

Is Serum Prostate Specific Antigen Level Affected by In-and-Out Urethral Catheterization?

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Aim: In this study, we aimed to investigate the effect of in-and-out urethral catheterization on serum total and free prostate specific antigen (PSA) levels and free/total PSA ratio.

Materials and Methods: This is a prospective study including 24 patients who admitted with lower urinary tract symptoms and underwent in-and-out urethral catheterization with 18 F Foley catheter inserted for postvoiding residual urine measurement. Blood samples were withdrawn to determine serum total and free PSA levels and free/total PSA ratio immediately before, and at 1, 24 and 72 hours after urethral catheterization.

Results: There was no alteration in total and free PSA levels or and free/total PSA ratio due to in-and-out urethral catheterization in patients who underwent postvoiding residual urine measurement ($p_{\text{total PSA}}=0.536$, $p_{\text{free PSA}}=0.099$, $p_{\text{free/total PSA}}=0.497$).

Conclusions: In our study, in-and-out urethral catheterization was not found to be an effective factor on serum total and free PSA levels or free/total PSA ratio.

Key Words: Prostate specific antigen, urethral catheterization

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Serum Prostat Spesifik Antijen Düzeyi Tek Seferlik Üretral Kateterizasyon'dan Etkilenir mi?

Amaç: Bu çalışmada tak-çıkarcı şeklindeki üretral kateterizasyonun serum total, serbest prostat spesifik antijen (PSA) ve serbest/total (PSA) oranına etkisini araştırdık.

Yöntem ve Gereç: Altüriner sistem semptomları ile başvuran ve işeme sonrası artıkcı idrar miktarı ölçümü için 18 F üretral foley ile kateterize edilen 24 hasta çalışmaya alındı. Üretral kateterizasyondan hemen önce, kateterizasyondan 1 saat, 24 saat ve 72 saat sonra serum total PSA düzeyi, serbest PSA düzeyi ve serbest/total PSA oranı ölçümleri kan örnekleri alındı.

Bulgular: İşeme sonrası artıkcı idrar ölçümü için yapılan tak-çıkarcı şeklindeki üretral kateterizasyonun serum total PSA düzeyi, serbest PSA düzeyi ve serbest/total PSA oranı ölçümlerine üzerine anlamlı etkisi saptanmadı ($p_{\text{total PSA}}=0.536$, $p_{\text{free PSA}}=0.099$, $p_{\text{free/total PSA}}=0.497$).

Sonuç: Bizim çalışmamızda, tak-çıkarcı şeklindeki üretral kateterizasyon serum total ve serbest PSA düzeyleri ve serbest/total PSA oranı üzerine etkili bulunmadı.

Anahtar Sözcükler: Prostat spesifik antijen, üretral kateterizasyon

Introduction

Prostate specific antigen (PSA) is a valuable tumor marker for the diagnosis and management of prostate cancer, although it is prostate-, but not cancer-specific. Increase in serum PSA level is due to disruption of the natural anatomic and physiologic barriers between the prostatic milieu and the bloodstream. Serum PSA level elevated above 4 ng/ml in men is a cause for physician concern. Although various physiologic and benign conditions may have an effect on the serum PSA level, prostate cancer is firstly considered in increased PSA levels (1-3).

Urethral catheterization is a common procedure in urology practice. While some patients need prolonged urethral catheterization due to urinary retention, others have only in-and-out catheterization for measurement of residual urine. In previous literature,

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controversial results exist on the effect of urethral catheterization on serum PSA level (3-5).

In this study, we aimed to investigate the effect of in-and-out urethral catheterization on serum total and free PSA level and free/total PSA ratio.

Materials and Methods

This is a prospective study including 24 patients who admitted with lower urinary tract symptoms. Digital rectal examination was normal in all patients. Exclusion criteria included: abnormal digital rectal examination, previous pelvic surgery history, any urologic cancer, active urinary tract infection, treatment with 5-alpha reductase inhibitors, and any urethral catheterization or urologic manipulation (e.g. cystoscopy, transrectal prostate biopsy, prostatic massage) within the last 45 days.

After urine flow rates were measured, the patients had an in-and-out urethral catheterization with 18 F Foley catheter for postvoiding residual urine measurement by a member of our team (Y.A.). Urethral catheter was meticulously inserted after sufficient lubrication to avoid any difficulty or trauma. Catheter was removed after measuring residual urine within 5 minutes.

Blood samples were withdrawn to detect serum total and free PSA level and free/total PSA ratio immediately before, and at 1, 24 and 72 hours after urethral catheterization. The reference range of serum PSA was 0-4 ng/ml (*Electrochemiluminescent Method; Roche Diagnostics®*, Germany).

Statistical analysis

The data were analyzed by using the Statistical Package for Social Science, version 11.1, software program (Illinois, USA). *Repeated measurement ANOVA test* was employed for all statistical analyses. A p value less than 0.05 was considered significant.

Results

The mean age of the patients was 62.04±9.12 (range 47 to 77) years. The mean serum total PSA level, free PSA level and free/total PSA ratio before the catheterization were 3.97±4.78 (range 0.33 to 18.8), 0.73±1.12 (range 0.03 to 4.31), and 0.24±0.22 (range 0.02 to 0.94) ng/ml, respectively. Serum total PSA levels at 1, 24 and 72 hours after urethral catheterization were 4.79±5.10 (range 0.56 to 18.8), 4.44±4.56 (range 0.68 to 16.4), and 4.7±4.69 (range 0.19±17.6) ng/ml, respectively. These values for serum free PSA were 1.11±1.36 (range 0.07±4.36), 0.86±1.1 (range 0.03 to 3.7) and 1.26±2.77 (range 0.03 to 12.6), and for serum free/total PSA ratio were 0.22±0.15 (range 0.02 to 0.48), 0.17±0.12 (range 0.02 to 0.4), and 0.26±0.48 (range 0.01 to 2.29), respectively (Table 1). The mean postvoiding residual urine volume of the patients was 59.79±70.35 ml (range 0 to 240).

According to our results, no significant differences were determined between values before, and at 1, 24 and 72 hours after catheterization for serum total PSA, serum free PSA and serum free/total PSA ratio ($p_{total\ PSA}=0.536$, $p_{free\ PSA}=0.099$, $p_{free/total\ PSA}=0.497$). Although

Table 1. Patients' data.

	Immediately before the catheterization	1 hour after catheterization	24 hours after catheterization	72 hours after catheterization	p value
Total PSA (ng/ml)	3.96± 4.78 (0.33-18.8)	4.79 ± 5.10 (0.56-18.8)	4.44 ± 4.56 (0.68-16.40)	4.7 ± 4.69 (0.19-17.6)	0.536 >0.05
Free PSA (ng/ml)	0. 73 ± 1.12 (0.03-4.31)	1.11 ± 1.36 (0.07-4.36)	0.86 ± 1.1 (0.03-3.70)	1.26 ± 2.77 (0.03-12.60)	0.099 >0.05
Free/Total PSA ratio	0.24 ± 0.22 (0.02-0.94)	0.22 ± 0.15 (0.19-0.48)	0.17 ± 0.12 (0.21-0.40)	0.26 ± 0.48 (0.003-2.29)	0.497 >0.05

PSA: Prostate specific antigen.
Data presented as mean± standard deviation.
Data in parentheses are minimum and maximum levels.

serum total and free PSA levels and free/total PSA ratio were slightly increased at 72 hours, these changes were not significant. Serum PSA changes before and after catheterization are shown in Figure 1.

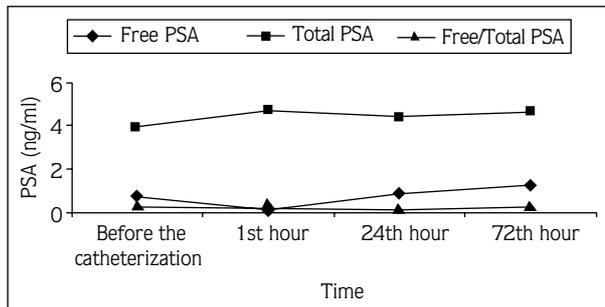


Figure 1. Serum PSA alteration before and after the catheterization. PSA: Prostate specific antigen.

Discussion

Serum PSA has an important role in identifying benign prostatic conditions from prostatic malignancy, although it is not an ideal tumor marker. Serum PSA level is influenced by age, urinary retention, ejaculation, hospitalization, hemodialysis, prostatic volume, prostatic morphology (histologic composition), prostatic inflammation and prostatic manipulations such as biopsy, prostatic massage and cystoscopy (1-5,6,9,10).

There are no clear results about the effect of urethral catheterization on serum PSA level in previous studies. In these studies, no correlation was found between indwelling catheterization and serum PSA elevations (5,6). In 1996, Matzkin and co-workers (7) conducted a prospective study in patients who had urethral catheter for an average of 5.5 days. They found a clinically insignificant increase in PSA level after prolonged urethral catheterization. Their results were also in agreement with the previous studies as mentioned above. However, some recent studies showed that there was a correlation between urethral catheterization and serum PSA level elevation. Batislam et al. (8) found that an indwelling catheter caused 2.6-fold serum PSA elevations. Konety and associates (9) indicated that increased PSA level was correlated with age and indwelling urethral catheterization in patients with spinal cord injury. They reported that it could be a result of the prolonged duration of catheterization in these men. All the studies mentioned above considered only serum total PSA level. There was only one study in the international literature

that considered serum free/total PSA ratio after transurethral resection due to benign prostatic hyperplasia (10). In this study, there was significant increase in the serum and free PSA levels, but no significant alteration in free/total PSA ratio. The authors concluded that free/total PSA might be a more reliable parameter in the early period after interventions such as transurethral prostate resection. In the present study, urethral catheterization did not affect serum PSA level. We believe that transurethral prostate resection is a more invasive procedure than urethral catheterization. Hence, invasive surgical procedures may play an important role in serum PSA increase.

Urethral catheterization is widely used in clinical practice for management of urinary retention and measurement of residual urine. Although postvoiding residual urine measurement might also be done by suprapubic ultrasound, it is not sufficient to detect the exact amount of residual urine due to the procedure being operator- and experience-dependent. Therefore, in-and-out urethral catheterization is still a valid method to measure postvoiding residual urine after uroflowmetry. However, it is not clear whether this catheterization has an effect on serum PSA level, serum free PSA level and free/total PSA ratio. In our study, no significant change was detected in serum total and free PSA levels or free/total PSA ratio due to in-and-out urethral catheterization for residual urine measurement. Blood samples can be reliably withdrawn for assessment of serum total and free PSA levels and free/total PSA ratio in patients undergoing only in-and-out catheterization. However, serum total and free PSA levels and free/total PSA ratio might be affected by prolonged duration of urethral catheterization due to constant mechanical stimulus and inflammation caused from the catheter. It is hard to draw a universal conclusion that urethral catheterization has no effect on serum total PSA level, serum free PSA level or free/total PSA ratio since the present study includes patients who underwent only in-and-out catheterization.

Numerous pathological conditions, urological manipulations and physiological conditions have been associated with varying degrees of increase in serum PSA levels. In light of our results, in-and-out urethral catheterization seems not to be an important risk factor for increasing serum total PSA level, serum free PSA level and free/total PSA ratio.

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