Feasibility of Transvesical Prostate Resection and Its Effect on Postoperative Complications

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OBJECTIVE To study the feasibility of transvesical prostate resection and its effect on urethral stricture.

MATERIALS AND METHODS We included 99 patients with symptomatic bladder outlet obstruction who underwent transvesical resection of prostate (TVRP; $n = 48$) and transurethral (TURP; $n = 51$) prostatectomy. We examined all the patients by means of digital rectal examination, transrectal ultrasound, and evaluated them by international prostate symptom score, quality of life score, uroflowmetric assessment and PSA level, and established definitive diagnosis. We followed up the patients in first month, third month, and the first year of the operation and monitored once a year in the following years.

RESULTS In this study, totally 99 symptomatic bladder outlet obstruction patients were included (TVRP = 48 and TURP = 51). Mean age of the patients were 66.5 ± 8.2 vs 68 ± 9.8 years for our patients with TVRP and TURP, respectively. Two groups displayed similar values in terms of improvements in the Qmax and PVR, and there were no statistically significant differences in between. We obtained similar values for resection time and weight of resected prostate tissue in both groups. Urethral stricture was not observed in TVRP group. In TURP group however, stricture was observed in 4 (7.8%) patients in bulbar urethra in sixth month at average. And there was also a concomitant urethral meatal stricture in one of these patients. When the 2 groups were compared, the rate of urethral stricture was statistically significantly higher in the TURP group ($P = .001$).

CONCLUSION Resection of prostate without using urethra significantly reduces the incidence of urethral stricture due to mucosal damage. UROLOGY 127: 86–90, 2019. © 2019 Elsevier Inc.

Transvesical resection of prostate (TVRP) is a new surgical method which is already well-defined in the literature.[1] Since prostate is resected without any application to urethra in this method, we think that the development of urethral stricture will be avoided due to minimal damage on urethra. We conducted a comparative study with a view to assess the viability and feasibility of TVRP as well as its effects on urethral stricture with respect to TURP in treating bladder outlet obstruction (BOO) cases.

PATIENTS AND METHODS

This study was approved by the Local Ethics Committee. Both methods were proposed to all the patients as 2 options, and the decision was left up to the patient's preference. All surgical operations were implemented by the same surgeon and in the same center between July 2015 and May 2018. We examined all the patients by means of digital rectal examination, transrectal ultrasound, and evaluated them by international prostate symptom score (IPSS), Quality of Life (QoL) score, uroflowmetric assessment and PSA level, and established definitive diagnoses. We included the patients with normal urinary bladder function in the study, who were ≥45 years of age and had a clear clinical diagnosis of BOO with the prostate gland volume ≤80 mL, IPSS ≥20, QoL Score ≥3, maximal urinary flow rate (Qmax) <15 mL/s and those who previously underwent conservative medical therapy that failed and surgical treatment was indicated. As for the exclusion criteria, (1) the patients over 80 and under 45 years of age, (2) the patients with neurologic comorbidities, (3) the patients with a history of previous urethral surgery, (4) the patients with a history of urethral stricture, and (5) the patients with a history of bladder tumor were not included in the study. Three patients with a history of urethral stricture were removed from the TVRP group and 5 patients from the TURP group.

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Research involving human participants: *All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.*

Informed consent: Informed consent was obtained from all individual participants included in the study.

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The patients with complaints about postoperative voiding difficulty were controlled by uroflowmetry. The patients with suspected urethral stricture were performed cystoscopy to confirm whether they had stricture or not.

SURGICAL TECHNIQUE

We implemented all operations under general or spinal anesthesia and used a bipolar resectoscope, and performed all the operations by one and the same surgeon. We used Bipolar TVRP and TURP (Olympus 24-channel rotating continuous flow type, Tokyo, Japan) in 200W setting for resection and 100W setting for coagulation. During TVRP, continuous irrigation was performed with 0.9% saline solution bags that were hanged to the lowest height, allowing appropriate fluid flow (max. 60 cm).

Immediately before the operation, a cystoscopy was performed with a 17 Fr scope in order to assess resection percentage of the prostate and to exclude patients with concomitant conditions such as bladder cancer or urethral stricture. The bladder was filled completely with saline to ease suprapubic access and then the procedure started. Endoscopic examination of anterior bladder wall was performed to get a continuous intravesical guidance during percutaneous approach. A cystoscope can help in continuous intravesical direction during puncturing and dilatation and to protect the posterior bladder wall and rectum from damage. Bladder entry was achieved by inserting an access needle from suprapubic midline, about 4 cm above symphysis pubis. After inserting a guidewire, first the canal was dilated using a 12 Fr Amplatz dilator and then formed by using 28-30 Fr Amplatz dilator. A renal sheath was inserted into the formed canal. Then, we entered the bladder through renal sheath, by using a 24 Fr resectoscope shaft (Supplementary Figure 1). If present, the middle lobe was preferred to start resection. Resection continued with ventral sides (between 11 and 1 o'clock directions), then both lateral lobes and finished with apex. Lateral, anterior, and apical prostate tissues were resected up to the prostate capsule. All patients were given one dose of parenteral antibiotic prophylaxis. At the end of surgery, an 18 Fr 2-way Foley catheter was placed to each patient. Then a 16 Fr Nelaton catheter was inserted through the renal sheath, and fixed to the skin using 3-0 Vicryl. Irrigation fluid was sent from suprapubic Nelaton catheter, in case irrigation was required. Except for the patients who developed complications such as hematuria or clot retention, urethral catheters were removed 3 days after urine output became clear. Suprapubic catheters were removed 1 day after the operation and patients were discharged.

During TURP, we used a standard technique; 24 Fr resectoscope shaft, and we entered the bladder through urethra. We did not perform meatotomy in any patient. Prostate resection began from the middle lobe (if present), continued on ventral sides (between 11 and 1 o'clock directions), then lateral lobes and apex. Lateral, anterior, and apical prostate tissues were resected to the prostate capsule. A 18 Fr three-way latex Foley catheter was inserted in each patient postoperatively and removed 3 days after urine output became clear. Data on perioperative and postoperative complications, operation period, weight of resected prostate tissue, catheter removal time, and hospitalization period were recorded on patients' files.

Patients were examined 1 month, 3 months, and 1 year after operation. They were re-examined annually in the following period. In the follow-up, uroflowmetry, postvoid residual urine volume (PVR) measurement with ultrasonography, IPSS, and QoL were performed.

STATISTICAL ANALYSIS

Statistical analysis was performed using IBM SPSS (Statistics for Windows, Version 22.0. Armonk, NY) programme. Cases were divided into 2 groups and definite data analysis (mean, median, range, and percentages) was performed. Two sample Student's t tests were used for intergroup comparisons. P value of $<.05$ was considered as statistically significant.

RESULTS

In this study, we included totally 99 symptomatic BOO patients (TVRP = 48 and TURP = 51). The patients' data (mean ± SD) were as following (TVRP vs TURP): age, 66.5 ± 8.2 vs 68 ± 9.8 years; prostate volume, 51.6 ± 18.4 vs 59.9 ± 19.1 mL; PSA level, 3.5 ± 2.1 vs 3.6 ± 2.3 ng/mL; IPSS, 26.6 ± 5.9 vs 26.1 ± 6.4; QoL score, 4.1 ± 1.1 vs 4.2 ± 1.2; maximum urinary flow rate (Qmax), 6.7 ± 2.1 vs 5.1 ± 2.6 mL/s; PVR, 57.5 ± 22.3 vs 83.9 ± 20.4 mL. Except for PVR, we found no statistically significant differences between the 2 groups (Table 1).

All the patients were monitored for 18 months at average and for 12 months at minimum. The change in the Qmax and PVR parameters are displayed in Table 2. Evidently there were no statistically significant differences between the 2 groups. Similar values were found for the resection time and weight of the resected prostate tissue in 2 groups (Table 2). Histopathology was reported as BPH in all patients.

Urethral stricture was not observed in TVPR group. In TURP group however, bulbar urethral stricture was observed in 4 (7.8 %) patients in the sixth month at average. The diagnosis of urethral stricture was assessed by means of uroflowmetry in the patients with complaints regarding urination. The patients with suspected urethral stricture were performed cysytoscopy to confirm if they had stricture or not.

One of these patients had accompanying meatal stenosis. When both groups were compared, the rate of urethral stricture was statistically significantly higher in the TURP group (P = .001; Table 3). Reoperations were required in all these patients, which were visual urethrotomy in 5 patients and external meatotomy in 1 patient as well as a repeated dilatation in 1 patient. Temporary stress or urge incontinence lasted for an average of 1.8 months in 3 (6.2%) patients in TVRP group. In TURP group however, stress incontinence was observed for an average of 2 months in 7 (13%) patients. At the end of the third month, there was no incontinence in any of the patients (Table 3).

Urinary tract infection, temporary hematuria, and acute retention were observed in both groups at similar rates.

Table 1. Preoperative baseline patients characteristics

Parameters	TVRP ($n = 48$)	TURP ($n = 51$)	*P* Value
Age	66.5 ± 8.2	68 ± 9.8	.4
PSA	3.5 ± 2.1	3.6 ± 2.3	.256
Prostate volume	51.6 ± 18.4	59.9 ± 19.1	.927
IPSS	26.6 ± 5.9	26.1 ± 6.4	.741
Q max	6.7 ± 2.1	5.1 ± 2.6	.66
PVR	57.5 ± 22.3	83.9 ± 20.4	**.02**
IIEF	16.8 ± 4.3	12.5 ± 5.1	.804
AUR	12	14	.9
QL	4.1 ± 1.1	4.2 ± 1.2	.838
Concomıtant dısorders	22	25	.1
BMI	24.1 ± 4.4	26.4 ± 5.3	.375

IPSS, International Prostate Symptom Score; PSA, prostate-specific antigen; PV, prostate gland volume; PVR, postvoid residual urine volume; Qmax, maximum flow rate; QoL, quality of life.
Values are given as mean ± standard deviation ($p < 0.05$).

However, dysuria seen in the first 2 weeks was observed in TURP group statistically significantly higher ($P = .01$; Table 4).

DISCUSSION

BOO is frequently encountered worldwide, with a steadily increasing morbidity, with increasing age. Since 1980s, gold standard[2] treatment method of BOO is recognized as TURP. We can mention urethral strictures in different locations as the major and annoying late complication of TURP.[3] Around 60% of strictures requiring complex interventions such as urethroplasty and dilatation may develop again within 1 year after initial treatment. Such a complication risk is a major concern about the urethral stricture development following TURP. Besides patient related factors such as age, type and diameter of the urethral catheter, diameter of the resectoscope, duration of catheterization and resection can be mentioned as risk factors in developing urethral strictures after TURP.[4-6]

In this study, the incidence of urethral stricture for TVRP and TURP was determined as 0%-7.8%, respectively. Considering the studies in the literature, this is clearly a significant success.[3,4,7,8] This situation has already been demonstrated in a similar way in the early results of our study.[1] In TURP group however, stricture was observed at the rate of 7.8% in compliance with the literature.[7,8] Urethra is not used in our surgical technique and prostate is removed through the bladder, which is similar to open prostatectomies.

Despite new methods such as holmium laser and green light laser in daily use, owing to new technological developments, the rate of urethral stricture after TURP did not change considerably.[8-10] Laser vaporization and conventional TURP were compared in a prospective study in terms of development of urethral stricture and significantly lower urethral stricture incidence was found in laser vaporization group.[9] The higher incidence of urethral stricture in TURP group was related to large-diameter shaft use in that study (23Fr vs 26Fr).[10] In general, wider resectoscope shafts used in the operations were blamed in the studies reporting higher urethral stricture incidence for TURP.[11,12] As shown in these studies, mucosal damage and consequent urethral stricture are common in urethral interventions, in parallel with the diameter of resectoscope. In our study however, mucosal damage and urethral stricture are minimized since urethra is not used at all.

Table 2. Operational data and postoperative findings

Parameters	TVRP ($n = 48$)	TURP ($n = 51$)	*P* Value
Resection time (min)	37.6 ± 14.2	38 ± 13.8	.299
Resected prostate tissue(g)	27.2 ± 12.6	33.2 ± 13.1	.890
Postoperative Qmax (mL/s)			
1 mo	18.5 ± 3.8	16.9 ± 3.6	.090
3 mo	19.7 ± 3.9	18.2 ± 4.1	.057
12 mo	20.8 ± 4.5	19.04 ± 4.1	.368
Postoperative IPSS			
1 mo	9.3	9.9	.211
3 mo	8.5	8.8	.78
12 mo	7.4	7.7	.45
Postoperative PVR (mL)			
1 mo	32.7 ± 15.5	43.7 ± 17.9	.289
3 mo	34.9 ± 14.8	34 ± 17.4	.710
12 mo	31.2 ± 15.8	34.7 ± 18.4	.133

IPSS, International Prostate Symptom Score; PVR, postvoid residual urine volume; Qmax, maximum flow rate.
Values are given as mean ± standard deviation.

Table 3. Postoperative complications

Parameters *n* (%)	TVRP (*n* = 48)	TURP (*n* = 51)	*P* Value
Urethral strictures			.001
Yes	0	4 (7,8)	
No	48 (100)	47 (92.2)	
Time of occurrence of urethral strictures (mo)	-	6	.01
Incontinence			.06
Yes	3 (6.2)	7 (13)	
No	45 (93.8)	44 (87)	
Incontinence duration (month)	1.8	2	.87
Peroperative complications	0	0	

Incontinence is another example of unpleasant complications after TURP. In most cases, incontinence is the consequence of intraoperative damage to the native urinary sphincteric mechanisms.[13] In this operation, incontinence is temporary in most cases. The rate of permanent incontinence is reported as %0,5-1.[7] In our study, permanent incontinence did not develop in any of the patients but only temporary incontinence was observed to be lasting for 2 months at average. This situation too is compliant with the literature and there is no statistically significant difference between TVRP and TURP.

Temporary hematuria, urinary tract infection, temporary acute retention, and dysuria are likely to occur in post-TURP early phase. When TURP and TVRP are compared, all these complications were observed at similar rates. However the rate of dysuria was observed at a statistically significantly lower rate in TVRP group. The reason for that is probably minimal mucosal erosion due to nonusage of urethra, in our opinion. Post-TURP dysuria can be seen at the rate of 10%, according to the literature.[14] In our study, dysuria was observed at the rate of 2% in TVRP group.

The only disadvantage of TVRP is percutaneous cystotomy required for the patient. However, percutaneous cystotomy catheter can be safely used for the patients having acute retention and probe is not possible in routine use. Although there are some potential complications of percutaneous cystotomy, such examples take place in the literature as case reports.[15] Moreover, these complications are reduced to miminum level since percutaneous cystotomy in TVRP is performed under cystoscopic guidance. We think that bladder damage due to cystostomy catheter in the postoperative first day has no clinical significance.

The weakness of our study can be listed as its retrospective design and the limited number of patients. We think that it is an important study in regard to reducing the rate of developing urethral stricture significantly. Besides, it reveals the applicability and pertinence of this new method by clearly displaying its efficacy and complication rates.

In conclusion, resecting prostate without using urethra substantially reduces the incidence of urethral stricture related with mucosal damage, and helps the urologists to manage this late complication of TURP.

Table 4. Short term postoperative complications

n (%)	TVRP (*n* = 48)	TURP (*n* = 51)	*P* Value
Dysuria	1 (2)	8 (15.6)	.01
UTI	4 (8.3)	6 (11.7)	.56
Hematuria	2 (4.1)	3 (5.8)	.6
AUR	1 (2)	1 (1.9)	.9

AUR, acute urinary retention; UTI, urinary tract infection.

SUPPLEMENTARY MATERIALS

Supplementary material associated with this article can be found in the online version at https://doi.org/10.1016/j.urology.2019.01.037.

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