

# Conventional monopolar transurethral resection of prostate in patients with large prostate ( $\geq 80$ grams)

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## Article history

Submitted: May 25, 2013

Accepted: June 23, 2013

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**Introduction.** Transurethral resection of the prostate (TURP) is still regarded as the gold standard for the treatment of lower urinary tract symptoms (LUTS) secondary to benign prostate obstruction in prostates between 30 and 80 mL. Endoscopic treatment of large prostate is not adequately discussed in literature. Our objective was to evaluate the efficacy and safety of TURP in large prostate glands ( $\geq 80$  ml) in patients with BPH.

**Material and methods.** From May 2004 to September 2012, 62 patients with high volume of BPH ( $\geq 80$  ml) treated with TURP by single surgeon, were evaluated retrospectively. Perioperative and post-operative full blood count and serum electrolytes, complications, operative time, weight of resected prostate tissue, time for catheter removal, and hospitalization time were recorded. Conventional TURP was performed using a standard technique.

**Results.** The mean PSA levels and prostate volumes were  $8 \pm 5.38$  ng/ml and  $90.93 \pm 13.95$  gm, respectively. The mean operating time was  $55.96 \pm 8.04$  minutes. The mean amount of tissue resected was  $52.21 \pm 7.59$  gm. Compare with baseline, there were significant improvements in International Prostate Symptom Score (IPSS), Quality of Life (QoL), maximum urinary flow rate (Qmax), and postvoiding residual urine after surgery. There was no major bleeding complication. There was no TUR syndrome or intraoperative death. Requiring re-catheterization was detected for 3 (4.8%) patients. Transient urge incontinence was observed for 3 (4.8%) patients. Bulbar urethral stricture was developed for 2 (3.2%) patients.

**Conclusions.** Morbidity of the TURP is decreased with the technological improvements. Conventional monopolar TURP can be effectively performed in large prostate ( $\geq 80$  mL) with the experience.

**Key Words:** benign prostate hypertrophy ◊ TURP ◊ large prostate

## INTRODUCTION

Benign prostatic hyperplasia (BPH) is a progressive disease leading to a gradual decrease in the quality of life of men. Lower urinary tract symptoms (LUTS) secondary to BPH are a common condition in the present aging of the male population. Transurethral resection of the prostate (TURP) still represents the gold standard in the operative managements of BPH [1–4]. During the last decade, there has been a continuous decline in the rate of TURP for the treatment

of LUTS secondary to benign prostate obstruction in prostates. In 1999, TURP represented 81% of all surgery for BPH in the USA, but by 2005, TURP represented only 39% of surgical procedures for BPH, due to the combined effect of fewer prostatic operations and minimally invasive procedures [5].

Lowrance et al. have stated that approximately 56% of reported procedures were performed electrosurgically by those certifying in 2010 (down from 89% in 2004), and laser prostatectomy use increased from 11% in 2004 to 44% in 2010 [6].

TURP can completely resect the adenoma. It is typically performed on prostate glands between 30 and 80 mL, and it could increase the operative morbidity when in procedures lasting more than 90 min. Post-operative complications rate increased in patients with prostate glands greater than 45 g or a history of acute urinary retention and in elderly patients above 80 years old [1].

Open prostatectomy is the classic therapy for symptomatic patients with large prostates (>80 gr) [3]. New developments such as laser (holmium laser and green light laser), staged TURP, laparoscopic prostatectomy, and bipolar TURP are options to replace this invasive procedure.

TURP is still regarded as the gold standard for the treatment of LUTS secondary to benign prostate obstruction in prostates between 30 and 80 mL. This limit depends on the surgeon's experience and resection speed. In a study by Michielsen et al., TURP was performed for large prostate glands (>60 mL) [7]. We retrospectively analyzed the efficacy and safety of TURP resection in large prostate glands ( $\geq 80$  ml) in patients with BPH.

## MATERIALS AND METHODS

From May 2004 to September 2012, 62 patients with lower urinary tract symptoms (LUTS) due to the high volume of BPH ( $\geq 80$  mL) treated with TURP were enrolled in this study. Data were collected retrospectively. Voiding symptoms and quality of life (QoL) were graded according to the International Prostate Symptom Score (IPSS) and its QoL assessment index [8]. Score of IPSS 13 or greater, QoL index of 3 or greater, and maximal urinary flow rates ( $Q_{max}$ ) <15 ml/s, prostate volume (PV)  $\geq 80$  ml patients were enrolled in our study.

The diagnostic evaluation included: history, physical and digital rectal examination, urinalysis, renal function, serum electrolytes, full blood count, prostate-specific antigen (PSA) determination, uroflowmetry, and abdominal ultrasound measurement of post-void residual urine volume. Transrectal ultrasound was performed to measure the prostate volume preoperatively.

Exclusion criteria were evidence or suspicion of prostate or bladder malignancy, bladder neurogenic disorder, and previous surgical treatments for BPH.

### Equipment

All of the procedures were performed under general or spinal anesthesia. Conventional TURP was performed using a standard technique (26 Ch rotatable sheath continuous flow-type; Comeg, Tuttlin-

gen, Germany; or Storz, Tuttlingen, Germany) and a Valleylab (Foece FX, Boulder, CO) or PETKOT 600 (PETAŞ, Ankara, Turkey) electro surgical instrument system with the setting at 120 W for cutting and 90 W for coagulation. All procedures were performed by a single surgeon. During TURP, continuous irrigation was performed with using mannitol 5% solution in 3000-mL bags. Mannitol bags were hung in the minimum height sufficient for appropriate fluid flow (maximum 60 cm).

### Surgical technique

Resection of the prostate was started from the middle lobe if it is existed. Then, resection was started ventral parts of the prostate (between 11 and 1 o'clock), followed by both lateral lobes, and finished with the apex. Lateral, anterior, and apical prostatic tissues were resected until the prostatic capsula. All patients received parenteral antibiotic prophylaxis.

At the end of surgery 22 Fr 3-way indwelling Foley catheter was inserted and continuous isotonic saline bladder irrigation was applied until bleeding had stopped. The catheters of the patients were removed in 48–72 hours after the urine became clear except in patients who developed complications such as hematuria and clot retention.

In all patients, a full blood count and serum electrolytes were determined after surgery. Signs and symptoms of transurethral resection (TUR) syndrome were also assessed clinically. TUR syndrome was defined as a sodium level after TURP of  $\leq 125$  mmol/L with two or more symptoms or signs of TUR syndrome: nausea, vomiting, bradycardia, hypotension, hypertension, chest pain, mental confusion, anxiety, paresthesia, and visual disturbances [9, 10]. Perioperative and postoperative complications, operative time, weight of resected prostate tissue, time to catheter removal, and hospitalization time were recorded. After discharge, patients were followed at 3 months and then yearly. The follow-up included the uroflowmetry, abdominal ultrasound measurement of post-void residual urine volume, IPSS, QoL, and PSA.

Complications were categorized into perioperative (intraoperative or immediate postoperative) complications, early postoperative complications (within 30 day after surgery), and late-term complications (>30 day after surgery).

### Statistical analysis

All data were expressed as the mean  $\pm$ SD. The Mann-Whitney U test was used for baseline characteristics. Comparisons for continuous variables be-

**Table 1.** Baseline characteristics of patients

Characteristics	Mean $\pm$ SD
Patients number	62
Age (year)	66.88 $\pm$ 7.18
PSA (ng/ml)	8.0 $\pm$ 5.38
IPSS	23.0 $\pm$ 2.5
Qmax (mL/s)	6.8 $\pm$ 1.7
QoL	4.7 $\pm$ 0.7

**Table 2.** Operative and perioperative variables

Variables	Mean $\pm$ SD
Operative time (mins)	55.96 $\pm$ 8.04
Resection weight (gm)	52.21 $\pm$ 7.59
Catheterization time (day)	3.77 $\pm$ 1.12
Hospital stay (day)	4.17 $\pm$ 1.23

fore and after operation for the same patients were performed using Wilcoxon rank-sum test. Probability values of  $p < 0.05$  were considered statistically significant. All analyses were performed using SPSS version 18.0 (IBM Corp., Armonk, NY).

## RESULTS

A total of 62 patients were evaluated. The mean age was 66.88  $\pm$ 7.18 year. The baseline characteristics of all patients are shown in Table 1. The mean prostate volumes were 90.93  $\pm$ 13.95 mL. The mean PSA levels of the patients were 8  $\pm$ 5.38 ng/mL. The mean operating time (time between introduction and removal of resectoscope) was 55.96  $\pm$ 8.04 minutes. The operating time restricted with 90 minutes. The mean amount of tissue resected was 52.21  $\pm$ 7.59 gm. The mean time for removal of catheter was 3.77  $\pm$ 1.12 days and the hospital stay 4.17  $\pm$ 1.23 days. The mean follow-up time was 61.88  $\pm$ 20.1 months. Operative and perioperative variables are shown in table 2. Compare with baseline, there were significant improvements in IPSS, QoL, Qmax, and postvoiding residual urine after surgery. The limitation of this study is that it is a retrospective observational study. There was no major bleeding complication and, no significant difference in the hemoglobin levels before and after surgery. Blood transfusion occurred in one (1.6%) patient. In the early postoperative period, clot retention with secondary bleeding was observed in 3 (4.8%) patients, and bladder irrigation was performed for these patients. There was no significant difference in serum sodium levels before and after surgery. Comparisons of preoperative and postop-

erative variables are shown in Table 3. Hyponatremia was detected in one patient after the surgery (serum sodium concentration was 125 mmol/L). Normal saline hydration and furosemide treatment was applied for these patients, and signs and symptoms of TUR syndrome were not detected clinically. There was no TUR syndrome or intraoperative death. Complications are shown in Table 4.

Requiring re-catheterization after TURP was detected for 3 (4.8%) patients. Catheter was removed 5 days after for these patients, and there was no complication to inability to void. The most frequent complications were significant (urinary tract infection) UTI (in 5 patients, 8.06%). These patients were treated successfully with antibiotics.

Transient urge incontinence was detected for three patients, and these were treated with anticholinergic and anti-inflammatories. Long-term incontinence was not detected. For long-term complications, bulbar urethral stricture was developed for

**Table 3.** Comparison of preoperative and postoperative variables

	Preoperative	Postoperative
Hemoglobin (mg/dl)	13.77 $\pm$ 1.14	13.15 $\pm$ 1.12
Sodium (mmol/l)	138.15 $\pm$ 2.0	135.65 $\pm$ 2.07
IPSS	23.01 $\pm$ 2.48	5.07 $\pm$ 1.48
Qmax (mL/s)	6.83 $\pm$ 1.7	22.17 $\pm$ 1.80
QoL	4.67 $\pm$ 0.69	1.74 $\pm$ 0.57

**Table 4.** Complications

	Number of patients (%)
Intraoperative complications	
Bleeding requiring transfusion	0
Death	0
TUR syndrome	0
Early postoperative complications	
Transfusion	1 (1.6%)
Clot retention	3 (4.8%)
Urinary tract infection (UTI)	5 (8.06%)
Re-catheterization	3 (4.8%)
Mild to moderate dysuria	8 (12.9%)
Transient incontinence	3 (4.8%)
Late postoperative complications	
Urethral stricture	2 (3.2%)
Bladder neck contracture	0
Incontinence	0
Re-operation for BPH	1 (1.6%)

two patients, and it was treated successfully with internal urethrotomy. Bladder neck contracture was not detected.

## DISCUSSION

TURP is still regarded as the gold standard for the treatment of LUTS secondary to benign prostate obstruction in prostates. The number of TURPs performed has gradually decreased in Europe and North America [5, 6, 9]. Medical therapy for BPH has actually limited the indications for surgical treatment only in patients who are resistant to medical therapy or those with unfavorable prognostic factors. Today, the treatment option for large prostates is open prostatectomy. Open prostatectomy should be treatment of the choice of in patients with prostate volume of greater than 80 to 100 ml and related large bladder stones, and when diverticulum resection is indicated [8, 11, 12]. Endoscopic treatment of large prostate is not adequately discussed in literature. The limit of the prostate volume for TURP depends on the surgeon's experience and resection speed.

Management of large prostate gland is not without consequences. Mebust et al clearly identified an association between rising prostate volume and the risk of complications in patients that are treated with TURP [1]. We tried TURP for large prostate and we proposed that TURP can also treat large prostate  $\geq 80$  mL. The limitations of current study were its retrospective nature, and patient sample size was relatively small.

We observed the significant improvements in IPSS, QoL score, Qmax., and postvoiding residual urine in postoperative follow-up. Sustained improvements and long-term efficacy of TURP were showed in some studies [2, 13]. Our data show that TURP can safely be performed with large prostate  $\geq 80$  mL.

Complications such as bleeding and the TUR syndrome discourage some urologist from performing endoscopic resection in large prostates. TUR syndrome (symptomatic dilutional hyponatremia from fluid overload) manifests itself with cardiovascular and neurologic symptoms and signs. TUR syndrome is caused by dilutional hyponatremia (serum sodium  $<125$  mEq/l), and it is characterized by mental confusion, nausea, vomiting, hypertension, bradycardia, and visual disturbances. The incidence of TUR syndrome has decreased significantly during the last few decades. Several methods have been recommended to decrease the fluid absorption and overload including maintaining low intravesical pressure by using low inflow pressure, continuous flow resectoscopy, and limiting the time spent performing the resection

( $<90$  min) [1, 8]. TUR syndrome largely disappeared with the use of modern irrigation fluids, improved surgical techniques, and continuous flow surgical instruments. The incidence of TUR syndrome has decreased significantly during the past few decades from 3–5% to  $<1\%$ . Mortality after TURP has decreased to  $<0.25\%$  [1–4, 12].

Mebust et al reported 3885 patients data who underwent TURP and found that with a resection time more than 90 minutes, the incidence of development of TUR syndrome was significantly higher (2%) than the group with a resection time less than 90 minutes (0.7%) [1].

Tasci et al. have evaluated 4320 patients' data who underwent monopolar TURP and they have reported that there was no TUR syndrome or intraoperative death [13]. Kallenberg et al have evaluated 91 patients' long-term follow-up data who underwent the TURP for BPH. They have been reported that there was no TUR syndrome too [14]. In our study, the procedures were performed with monopolar technology. We used low inflow pressure to decrease the fluid absorption and overload including maintaining low intravesical pressure by using continuous flow resectoscopy and limited fluid height (max 60 cm). Some complications are related to prolonged operating times. We did not exceed 90 minutes for operations time to prevent complications. Our results show that there was no TUR syndrome or intraoperative death in 62 patients who had prostate greater than 80 mL and underwent monopolar TURP. In our opinion, prostate limit for TURP depends on the surgeon's experience and resection speed.

Recurrent or persistent bleeding sometimes results in clot formations and a bladder tamponade that required evacuation or even reintervention (1.3–5%). Transfusion rates in TURP series have been significantly reduced over time. But clot retention incidence ranges between 2% and 5% and bleeding still remains a problem [4]. In a study, severe bleeding necessitating intraoperative or postoperative blood transfusion was seen in 7 (0.25%) patients [13]. In our study, the most frequent complications that occurred within first month after TURP were urinary tract infection (8.06%), recatheterization (4.8%), and secondary bleeding requiring evacuation or irrigation (4.8%).

Lee et al. have reported on three (7.7%) transfusion and four (10.3%) clot retentions in TURP. They found no significant difference in the changes in hemoglobin levels or serum sodium levels before and after the surgery [15]. In another study, transfusions were clinically indicated by the intraoperative development of hypovolemic shock symptoms and a decrease in hemoglobin to as low as 7 gm/dl, and transfusion

rate was reported 2% [16]. Mebust and colleagues retrospectively reviewed 3885 patients who underwent TURP and found that with a resection time more than 90 minutes, the incidence of intraoperative bleeding was significantly higher (7.3%) than the group with a resection time less than 90 minutes (0.9%) [1]. In our study, there was no major bleeding complication. There were one (1.6%) transfusion and two (3.2%) clot retention requiring evacuation. We offered blood transfusion postoperatively in one patient, who had cardiac problem with mild anemia or lower limit hemoglobin values preoperatively. There was no significant difference in the changes in hemoglobin levels or serum sodium levels before and after the surgery.

Several infection rates were published in literature. Colau et al. have reported that the incidence of postoperative TURP infection was 21.6%, including 2.3% rate of septic shock [17]. Rassweiler et al. have reported low rate infection (1.7%) [4]. The incidence of post-op TURP infection rate was 8.06% in our study.

Early incontinence may occur in up to 30–40% of patients. However, late iatrogenic stress incontinence occurs in lower than 0.5% of patients. Early incontinence is usually urge symptomatic, because of irritative symptoms associated urinary tract infection, and detrusor instability caused by long-lasting BPH [4]. Ou et al. have reported that one patient presented temporary stress incontinence postoperatively, and it resolved without any treatment [18]. In our study, postoperative temporary stress incontinence was detected in two (4.8%) patients, which resolved spontaneously after 3 months without any medication or surgical intervention.

The rate of urethral stricture varies from 2.2% to 9.8% in the literature. The incidence of bladder neck stenosis is reported as 0.3% to 9.2% [4, 13, 16]. In our study, 3 patients required further surgery for urethral and meatal stricture (one patient (1.6%) un-

derwent endourethrotomy, and two patients (3.2%) underwent urethral meatoplasty).

Reich et al have reported that mortality rate was increased to 0.71% when resection weight exceeded 60 gm (compared to 0.06% for 60 gm or less and 0.09% for 30 gm or less). The risk of intraoperative or postoperative bleeding requiring blood transfusion increased with a resection weight more than 60 gm [19]. Bipolar transurethral resection was suggested to reduce the complications and avoid TUR syndrome. Starkman et al. have been reported that they detected hyponatremia and pulmonary edema in a patient who had TURP using bipolar transurethral resection. They did not detect major bleeding complication or episodes of clot retention requiring evacuation [20].

A total of 20,671 patients who underwent TURP between 1992 and 1996 were followed up for 8 years, and the incidence of a secondary TURP at one year was 2.9% [3]. Tascı et al. have reported that re-treatment with the recurrent BPH rate was 4.4% [13]. In our series, re-treatment rate for BPH was one (1.6%) patient in the following time.

## CONCLUSIONS

Several technical improvements and significant improvements in teaching modalities, including video-assisted TURP, using continuous-flow instruments, modifications of high-frequency generators, allow better education and reduction of operation time. Morbidity of the TURP is decreased with these improvements. Conventional monopolar TURP can be performed with efficacy in large prostate ( $\geq 80$  mL) with the experience. Randomized studies of TURP vs. open prostatectomy are necessary for prostate greater than 80 mL. Of course, the limit of our study was that patient sample size was relatively small, so further randomized, comparative investigation is required.

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