

Monopolar vs. Bipolar Trans Urethral Resection of Prostrate (TURP) - A Comparative Outcome Analysis in Benign Prostatic Hyperplasia - A Single Centre Experience in Western Odisha

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ABSTRACT

BACKGROUND

In this study we wanted to compare the clinical outcomes in terms of symptom improvement and perioperative results of monopolar and bipolar trans urethral resection of prostrate (TURP) for benign prostatic hyperplasia (BPH) and evaluate the advantages of bipolar transurethral resection over the monopolar resection.

METHODS

A total of 150 patients who underwent trans urethral resection of prostate (TURP) surgical procedure, (n = 75 for monopolar TURP) and (n = 75 for bipolar TURP) for BPH enrolled between December 2018 to November 2020 at the Department of Urology in VSSIMSAR, Burla, Odisha.

RESULTS

Significant differences were found in operating time in minutes (45.11 ± 4.029 vs 41.99 ± 5.020 , $P < 0.025$) between monopolar and bipolar TURP. The mean sodium falls in post-operative period in bipolar and monopolar TURP was 7 Meq and 3 Meq respectively which was statistically significant (P - value less than 0.05). Bipolar TURP is equally effective as monopolar in reducing the international prostate symptom score (IPSS), improvement in quality of life, maximum urinary flow rate. Trans urethral resection (TUR) syndrome was reported in two patients who had undergone monopolar resection without any incidence in bipolar group. 3 patients in monopolar group developed clot retention compared to 1 in bipolar group in post-operative period. Fall in haemoglobin (Hb) and packed cell volume (PCV) was more with monopolar group but insignificant.

CONCLUSIONS

Bipolar TURP is safe and equally effective as monopolar TURP with advantage of shorter operative time and absence of dilutional hyponatremia and TUR syndrome, but needs large randomized trials with long follow up to confirm its efficacy and safety.

KEYWORDS

Monopolar TURP; Bipolar TURP; Benign Prostate Hyperplasia

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BACKGROUND

Benign prostatic hyperplasia (BPH) is one of the most common problems of aging males all over the world. Benign prostatic hyperplasia produces variety of lower urinary tract symptoms (LUTS) which can lead persistent bothersome symptoms affecting the quality of life.¹ Enlargement produce wide variety of symptoms which are known as lower urinary tract symptoms (LUTS) and they can be classified as obstructive and irritative. It includes hesitancy, thin stream, intermittency, post void dribbling, decreased force of urination, straining, nocturia, frequency and dysuria.²

Among the endoscopic options, TURP is considered as a "gold standard" treatment for enlarged benign prostate and most commonly done surgical procedure for BPH.³ Indications and treatment methods for enlarged prostate are well established. TURP can be done by using monopolar cautery or bipolar current. Monopolar is already established and gold standard procedure against which all other modalities are compared. Improvements in technology and modifications in instruments and various new advances in electro cautery have brought about huge reductions in morbidity and mortality, but the basic principles of TURP remain the same. Bipolar TURP using the Gyrus™ plasma kinetic system is as effective as monopolar TURP with the additional advantage of shorter duration of catheter use, hospital stay and reduced complications.⁴

The aim of our study was to compare the clinical outcomes in terms of symptom improvement and perioperative results of monopolar and bipolar TURP for benign prostatic hyperplasia with a secondary objective to study the advantages of bipolar transurethral resection over the monopolar resection.

METHODS

After institutional ethics committee approval (communication on VIREC decision vide letter no. 077 / 19 – I – S - 078 / Dt. 25.01.2019) and informed consent from patients, we performed a prospective analysis of 150 patients of BPH who underwent TURP with (n = 75) each for monopolar and bipolar group with a mean prostate size of 36 mg (monopolar 36.12 ± 6.039 vs bipolar 35.89 ± 5.802) between December 2018 and November 2020 at the Department of Urology VSSIMSAR, Burla, Odisha. Patients were evaluated by clinical examination, trans abdomino pelvic USG, uro-flowmetry, IPPS questionnaire, serum prostate specific antigen (PSA), urine analysis, urine culture, complete blood count, renal function test, blood sugar analysis and coagulation profile before the procedure. We preferred the surgical procedure according to patient's choice.

Indications for surgery included failed medical management, acute urinary retention with failed voiding trial, recurrent urinary tract infection and haematuria. Patients with documented or suspected prostate cancer, neurogenic bladder, previous prostate surgery, urethral stricture, associated bladder stones and renal impairment were excluded from the study. Abnormal PSA or digital

rectal examination findings were triggers for a transrectal ultrasound sonography (USG-guided) prostate biopsy before inclusion in the study.

All the TURP procedures were performed under spinal anaesthesia under lithotomy position. Preliminary cystourethroscopy was done to assess urethra, verumontanum, prostate gland, bladder mucosa and ureteric orifice.

The resectoscope used was 26 Fr Modified Iglesias double sheath continuous irrigation resectoscope with thumb operating working element. Monopolar resection was performed using Erbee cautery with cutting and coagulation setting of 100 W and 60 W respectively with glycine 1.5 % as irrigant fluids.

Bipolar resection was performed using the Gyrus PK bipolar resection system. Generator settings for cutting and coagulation were 160W and 180 W respectively with 0.9 % normal saline as irrigant fluid.

The resection time of all procedures were calculated from initiation of resection to removal of resectoscope sheath. For all patient's resection time, intra-operative complications were noted and 22 - F, 3 - way Foley's catheter was inserted at the end of procedure and irrigation of bladder with normal saline was started and continued for 24 hours post-operative period. The resected prostatic specimens were sent to pathology lab for histopathological (HP) study.

During post-operative period, all patients were monitored for hematuria, altered sensorium and any change in vital parameters. In the post-operative period, blood was sent for hemogram, serum electrolytes. Catheter was removed on 3rd post-operative day and after voiding the patient was discharged on same day. Patients were followed-up at 1, 3, 6 and 12 months with the IPSS reassessment and Qmax obtained using rotating disc type uroflowmeter. Changes in IPSS, quality of life (QoL), urine flow rate, haemoglobin, pack cell volume and sodium were analysed.

Statistical Analysis

The chi - square test was applied to compare the proportions between 2 groups. Continuous variables were presented as mean ± SD and were compared using the student's t-test when the data followed a normal distribution. The adjusted calculation was performed using statistical package for social sciences (SPSS) package with binary logistic regression. A P-value of < 0.05 was considered as statistically significant.

RESULTS

This prospective comparative study was undertaken to compare the outcomes in 150 patients out of which 75 each had undergone monopolar and bipolar TURP. This study compares outcomes in terms of change in IPPS scoring, QoL, urine flow rate, haemoglobin, PCV, serum sodium, operative time and post-operative complications in both groups.

Age of the patients included in this study was more than 50 years, with mean age of 64.34 ± 7.039 years and 65.98 ± 8.196 years in monopolar and bipolar group respectively. In both monopolar and bipolar group, patients with diabetes mellitus, hypertension and on Foley's catheter were almost equal i.e. 12, 13 and 12 in monopolar vs 13, 12 and 13 bipolar respectively. Mean prostate volume in monopolar and bipolar group was 36.12 ± 6.039 and 35.89 ± 5.802 gram respectively. Significant lower operative time was there in bipolar resection than monopolar resection (41.99 ± 5.020 vs 45.11 ± 4.029 vs, $P < 0.025$). The pre-operative and post-operative change in maximum flow rate, change in IPPS scoring, change in QoL, change in serum sodium was quite significant in both groups.

Variables	Monopolar Group		t-Value [95 % CI]	P Value
	Pre-op (Mean ± SD)	Post-Op (Mean ± SD)		
QMAX (n = 64)	9.6158 ± 0.9775	17.7578 ± 0.7451	- 66.614	0.01*
IPPS (n = 75)	23.20 ± 1.993	12.50 ± 1.55	69.283	0.01*
Hb	12.381 ± 0.8788	11.573 ± 0.8751	41.430	0.01*
PCV	36.16 ± 2.597	34.21 ± 2.521	14.628	0.01*
Na*	139.78 ± 2.852	132.28 ± 3.165	26.842	0.01*
QoL	3.89 ± 0.712	1.86 ± 0.577	26.317	0.01*

Table 1. Pre-Op VS Post-Op (Monopolar TURP)

*denotes significant P - value

Variables	Bipolar Group		t-Value [95 % CI]	P Value
	Pre-Op (Mean ± SD)	Post-Op (Mean ± SD)		
QMAX (n = 63)	9.4920 ± 1.1566	17.6349 ± 0.81244	- 61.094	0.01*
IPPS (n = 75)	22.85 ± 1.7564	12.56 ± 1.521	58.794	0.01*
Hb	12.314 ± 1.0850	11.743 ± 1.078	46.740	0.01*
PCV	36.026 ± 2.893	34.35 ± 3.129	13.824	0.01*
Na*	139.60 ± 3.080	136.33 ± 3.043	48.482	0.01*
QoL	3.95 ± 0.759	1.85 ± 0.558	22.911	0.01*

Table 2. Pre-Op vs Post-Op (Bipolar TURP)

*denotes significant P - value

Prostate Vol	Group	N	Mean	Std. Deviation	P Value
	Monopolar	75	36.12	6.039	.925
Bipolar	75	35.89	5.802	.925	
OP Time (In mins)	Monopolar	75	45.11	4.029	.001*
Bipolar	75	41.99	5.020	.001*	

Table 3. Prostate Volume vs Operative Time

*denotes significant p-value

In the follow up in first post-operative month there is significant symptomatic improvement with fall in IPPS score of 10.70 and 10.29 in monopolar and bipolar group respectively which indicates successfulness of surgical procedure. The mean fall in sodium was 7.5 mEq and 3.27 mEq in monopolar and bipolar group respectively in post-operative period which is statically significant with P value < 0.05. Fall in haemoglobin was 0.808 and 0.571 gram % in monopolar and bipolar resection respectively. This fall is only in numbers but clinically not significant. Maximum flow rate improved by 8.14 in monopolar vs 8.14 in bipolar group which indicates successfulness of both surgical procedures, but statistically insignificant. There was change in PCV intra operatively by 1.95 in monopolar vs 1.67 in bipolar group but clinically not significant. Post-operative complications like TUR syndrome and failure to void were reported after TURP in monopolar group. In bipolar group there was no incidence of TUR syndrome. Few patients developed clot retention in both groups. (Monopolar 3 & Bipolar 2)

DISCUSSION

BPH is a common disease of older men, often leading to troublesome symptoms, and a decrease in quality of life. Treatment options for benign hyperplasia of prostate include watchful waiting, medical and surgical management. Alpha blockers and 5α reductase inhibitors can be given as medical management.⁵ Medical therapy is usually the first line management for BPH but surgery is required in 20 % patients.⁶ Surgical options varies from minimally invasive procedure to open prostatectomy depending on patients need. TURP is the most common performed surgery for BPH and a large amount of data over the years demonstrates its efficacy and safety. Even though the mortality rate is very low in TURP, there is some concern regarding perioperative complications like haemorrhage, dilutional hyponatremia, and TUR syndrome. Hyponatremia and TUR syndrome are caused by using hypo osmolar nonconducting irrigation fluid glycine (1.5 %) in M- TURP.^{7,8,9} In bipolar TURP due to the mechanism of current flow, it allows the surgeon to perform the resection using normal saline as irrigant decreasing the risk of dilutional hyponatremia and TUR syndrome.^{10,11,12} Many study shows that bipolar TURP allows a longer operative time while respecting larger glands and with better haemostasis as compared to M-TURP due its cut and seal effect. The other advantages of bipolar system are reduced collateral and penetrative tissue damage, less tissue charring, better identification of the surgical capsule and less granulation tissue formation.

Recent studies providing comparative study between bipolar vs. monopolar TURP were encouraging though majority of the studies were retrospective (hence subject to confounders). There is no clear agreement or comparison among the two types of TURP procedures regarding efficacy and safety of both these procedures.

In our study, mean prostate size undergoing monopolar TURP was 36.12 ± 6.034 and in bipolar TURP was 35.89 ± 5.802 , which were quite similar as compare to other studies.^{13,14,15} The mean operative time for monopolar and bipolar TURP was 45.11 minute and 41.99 minute respectively which is statically significant. Similar results were shown by studies done by M.I.Karaman et al. & Patankar S et al. which shows shorter operating times, less blood loss, shorter periods of irrigation and catheterization with bipolar resection.^{16,17} Michielsen et al. have reported significantly longer operating times with bipolar resection.¹⁸ In the study done by Vijay Kumar Sarma Madduri et al. the resection took a mean of 51.75 ± 14.28 min in the M-TURP group while it took a mean of 82.14 ± 29.60 min for the B - TURP group. This difference was statistically significant ($P < 0.001$). The longer operative time in the B-TURP group is because of the considerably larger size of the gland resected using bipolar technology.¹⁹ This may be attributed to the generalised perception of the operating surgeon that B - TURP can be done for large prostate glands with better safety profile.²⁰

In the post-operative period, the mean fall in sodium concentration in M - TURP is 7.5 mEq while B - TURP had a mean drop of 3.27 mEq/L, which is statistically significant (P

< 0.05). Similar results were found by Kong et al. (1.03 mEq/L in B - TURP vs. 5.01 mEq/L in M - TURP (P = 0.01)).²¹

In our study, TUR syndrome occurred in two patients (2.6 %) in the M - TURP group, whereas in B - TURP group not a single patient developed TUR syndrome. This result is in concordance with literature which shows B - TURP leads to less decline in serum sodium levels and virtually eliminates the risk of TUR syndrome. However, the fluid absorption in B - TURP is the same as in M - TURP and hence volume overload can still occur, which may be of concern in patients with cardiac problems.²² In around 22 studies between 2004 and 2011 which compared M - TURP with B - TURP, not a single case of TUR syndrome reported in 1401 patients of the B - TURP group, whereas in same studies, 35 cases of TUR syndrome occurred out of a total of 1375 patients who underwent M-TURP. However, one study has not reported any TUR syndrome in a cohort of 51 patients undergoing M - TURP, even though there was a statistically significant drop in serum sodium levels in the M - TURP group.²¹

The mean fall in haemoglobin was 0.808 and 0.571 gram % in monopolar and bipolar resection respectively. This fall is only in numbers but clinically not significant. None of the patients in either group required blood transfusion in post-operative period. Other studies too have noted a statistically insignificant blood loss between M-TURP and B-TURP. In one study, the mean fall in haemoglobin in the B-TURP group was 0.67 ± 0.62 g/dl, whereas for the M - TURP group, it was 0.62 ± 0.78 g/dl.⁴

Although the "cut-and-seal" effect of bipolar technology is supposed to result in better haemostasis during resection.^{23,24} However, some studies have noted a lesser blood loss in B-TURP group as compared to MTURP group (0.6 g/dl vs. 1.8 g/dl, P = 0.01).²¹ In the study done by V.K Madduri et al. although larger glands were operated by bipolar technology, still the blood loss between both the groups was comparable. This shows that bipolar technology does have a certain advantage as far as haemostasis is concerned.¹⁹

In our study patients undergoing bipolar TURP were more severely obstructed (Qmax: 9.49 ± 1.15) compared to monopolar TURP (Qmax: 9.61 ± 0.97) compared to opposite in Kong et al. study which was with Qmax 4.99 ml/sec for B - TURP and 4.60 ml/sec in M - TURP.²¹ In our study in the follow up in first post-operative month there is significant symptomatic improvement with fall in IPPS score of 10.70 and 10.29 in monopolar and bipolar group respectively which indicates the successfulness of surgical procedures in both groups.

Clot retention occurred in 3 (4 %) patients of the M-TURP group and 2 (2.6 %) patients of the B-TURP group. The result was clinically insignificant. Similar to our results, Lee et al. reported a clot retention rate of 10.3 % in the M-TURP group and 5.3 % in the B-TURP group (P = 0.389).²⁵ However, larger number of samples are required to validate the advantage of any one procedure in respect to post-operative clot retention.

CONCLUSIONS

Bipolar TURP is safe and equally effective as monopolar TURP with advantage of shorter operative time and absence of dilutional hyponatremia and TUR syndrome, but needs large randomized trials with long follow up to confirm its efficacy and safety.

Limitations of the Study

It is non-randomized study and all cases operated in a single centre, so the results may not be applicable to all patients. The sample size in both groups are small. A large number of patients with long term follow up are needed to better define the advantage of bipolar TURP in management of BPH.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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