RESEARCH ARTICLE

Yusuf Senoglu [1]
Ali Tekin [2]
Olcay Yildirim [3]
Dursun Baba [1]
Alpaslan Yuksel [1]

[1] Düzce University, Faculty of Medicine, Urology Department, Duzce, Türkiye
[2] Acıbadem University, Atakent Hospital, Clinic of Urology, Istanbul, Türkiye
[3] Ada Hospital, Urology Department, Giresun, Türkiye

Corresponding Author:
Yusuf Senoglu
mail: ysenoglu@yahoo.com

Received: 12.07.2023
Acceptance: 07.09.2023
DOI: 10.18521/ktd.1326542

Oral presentation in Belgrade/SERBIA;10th EAU South Eastern European Meeting (SEEM) 24-26 October 2014

Konuralp Medical Journal
e-ISSN1309–3878
konuralptipdergi@duzce.edu.tr
konuralptipdergisi@gmail.com
www.konuralptipdergi.duzce.edu.tr

Comparison of Early Versus Late Urethral Catheter Removal After Transurethral Resection of the Prostate in Patients with Benign Prostate Hyperplasia

ABSTRACT

Objective: Transurethral resection of the prostate (TURP) is considered the standard in the surgical therapy of lower urinary tract symptoms related to benign prostate hyperplasia (BPH). However, there is no consensus on the timing of catheter removal. In this study, we aimed to compare the long-term effects of early and delayed removal of urethral catheters who underwent TURP.

Methods: We prospectively analyzed a total of 91 patients who underwent TURP. Patients were randomized into two groups; the early (postop 1st-2nd days) and delayed (7th day) removal of the urethral catheter. After the surgery in 1, 3, and 6th months, we evaluated all patients regarding treatment success. In addition, international prostate symptom score (IPSS), quality of life (QoL), maximum flow rate, postvoid residual urine volume, and morbidities (hematuria, infection, urethral stricture, irritative symptoms, need for re-operation) were assessed at all visits.

Results: After TURP, there was no statistical difference in urodynamic parameters, complications, IPSS, and QoL in both groups. Only in the 3rd-month, the maximum flow rate was higher in favor of the early group. Despite similar results in both groups, strictures occurred earlier in the early group than delayed group (respectively 1 and 3 months).

Conclusions: These results suggest that there are no differences in efficacy and complications in groups of early or delayed urethral catheter removal after TURP. The results of long-term studies with large series should be awaited to reach a more definite conclusion. We have tried to shed light on a topic without consensus on the time of urethral catheterization after TURP.

Keywords: Transurethral Resection of the Prostate (TURP), Urethral Catheter, Benign Prostatic Hyperplasia.

Benign Prostat Hiperplazili Hastalarda Transüretral Prostat Rezeksiyonu Sonrası Erken Ve Geç Üretral Kateter Çekilmesinin Sonuçlarının Karşılaştırılması

ÖZET

Amaç: Prostatın transüretral rezeksiyonu (TURP), benign prostat hiperplazisine (BPH) bağlı alt üriner sistem semptomlarının cerrahi tedavisinde standart olarak kabul edilir. Ancak, üretral kateterin çıkarılma zamanlaması konusunda görüş birliği yoktur. Biz çalışmamızda TURP sonrası üretral kateterin erken veya geç çıkarılmasının uzun dönem etkilerini karşılaştırmayı amaçladık.

Gereç ve Yöntem: TURP uygulanan toplam 91 hasta prospektif olarak incelendi. Hastalar üretral kateterin erken (postop 1.-2. gün) ve geç (7. gün) çıkarıldığı iki gruba randomize edildi. Ameliyat sonrası 1, 3 ve 6. aylarda tüm hastalar tedavi başarısı açısından değerlendirildi. Ek olarak, uluslararası prostat semptom skoru (IPSS), yaşam kalitesi (QoL), maksimum akış hızı, işeme sonrası rezidüel idrar hacmi ve morbiditeler (hematüri, enfeksiyon, üretral darlık, tahriş edici semptomlar, yeniden ameliyat ihtiyacı) tüm ziyaretlerde sorgulandı.

Bulgular: Ameliyat sonrası dönemde her iki grupta ürodinamik çalışma, komplikasyonlar, IPSS ve QoL açısından istatistiksel fark saptanmadı. Sadece 3. ayda maksimum akım hızının erken grupta daha yüksek olduğu görüldü. Ancak her iki grupta da benzer sonuçlara rağmen, üretral darlıkların erken grupta gecikmiş gruba göre daha erken (sırasıyla 1 ve 3 ay) meydana geldiği görüldü.

Sonuç: TURP sonrası üretral kateterizasyon zamanı konusunda, görüş birliği olmayan bir konuyu aydınlatmaya çalıştık. TURP sonrası üretral kateterin erken veya geç çıkarıldığı gruplar arasında etkinlik ve komplikasyonlar açısından herhangi bir farkın ortaya çıkmadığı saptanmıştır. Ancak daha kesin bir sonuca varmak için uzun süreli ve geniş serili çalışmaların sonuçları beklenmelidir.

Anahtar Kelimeler: Transüretral Prostat Rezeksiyonu (TURP), Üretral Kateter, Benign Prostat Hiperplazisi.

INTRODUCTION

Benign prostatic hyperplasia (BPH) and prostatic obstruction associated with BPH are the most common cause of lower urinary tract symptoms (LUTS) in aging men. The probability of developing LUTS within 30 years due to BPH in asymptomatic men in their 40s is approximately 50% (1). Although there are many drugs and non-drug, non-surgical treatment options for relieving these symptoms, transurethral resection of the prostate (TURP) is the standard gold treatment and the most widely used and accepted method for patients need surgery. It is illustrated in large series of patients that TURP has a practical and permanent corrective effect on urodynamic parameters and clinic (2).

TURP has evolved tremendously over the past 20 years. Many technical improvements and growth of experience in endoscopic surgery have developed TURP over time to enable it to compete with other accepted minimally invasive methods. However, although it is the standard surgical technique, there is still no consensus about the time of catheter removal, and any guideline does not inform the duration of catheter use (3).

Urethral catheterization is a common practice for urinary drainage and irrigation in the early post-operative period. However, catheterization length shows significant differences between surgeons and centers. Expectations of the proponents of early removal of the urethral catheter are shorter hospital stays, earlier return to active life, and additional advantages such as lower morbidity. However, the literature on the effects of a long or short catheterization duration is still insufficient.

In this randomized prospective study, we aimed to compare the impact of treatment on the results in early (24 hours after control of bleeding) and delayed (5-7 days after control of bleeding) catheter removal groups in patients who underwent TURP in 6 months follow-up.

MATERIAL AND METHODS

We prospectively analyzed the data of 91 patients who underwent TURP for obstructive BPH in 2013. The ethics committee of our hospital approved our study (Ethical approval decision number 2013/403), we informed all patients about the complications of TURP, and we obtained informed consent.

TURP was performed using a standard technique with monopolar (26 F sheath; electrosurgical instrument system; Storz) and bipolar energy (Gyrus ACMI 26 F sheath) under spinal anesthesia. Surgical indications were medical treatment failure, recurrent urinary retention, recurrent and non-controlled UTI, bladder stone formation, and recurrent gross hematuria.

Patients were evaluated with a clinical history, digital rectal examination (DRE), prostate volume with abdominal ultrasonography, measurement of maximum flow rate and postvoid residual urine volume (PVR), urinalysis, urine culture, serum creatine and PSA level before the surgery. International Prostate Symptom Score (IPSS) and quality of life (QoL) questionnaires were also administered to the patients. A prostate needle biopsy was performed before the surgery for suspicious or abnormal DRE or PSA> 3 ng/ml to exclude patients with malignant histopathology.

Patients with prostate cancer, neurogenic disorders, urethral trauma, renal dysfunction, urethral stricture, and who had an endoscopic procedure before were excluded from the study.

Possible causes of voiding dysfunction were excluded with the pressure-flow study if patients under 50 years or with prostate volume <40ml.

During the operation, irrigation was provided with 5% mannitol for monopolar and isotonic solution for bipolar system. At the end of the operation, continuous irrigation was applied with a 22F 3-way Foley catheter using isotonic solution and continued until there was no hematuria. Antibiotic prophylaxis was used with 1g cefazolin preoperatively and 12 hours after the operation. In addition, patients were prescribed oral 500mg ciprofloxacin twice a day until two days after postoperatively catheter removal.

The patients were divided into two groups. Group I included 47 patients in whom catheters were removed 24 hours after control of bleeding, and Group II included 44 patients in whom catheters were removed seven days after control of bleeding.

In the early group, patients were discharged after catheter removal with two or three successfull voids. In the delayed group, patients were discharged with a urethral catheter and requested to come for catheter removal after seven days.

At 1, 3, and 6th months after the operation, maximum flow rate and residual urine volume were measured, and we questioned LUTS, IPSS, and quality of life during all visits. Additionally, all patients were examined for complications (bleeding, infection, urethral stricture, a necessity for re-operation, and the number of referrals to the clinic).

Statistical Analysis: The descriptive values of the data obtained in the study were organized in tables. It was examined with the Shapiro-Wilk test if numerical variables showed normal distribution. In addition, the Mann-Whitney test was used for numerical, chi-square test for categorical variables compared to early and delayed catheter removal groups. Also, the Friedman test was used to examine the periodic changes in the two groups separately. A P value <0.05 was considered statistically significant, and PASW (ver.18) program was used for calculations.

RESULTS

After TURP, 91 patients were randomized to early and delayed catheter removal groups; 47 and 44 patients were included, respectively. In terms of the energy source used during the operation, the monopolar resection rate was 19.1% in the early group; 25% in the delayed group and was not statistically significant. The mean duration of catheterization (±standard deviation) was calculated as 36±10 hours in the early group and 8±1 days in the delayed group. All patients were followed for at least 6 months. The baseline characteristics of the patients are presented in Table 1. There was no statistical significance between the values.

IPSS and quality of life were questioned in 1, 3 and 6th months; maximum flow rate and residual urine volume were measured; all patients were interviewed regarding complications during all visits.

During the follow-up period, voiding symptoms ceased in most of the patients. IPSS and QoL scores decreased to 7.4/1.8 and 6.1/1.5; Qmax increased from 8.2 to 16.5 and from 6.7 to 16.2 mL/s; in the first month, in early and delayed groups respectively.

Also, PVR was at an unmeasurable level in both groups (Table 2). The results in all visits were significantly different from preoperative data (P <0.05). No significant difference was detected in the two groups in the 1st month.

Table 1. Baseline characteristics of patients before TURP

	Early	**Delayed**
Characteristics	***Mean - SD***	
Number of patients	47	44
Age (y)	60±8	61 ± 10
Prostate volume (mL)	56 ±15	63± 12
Qmax (mL/s)	8.7±3.8	6.2±4.4
PVR (mL)	140	159
IPSS	21±4	21±4
QoL	4 ± 1	4 ± 1
PSA (ng/mL)	3.1±1.5	4.2±3.8

Qmax: maximum flow rate, PVR: post-voided residue volume, IPSS: International prostate symptom score, QoL: Quality of life, PSA: Prostate-specific antigen.

Table 2. Voiding variables after TURP

	Early group			**Delayed group**		
	1st month	*3rd month*	*6thmonth*	*1st month*	*3rd month*	*6thmonth*
			Mean±SD			
Qmax (mL/s)	16.5±7.8	18.3±6.1	19.7±5.7	16.2±7.2	14.9±5.8	19.3±6.7
PVR (mL)	17±44	6.1±15	6.4±16.6	2±4	4.1±8.5	5.1±10.7
IPSS	7.4±5.3	4.7±3.2	4.3±3.4	6.1±4.5	6.2±4.3	4.6±3.1
QoL	1.8±1.2	1.3±0.8	1.1±0.8	1.5±0.9	1.6±0.9	1.3±0.9

*Qmax: maximum flow rate, PVR: post-voided residue volume, IPSS: International prostate symptom score, QoL: Quality of life

In the 3th month, we found only the maximum flow rate (18.3 mL/s in early and 14.9 mL/s in delayed groups) significantly higher in the early group. Nevertheless, in the 6th month, there was no significant difference between the both groups regarding urodynamic parameters.

Post-operative evaluation; 3th month compared with the 6th month, differences for the IPSS and QoL were not significant between the two groups (p> 0.05). As the overview, up to 6 months, the IPSS and quality of life in both groups were in a constant decrease trend, and the flow rate was determined to increase continually.

In addition, the early and delayed groups were compared among themselves in terms of values measured at three different times after TURP. The maximum flow rates of post-operative month 6 were statistically higher than post-operative months 1 and 3 in the two groups. It was observed that IPSS decreased gradually at all visits in both groups. (Table 2).

The clinic admission frequency was assessed within 6 months after discharge to identify post-operative complications. In the early and delayed groups, the number of outpatient hospital admissions about urological symptoms was found to be 0.74 and 0.70, respectively; it was not statistically significant (p=0.870).

Patients were also questionnaired in all visits for dysuria, hematuria, urinary tract infection, and obstructive symptoms. Macroscopic hematuria was not observed in both groups after the removal of the urethral catheter. Only one patient received antibiotic treatment in the early group with the diagnosis of urinary tract infection. After urethral catheter removal, urinary retention occurred in one patient, and after the following four days, spontaneous voiding was seen in the early group. Dysuria continued up to 3 months in the early and delayed groups, 23.4%, and 22.7%, respectively. No differences were detected when all complications (dysuria, urinary retention, urinary tract infection) were compared in the two groups.

Five patients in each group required endoscopic procedures for urethral stricture or bladder neck stenosis during the 6-month follow-up period. In all five patients in the early group, urethral stricture was observed. The urethral

stricture occurred within 1 one month in 4 patients and 3rd month in one patient. In the delayed catheter removal group, two patients underwent endoscopy with urethral stricture, 2 had bladder neck stenosis, and one had meatal stenosis. Meatal stenosis developed within the first month after TURP. In the delayed group, we observed urethra and bladder neck stenosis three months after the removal of the catheter. The kind of stenosis and changes in development time in the two groups were not statistically significant ($p = 0.806$).

DISCUSSION

TURP is currently the gold standard surgical treatment for BPH-associated LUTS. Surgical techniques other than TURP are claimed to have more advantages in terms of complications. The necessity of urethral catheterization for bladder irrigation after TURP is accepted without question by all clinicians. However, there is no consensus on how long the catheter should be kept after the operation. Some recommendations about catheter removal time; 1-2 hours after surgery, surgical night, one day after surgery, or after 2-3 days (4,5,6). Nevertheless, the knowledge of the literature is not sufficient yet about how long the duration of catheterization must be and the long-term effects of catheterization.

When the studies carried out so far are examined, a randomized controlled prospective study investigating the long-term effects of early or delayed removal of the catheter has not been designed until today. Generally, the advantages of removing the urethral catheter in the early period (the first 24 hours after surgery) are suggested to shorten the hospital stay and reduce treatment costs (7). Mueller et al. reported that catheter removal on post-operative day 1 decreases hospitalization time from 3.1 to 1.2 days, providing advantages in terms of treatment costs (8). Indeed, the total length of stay in the hospital is an essential parameter in the total treatment costs. However, assuming no other morbidity and delayed catheter removal is planned, hospitalization is not mandatory after controlling bleeding. In our study, in which hospitalization times were similar in both groups, we think that we did not allow long-term catheterization to increase the cost of treatment.

After the operation, the development of urethral stricture causes includes large prostate, long operating time, the thickness of the urethral catheter, infected urine, and using a thick resectoscope (9). Our study showed no statistically significant difference between the two groups in prostate volume. Therefore, we can say no substantial difference in the duration of the operation. We tried to minimize the differences between variable values except for the catheterization time as much as possible.

It is a separate discussion on monopolar and bipolar systems using different technologies and irrigation solutions that have superiorities to each other in terms of efficacy and complications of TURP. Although the use of two different energy systems in surgery is considered the limiting factor of the study; since the usage rates of various systems in the two groups are similar, it can be accepted that the two methods applied have negligible effect on the results.

After TURP, the new mucosa will be created immediately on the bladder neck and membranous urethra in the operated area. In one study, it was reported that after the operation, blood clots, fibrin, and necrotic cells would be removed with urination and without urination for a long time; these accumulated cells can lead to a stricture (10). However, until now, this has not been proven as histopathologic or urodynamic. On the other hand cause of corrupted integrity of the mucosal surfaces during surgery due to contact with urine, inflammation, and scar tissue formation has been suggested to induce the development of urethral stricture (9). Nielsen et al.; reported that edema and progressive subepithelial inflammation occur due to urinary extravasation, and urinary passage into the mucosal barrier posed by increased intramural voiding pressure predisposes the formation of urethral stricture (11). Strictures of the prostatic urethra are related to delayed epithelialization and excessive fibrotic tissue growth (12). No significant differences were observed regarding the incidence of stricture in the two groups in our study. On the contrary, 4 of 5 strictures in the delayed group were observed in the 3rd month or later. This suggests that longer catheterization could only delay the urethral stricture. However, studies with larger groups are required to reveal this situation.

In a study with 64 patients, they removed the urethral catheter as soon as they had clear urine after TURP and discharged within 23 hours. During this period, none of the patients has voiding difficulty or re-catheterization due to clot retention not being required (13). In another study with 66 patients with the urethral catheter removed after TURP on 1, 2, and 3rd days, re-catheterized patients were evaluated. There was no statistically significant relationship between early urethral catheter removal and the development of urinary retention after TURP in this study with a limited number of patients (14). While urinary retention was observed in only one patient in the early group, it was not in any patient in the delayed group in our study.

Despite the efficiency and complication rates in many clinics and studies, there is a consensus that early removal of urethral catheters reduces costs. Our clinic's average urethral catheter removal time varies from 2 to 5 days after surgery. The duration of catheterization is not a strict rule but it is decided by the surgeon in charge. Regarding the duration of catheterization, the factors to be considered include resection time, prostate size, the duration of post-operative

bleeding, the patient's general medical status, and diseases that could interfere with bladder function (e.g. diabetes mellitus). In this study, patients in both groups with early and delayed catheter removal were discharged 2 or 3 days after the operation. The delayed group was released with a urethral catheter, then re-invited for removal. Thus, it was ensured that there was no significant difference between the two groups in terms of hospital expenses.

While determining the duration of catheterization after TURP, not only the physical characteristics of the patient but also their mental and psychological conditions should be taken into account. After TURP, patients may experience significant anxiety due to hematuria, urinary retention, irritative complaints, or urethral catheter, and their quality of life may deteriorate. Rarely, re-catheterization may be necessary. In a study in which urinary retention and the need for catheterization were significantly higher in the early group, patients stated that they would prefer to stay with a catheter for one more day after TURP (14). However, the early removal of the urethral catheter is thought to have many advantages; the presence of a catheter after the operation increases the quality of life of patients by preventing many post-operative complications in the early period may be considered. Our study shows that dysuria seen in the early period harms the quality of life in the early group. However, not statistically significant; complaints from dysuria in the delayed group were observed to be more slightly. Prospective controlled studies on this topic will provide objective data about urethral catheterization and quality of life.

On the other hand, some clinicians advocate for early removal of the urethral catheter; short-term urethral catheterization reduces the risk of urinary tract infection (15). However, in our study, a urinary tract infection was seen in 1 patient in the early group; it was not detected in the delayed group. Thus, the urethral catheter was left in place for a couple more days; it can be said that it did not cause a significant increase in the risk of infection.

CONCLUSION

We compared the six-months results of the two groups: early and delayed removal of urethral catheters. We think we have contributed to the literature on the subject that seems simple but essential. Our findings suggest that early or late removal of the urethral catheter after TURP does not play an important role in terms of surgical morbidity and the efficacy of treatment. However, long-term outcomes should be expected to reach a more definite conclusion, and randomized prospective studies with large series should be designed.

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