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Original Research Paper

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MONOPOLAR VERSUS BIPOLAR TURP FOR MANAGEMENT OF BENIGN PROSTATIC HYPERPLASIA: A RANDOMISED PROSPECTIVE STUDY

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ABSTRACT

Background: Monopolar transurethral resection of the prostate (M-TURP) was considered a gold standard for the treatment of prostates with a volume lower than 80 cm^3 due to its effectiveness and low cost. Its newly introduced modification, bipolar TURP (B-TURP), promises to overcome its most prominent shortcomings, namely bleeding and dilutional hyponatremia. **Aim:** To find out perioperative outcomes of patients undergoing M-TURP and B-TURP for BPH. **Materials & Methodology:** Study consisted of systematically randomisely selected patients (*n=100*) with age >45 years who reported with lower urinary tract symptoms because of BPH and underwent M-TURP (Group I; *n=50*) or B-TURP (Group II; *n=50*) from January, 2019 to October, 2020. A thorough clinical evaluation was performed for all the enrolled patients. Thereafter, all the patients were subjected to various diagnostic test. In case of any abnormality detected on digital rectal examination or PSA levels, prostate biopsy was performed. A 26 Fr Karl Storz (Tuttlingen ,Germany) Iglesias resectoscope and 1.5% glycine was used as the irrigation solution for M-TURP. B-TURP was performed using 26 Fr resectoscope and 0.9% normal saline (NS) used as an irrigant. The data thus collected was tabulated and statistically analysed using SPSS version 18.0 software. **Results:** The mean size of postate for M-TURP(52.90±3.21) and for B-TURP(56.84±2.15),mean age of patients for M-TURP(62.2±2.76) and B-TURP(62.56±2.56), and operative time was for M-TURP(42.77±2.87) and B-TURP (43.88±2.01) comparable between both groups. The mean fall in postoperative serum sodium concentration was 3.50 ± 0.90 mEq/L for the B-TURP group as compared to 10.08 ± 1.99 mEq/L for the M-TURP group (P=0.02). IPSS, postvoid residual volume, and Qmax improved in both groups. No TUR Syndrome noted in B-TURP as compared to one TUR Syndrome occurred in M-TURP. Drop in hemoglobin levels (g/dl) was more in patients of M-TURP. **Conclusion:** B-TURP holds more advantages in reducing bleeding complications, less chances of dilutional hyponatremia and less chances of TUR syndrome.

KEYWORDS : Benign prostate hypertrophy, M-TURP, B-TURP, hyponatremia.

INTRODUCTION

The American Urological Association (AUA) defined benign prostatic hyperplasia (BPH) as histologic diagnosis referring to the proliferation of epithelial cells and smooth muscle within the transition zone of prostate. **(1)** The prostatic transition zone makes up approximately 5% of the prostate and is the portion that surrounds the proximal urethra. This zone is the site of continual growth throughout life. **(2)** BPH is a common disease affecting men in old age, often leading to troublesome symptoms, and a decrease in quality of life. Up to 50% of males over the age of 50 and up to 80% of males over the age of 80 experience lower urinary tract symptoms (LUTS) from BPH. **(3)**

Medical management, transurethral resection of the prostate (TURP), and open prostatectomy are the main options of treatment for BPH. TURP is accepted as the gold standard for the surgical treatment of BPH in appropriate patients. **(4)** Until now, monopolar transurethral resection of the prostate (M-TURP) was considered a gold standard for the surgical treatment of prostates with a volume lower than 80 cm^3 due to its low cost and effectiveness. **(5,6)** But, this established technique is associated with some important complications, such as urethral stenosis, bladder neck sclerosis, bleeding, and especially TUR syndrome, due to the need for hypotonic infusion fluid to avoid electrical conduction.TUR syndrome consists of water intoxication alongside hyponatremia, and can lead to the occurrence of cerebral edema. **(7)** In late 1990's the introduction of bipolar technology (B-TURP) represents a significant evolution in the TURP technique in recent years. B-TURP presents a considerable advantage given the fact that it can be performed with normal saline solution, with excellent results in relation to a greater volume of resection within the same surgical time. **(8)** The differences in efficacy and outcomes of bipolar versus monopolar TURP have been studied with mixed results. One of the study **(9)** found that bipolar resection with 0.9% NaCl had minimal effects on serum sodium when compared with monopolar resection.

With this background, the present study was planned to find out perioperative outcomes of patients undergoing M-TURP and B-TURP.

MATERIALS & METHODS

The randomized prospective study was conducted in the Department of Urology, Government Medical College and Associate Group of Hospitals, Kota (Raj) among systematically randomly selected patients (*n=100*) with age >45 years who reported with lower urinary tract symptoms because of BPH and underwent M-TURP or B-TURP from January, 2019 to October, 2020. The patients were equally divided into two groups(figure:1)

Group I (*n=50*): patients who underwent M-TURP prodecuure.
Group II (*n=50*): patients who underwent B-TURP procedure.

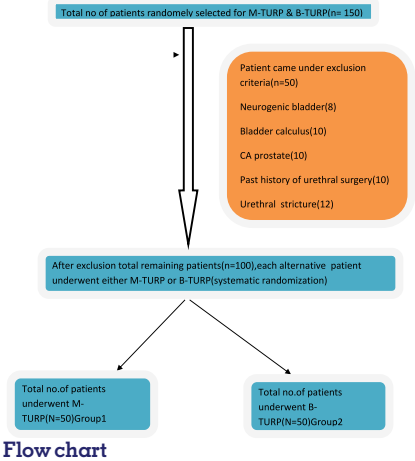

Figure:1 Flow chart

The institutional ethical committee clearance was obtained before the starting of the study. The written and informed consent was obtained from all the patients before enrolling them in the study.

The inclusion criteria of the study consisted of: 1. Symptoms of bladder outlet obstruction due to BPH. 2. Maximal urinary flow rate (Q_{max}) of <15 ml/s. 3. Trans-abdominal ultrasound (USG) prostate volume exceeding 20 g with upto 80 g. 4. Failure to relieve symptoms by medications (alpha blockers ± 5 alpha reductase inhibitors), acute urinary retention failing at least one voiding trial, recurrent gross haematuria due to B.O.O, upper urinary tract changes due to bladder outlet obstruction. The exclusion criteria consisted of: 1. Neurovesical dysfunction. 2. Bladder calculus. 3. Carcinoma of prostate. 4. Past history of prostatic or urethral surgery. 5. Urethral stricture.

A thorough clinical evaluation was performed for all the enrolled patients including documentation of detailed history and physical examination.

Thereafter, all the patients were subjected to the following diagnostic tests:

- Urinalysis (urine routine, microscopic examination, and urine culture)
- Uroflometry and PVR
- Serum prostate-specific antigen (PSA), (PSA level <4 ng/ml was considered normal)
- USG of kidney, ureter, and bladder with prostate volume and postvoid residual urine measurement
- Urodynamic study if neurovesical dysfunction (e.g., diabetes) was suspected to be the cause of voiding dysfunction
- Hemoglobin, total leukocyte count, and differential leukocyte count.
- Blood urea, serum creatinine, serum sodium, and potassium levels
- Coagulation profile
- Fasting and postprandial blood sugar level.

In case of any abnormality detected on digital rectal examination or PSA levels, prostate biopsy was performed.

A 26 Fr Karl Storz (Tuttlingen, Germany) Iglesias resectoscope and 1.5% glycine was used as the irrigation solution for M-TURP. A Monopolor electric energy source was used with the current setting set to 120 W cutting and 80W coagulation. B-TURP was performed using 26 Fr resectoscope and 0.9% normal saline (NS) used as an irrigant. Bipolar electric energy source was used with the current setting at 200 W cutting and 120W coagulation.

The data thus collected was tabulated and descriptive statistical analysis was performed. $P < 0.05$ was considered statistically significant.

RESULTS:

A total of 100 patients with BPE were divided into two groups, namely M-TURP ($n = 50$) and B-TURP ($n = 50$). The mean size of prostate for M-TURP (52.90±3.21) and for B-TURP (56.84±2.15) was comparable with insignificant difference statistically(p=0.19). The mean age of patients in both groups was comparable with an insignificant difference statistically(p=0.65). The mean prostate-specific antigen level (ng/dl) was observed to be little higher in BTURP with insignificant difference between groups(p=0.075). The mean operative time was found to be comparable between both the groups(p=0.112) [Table 1].

Table no.1: Comparison of various baseline characteristics of both study groups

	MTURP	BTURP	p-value
Mean age (yrs)	62.2±2.76	62.56±2.56	0.65
Mean prostate-specific antigen level (ng/dl)	2.18±1.71	3.36±1.56	0.075
Mean operative time (min)	42.77±2.87	43.88±2.01	0.112

The mean prostate size significantly reduced after surgery in both the groups(p=0.004). Postvoid residual volume (mL) was also reduced significantly after surgery. The Qmax (mL/s) improved postoperatively in both the groups, and statistically it was reduced significantly in B-TURP as compared to M-TURP(p=0.002). The IPSS reduced in both the groups and was comparable. The mean fall in postoperative serum sodium concentration was 3.50 ± 0.90 mEq/L for the B-TURP group as compared to 10.08 ± 1.99 mEq/L for the M-TURP group (P=0.02). Drop in hemoglobin (Hb) levels (g/dl) in patients of M-TURP group was significantly higher compared to patients of B-TURP group(p=0.12). Transurethral resection syndrome was observed in one cases in MTURP and no TUR syndrome in B-TURP. Mean postoperative irrigation and Mean postoperative catheter (h) was comparable in both the groups with an insignificant relation statistically. Clot retention was more in MTURP group. Blood transfusion was done in more patients in MTURP group. Mean hospital stay was comparable in both the groups [Table no. 2].

Table no.2: Comparison of various parameters of both study groups

PARAMETERS		MTURP	BTURP	p-value
Mean prostate size (cc)	**Pre surgery**	52.90±3.21	56.84±2.15	0.19
	Post surgery	13.92±1.77	22.04±2.01	0.12
	Intragroup comparison (p-value)	0.004*	0.023*	-
Postvoid residual volume (mL)	**Pre surgery**	165.62±2.109	171.54±2.17	0.05*
	Post surgery	39.1±3.48	69.14±1.07	0.02*
	Intragroup comparison (p-value)	0.001*	0.051*	-
Mean Qmax (ml/s)	**Pre surgery**	9.12±1.112	9.24±2.18	0.76
	Post surgery	15.98±2.98	16.04±2.10	0.88
	Intragroup comparison (p-value)	0.006*	0.002*	-
IPSS	**Pre surgery**	29.72±2.91	30.1±2.19	1.89
	Post surgery	16.84±2.18	16.44±1.89	0.13
	Intragroup comparison (p-value)	0.012*	0.04*	-
Potassium (mmol/L)	**Pre surgery**	4.5±2.8	4.28±0.76	0.05
	Post surgery	4.34±1.87	4.08±1.09	0.87
	Drop in potassium	0.16±0.05	0.20±0.002	0.04*
Na (mEq/L)	**Pre surgery**	136.7±3.12	137.84±2.91	0.90
	Post surgery	126.62±2.01	134.34±2.01	0.003*
	Drop in sodium	10.08±1.99	3.50±0.90	0.02*

Mean haemoglobin (g/dl)	**Pre surgery**	12.82±1.88	11.96±2.09	0.07
	Post surgery	10±0.78	11±1.21	0.19
	Drop in hemoglobin	2.82±0.12	0.952±0.31	0.12
Transurethral resection syndrome		1	0	-
Mean postoperative irrigation		22.52±1.74	22.62±1.72	0.81
Mean postoperative catheter (h)		53.92±2.98	53.32±1.01	0.07
Clot retention		12(24%)	5(10%)	0.69
Blood transfusion		11(22%)	3(6%)	0.76
Mean hospital stay (days)		3.64±2.18	2.12±0.889	0.96

DISCUSSION:

Benign Prostrate Hypertrophy is a common disease affecting older men, causing bothersome symptoms that decrease the quality of life. The conventional M-TURP is associated with various complications, this has led to the advent of new technique of B-TURP. The present study was conducted to evaluate and compare the safety and efficacy of B-TURP and M-TURP in the management of patients requiring surgical intervention for BPE. We found that mean age of patients in both the groups was around 58 to 66yrs of age. Similar results were observed in study by Raghuvanshi K et al.[10] who found the age of study subjects varying between 51 years to 88 years in both the groups. In present study, patients undergoing M-TURP had a mean serum PSA level of 2.18±1.71ng/ml, whereas in B-TURP group, mean serum PSA was 3.36±1.56ng/ml, with an insignificant difference statistically (P = 0.075). Similar results were observed in study by Madduri VK et al.[11] Giulianelli et al.[12] also observed similar findings with BTURP having higher serum PSA levels than MTURP. Mean operative time was comparable in both the groups. Similar results were observed in study by Madduri VK et al.[11]

In the present study, baseline prostate size recorded by ultrasonographicaly was comparable in both group. Similar results were found in studies by Raghuvanshi K et al.[10] and Madduri VK et al.[11] The present study revealed that after surgery, the prostate size recorded 3 months' postsurgery was significantly reduced in both the modalities. Similar results were observed in study by Kumar *et al*.[13]

IPSS and Qmax scores showed significant postoperative improvements among both groups ($P < 0.05$). Similar results were obtained in study by Al-Rawashdah *et al*.[13] revealed the significant postoperative improvements in PVR, IPSS, and Qmax among both groups. As observed in our study, Al-Rawashdah *et al*.[13] also found that intergroup comparison was insignificant. Similar findings were observed in study by Kong et al.[14]

Sodium and potassium levels were observed to be comparable in both the groups. Postoperatively, both decrease in both the groups, with drop in sodium being more in MTURP. Similar results were obtained in study by Karadeniz *et al*.[9] This shows that B-TURP reduces the risk of dilutional hyponatremia, which is significantly increased with M-TURP leading to TUR syndrome. Therefore, cardiovascular changes in TUR syndrome can be caused by dilutional hyponatremia.[15] In our study TUR syndrome was only observed in M-TURP group. Similar findings were observed in study by Madduri VK et al.[11]

The mean fall in hemoglobin in the M-TURP group was 2.82±0.12g/dl whereas in the B-TURP group, it was 0.952±0.31g/dl, with an insignificant difference statistically (P>0.05). Studies by Madduri VK et al.[11] and Giulianelli et al.[12] also observed a statistically insignificant blood loss between M-TURP and B-TURP, with more drop in haemoglobin levels in MTURP. So B-TURP has an added advantage as far as hemostasis is concerned.

The mean irrigation and mean catheter time was comparable in both the groups. Similar findings were observed in study by Lee et al.[16] Clot retention was observed in 12 cases of the M-TURP group and five patients of the B-TURP group, with an insignificant relation statistically. Similar results were seen in study by Lee et al.[16] Blood transfusion was required more in patients treated with M-TURP than with B-TURP. It is advocated that bipolar electrocautery is more efficient at controlling bleeding. Similar findings were observed in study by Borboroglu et al.[17] The mean hospital stay was more in patients treated with M-TURP than with B-TURP. Similar results were observed by Lee et al.[16]

Although results of B-TURP and M-TURP are comparable, but less chances of hemoglobin drop, dilutional hyponatremia and TUR syndrome in B-TURP, make it more suitable technique than M-TURP. Further studies are required to be conducted on a larger sample size, with a longer period of follow up to establish more concrete views on the use of B-TURP in the management of patients with BPE.

CONCLUSION:

The present prospective study suggests that both B-TURP and M-TURP are safe and effective surgical techniques for the management of BPE. However, B-TURP holds more advantages in reducing bleeding complications, less chances of dilutional hyponatremia and less chances of TUR syndrome.

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