

## Original Research Article

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# Bipolar TURP in high-risk patients with large prostate gland: our experience

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## ABSTRACT

**Background:** The present gold standard monopolar-TURP is associated with a number of complications and has less safety margin in comorbid patients. Bipolar TURP is a modification of conventional M-TURP and has the potential to overcome its most prominent shortcomings with better safety profile in patients with comorbidities. Aim of the study was to evaluate the efficacy of bipolar-TURP in terms of operative and postoperative parameters.

**Methods:** This prospective study was conducted in the department of urology SKIMS Srinagar, from April-2019 to October 2020. Forty-five patients with one or more comorbidities and BPH, with a prostate weight  $\geq 60$  gm was evaluated. Operative and postoperative parameters were recorded and patients followed with IPSS and uroflowmetry for a period of 6-months.

**Results:** Of 45 patients who underwent B-TURP, pre-operative parameters were mean age(years)  $66.59 \pm 9.88$ , mean prostate size (gm)  $77.42 \pm 18.4$ , mean IPSS of  $26.3 \pm 2.9$ , mean serum PSA (ng/dl) of  $2.32 \pm 0.88$ , mean  $Q_{max}$  (ml/s) of  $7.71 \pm 2.41$  and PVRU of  $113.45 \pm 16.5$  ml. Operative and post-operative parameters were, mean operative time(min) of  $68.14 \pm 29.6$ , TUR syndrome in none, mean change in  $Na^+$  of  $-0.98 \pm 0.75$  meq/l, mean change in Hb of  $-1.66 \pm 0.68$  g/dL, mean irrigation time (hours)  $24.53 \pm 5.46$ , clot retention in 3 (6.66%) patients, transfusion in 2 (4.44%) patients, mean postoperative catheter time(hours)  $69.5 \pm 10.5$  and mean hospital stay  $3.6 \pm 1.61$  days. Two (4.44%) patients developed stricture urethra and were managed with urethral dilatation. IPSS and  $Q_{max}$  at 6-weeks were  $10.2 \pm 2.18$  and  $16.22 \pm 2.31$  ml and at 6-months were  $6.43 \pm 1.16$  and  $19.12 \pm 3.14$  ml respectively.

**Conclusions:** B-TURP seems to be a more sensible choice for patients with underlying comorbidities or implanted cardiac devices.

**Keywords:** Large prostate, Bipolar-TURP, High-risk patients

## INTRODUCTION

With a rapidly growing elderly population, the number of high-risk patients with very large prostate glands is expanding. High-risk patients with benign prostatic hyperplasia (BPH) are defined as elderly patients with concomitant cardiovascular, pulmonary, and other organ diseases. Surgical intervention through monopolar transurethral resection of the prostate (M-TURP) is considered as a gold standard due to its proven safety and

efficacy.<sup>1-3</sup> However, systemic absorption of the electrolyte-free irrigation solutions (i.e. glycine, sorbitol, and mannitol) and high-frequency electrical current in M-TURP can result in number of complications including TUR syndrome, bleeding, urethral strictures or bladder neck contractures.<sup>4-6</sup> Bipolar TURP (B-TURP) is a modification of conventional M-TURP procedure that uses isotonic normal saline as irrigating fluid and thus reduces the risk of TUR syndrome and the absence of a return current reduces the risk of burns and urethral or

bladder neck stricture and improved hemostasis during resection minimizes the blood loss and transfusion rate, thus permitting a longer operative time.<sup>7</sup> During the resection of large glands, the use of normal saline decreases the risk of hyperglycaemia in patients with diabetes and the absence of a return current through the body in the bipolar technology has fewer effects in patients with a cardiac device. We prospectively studied operative and perioperative parameters in medically compromised patients with large prostate glands undergoing B-TURP.

## METHODS

This prospective study was conducted in Sher-I-Kashmir institute of medical sciences (SKIMS) Soura in the department of urology from April 2019 to October 2020 in which we evaluated the efficacy of bipolar TURP in terms of operative, postoperative parameters for prostate glands weighing  $\geq 60$  gm in 45 patients with at least one comorbidity such as hypertension (HT), diabetes mellitus (DM), cardiovascular disease (CVD), chronic obstructive pulmonary disease (COPD), chronic renal failure (CRF), and patients with permanent pacemakers (PM). Patients with neurovesical dysfunction, bladder calculi, carcinoma prostate and prostatic or urethral surgery were excluded from study. A detailed history including comorbidity history was taken and all patients with bladder outlet obstruction due to BPH were included. Patients were assessed using international prostate symptom score (IPSS), uroflowmetry (UFM), postvoid residual volume (PVR), digital rectal examination. Quantification of prostate volume was done with help of transabdominal ultrasound. All patients were operated in an indoor admission basis under spinal anesthesia. B-TURP was performed using Olympus (Olympus medical, Tokyo, Japan) 26 Fr resectoscope and 0.9% normal saline (NS) as an irrigant. The Olympus "TURIS system" bipolar generator (generator model ESG-400) was used with the current setting at 200 W cutting and 120 W coagulation. Traction was removed 6 hours after the procedure and on next day early morning irrigation was stopped after assessing degree of hematuria. Operative, post-operative parameters were recorded and patients were followed for 6 months with IPSS and  $Q_{max}$ .

### Statistical analysis

The recorded data was compiled and entered in a spreadsheet (Microsoft excel) and then exported to data editor of SPSS version 20.0 (SPSS Inc., Chicago, Illinois, USA). Relevant tests were applied for specific type of variable.

## RESULTS

Of 45 patients studied who underwent B-TURP, pre-operative parameters (Table 1) were; mean age of patients (years)  $66.59 \pm 9.88$ , mean prostate size (gm)  $77.42 \pm 18.4$ , mean IPSS of  $26.3 \pm 2.9$ , mean serum PSA

(ng/dl)  $2.32 \pm 0.88$ , mean  $Q_{max}$  (ml/s)  $7.71 \pm 2.41$ , PVRU (ml)  $113.45 \pm 16.5$ .

**Table 1: Preoperative characteristics of the patients.**

Age (year)	Prostate size	IPSS	Serum PSA	$Q_{max}$	PVRU
$66.5 \pm 9.88$	$77.42 \pm 18.4$	$26.3 \pm 2.9$	$2.32 \pm 0.88$	$7.71 \pm 2.41$	$113.4 \pm 16.5$

IPSS, International Prostate Symptom Score; PSA, prostate specific antigen;  $Q_{max}$ , maximum flow rate; PVRU, postvoid residual urine;

The distribution of comorbidities is summarized in Table 2.

**Table 2: Distribution of comorbidities.**

Comorbidity	No. of patients
<b>HT</b>	10
<b>HT + CVD</b>	05
<b>HT + COPD</b>	03
<b>HT + DM</b>	04
<b>HT + PM</b>	03
<b>HT + CKD</b>	03
<b>HT + CVD + DM</b>	04
<b>HT + DM + COPD</b>	03
<b>COPD</b>	04
<b>DM</b>	04
<b>DM + CKD</b>	02

HT, hypertension; CVD, cardiovascular disease; DM, diabetes mellitus; COPD, chronic obstructive pulmonary disease; CKD, chronic kidney disease; PM, permanent pace maker;

**Table 3: Operative and post-operative parameters.**

Parameter	Value
<b>OT (min)</b>	$68.14 \pm 29.6$
<b>TUR syndrome</b>	0
<b>Change in sodium (meq/l)</b>	$-0.98 \pm 0.75$
<b>Change in Hb (g/dl)</b>	$-1.66 \pm 0.68$
<b>Irrigation time (hours)</b>	$24.53 \pm 5.46$
<b>Clot retention</b>	3 (6.66%)
<b>Transfusion</b>	2 (4.44%)
<b>Catheter time (hours)</b>	$69.5 \pm 10.5$
<b>Hospital stays (days)</b>	$3.6 \pm 1.61$
<b>stricture urethra</b>	2 (4.44%)
<b>IPSS</b>	
at 6 weeks	$10.2 \pm 2.18$
at 6 months	$6.43 \pm 1.16$
<b><math>Q_{max}</math></b>	
at 6 weeks	$16.22 \pm 2.31$
at 6 months	$19.12 \pm 3.14$

OT, (operating time); TUR syndrome, (transurethral resection syndrome);

Operative and post-operative parameters (Table 3) were mean OT time (min)  $68.14 \pm 29.6$ , TUR syndrome nil, mean change in Na (meq/l)  $-0.98 \pm 0.75$ , mean change in

Hb (g/dl)  $-1.66 \pm 0.68$ , mean irrigation time (hours)  $24.53 \pm 5.46$ , clot retention in 3 (6.66%) patients, transfusion in 2 (4.44%) patients, mean postoperative catheter time (hours)  $69.5 \pm 10.5$  and mean hospital stay (days)  $3.6 \pm 1.61$ . Two (4.44%) patient developed stricture urethra and were managed with urethral dilatation. IPSS and  $Q_{max}$  at 6 weeks were  $10.2 \pm 2.18$  and  $16.22 \pm 2.31$  and at 6 months were  $6.43 \pm 1.16$  and  $19.12 \pm 3.14$  respectively.

## DISCUSSION

The risk of BPH-related prostate surgery after 50 years of age has been estimated as 15.2%.<sup>8</sup> High-risk patients with large prostate glands are at a significant risk of complications during surgery.<sup>9</sup> Although several authors have reported that a conservative treatment is sufficient to relieve LUTS in elderly comorbid patients with BPH, the long-term therapeutic effect is poor and the potential of symptom recurrence is high, especially in cases with large prostate volume.<sup>10</sup>

Out of several treatment modalities available, surgical intervention through M-TURP is considered as the gold standard.<sup>6-8</sup> However, M-TURP can result in a number of complications including TUR syndrome, bleeding, urethral strictures or bladder neck contractures.<sup>4-6</sup> B-TURP is a modification of conventional M-TURP procedure that uses isotonic irrigating fluid and reduces the risk of TUR syndrome. This also permits a longer operative time during resection of larger glands, there is a “cut-and-seal” effect during bipolar TURP and this is claimed to achieve better hemostasis as compared to M-TURP. The bipolar current has no impact on cardiac electrophysiology and ensures the safety of the operation. Finally, B-TURP has been demonstrated to be more effective than M-TURP in resecting large volumes of prostate tissue.<sup>11</sup> Because of these factors B-TURP is a reliable resection option in the patients with comorbidities having larger prostates. Although studies comparing B-TURP with M-TURP revealed promising benefits, including fewer frequencies of bleeding and hyponatremia, the use of bipolar technology over conventional M-TURP has not gained the status of gold standard.<sup>12</sup>

After introduction of B-TURP at institution, we studied operative and postoperative parameters of high-risk patients with large prostate gland undergoing B-TURP.

In our patients mean pre-operative IPSS was  $26.3 \pm 2.9$ . The higher base line IPSS is probably due to delay in surgery and conservative management in these high-risk patients and is in concordance with the literature. Yang et al compared the effects of bipolar and monopolar transurethral resection of the prostate for treating elderly patients with benign prostatic hyperplasia who had internal comorbidities and had preoperative IPSS of  $26.91 \pm 3.76$  and  $25.63 \pm 2.79$  in M-TURP and B-TURP groups respectively ( $p=0.088$ ).<sup>13</sup> In our study patients  $Q_{max}$  of  $7.71 \pm 2.41$  was observed. The peak flow reported

in literature for monopolar TURP and bipolar TURP varies from 4.2 to 10.9 ml/s and 4.4 to 10.9 ml/s respectively.<sup>13,14</sup> PVRU (ml) of our patients measured with transabdominal USG was  $113.45 \pm 16.5$ . PVRU of  $126.63 \pm 17.84$  and  $131.5 \pm 73.7$  mL was reported by other investigators in their B-TURP group respectively.<sup>13,15</sup>

Gland resection took us a mean of  $68.14 \pm 29.6$  minutes while Yang et al reported operating time for M-TURP and B-TURP  $62.40 \pm 6.10$  and  $65.0 \pm 6.99$  minutes respectively ( $p=0.058$ ) and Sinanoglu et al reported operating time of M-TURP and B-TURP  $60.8 \pm 17.2$  and  $60.0 \pm 23.5$  minutes, respectively ( $p=0.17$ ).<sup>13,15</sup> No TUR syndrome was observed in our patients.

Post-procedure serum sodium concentration in our patients had a mean drop of  $0.98 \pm 0.75$  mEq/L. 2-hour post-procedure (mg/dL) serum sodium level was lower in the B-TURP group vs monopolar group ( $-4.4 \pm 4.3$  and  $-10.8 \pm 4.4$ , respectively,  $p=0.00$ ) as reported in their study by Sinanoglu et al.<sup>15</sup> Although larger glands were operated using B-TURP, still the postoperative serum sodium drop is not that severe and is statistically significant when compared with literature regarding fall in serum sodium after M-TURP. B-TURP leads to less decline in serum sodium levels and virtually eliminates the risk of TUR syndrome. The mean fall in hemoglobin in our patients was  $1.66 \pm 0.68$  g/dl. The “cut-and-seal” effect of bipolar technology is supposed to result in better hemostasis, better vision and faster resection and studies have noted a lesser blood loss in B-TURP group as compared to M-TURP group (0.6 g/dl vs. 1.8 g/dl,  $p=0.01$ ).<sup>16</sup> Giulianelli et al reported a drop of mean Hb from 14.52 to 10.4 mg/dl in the M-TURP group while in B-TURP group, mean Hb dropped from 14.88 to 13.6 mg/dl.<sup>17</sup> The mean postoperative irrigation time in our patients was  $24.53 \pm 5.46$  hours and is in concordance with literature.<sup>18,19</sup> Clot retention occurred in 3 (6.66%) of our patients, one patient among which received transfusion in postoperative period and our results are similar to study done by Mamoulakis et al who had clot retention in 7 (5.1%) patients of M-TURP group and 9 (6.4%) patients of B-TURP group ( $p=0.831$ ) and Lee et al reported a clot retention rate of 5.3% in the B-TURP group.<sup>12,20</sup> Two (4.44%) patients received transfusion in postoperative period, one among which had postoperative clot retention and other patient had CKD who had low Hb level in postoperative period.

The mean postoperative catheter duration in our patients was  $69.5 \pm 10.5$  hours and is in concordance with literature regarding B-TURP.<sup>12,15,19</sup> 3.6  $\pm 1.16$  days was the mean hospital stay of our patients and Sinanoglu reported a hospital stay of 3 days irrespective of the operation modalities (monopolar or bipolar).<sup>15</sup> Giulianelli et al reported a hospital stay for M-TURP and B-TURP was  $72 \pm 48$  hour and  $48 \pm 6$  hour respectively.<sup>17</sup>

Follow up of patients was done with PVRU and  $Q_{max}$  at 6 weeks and 6 months, and we had 2 patients (4.44%) who

developed urethral stricture in this period and these patients were managed with urethral dilatation. In a very recent study, urethral stricture was found in 9 patients (7.3%) from the M-TURP arm and 12 patients (7.1%) from the B-TURP arm.<sup>21</sup> In spite of the fact that HT and/or CAD and/or DM are conditions that affect the vital supply of tissues including the urethra and that could be potential risk factors for the occurrence of urethral stricture, we observed urethral stricture rate comparable to that of M-TURP. IPSS and Q<sub>max</sub> showed a statistically significant improvement at 6 weeks (IPSS; 10.2±2.18 and Q<sub>max</sub>16.12±2.31) and at 6 months (IPSS; 6.43±1.16 and Q<sub>max</sub>19.12±3.14) over the preoperative IPSS; 26.3±2.9 and Q<sub>max</sub>7.71±2.41 respectively and these results were comparable with the literature.<sup>13,17,18</sup>

## CONCLUSION

The main advantages of bipolar TURP are the use of saline as irrigation fluid that eliminates the risk of trans urethral resection syndrome (TUR syndrome) and the return current, reducing the risk of burns, the stimulation of nerves and interference with implanted cardiac devices. In addition, the improved coupling of cut and coagulation may lead to less blood loss, better vision and faster resection.

B-TURP is a more sensible choice for patients with a poor general condition or with serious comorbidities because it has a lower prevalence of adverse effects.

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