

Comparison between monopolar and bipolar transurethral resection of the prostate for benign prostatic hyperplasia – A randomized controlled study

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Abstract

Introduction: Benign prostate hyperplasia (BPH) is characterized by an unregulated proliferation of smooth muscle, glandular epithelium and connective tissue within the prostate. In Surgical intervention Monopolar TURP and Bipolar TURP are safe, standard and effective techniques. Both are widely used in the surgical treatment for BPH. B-TURP is the new benchmark modality which has decreased incidence of hyponatremia and bleeding. **Objectives:** To compare the clinical outcomes of the two procedures with respect to Efficacy of the procedures in relation to resected prostatic tissue, Resection time, IPSS, Qmax, Fall in Serum Sodium in the post-operative period and post-op complications. **Material and Methods:** The present study was conducted in the Department of Surgery, Rohilkhand Medical College and Hospital, Bareilly with the objective to compare the clinical efficacy and safety of M-TURP and B-TURP. 118 patients were randomly divided into two groups. Randomization was done using the software available at <http://www.randomizer.org/>. There were 59 patients in each group. **Results:** The mean change in hemoglobin and serum sodium was significantly ($p<0.05$) more in the M-TURP group. The resection time with significantly less in M-TURP and the mean post-operative Q-max (ml/sec) was 17.42 ± 1.23 and 17.97 ± 0.94 in M-TURP and B-TURP respectively with significant difference ($p=0.008$). The mean Post void residual urine was significantly higher in M-TURP (76.61ml) than in B-TURP (67.56 ml) group ($p<0.05$) post-operatively. **Conclusion:** Overall, the results of M-TURP and B-TURP are generally similar. Hemoglobin and serum sodium decreased more post-operatively in M-TURP. The complication rate was low in both the groups but TUR syndrome occurred only in M-TURP patients. Both methods can be used safely in BPH surgery, but B-TURP is safer in long duration surgery. QOL was statistically similar in M-TURP and B-TURP and significantly improved in both the groups.

Keywords: Monopolar transurethral resection of prostate (M-TURP), Bipolar transurethral resection of prostate (B-TURP), International prostate symptoms score (IPSS).

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Introduction

Benign prostate hyperplasia (BPH) is characterized by an unregulated proliferation of smooth muscles, glandular epithelium and connective tissue within the prostate gland[1]. Males with BPH are found to be at risk for developing lower urinary tract symptoms (LUTS). Benign prostate hyperplasia prevalence rises significantly with age; around 50% of men demonstrate histopathological evidence of BPH by 60 years, increasing to 90% by 85 years[2].

Surgical therapy is usually considered once a lack of medical therapy efficacy has been established. Surgical intervention ranges from transurethral resection of the prostate (TURP) to Prostatectomy; the commonest surgical technique currently used for BPH is TURP. Monopolar TURP and Bipolar TURP are safe, standard and effective techniques. Both are widely used in the surgical treatment for BPH. B-TURP is the new benchmark modality which has decreased incidence of hyponatremia and bleeding[3,4].

The present study was conducted to compare the clinical outcomes of the two procedures with respect to efficacy of the procedures in relation to the size of the prostate, irrigant used during surgery, resection time, fall in serum sodium in the post-operative period and post-operative complications.

Aim

To compare the clinical efficacy and safety of M-TURP and B-TURP for treating patients of benign prostatic hyperplasia.

Objectives

To compare the clinical outcomes of the two procedures with respect to- efficacy of the procedures in relation to resected prostatic tissue, irrigant used during surgery, resection time, IPSS score, Qmax, fall in serum sodium and hemoglobin in the post-operative period and post-operative complications.

Material and methods

118 patients of BPH admitted in the indoor department of surgery in Rohilkhand medical college and hospital, Bareilly between 1st November 2019 to 31st October 2020 and who underwent transurethral resection of the prostate gland were randomly divided into two equal groups. Randomization was done using the software available at <http://www.randomizer.org/>. There were 59 patients in each group, those who underwent M-TURP and those who underwent B-TURP.

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Inclusion criteria

All Patients of BPH who underwent transurethral resection of the prostate.

Exclusion criteria

Patients with prostatic cancer, urethral stricture, neurogenic bladder, prostatitis, active urinary infection. Those with a history of previous Prostate surgery and Coagulopathy were excluded.

Sample Size

Sample size was 118 as per PS2 (Alpha is .05; power is 0.7; sigma is 6.5; delta is 3; m is 1)[5].

Procedure

All patients underwent Monopolar or Bipolar TURP. Spinal anaesthesia was used for all patients and patients underwent the procedure in a lithotomy position. Preliminary cystourethroscopy was done to assess the anterior urethra, verumontanum, prostate gland, bladder mucosa and ureteric orifices. A 26-F Karl Storz continuous flow resectoscope with Baum Rucker type of active working element was used for resection. Glycine was the irrigant for Monopolar TURP and saline for Bipolar TURP. All patients were followed up and

reviewed with post-operative uroflowmetry. Changes in pre-operative and post-operative findings were analysed.

Statistical analysis

Data was analysed using the program Statistical Package for Social Science (SPSS) 23. The results were presented in frequencies, percentage and mean \pm standard deviation.

Ethics

Data were collected after taking clearance from the Institutional ethical committee.

Results

The present study was conducted in the Department of Surgery, Rohilkhand Medical College and Hospital, Bareilly with the objective to compare M-TURP and B-TURP for treating patients of benign prostatic hyperplasia. A total of 118 patients who underwent TURP were included in this study. They were randomly divided into two groups of 59 patients each.

The mean age of patients in the M-TURP and B-TURP group was 62.08 ± 10.80 and 61.27 ± 10.46 years respectively.

Table-1: Comparison of mean change from pre- to post-operative outcomes between the groups

Group	Hemoglobin (gm/dl)				Packed cell volume (%)				Serum Sodium (mmol/L)			
	Pre-operative	Post-operative	Mean change	p-value ²	Pre-operative	Post-operative	Mean change	p-value ²	Pre-operative	Post-operative	Mean change	p-value ²
M-TURP	12.36 \pm 0.9 2	11.62 \pm 0.9 1	0.74 \pm 0.2 2	0.0001 *	35.97 \pm 2.7 1	34.27 \pm 2.6 3	1.69 \pm 1.1 1	0.0001 *	139.22 \pm 3.1 6	132.34 \pm 3.5 3	6.23 \pm 2.0 8	0.0001 *
B-TURP	12.34 \pm 1.1 5	11.69 \pm 1.1 5	0.65 \pm 0.2 4	0.0001 *	35.69 \pm 2.9 8	34.27 \pm 2.6 3	1.76 \pm 0.9 3	0.0001 *	139.39 \pm 3.2 5	135.29 \pm 3.3 2	4.10 \pm 1.0 6	0.0001 *
p-value ¹	0.04*				0.72				0.001*			

¹Unpaired t-test, ²Paired t-test, *Significant

Table-1 shows the comparison of mean change in Hb, PCV and Na from pre- to post-operative within groups. The mean change in hemoglobin was 0.74 ± 0.22 gm/dl in M-TURP and 0.65 ± 0.24 in the B-TURP group and the mean change in serum sodium was 6.23 ± 2.08 mmol/L in M-TURP and 4.10 ± 1.06 mmol/L in B-TURP group. The mean change in haemoglobin and serum sodium was significantly ($p < 0.05$) more in the M-TURP group.

Table 2: Post-operative findings

Post-operative findings	M-TURP	B-TURP	p-value
	Mean \pm SD	Mean \pm SD	
Resection time	41.93 \pm 5.26	44.68 \pm 4.43	0.003*
Q-max (ml/sec)	17.42 \pm 1.23	17.97 \pm 0.94	0.008*
Resected prostatic tissue(gm)	34.65	32.77	0.16
Prostate volume (in ml)	41.22 \pm 5.50	46.86 \pm 6.85	0.08
Post void residual urine (in ml)	76.61 \pm 11.83	67.56 \pm 12.69	0.001*
IPSS	12.59 \pm 1.54	12.54 \pm 1.54	0.64
QOL index	1.49 \pm 0.57	1.49 \pm 0.57	0.24

*Significant

Table-2 shows the resection time with significant less in M-TURP and the mean post-operative Q-max (ml/sec) was 17.42 ± 1.23 and 17.97 ± 0.94 in M-TURP and B-TURP respectively with significant difference ($p = 0.008$). The mean resected prostatic tissue was 34.65 gm in M-TURP and 32.77 gm in B-TURP with no significance ($p > 0.05$) difference. The mean prostate volume was 41.22 ± 5.50 in M-TURP and 46.86 ± 6.85 in B-TURP with no significant ($p > 0.05$) difference between the group. The mean Post void residual urine was significantly higher in M-TURP (76.61 ml) than in B-TURP (67.56 ml) group ($p < 0.05$) post-operatively. There was no significant difference in IPSS and QOL index in between the two groups.

Table 3: Comparison of immediate complications between the groups

Immediate and Late post-op complications	M-TURP (n=59)		B-TURP (n=59)		p-value[1]
	No.	%	No.	%	
Clot retention	10	16.9	4	6.8	0.08
TUR syndrome	6	10.2	0	0.0	0.01
BNC[1]	3	5.1	6	10.2	0.29
Stricture[2]	6	10.2	4	6.8	0.50
Erectile dysfunction[3]	6	10.2	4	6.8	0.50

¹Chi-square test, Multiple response

Table-3 shows the comparison of post-operative complications between the groups. Post-operative clot retention was seen in 16.9% patients of M-TURP and in 6.8% patients of B-TURP. There was no significant ($p > 0.05$) difference in post-operative clot retention between the groups. However, TUR syndrome was seen in 10.2% patients of M-TURP and in 0.0% patients of B-TURP. The incidence

of post-operative TUR syndrome was significantly ($p = 0.01$) more in the M-TURP group. The risk of BNC (Bladder neck contracture) was 0.47 times higher in B-TURP than M-TURP. The risk of Stricture was 1.55 times higher in M-TURP than B-TURP. The risk of Erectile dysfunction was 1.55 times higher in M-TURP than B-TURP. However, these differences were not significant.

Discussion

Surgeries for BPH are among the most frequently performed surgeries in the world. Treatment guidelines define recurrent urinary infections, resistant hematuria, and impairment of renal functions as absolute indications for surgery. In other patients, symptoms of the patients should be assessed, and treatment should be chosen according to the severity of symptoms (Chapple, 2003)[6]. TURP is the most commonly applied surgical method for BPH. According to the European Urology Association guidelines complications of TURP include incontinence (1.8%), bladder neck contraction (4.7%), urethral stricture (3.8%), TUR syndrome (1.1%), blood transfusion requirement (8.4%), retrograde ejaculation (65.4%), and erectile dysfunction (6.5%) (Oelke et al, 2012)[7]. The present study was conducted in the Department of Surgery, Rohilkhand Medical College and Hospital, Bareilly with the objective to compare the clinical efficacy and safety of M-TURP and B-TURP for treating patients of benign prostatic hyperplasia. A total of 59 patients in each group were included in the study. In a comparison between the groups serum sodium was significantly ($p < 0.05$) decreased in M-TURP (6.23 ± 2.08 mmol/L) in comparison with B-TURP (4.10 ± 1.06 mmol/L). Similarly, hemoglobin was decreased ($p < 0.05$) more in the M-TURP (0.74 ± 0.22 gm/dl) group in comparison with the B-TURP group (0.65 ± 0.24 gm/dl). Pradiptha et al (2019) observed that a decline in the levels of Hb after surgery in the monopolar group (1.4 gm/dl) was significantly ($p = 0.01$) more than in the bipolar group (0.3 gm/dl) ($p = 0.033$). However, the difference between the two groups was insignificant ($p = 0.639$)[8]. Pradiptha et al (2019) showed declining levels of serum sodium between two groups were 0.3 mmol/L in the bipolar group and 1.4 mmol/L in the monopolar was significant [8]. This is similar to our studies. IPSS score and QOL index were equally improved in both the groups. There was significant ($p = 0.0001$) difference for IPSS score and QOL index in both the groups, and there was no significant ($p > 0.05$) difference between the group. The findings of this study in regard to IPSS was in agreement with the study by Al-Refaey et al (2020) who showed that post-operative mean IPSS was 8.10 in M-TURP and 7.57 mean IPSS in B-TURP, there was no statistically significant difference in terms of IPSS between monopolar (M-TURP) and bipolar (B-TURP) resections, Mean QOL was 2.53 in M-TURP and 2.73 in B-TURP groups[9]. Compared with above study, post-op IPSS score was significantly higher in our study but QOL was lower to above studies. In the present study, the mean resection time was significantly ($p = 0.003$) lower among patients undergoing M-TURP (41.93 ± 5.26 minutes) than those undergoing B-TURP (44.68 ± 4.43 minutes). In the study by Raghuvanshi et al (2019), the mean resection time required for patients undergoing M-TURP (31.20 ± 11.72 minutes) was also significantly lower as compared to B-TURP group (43.10 ± 13.44 minutes)[10]. In our study resection time in both the groups was significantly lower than above studies, but resection time in M-TURP was significantly lower as compared to B-TURP similar to the above study. In this study, the mean resected prostatic tissue was 34.65 gm in M-TURP and 32.77 gm in B-TURP with no significance ($p > 0.05$) difference. The mean prostate volume was 41.22 ± 5.50 in M-TURP and 46.86 ± 6.85 in B-TURP with no significant ($p > 0.05$) difference between the groups. The mean post-operative Postvoid residual urine was 76.61 ml in M-TURP and 67.56 ml in B-TURP. Similar to this study, El-Helbawy et al (2015) found that the mean resected prostatic tissue volume was larger in the bipolar group (42.03 ± 10.43 g) than in the monopolar group (37.68 ± 10.46 g) but the difference was statistically insignificant [11]. Permpongkosol (2018) compared with long term follow-up, the efficacy and safety of B-TURP in the treatment of BPH with prostate gland and reported that median prostate volume of 42 cm³ ($56.51 - 32.47$) were treated with B-TURP[12]. Study by Raghuvanshi et al (2019), showed mean post-op post void residual urine was 39.23 ml and 69.86 ml respectively in both the groups. There was significant difference in both the groups and in between the groups[10]. In comparison with above studies, post-op prostate size and volume was slightly less, and post void residual urine was higher in our study. The mean post-operative Q-max (ml/sec) was 17.42 ± 1.23 and 17.97 ± 0.94

in M-TURP and B-TURP respectively with significant difference ($p = 0.008$) in both the groups not in between the groups as mean pre-operative Q-max was 9.34 ± 1.40 ml/sec in M-TURP and 8.02 ± 0.91 ml/sec in B-TURP. Similar to this study Ismael et al (2019) showed mean post-op Q-max was 16.6 ml/sec in M-TURP and 17.7 ml/sec in B-TURP and there was significant difference in between the groups[13]. In our study post-op Q-max was more or less similar to the above studies. In this study there was no significant ($p > 0.05$) difference in post-operative clot retention between the groups. Clot retention was seen in 16.9% of M-TURP patients and 6.8% of B-TURP patients. Transurethral resection syndrome was seen in 10.2% patients of M-TURP and no patient was seen in B-TURP group. So, there was significant ($p = 0.01$) difference in post-operative TUR syndrome between the groups. BNC (Bladder neck contracture) was seen in 5.1% patients of M-TURP and in 10.2% in patients of B-TURP groups. The risk of BNC was 0.47 times higher in B-TURP than M-TURP, which was not significant ($p = 0.29$). Similarly urethral stricture was seen in 10.2% patients of M-TURP and in 6.8% in patients of B-TURP group. The risk of urethral stricture was 1.55 times higher in M-TURP than B-TURP with no significant ($p = 0.50$) difference between the groups. Erectile dysfunction was seen in 10.2% patients of M-TURP and in 6.8% in patients of B-TURP group with no significant difference between the groups. The risk of erectile dysfunction was 1.55 times higher in M-TURP than B-TURP. Bruce et al (2020) compared outcomes of monopolar versus bipolar transurethral resection of the prostate (TURP) and found that the complication of clot retention ($P = 0.79$) was similar in both groups[14]. Singh and Khan (2019) reported short term experience regarding efficacy of bipolar transurethral resection. They observed only one patient developed urethral stricture during follow up[15]. Permpongkosol (2018) compared with long term follow-up, the efficacy and safety of B-TURP in the treatment of BPH. Regarding TURP complications, significant differences were observed in relation to transient incontinence (5.87%), urinary tract infection (2.5%), urinary retention/catheterization (1.57%), contracture of bladder neck (4.4%), urethral strictures (4.09%), recurrence of BPH (2.83%), hypotonic bladder (0.6%) and erectile dysfunction (7.8%)[12]. In the study by Madduri et al (2016), there were three instances of the transurethral resection (TUR) syndrome in the M-TURP group whereas no TUR syndrome occurred in the B-TURP group[16]. Our study also had similar findings.

Conclusion

In our study, there was significant more decrease in haemoglobin ($p < 0.05$) and serum sodium ($p < 0.001$) post-operatively between the groups. Serum sodium was significantly decreased in M-TURP (6.23 ± 2.08 mmol/L) in comparison with B-TURP (4.10 ± 1.06 mmol/L). Similarly, haemoglobin was decreased more in M-TURP (0.74 ± 0.22 gm/dl) in comparison to B-TURP (0.65 ± 0.24 gm/dl). Mean resection time was significantly ($p = 0.003$) lower amongst patients of M-TURP than B-TURP groups. The mean post-operative Q-max (ml/sec) was 17.42 ± 1.23 and 17.97 ± 0.94 in M-TURP and B-TURP respectively with a significant difference ($p = 0.008$) between the groups. The mean resected prostatic tissue was 34.65 gm in M-TURP and 32.77 gm in B-TURP with no significance ($p > 0.05$) difference. The mean prostate volume was 41.22 ± 5.50 in M-TURP and 46.86 ± 6.85 in B-TURP with no significance ($p > 0.05$) difference between the group. The mean post-op Post void residual urine was significantly ($p < 0.05$) higher in M-TURP group (76.61 ml) than the B-TURP group (67.56 ml). Mean change for IPSS and QOL was not significant ($p > 0.05$) between the groups. Post-operative clot retention was seen in 16.9% patients of M-TURP and in 6.8% patients of B-TURP. There was no significant ($p > 0.05$) difference in post-operative clot retention between the groups. However, TUR syndrome was seen in 10.2% patients of M-TURP patients and no case of TUR syndrome was seen in B-TURP group. This difference was significant ($p = 0.01$). Overall, the results of M-TURP and B-TURP are generally similar. Hemoglobin and serum sodium decreased more post-operatively in M-TURP. The complication rate was low in both the groups but TUR syndrome occurred only in M-TURP patients. Both methods can be

used safely in BPH surgery, but B-TURP is safer in long duration surgery. QOL was statistically similar in M-TURP and B-TURP and significantly improved in both the groups.

References

1. Roehrborn CG. Pathology of benign prostatic hyperplasia. *International Journal of Impotence Research*. 2008;20(Supplement 3):S11-8.
2. Egan KB. The epidemiology of benign prostatic hyperplasia associated with lower urinary tract symptoms: prevalence and incident rates. *The Urologic clinics of North America*. 2016;43(3):289-97.
3. Liu, Z., Li, Y.W., Wu, W.R. and Lu, Q. Long-Term Clinical Efficacy and Safety Profile of Transurethral Resection of Prostate versus Plasmakinetic Resection of the Prostate for Benign Prostatic Hyperplasia. *Urology* 2017; 103: 198-203.
4. Abou-Taleb, A., El-Shaer, W., Kandeel, W., Gharib, T. and Elshaer, A. Bipolar Plasmakinetic Enucleoresection of the Prostate: Our Experience with 245 Patients for 3 Years of Follow-Up. *Journal of Endourology* 2017; 31: 300-306.
5. Gupta P, Singh N: How to write a thesis and thesis protocol, forwarded by Bipin Batra, Jaypee publications 2014; ed.1;89-90
6. Chapple. The total approach in lower urinary tract symptoms/benign prostatic hyperplasia(LUTS/BPH)management: introduction and conclusions. *Eur Urol* 2003;2:1-5.
7. Oelke M, Bachmann A, Descezaud A, Emberton M, Gravas S, Michel MC, et al. Management of lower urinary tract symptoms (LUTS). *EAU Guidelines* 2012;40-3.
8. Pradiptha NT., Duarsa GWK., Mahadewa TGB. Prospective cohort study comparison of bipolar and monopolar transurethral resection of prostate for benign prostatic hyperplasia: hemoglobin, sodium levels, and urethral catheter traction application. *IJRMS* 2019; 7 (12):9
9. Abdullah Al-Refaey Abd El-Raouf GE. Bipolar transurethral resection of prostate versus open prostatectomy in patients with prostatic volumes from 80-120 gm: a prospective randomized study. *Al-Azhar Medical Journal*. 2020;49(3):1063-74.
10. Raghuvanshi K, Raval A, Jain DK, Vartak KP, Patil S, Iqbal S, et al. Comparative assessment of monopolar versus bipolar transurethral resection of prostate for the management of benign prostatic enlargement. *Urol Sci* 2019;30:262-5.
11. El-Helbawy MN, Abd-Elbaky TM, Elserafy FA. Safety and efficacy of bipolar TURP in management of benign prostatic hyperplasia. *Menoufia Medical Journal* 2015; 28:225–232.
12. Permpongkosol, S. The Clinical Effect of Bipolar Transurethral Resection in Saline of Benign Prostate Hyperplasia with Long Term Follow-Up. *Open Journal of Urology* 2018; 8: 108-117
13. Ismael RH, Al Bazzaz PH, Zeebari DN, Hassan AF. Bipolar versus monopolar transurethral resection of the prostate (TURP): A prospective study of two urology centers. *Journal of Kurdistan Board of Medical Specialties*. 2019;5(2):8
14. Bruce A, Ehsanullah SA, Khashaba S. Safety and efficacy of bipolar transurethral resection of the prostate versus monopolar transurethral resection of prostate in the treatment of moderate-large volume prostatic hyperplasia: a systematic review and meta-analysis. *Journal of Endourology* 2020:12
15. Khan MM A. Efficacy of bipolar transurethral resection of the prostate using TURIS: our short-term experience. *ISJ* 2019; 6 (5):67
16. Madduri VK,Pal DK. Monopolar versus bipolar transurethral resection of prostate for benign prostatic hyperplasia: Operative outcomes and surgeon preferences, a real-world scenario. *Urol Ann*. 2016;8(3):291-296.

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