UROONCOLOGY

Original Article

The risk factors for acute urinary retention in patients with benign prostatic hyperplasia

Benign prostat hiperplazili hastalarda akut üriner retansiyon gelişimine etki eden risk faktörleri

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ABSTRACT

Objective: The most common cause of obstructive acute urinary retention (AUR) is benign prostatic hyperplasia (BPH). To investigate the etiology of AUR, we evaluated the relationship between AUR and histological prostatic inflammation in patients with BPH.

Materials and Methods: Between January and December of 2008, 226 patients who underwent transurethral resection of prostate (TURP) for AUR or lower urinary tract symptoms (LUTS) as a result of BPH were included in the study. Patients were classified into AUR(+) (n=89) and AUR(-) (n=137) groups. The two groups were compared along the following dimensions: age, weight of resected prostatic tissue (Rt), total prostate specific antigen (tPSA) levels and the presence of inflammation in the prostatic pathology. Independent risk factors for AUR were evaluated using logistic regression analysis. P values <0.05 were considered significant.

Results: The mean age of the 226 patients was 67.7±7.7 years; the mean tPSA level was 6.45±4.97 ng/ml; and the mean weight of resected prostatic tissue (Rt) was 25.47±21.77 g. The mean age and Rt of the AUR(+) group were significantly higher than those of the AUR(-) group (p<0.0001 and p=0.031, respectively). The odds of AUR were significantly higher in the patients with inflammation than in those without (p=0.049). An age over 70 years, more than 25 g resected tissue and the presence of prostatic inflammation were independent risk factors for AUR in the logistic regression analysis.

Conclusion: Our results indicated that being older than 70 years of age, ≥25 g Rt in TURP and the presence of prostatic inflammation were independent risk factors for AUR in patients with BPH.

Key words: Acute urinary retention; benign prostatic hyperplasia; inflammation; lower urinary tract symptoms; prostate specific antigen.

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Submitted:
10.11.2011

Accepted:
09.02.2012

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Available online at www.turkishjournalofurology.com

ÖZET

Amaç: Akut üriner retansiyonun (AUR) ensık sebebi benign prostat hiperplazisidir(BPH). AUR'un etyolojisini ayrıntılı bir şekilde araştırmak için, BPH'lı hastalarda AUR ve histolojik prostatik inflamasyon ilişkisini değerlendirdik.

Gereç ve Yöntem: Çalışmaya Ocak-Aralık 2008 tarihleri arasında BPH'ne bağlı AUR veya alt üriner sistem semptomları (AÜSS) nedeniyle trans üretral rezeksiyon-prostat (TURP) yapılan 226 hasta dahil edildi. Hastalar AUR(+) (n=89) ve AUR(-) (n=137) olmak üzere 2 gruba ayrıldı. Bu iki grup; yaşlarına, rezeke edilen prostat dokusu ağırlığına (Rt), total prostat spesifik antijen (tPSA) düzeylerine ve prostat dokusu patolojisinde inflamasyon varlığına göre karşılaştırıldı. AUR için bağımsız risk faktörleri lojistik regresyon analizi ile değerlendirildi ve P değeri <0.005 ise anlamlı olarak kabul edildi.

Bulgular: Bu 226 hastanın ortalama yaşları 67.7±7.7 yıl, ortalama tPSA değeri 6.45±4.97 ng/ml, ortalama rezeke edilen prostat ağırlığı (Rt) 25.47±21.77 gr. idi. Ortalama yaş ve ortalama Rt, AUR(+) grubunda diğer gruba göre anlamlı olarak daha fazla idi (p<0.0001 ve p=0.031). Prostatik inflamasyonu olan hastalarda AUR gelişme riski olmayanlara göre anlamlı olarak daha yüksek bulundu (p=0.049). Yapılan lojistik regresyon analizinde, 70 yaşın üzerinde, 25 gr'dan fazla doku çıkarılması ve prostatik inflamasyon varlığı AUR gelişiminde bağımsız risk faktörleri olarak bulundu.

Sonuç: Sonuçlarımız göstermektedir ki; BPH'li hastalarda 70 yaşın üzerinde olmak, 25 gr'dan fazla doku çıkarılması ve prostatik inflamasyon varlığı AUR gelişiminde bağımsız risk faktörleridir.

Anahtar sözcükler: Akut üriner retansiyon; benign prostat hiperplazisi; alt üriner sistem semptomları; prostat spesifik antijen.

Turkish Journal of Urology 2012; 38(2): 65-69
doi:10.5152/tud.2012.016

Introduction

Acute urinary retention (AUR) is a painful urologic condition requiring rapid bladder decompression. It is characterized by suprapubic pain and an inability to urinate.[1] AUR may develop into urinary infection, permanent bladder dysfunction and even renal insufficiency.[2-4] The most common cause of obstructive AUR is benign prostatic hyperplasia (BPH).[3] Because of the age-dependent nature of BPH, the risk of AUR increases with age (10-30% with every 5-year age increase).[3,5,6]

There are three main pathophysiologic mechanisms of AUR: bladder outlet obstruction, detrusor underactivity and neurogenic bladder. The first two of these three mechanisms are responsible for the AUR observed in BPH patients.[7] Our goal in the present study was to further investigate the role of prostatic inflammation in the development of AUR and to explore possible relationships between AUR and age, the weight of resected prostatic tissue (Rt) and the total prostate specific antigen (tPSA) level.

Materials and methods

Between January and December of 2008, 226 patients who underwent transurethral resection of prostate (TURP) because of either AUR or lower urinary tract symptoms (LUTS) were included in the study. The patients with a history of lower urinary tract surgery, prostate cancer, neurological disease, previous urethral catheterization due to any etiology or documented urinary tract infection at the time of diagnosis were excluded from the study.

Patients were classified into two groups: an AUR(+) group and an AUR(-) group. The AUR(+) group consisted of 89 patients (39.38%), and the AUR(-) group consisted of 137 patients (60.62%). The AUR(+) group included the patients in whom catheterization was required for the first time in their lives due to bladder distention.

A detailed medical history was obtained from each patient, including IPSS (International prostate symptom score) for the assessment of LUTS. Routine serum biochemical tests, blood count, serum free and total PSA determination and urine analysis were performed. Total PSA levels above 4 ng/ml were considered to be abnormal. Prostatic evaluation included digital rectal examination (DRE) and transrectal ultrasound (TRUS), which were performed to investigate the prostatic morphology, to determine the volume of the prostate and to guide the prostate needle biopsy when indicated. The maximal urinary flow rate (Qmax) was obtained using uroflowmetry. AUR, moderate or severe LUTS (IPSS≥20) and low Qmax levels (<10 ml/s) were considered to be indications for prostatectomy.

All of the operations were performed by the same surgical staff and using the same TURP technique with a 26-F continuous irrigation resectoscope and monopolar energy. The weight of resected prostatic tissue was measured by weighing the surgical specimen using a high-sensitivity electronic scale.

The AUR(+) and AUR(-) groups were compared according to age, Rt, tPSA levels and the presence of inflammation in the prostatic pathology. Independent risk factors for AUR development were evaluated using logistic regression analysis.

The Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA), version 13.0 was used for data analysis. Pearson's chi-squared test and the Mann-Whitney U test were applied. Logistic regression analysis was performed to evaluate the effects of the known and potential risk factors for AUR, such as age, tPSA, Rt and the presence of pathological prostatic inflammation. p values ≤0.05 were considered significant.

Results

The mean age of the 226 patients was 67.7±7.7 (38-84) years, the mean tPSA level was 6.45±4.97 (0.6-20) ng/ml and the mean weight of resected prostatic tissue was 25.47±21.77 (10-135) g. The mean duration of catheterization was 23.90±51.30 (1-365) days for the 89 patients who were catheterized before surgery. The data on age, tPSA level and Rt are shown in Table 1.

The mean age and Rt of the AUR(+) group were significantly higher than those of the AUR(-) group (p<0.0001 and p=0.031, respectively). The mean tPSA level of the AUR(+) group was also higher than that of the AUR(-) group, but the difference was not statistically significant (p=0.089).

The incidence of AUR and Rt were higher in patients who were over 70 years of age (p=0.03 and p=0.004, respectively). However, the mean tPSA levels were similar between the AUR (+) and AUR(-) groups (p=0.558) (Table 2).

Table 1. Patient characteristics (mean±SD) (min-max) (n=226)

	AUR(+) (n= 89)	AUR(-) (n= 137)	p-value
Age (yr)	70.1±6.1 (59–84)	66.1±8.2 (38–84)	<0.0001*
tPSA (ng/ml)	7.60±5.15 (0.6–20)	5.54±4.70 (0.8–16)	0.089
Weight of resected tissue (g)	29.35±24.58 (10–135)	22.95±19.40 (10–110)	0.031*

SD: standard deviation; tPSA: total prostate specific antigen; AUR: acute urinary retention
*:p<0.05

The patients were also compared according to the level of prostatic inflammation. No differences were observed between the patients with BPH and those with prostatitis in terms of mean age, tPSA level, and Rt. The duration of catheterization was longer in the patients with prostatitis than in those with BPH alone (p=0.045) (Table 3).

The odds of developing AUR were significantly higher in the patients with inflammation than in those without (p=0.049). Multiple linear regression analysis revealed that the following criteria were independent risk factors for the development of AUR: an age over 70 years, more than 25 g resected tissue and the observation of prostatic inflammation in the pathology of the disease (Table 4).

Table 2. Comparison of studied parameters with regard to patients age (mean±SD) (min-max)

	Age ≤70 years (n=139)	Age >70 years (n=87)	p-value
tPSA (ng/ml)	6.74±4.80 (0.6-16)	6.01±5.25 (0.9-20)	0.558
Weight of resected tissue (g)	22.20±17.90 (10-135)	30.67±26.06 (10-110)	0.004*
AUR(+) [n (%)]	47 (33.8%)	42 (48%)	0.03**
AUR(-) [n (%)]	92 (66.2%)	45 (52%)	

SD: standard deviation; tPSA: total prostate specific antigen; AUR: acute urinary retention
*:p<0.05, **Chi-squared

Table 3. Comparison of inflammation (+) and (-) patients (mean±SD) (min-max)

	Inflammation (-) (n=163)	Inflammation (+) (n=63)	p value
Age (yr)	67.7±7.9 (40-84)	66.1±8.2 (38-84)	0.861
tPSA level (ng/ml)	5.65±5.00 (0.8-20)	8.00±4.62 (0.6-16)	0.65
Weight of resected tissue (g)	25.65±19.57 (10-110)	25.01±26.80 (10-135)	0.845
Duration of catheterization (day)	13.95±19.17 (1-120)* (n=59)†	39.65±77.06 (2-365)* (n=30)†	0.045*

SD: standard deviation, tPSA: total prostate specific antigen, BPH: benign prostatic hyperplasia.
†: Only the patients who developed AUR were included. *: p<0.05.

Discussion

AUR is a health condition that seriously decreases the patient's quality of life. Although many etiologic factors have been identified (which are classified under three main categories: obstructive, neurogenic and myogenic), BPH is thought to be the most prevalent.[2] The exact causative mechanism of AUR remains under debate.[8]

Several community-and population-based studies have clearly demonstrated that the incidence of AUR increases with age, particularly in men over age 70. Although the incidence of AUR is 0.05-0.3% in men younger than 50, it is estimated increasing to 3.42% for those older than 70.[9-12] In the present study, we have confirmed the relationship between age and the development of AUR. The mean age of our AUR group was significantly higher than that of the control group (p<0.0001). When the age of 70 was considered to be a cut-off point, we demonstrated that the risk of AUR was higher in patients over 70 than in those under 70.

In the study of Roehrborn et al.,[13] large prostatic volume and high PSA level were found to be the strongest predictors of the occurrence of AUR. Kefi et al.[14] reported that there was no difference between the patients with and without AUR with respect to prostatic volume and the weight of resected prostatic tissue; however, there was a significant difference with respect to the tPSA level. Tuncel et al.[15] and Atan et al.[16] also found that the serum tPSA level was an important risk factor in AUR etiology, whereas the prostatic size was not. Our findings were opposite to theirs, both in terms of tPSA and Rt. There was no difference in total PSA, but Rt differed. When we separated the groups according to age (being over/under 70), the results did not change. Prostatic size but not serum tPSA level had an effect on the occurrence of AUR for both age groups.

In the study of Van Vuuren et al.,[17] which consisted of 405 patients with BPH or prostate cancer, it was reported that the risk of developing acute urinary retention was twice as likely in BPH patients as in prostate cancer patients if prostatitis was present

Table 4. Predictive variables for AUR: results from multivariate analysis

Risk factors	Beta coefficient	SE B	OR	p value	95% CI (min-max)
Age (>70 years)	0.578	0.286	1.8	0.043	1.0-3.1
Weight of resected tissue (≥25 g)	0.640	0.299	1.9	0.033	1.1-3.4
Prostatic inflammation (+)	0.614	0.312	1.8	0.049	1.0-3.4

SE B: standard error of Beta; CI: confidence interval; OR: odds ratio

Turkish Journal of Urology 2012; 38(2): 65-69
doi:10.5152/tud.2012.016

concomitantly. In addition, acute urinary retention developed at an earlier age and in the presence of higher PSA in BPH patients with prostatitis than in those with prostate cancer and prostatitis.

It was also reported by Asgari et al.[18] that the presence of prostatitis was a risk factor for AUR in a study of 280 patients.

There are several studies in the literature that speculate on the relationship between inflammatory prostatitis and serum tPSA levels. Some of these studies found that tPSA levels were significantly higher in patients with prostatitis; however, others failed to support that conclusion, stating that there was no significant association between the existence of prostatitis and tPSA levels, age and prostatic volume.[19-23] In the present study, neither prostatic pathology and tPSA nor age and tPSA were found to be related.

In our study, we detected that the risk of AUR was 1,8 times higher in patients with prostatitis. Tuncel et al.[15] found that the risk of AUR was approximately 3 times higher in patients with prostatic inflammation, and they speculated that this elevated risk was dependent on the induction of urinary tract infections by post-void residual urine. However, it should be noted that not all chronic prostatitis patients develop AUR, and patients with a documented urinary tract infection were not included in our study. Therefore, prostatic edema due to inflammation may contribute to the development of AUR, but further studies are needed to draw any conclusions on the subject.

According to the present study, the duration of catheterization was significantly longer in the patients with chronic prostatitis than in those with BPH. However, due to the retrospective nature of our study, we were unable to determine if the prostatic inflammation was the causative pathology leading to AUR or the consequence of catheterization. There was no way to determine the pathology of the patient's prostate without performing a biopsy or resection prior to catheterization. The role of prostate morphology in the etiology of AUR still requires further exploration.

In the large multicenter study of Fitzpatrick et al., which considered 6074 patients, it was demonstrated that urethral catheterization and alpha 1 receptor blocker therapy followed by a trial without catheterization should be the standard management technique in patients with AUR. However, the success rate of the protocol was determined to be approximately 40%.[24]

Conclusion

In this study, we have found that advanced age (>70 years), a larger prostate (resected prostate volume ≥25 g) and the presence of prostatic inflammation were independent risk factors for the occurrence of AUR, whereas tPSA level was not. However, our findings should be confirmed with prospective studies that include an adequate number of patients and sufficient follow-up.

Conflict of interest

No conflict of interest was declared by the authors.

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