

The effect of urethral catheterization on the level of prostate-specific antigen

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Background: The normal prostate-specific antigen (PSA) level in patients with urethral catheterization is a controversy. We designed this study to investigate the effect of nontraumatic urethral catheterization without urinary retention on serum PSA. **Materials and Methods:** Seventy patients scheduled for urethral catheterization before elective surgeries were randomly selected and included in the study. They were categorized into two age groups: 40–60 years (Group A) and over 60 years (Group B). Total PSA, PSA density, and free/total PSA were assessed before and after catheterization. **Results:** The PSA levels showed no statistically significant rise after urethral catheterization. The average of PSA level was 1.01 and 1.6 in A and B Groups, respectively, and changed to 1.38 and 1.80 in A and B Groups 1 day after catheterization ($P > 0.05$). Free/total PSA was 28.75 and 26 in A and B Groups before catheterization and changed to 28.35 and 27.5 in A and B Groups after catheterization ($P > 0.05$). **Conclusion:** Nontraumatic urethral catheterization has very little effect on PSA level and in patients with urethral catheter routine evaluation of PSA rising should be considered.

Key words: Biopsy, prostate-specific antigen, urethral catheterization

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INTRODUCTION

Prostate cancer is the second most common cancer in men which early diagnosis and treatment is of great importance.^[1] Prostate-specific antigen (PSA) is a glycoprotein molecule that is secreted from the acinar cells. This molecule is introduced as one of the most important tumor markers in the field of oncology.^[2] PSA is very effective in the assessment, early detection, and follow-up of prostate cancer.^[3] Less than 1% of PSA is released in the blood stream and the mechanism of PSA release from prostate to blood flow is not completely clear.^[4] There are barricades such as capillary basal membrane, acinar basal membrane, and endothelial layers to prevent PSA release. Any damage to these structures may increase the PSA level in the blood. The most important reasons are prostate cancer, prostatic intraepithelial neoplasia, prostatitis, benign prostatic hyperplasia (BPH), and trauma.^[5]

It has been shown that increased levels of PSA after urethral catheterization in a patient with BPH are not only associated with the volume but also depend on the degree of prostate inflammation and infection due to urinary retention or urinary obstruction.^[6]

The effect of urethral catheterization on PSA level as a single parameter (without urinary retention or trauma) has not been evaluated in the medical literature. This study aimed to investigate the increased PSA after urethral catheterization and the time required for returning to the original state.

MATERIALS AND METHODS

In this clinical trial, from September 2014 to March 2015, seventy 40–75-year-old patients who were candidates for urethral catheterization before urologic operations in Isfahan University of Medical Sciences, Al Zahra Hospital (43 radical nephrectomy, 20 laparoscopic herniorrhaphy, 5 renal cyst, and 2 xanthogranulomatous

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pyelonephritis) with normal PSA level and normal digital rectal examination were selected. Exclusion criteria were urethral traumatization, history of prostate cancer, prostatitis, urologic manipulation after obtaining informed consent; they were categorized into two age groups including Groups A (40–60 years) and B (61–75 years). In all patients, PSA baseline, total PSA, free PSA, and the F/T ratio were measured and abdominal ultrasonography was carried on to calculate PSA density before urethral catheterization and then 1 day and 3 days after catheterization. The obtained information in each age group was analyzed using IBM, SPSS V. 22 software. We applied repeated ANOVA to compare repeated measures in each group considering $P = 0.05$. The A and B groups were analyzed separately without any comparison between two groups.

RESULTS

Considering the sample size formula and inclusion criteria, a total of seventy patients entered the study. After taking informed consent, they were categorized into Groups A ($n = 33$) and B ($n = 37$) based on their age (Group A: 40–60 years, Group B: 60–75 years). The mean age in Groups A and B was 52 ± 3.1 and 68 ± 7.4 years old, respectively.

The mean prostate volume in Groups A and B was 44.46 cc and 26.27 cc, respectively.

Regarding the results of Tables 1 and 2, PSA, PSA density, and free/total PSA levels were not statistically different before and after urethral catheterization. This result in two age groups was the same and even in older patients urethral catheterization did not change PSA, PSA density, or FREE/TOTAL PSA.

DISCUSSION

PSA is a worthwhile tumor marker in the diagnosis and treatment of prostate cancer.

Urethral catheterization is a common operation to treat urinary retention. In addition, there are patients with permanent indwelling urinary catheters or patients with urethral catheters who are candidates for prostatic surgeries. Interpretation of PSA level and going to transrectal ultrasound (TRUS) biopsy of the prostate in patients with urethral catheter is a challenging issue, particularly in patients who are candidates for open prostatectomy or transurethral resection of the prostate.

Some authors believe that serum PSA level in these patients is increased and a higher threshold for TRUS biopsy of

Table 1: Prostate-specific antigen, prostate-specific antigen density and free/total prostate-specific antigen levels in Group A

Variables	Before catheterization	1 day after catheterization	3 days after catheterization	P
PSA	1.01±0.13	1.38±0.27	1.32±0.28	>0.05
Free/total PSA	28.75±2.24	28.35±2.0	28.45±1.8	>0.05
PSA density	0.043±0.004	0.056±0.009	0.052±0.008	>0.05

PSA=Prostate-specific antigen

Table 2: Prostate-specific antigen, prostate-specific antigen density and free/total prostate-specific antigen levels in Group B

Variables	Before catheterization	1 day after catheterization	3 days after catheterization	P
PSA	1.61±0.40	1.80±0.44	1.86±0.45	>0.05
Free/total PSA	26.00±1.53	27.50±4.50	27.37±4.7	>0.05
PSA density	0.041±0.008	0.045±0.007	0.047±0.008	>0.05

PSA=Prostate-specific antigen

prostate should be considered. In one study, it is proposed that TRUS biopsy would not be necessary in patients with indwelling urethral catheters if serum PSA is <10 and prostate volume is more than 60 ml.^[7,8]

On the other hand, there are other studies that urethral catheterization has not changed PSA levels. In one of them, PSA and related parameters were evaluated in patients undergoing clean intermittent catheterization and there was no increase in PSA level with urethral catheterization. In one research, PSA levels in patients with urinary retention after urethral catheterization and cystostomy insertion were evaluated and compared. Although PSA level was higher in patients with urethral catheter in comparison with cystostomy tube, this difference was clinically insignificant.^[9]

The aim of this study was to investigate the effects of urethral catheterization on PSA level. Based on the results of this study, urethral catheterization had no significant effect on serum PSA. Other parameters such as PSA density and free/total PSA also did not increase after urethral catheterization. It should be considered that our patients did not have lower urinary tract symptoms and urethral catheterization was atraumatic.

We believe that urethral catheterization would not have a clinically significant effect on serum PSA if it was carried out without trauma. We assume that standard evaluation in patients with increased level of PSA is necessary even though there has been a urethral catheterization recently.

CONCLUSION

It appears that urethral catheterization did not increase PSA levels and free/total PSA on the condition that it is performed gently.

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Conflicts of interest

There are no conflicts of interest.

AUTHORS' CONTRIBUTION

- MHI contributed in the conception of the work, conducting the study, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work.
- HS contributed in the conception of the work, conducting the study, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work.
- AJ contributed in the conception of the work, revising the draft, approval of the final version of the manuscript, and agreed for all aspects of the work
- SE contributed in the design of the work, revising the

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