

# A Prospective Randomised Comparative Study of Monopolar Transurethral Resection of Prostate versus for Bipolar Resection of Prostate

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## ABSTRACT

We conducted a prospective randomized study to compare bipolar resection of prostate (BRP) with mono-polar transurethral resection of prostate (mTURP). A total of 120 patients of symptomatic benign prostatic hyperplasia (BPH) were randomized into two groups and treated with bipolar resection of prostate with saline as irrigating fluid and monopolar TURP with 1.5% glycine as irrigation fluid. Pre- and post-op findings were recorded up to 6 months in all patients. Both the groups were comparable in age, prostate size regarding volume, international prostate symptom score (IPSS) and hemoglobin levels. The TURP group showed a statistically significant decline in Hb from the preoperative value. Postoperative serum sodium level was significantly low in the mTURP group than in the BRP group. We did not come across transurethral resection (TUR) syndrome in any patient. There was no significant difference in operation time, catheterization time, hospital stay among the two groups. Postoperative improvement in IPSS was similar. The peak urine flow (Q Max) was significantly high in bipolar resection group. Bipolar resection of prostate has lower intraoperative complications and improved results compared to monopolar TURP.

**Keywords:** Benign prostatic hyperplasia, Bipolar resection of prostate, TURP

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## INTRODUCTION

Transurethral resection of the prostate (TURP) using monopolar cautery has been the gold standard for treatment of BPH with persistent symptoms of bladder

outlet obstruction.<sup>1</sup> However, TURP is still associated with significant complications, such as TUR syndrome, hemorrhage, and strictures of the urethra.<sup>2</sup> A bipolar resection of prostate which used the cutting effect by the creation of ionized plasma corona in an electrolyte solution (normal saline) offers a promising alternative to TURP with decreased physiological changes during surgery and likely decrease in complications.<sup>3</sup>

In this prospective randomized control study, the two procedures were compared in terms of efficacy and complications.

## MATERIALS AND METHODS

We conducted a prospective randomized study on patients with a diagnosis of benign enlargement of prostate undergoing surgical treatment at a tertiary care hospital from May 2012 to June 2015. We recruited 120 patients with IPSS > 18, residual volume more than 100 mL, prostate volume 40 to 90 cc. Patients aged below 50 years, patients with urethral strictures, neurogenic bladder were excluded. Pre-op hemoglobin (Hb), IPSS score, ultrasound measured prostate volume, operative time, post-op Hb, was recorded for all patients. Postoperatively the patients were re-evaluated at 1, 3 and 6 months with IPSS, postvoid residual urine and Q Max.

## OPERATING TECHNIQUE

Computer generated randomization into two groups divided the patients. In Group I (n = 60) TURP was conducted with 26 F resectoscope using continuous flow with standard loop electrode using monopolar cautery (cutting 100W and coagulation 80W) using 1.5% glycine as an irrigation fluid. In Group II (n = 60), patients underwent PRP using plasma kinetic generator (TURIS, Olympus) with settings of 230 W cutting 75 W coagulation and 0.9% saline as irrigation fluid using 27° F continuous flow resectoscope (Olympus).

All operations were done under subarachnoid spinal anesthesia. A baseline blood sample (2 mL) used to be sent for estimation of serum sodium and potassium. These tests were repeated at 1-hour and the end of the procedure. Hemoglobin (Hb) and hematocrit were studied before and after the procedure in all patients. Resection

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time, the volume of irrigation fluid used, the weight of the resected gland and duration of surgery were recorded.

The patient's vital parameters (pulse, blood pressure, oxygen saturation monitoring by pulse oximeter) were monitored, and clinical signs of TUR syndrome was watched for. Barnes method of resection was used in all our patients.

All patients received postoperative irrigation through 3 way Foley's catheter. The catheter was removed on post-operative Day 3 in all cases.

## RESULTS

In the study, the majority of patients were in the age group 55 to 70 years. Age, prostate volume by ultrasound, maximum flow rate (Q Max, effective capacity of a bladder, after voiding residual urine, IPSS and pre-op hemoglobin (Hb) were comparable. (Table 1).

Operation time was longer in the BRP group. The weight of resected gland, volumes of irrigation and catheterization time were comparable between the two groups and not significant (Table 2).

The monopolar group had a greater fall of serum sodium (5.27 meq/L) compared to the BRP group (1.43 meq/L),

and this was statistically highly significant between the groups ( $p = 0.000$ ). However, TUR syndrome was not observed in both groups. The mTURP group showed a statistically highly significant decline in Hb 1.033 gm % (0.2617),  $p = 0.000$  from the preoperative value. In comparison, the bipolar group showed a smaller drop in hemoglobin 0.607 gm % (0.1617). Hematocrit values showed a similar trend with the mTURP group recording a more significant fall from the preoperative value as compared to the BRP group (2.690, and 1.593,  $p < 0.05$  respectively) (Table 3). However, none of the patients required a blood transfusion.

There were no significant complications other than clot retention for which cystoscopy and clot evacuation was needed in two patients in the monopolar group and one patient in the bipolar group.

Follow-up of patients (1, 3 and 6 months postoperatively) demonstrated an improvement in I-PSS and Qmax in both the groups. The improvement in IPSS and drop in PVR was comparable in both groups (Tables 4 and 5). The Qmax at follow-up was significantly high in the bipolar group as compared to the monopolar group ( $p < 0.05$ ; Table 6).

**Table 1:** Preoperative parameters of patients participating in the study

Parameters	Mean + SD	
	mTURP (N = 60)	BRP (N = 60)
Age mean (range) in years	66.5 (60-74)	68.1 (61-80)
Prostate volume (mL)	64 ± 8	66 ± 9
Q Max (mL/s)	7.73 (0.883)	7.75 (0.786)
Effective capacity (mL)	380 (110)	410 (120)
Post void residual urine (mL)	240.18 (65.854)	220.65 (43.414)
IPSS score	28.53 (3.963)	29.40 (4.507)
Hemoglobin	13.803 (0.8336)	14.450 (1.1500)

**Table 2:** Intraoperative variables between bipolar and monopolar groups

	m-TURP mean (SD)	BRP mean (SD)	Significance
Volume of irrigant (Ltrs)	25.37 (2.414) glycine	25.53 (2.193) saline	0.781
Resection time (min)	60.73 (5.589)	65.67 (6.625)	0.003
Resected weight (g)	33.17 (3.130)	36.07 (4.127)	0.008
Catheterisation time	3.5 (1.1)	3.8 (0.8)	0.653

**Table 3:** Comparison of mean change of electrolytes and hemoglobin between mTURP and PRP groups

Parameter	Mean change		p-value
	Glycine (Variance)	Saline (Variance)	
Mean Sodium (meq/l)	-5.27 (1.081)	-0.07 (1.437)	0.0001
Mean Potassium (meq/l)	+0.137 (0.0765)	+0.050 (0.0900)	0.0002
Mean Hb (gm%)	-1.033 (0.2617)	-0.607 (0.1617)	0.000
Mean HCT	2.690 (0.5530)	1.593 (0.4777)	0.000

**Table 4:** Comparison of IPSS between bipolar and monopolar groups

Time	Bipolar IPSS mean (SD)	Monopolar IPSS mean (SD)	p-value
Pre-op	28.53 (3.963)	29.40 (4.507)	0.432
Post-op 1 month	8.07 (0.907)	7.60 (0.770)	0.036
Post-op 3 months	8.63 (0.890)	7.60 (0.770)	0.048
Post-op 6 months	8.10 (0.923)	7.60 (0.770)	0.026

**Table 5:** Comparison of PVR between bipolar and monopolar groups

Time	Bipolar PVR (mL)	Mean (SD) Monopolar PVR (mL)	Mean (SD) p-value
Pre-op	240.18 (65.854)	220.65 (43.414)	0.268
Post-op 1 month	25.17 (6.395)	27.00 (5.675)	0.245
Post-op 3 months	26.53 (5.296)	27.80 (5.442)	0.365
Post-op 6 months	24.03 (5.910)	28.53 (5.303)	0.003

**Table 6:** Comparison of Q Max between bipolar and monopolar groups

Time	Bipolar Q Max (mL/s)	Mean (SD) Monopolar Q Max (mL/s)	Mean (SD) p-value
Pre-op	7.73 (.883)	7.75 (.786)	0.931
Post-op 1 month	18.90 (1.322)	16.23 (1.073)	0.000
Post-op 3 months	18.93 (1.172)	16.37 (0.999)	0.000
Post-op 6 months	19.13 (1.252)	16.47(0.937)	0.000

## DISCUSSION

The advent of fairly effective medical therapy for the lower urinary tract symptoms (LUTS) because of BPH in the form of alpha blockers and five alpha reductase inhibitors has led to decline in the surgical treatment of BPH. TURP continues to be the gold standard surgical procedure whenever there is an indication for surgery.<sup>1</sup> Though TURP is a safe procedure (mortality > 0.25%), it has significance. Intraoperative complications (blood loss, with a 2.5-8.6% transfusion rate, and TUR syndrome)<sup>2</sup> BRP with use of normal physiological saline as irrigation fluid is promising in decreasing these complications.

In our randomized control study, we compared two groups of patients (sixty each) undergoing mTURP and BRP with glycine and saline as irrigating solutions respectively. The two groups had no statistically significant differences in baseline characteristics of patient's age and ASA status. Two senior consultant urologists performed the operations.

In this study, there was an increased time of resection in bipolar group (63.50 min,) more than monopolar group (54.67) which was statistically significant. This may have been due to the smaller loop of BRP resectoscope.

The mean duration of catheterization in both the groups was comparable. Hb fall after mTURP was higher than BRP indicating better hemostasis with BRP.

The current study showed that the BRP with normal saline as irrigating fluid showed negligible fall in serum

Na compared to mTURP with Glycine as irrigating fluid.<sup>8</sup>

During our patient follow-up (1, 3, and 6 months post-operatively) we found an improvement in IPSS and Qmax in both the groups. IPSS improvement was comparable in both groups. The Q-max at was significantly higher in the bipolar group as compared to the monopolar group.

The current study showed significantly higher improvement in peak urinary flow postoperatively in patients undergoing BRP than in mTURP group.

## CONCLUSION

The present study shows that the bipolar system is a promising technique in the surgical management of BPH. Our results demonstrate that bipolar transurethral resection of prostate causes less drop in sodium, hemoglobin, and level than monopolar transurethral resection of prostate. Similar findings were seen some earlier studies.<sup>4-6</sup> However, it takes a longer resection time. Bipolar saline TURP is a safer option in patients with large prostates with multiple comorbidities.

Our study suggests that at 6 months of follow-up bipolar TURP is equivalent to monopolar in terms of efficacy. The procedures also have a comparable complication profile. However, the use of normal saline for irrigation improves the safety of procedure. Our study indicates that BRP is clinically as effective as mTURP with a better safety profile.

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