitalization and mortality after prostate biopsy. They revealed that hospitalization and mortality after the procedure were mostly due to prostate cancer. Furthermore, the risk of hospitalization and mortality increases with advanced age was found. Anderson et al. [16] determined that the risk factors for post-biopsy sepsis were the use of antibiotics in the last 6 months and international traveling. They could not find a significant relationship between age, hospitalization history, and comorbidities, and sepsis. In their review, Jones et al. [17] reported that infectious complications increased after prostate biopsy in recent studies. They indicated that the reason for this was the more frequent occurrence of resistant bacteria due to the increased use of antibiotics. Although we determined that the complications such as urinary infections and sepsis requiring hospitalization after prostate biopsy were more common in elderly men, however, we could not find a statistically significant difference between the two groups. It can be related with low rate sepsis in our cohort. We also could not examine the risk factors for sepsis after biopsy due to the low number of patients with sepsis. We think that a significant increase can be observed in the studies with larger patient groups. In our study, infectious complications with a transient fever after prostate biopsy were found to be statistically significantly higher in men over 65 years of age. We consider that the reason for more serious complications associated with infection in elderly men is due to the higher rate of comorbidities and the gradual weakening of the immune system with advanced age. In the studies in the literature, it stated that these infectious complications are observed at a much lower rate in transperineal biopsy [17, 18]. However, a transperineal biopsy is mostly performed under general anesthesia

since patients cannot tolerate it, which carries the risks associated with general anesthesia, especially in elderly patients.

Pinsky et al. [11] also examined the factors that increased the risk of complications after the biopsy. They determined that prostate size and the presence of prostatitis before biopsy increased the risk of complications. Loeb et al. [19] determined that post-biopsy hospitalization was significantly higher in repeated biopsies. They indicated that they could not find a statistically significant difference in infectious and non-infectious complications, though at a higher rate. In our study, it was determined that age, PSA elevation, and PSA density increased the risk of complications after prostate biopsy.

The fact that our study was a retrospective study with a limited group may have caused a limitation in prognostic predictive values. Prospective randomized controlled studies are needed in this area.

In conclusion, we revealed that the complications after prostate biopsy, which is commonly used for the diagnosis of prostate cancer in men, were generally more common in elderly patients. Therefore, elderly patients should be informed in detail about the complications that may develop after prostate biopsy, and we consider that early diagnosis and treatment are important in complications.

**Conflict of Interest:** No conflict of interest was declared by the author.

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**Contributions of the authors to the article**

O.A. and A.B. set up the main idea and hypothesis of the study. O.A., A.B., B.A., H.I.I. developed the theory and edited the material method section. O.A., M.S., I.G.K. evaluated the data in the results section. The discussion part of the article was written by O.A., A.B., O.A., B.A., I.G.K. have reviewed and made the necessary corrections and approved. Besides, all authors discussed the entire study and approved its final version.