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Original Research Article

Efficacy of bipolar transurethral resection of the prostate using TURIS: our short term experience

Praveen Singh, Mohd Mubashir A. Khan*

Department of Urology, Uttar Pradesh University of Medical Sciences, Saifai, Etawah, Uttar Pradesh, India

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***Correspondence:**
Dr. Mohd Mubashir A. Khan,
E-mail: drmubashiralikhan@yahoo.com

ABSTRACT

Background: Objective of the study was to report our short term experience regarding efficacy of bipolar transurethral resection of prostate using TURIS (transurethral resection in saline) system.
Methods: Between May 2016 to April 2017 49 consecutive patients underwent bipolar transurethral resection of prostate (B-TURP) at our institute. All patients were evaluated preoperatively by physical examination, ultrasonography and laboratory studies, including measurement of hemoglobin, serum sodium, and prostate specific antigen levels. Patients were assessed postoperatively at three, six and 18 months.
Results: The mean age of the patients was 64.83±7.47 years and mean preoperative prostate volume was 64.73±13.59 ml. The mean preoperative hemoglobin was 13.32±0.9 g/l and mean postoperative hemoglobin was 12.09±1.11 g/l. The mean resection time was 57.02±14.37 minutes and mean resected specimen weight was 41.69±12.15 gm. The mean preoperative maximum urinary flow rate (Qmax) was 8.6±1.17 ml/s and mean Qmax at three, six and 18 months follow up was 18.85±2.15, 19.43±1.49 and 18.98±1.6 ml/s respectively. The mean preoperative international prostate symptom score (IPSS) was 26.32±2.69 and mean IPSS at three, six and 18 months follow up was 6.68±1.36, 6.47±0.79 and 6.30±0.9 respectively. Only one patient developed urethral stricture during follow up.
Conclusions: The B-TURP is efficacious and results in significant improvement in IPSS and Qmax. The urethral stricture rate after B-TURP is not different from monopolar TURP.

Keywords: Bipolar transurethral resection of prostate, Benign prostatic hyperplasia, Urethral stricture

INTRODUCTION

Transurethral resection of prostate (TURP) is still the gold standard treatment for benign prostatic hyperplasia.[1,2] TURP rates have declined over the past two decades due to the significant benefits of medical therapy and, to a lesser extent, the proliferation of alternative surgical techniques.[3]

TURP can be done by using monopolar or bipolar current. Monopolar TURP (M-TURP) is already established and gold standard procedure against which all other modalities are compared. However, M-TURP is associated with potential complications such as intraoperative bleeding, clot retention and transurethral resection (TUR) syndrome, and has an overall morbidity rate of 11.1%.[4] Bipolar TURP (B-TURP) has become increasingly popular because it utilizes saline irrigation, which avoids the potential for TUR syndrome and the associated constraints on resection time.[5]

However, there are reports that B-TURP is associated with increased incidence of urethral stricture (US).[6-8] This is despite the fact that bipolar current has a smaller depth of tissue penetration due to lower peak voltage and high frequency.[9] Many other studies have not observed a significant difference in urethral stricture rates between M-TURP and B-TURP.[10-13]

We hereby report our short term experience using bipolar current to perform TURP.

METHODS

This is an observational prospective study. Between May 2016 and April 2017 49 consecutive patients underwent B-TURP at our institute. All patients were evaluated preoperatively by physical examinations, digital rectal examination and laboratory studies that included measurement of hemoglobin, serum sodium, prostate specific antigen (PSA), coagulation profile and urinalysis with or without culture to exclude infection. Patients who were not in refractory urinary retention underwent uroflowmetry. Imaging data included abdomino-pelvic ultrasonography to assess the volume of prostate. International prostate symptom score (IPSS) of all patients was recorded. Patients were considered candidates for surgery if they had bothersome symptoms with IPSS>18 despite medical treatment, refractory urinary retention, recurrent urinary tract infections, hematuria, bladder stones or renal impairment due to benign prostatic enlargement. Patients with suspicion of prostatic cancer, neurogenic bladder dysfunction or previous prostatic surgery were excluded from analysis.

All patients received preoperative antibiotics. All the procedures were done under spinal anesthesia. Cystoscopy was done initially in all patients to assess the urethra, any bladder pathology and prostate size. All cases were done by single surgeon. We used Olympus TUR in saline (TURIS) system for B-TURP, which included 26 Fr continuous flow sheath, rotatable inner sheath with visual obturator, active working element, 4mm 30^0 direction of view telescope. Erbe VIO 300D electrosurgical unit (Erbe Elektromedizin GmbH, Tubingen, Germany) was used as source of energy. The settings were effect 5 for cutting and effect 4 for coagulation. Erbe VIO 300D has a power limitation and supply within the range needed power based on tissue conditions. For bipolar cut++ the maximum output is 300±20% watts, independent of effect setting in initial cutting stage for milliseconds. In tissues with ignited plasma 210 watts is maximum output. In bipolar soft coagulation++ with effect 4 the maximum output is 80 watts. The irrigation fluid used was 0.9% saline.

At the end of procedure, a 22 Fr three way Foleys catheter was inserted and continuous bladder irrigation was commenced with 0.9% saline. The catheter was removed 24 hours after urine had become clear, following the cessation of irrigation.

Perioperative data such as resection time (defined as time elapsed from start of resection to insertion of catheter), weight of resected prostate, duration of urethral catheterization and hospital stay were recorded. Postoperatively serum sodium and hemoglobin were examined immediately after shifting to recovery room. After discharge, patients were reassessed at three, six and 18 months after surgery and IPSS and Qmax were recorded. Retrograde urethrography was performed in patients with lower urinary tract symptoms and a Qmax<10 ml/s to assess for urethral stricture (US). If no US was diagnosed, cystoscopy was done to exclude any residual adenoma as a cause for low Qmax.

Statistical analysis

Categorical variables were presented in number and percentage and continuous variables were presented as mean± standard deviation. Paired t test were used for comparing preoperative and postoperative parametric variables and Wilcoxon Signed Ranks Test was used for non parametric variables. A p value of <0.05 was considered statistically significant. The data was entered in MS EXCEL spread sheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 16.0.

RESULTS

Table 1 lists the patients' baseline characteristics, operative data, and early postoperative outcomes. Although there was a statistically significant difference between preoperative and postoperative hemoglobin levels, only one patient (2.04%) required blood transfusion in the postoperative period. Similarly there was a statistically significant difference between preoperative and postoperative serum sodium levels, but none of the patients required correction of serum sodium levels or developed TUR syndrome.

In our study 18 patients had refractory urinary retention. Preoperative uroflowmetry was done for 31/49 patients, showing a mean Qmax of 8.66±1.17 ml/s. At three, six and 18 months 46, 44 and 42 patients respectively came for follow up. Their mean Qmax was 18.85±2.15 ml/s, 19.43±1.49 ml/s, and 18.98±1.6 ml/s respectively. The mean preoperative IPSS was 26.32±2.69. At three months follow up IPSS of only 45 patients could be recorded, while at six and 18 months follow up IPSS of 44 and 42 patients was noted respectively. The mean IPSS at three, six and 18 months was 6.68±1.3, 6.47±0.79 and 6.30±0.99 respectively. While analyzing Qmax, we found that there were only 30, 28 and 26 patients at three, six and 18 months follow up respectively whose preoperative Qmax was recorded (Table 2). Similarly while analyzing IPSS of patients during follow up, there were only 45, 44 and 42 patients at three, six and 18 months respectively whose preoperative IPSS was recorded (Table 3).

Two patients (4.08%) failed to void after catheter removal and required recatheterisation. They were successfully weaned off the catheter on day 6. Two patients (4.08%) had culture proven urinary tract infection that was treated with appropriate antibiotics. None of our patients reported any form of urinary incontinence. Only one patient (2.04%) was found to have Qmax<10 ml/s at six months follow up. He was

assessed with retrograde urethrography and found to have focal stricture at bulbo-membranous junction. He was managed with optical internal urethrotomy.

Table 1: Patient characteristics, perioperative, and postoperative parameters.

Characteristics	N	Min	Max	Mean	SD
Age (years)	49	51	82	64.83	7.47
Prostate volume (ml)	49	38	85	64.73	13.59
Preoperative hemoglobin (g/dl)	49	10.1	14.7	13.32	0.91
Postoperative hemoglobin (g/dl)	49	8.2	13.9	12.09	1.11
Preoperative serum sodium (mmol/l)	49	135	146	139.67	2.26
Postoperative serum sodium (mmol/l)	49	133	142	136.82	2.03
Resection time (minutes)	49	30	77	57.02	14.37
Weight of resected prostate (g)	49	18	59	41.69	12.15
Postoperative catheterization (days)	49	2	4	2.36	0.52

N- Number of patients, Min-Minimum, Max- Maximum, SD-Standard deviation

Table 2: Preoperative and postoperative maximum urinary flow rate.

Variable	After 3 months			After 6 months			After 18 months		
	Preoperative	Postoperative	P value	Preoperative	Postoperative	P value	Preoperative	Postoperative	P value
	n=30	n=30		n=28	n=28		n=26	n=26	
Qmax (ml/s)	8.66±1.18	18.86±2.42	0.001*	8.77±1.14	19.47±1.39	0.001*	8.84±1.14	19.03±1.47	0.001*

Qmax-Maximum urinary flow rate, *- Significant.

Table 3: Preoperative and postoperative international prostate symptom score.

Variable	After 3 months			After 6 months			After 18 months		
	Preoperative	Postoperative	P value	Preoperative	Postoperative	P value	Preoperative	Postoperative	P value
	n=45	n=45		n=44	n=44		n=42	n=42	
IPSS	26.35±2.6	6.68±1.36	0.001*	26.31±2.62	6.47±0.79	0.001*	26.23±2.65	6.30±0.99	0.001*

IPSS- International prostate symptom score, *- Significant

DISCUSSION

B-TURP has become increasingly popular because it utilizes saline irrigation, which avoids the potential for TUR syndrome and the associated constraints on resection time.[5] However, there are concerns that B-TURP has a potential for postoperative urethral stricture formation.

In our study we used the Olympus TURIS bipolar system. Since it is regarded as a "quasibipolar" system with a risk of current leakage, there are speculations that it may result in higher postoperative urethral stricture rates compared to M-TURP. However, research and development department In Olympus evaluated the current leakage in bipolar and monopolar system and they found that current leakage in bipolar system is 6-7 mA and from 26 mA to 40 mA in monopolar system.[13]

Our study included 49 patients who underwent B-TURP and were followed up for 18 months subjectively by IPSS and objectively by uroflowmetry. A number of randomized controlled trials have shown that B-TURP has a durable short term efficacy.[10,14,15]

In our study, the mean age of the patients, prostate volume and the drop in hemoglobin and serum sodium levels were comparable to available literature.[7,10,14] In our study, there was a significant improvement in the mean IPSS and mean Qmax at three, six and 18 months follow up. Zamel et al followed 32 patients who underwent bipolar prostatectomy and were evaluated at three months and two years post surgery. They also found similar results using bipolar system.[13]

Chen et al compared patients who underwent M-TURP and TURIS. They found significant improvements in IPSS and Qmax in TURIS group at six, 12 and 24 months post surgery which was comparable to M-TURP group.[14] Although our study was not a comparative study, our results also showed that B-TURP results in significant improvement in Qmax and IPSS at three, six and 18 months. Other randomized controlled trials comparing M-TURP and B-TURP reported similar results.[16,17]

In our study two patients (4.08%) failed to void after catheter removal and required recatheterisation. In the study by Tefekeli et al 2% of patients who underwent B-TURP required recatheterisation due to failure to void after catheter removal.[6] Failure to void after TURP is due

to several factors such as edema of residual prostatic tissue, postoperative urethral pain and poorly contractile bladder.

One of the concerns that exist for B-TURP is the potential for postoperative urethral stricture. Urethral stricture disease associated with TURP may present anywhere in urethra. The most common location is the bulbo-membranous urethra, followed by fossa navicularis and penile urethra.[18,19]

Komura et al reported that at three years follow up in patients with a prostate volume ≤70 ml there was no difference in urethral stricture rate between M-TURP and B-TURP, but in patients with a prostate volume >70 ml there was a significantly higher urethral stricture rate in B-TURP as compared to M-TURP. They concluded that higher urethral stricture rate in the B-TURP group was significantly associated with longer operation time and large prostate volume.[7] In our study only one patient (2.04%) developed urethral stricture. We could not find any correlation between the prostate volume, operation time and urethral stricture due to small sample size and non comparative study.

Michielsen and Coomans reported that there was no significant difference in Urethral stricture rate between M-TURP and B-TURP.[18] Their result is similar to our study albeit with a longer follow up. Similarly Zamel et al in their retrospective study of 32 patients who underwent bipolar prostatectomy, and were followed up for two years reported no case of urethral stricture.[13]

The limitation of our study is that, it is a non comparative one, with a small sample size and a shorter follow up.

CONCLUSION

The B-TURP using TURIS system is efficacious and results in significant improvement in IPSS and Qmax. The urethral stricture rate after B-TURP is not different from M-TURP. However, further large randomized controlled studies with a longer follow up are needed to confirm these results.

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