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RESEARCH ARTICLE
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A PROSPECTIVE, COMPARATIVE ANALYSIS OF POST-OPERATIVE HEMOGLOBIN LEVELS: MONOPOLAR VS. BIPOLAR TRANSURETHRAL RESECTION OF PROSTATE FOR MANAGEMENT OF BENIGN PROSTATIC HYPERPLASIA

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ABSTRACT

Background: Monopolar transurethral resection of the prostate (M-TURP) has long been considered the gold standard in benign prostate hyperplasia management, however, recently, bipolar transurethral resection of the prostate (B-TURP) has emerged as a new modality, offering potential advantages including the use of isotonic saline as an irrigant. This study aims to compare the post-operative mean hemoglobin levels in patients undergoing M-TURP versus B-TURP in the surgical management of BPH.

Methods: A prospective comparative study was conducted at the Department of Urology in a tertiary hospital over a period from September 2, 2022, to March 2, 2023. Patients were consecutively allocated to either Group M (undergoing M-TURP) or Group B (undergoing B-TURP). Blood specimens were collected 24 hours after surgery to estimate hemoglobin levels post-operatively

Results: The study comprised 136 patients, with Group A (M-TURP) exhibiting a mean age of 62.32±1.79 years and Group B (B-TURP) a mean age of 62.98±1.90 years. Prostate size did not significantly differ between the two groups (p=0.421). However, pre-operative hemoglobin levels were significantly higher in Group B (12.26±0.13 g/dl) compared to Group A (12.29±0.13 g/dl) (p=0.000). Post-operatively, Group B maintained higher mean hemoglobin levels (11.82±0.06 g/dl) compared to Group A (11.19±0.09 g/dl) (p=0.000)

Conclusion: These findings suggest a potential advantage of B-TURP over M-TURP in preserving post-operative hemoglobin levels, highlighting its potential as a preferred surgical modality for BPH management.

Keywords: Benign prostatic hyperplasia, Monopolar transurethral, Bipolar transurethral.

INTRODUCTION

Benign prostatic hyperplasia is the expansion of epithelial cells and smooth muscle in the transition zone of prostate. Benign prostatic hyperplasia related obstruction which leads to lower urinary tract

symptoms causes a trouble for the old age patients. Over the time period prevalence of benign prostatic hyperplasia increases significantly. Data from previous studies showed that its prevalence in forty, fifty and sixty years of age is 8% , 50% and 80% [1] and a study conducted recently showed 537 out of 1000 (53.7%) male patients age 51-77 with mean age of 55.77 ± 4.85 i.e (53.7%) were having lower urinary tract symptoms in Pakistan.[2]

To treat the symptoms and complications of lower urinary tract symptoms due to Benign Prostate Obstruction, there are many options which includes medical treatment like alpha receptor blockers taken orally or surgical treatment which includes transurethral resection of the prostate (TURP) or open prostatectomy.[3] Transurethral resection of the prostate provides benefit to patients, especially to those older patients who cannot tolerate open surgical procedures. Due to its outstanding results TURP remains the gold standard for enlarged prostate surgery.[4]

Monopolar and bipolar TURP are minimally invasive methods of prostatic surgery and are correspondingly used in hospitals.[5] Monopolar uses high frequency current while Bipolar uses low voltage current which helps surgeon to resect and cauterize at the same time. M-TURP is done with irrigation (5%dextrose water/glycine) allowing a clear field during surgery. B-TURP is done with normal saline irrigation to minimize the complications. The most frequent complication of transurethral resection of the prostate is intraoperative and postoperative bleeding and electrolyte disturbance. The benefits of this procedure are controlled hemostasis, enhanced intraoperative vision field, reduced amount of post-operative hematuria, smaller incidence of electrolyte imbalance and catheterization time.

Raghuvanshi and colleagues concluded in their study that the patients undergone monopolar transurethral resection of the prostate had preoperative mean hemoglobin 12.48 gm and post operatively mean hemoglobin 11.23 gm with the drop of mean hemoglobin 1.25 gm.[6] While patients undergone bipolar transurethral resection of the prostate had preoperative mean hemoglobin 12.99 gm and postoperatively mean hemoglobin 12.35 gm with the drop of mean hemoglobin 0.64 gm which was statistically significant (P value < 0.0001).

Another study showed that TURP with 5% Dextrose Water using Monopolar Resectoscope group (11.71±0.70) and TURP with Normal Saline using Bipolar Resectoscope group (11.38±0.68 g/dl) among patients with Benign Prostate Hyperplasia with 95% confidence level and 80 % power of test.[7]

Srinivasrao and colleagues reported in their study that monopolar TURP causes significant drop in hemoglobin level and serum sodium level after 24-hour post operatively then bipolar transurethral resection of the prostate.[8] Agarwal and colleagues concluded in their study conducted upon 60 patients that drop in hemoglobin and serum sodium levels in both Monopolar transurethral resection of the prostate and Bipolar transurethral resection of the prostate was not statistically significantly with the (P value 0.16).

In the above given data, there is still controversy among procedures in terms of blood loss, so the study is conducted to compare the post-operative mean hemoglobin levels in patients undergoing M-TURP versus B-TURP in the surgical management of BPH.

METHODS

The study employed a prospective, comparative design and was conducted at the Urology Department, Sir Ganga Ram Hospital in Lahore. The duration of the study spanned from September 2, 2022, to March 2, 2023, encompassing a period of six months following the approval of the study synopsis.

A sample size of 136 participants was determined for the study, with 68 individuals allocated to each group. The sample size calculation was based on the expected hemoglobin levels 24 hours post-surgery in two distinct groups: those undergoing TURP with 5% Dextrose Water using Monopolar Resectoscope and those undergoing TURP with Normal Saline using Bipolar Resectoscope. This calculation was conducted with a 95% confidence level and 80% power of the test.

Consecutive sampling was employed to select eligible participants. Inclusion criteria encompassed individuals diagnosed with Benign Prostate Hyperplasia (BPH) within the age range of 55 to 70 years

and of male gender. Exclusion criteria included the presence of neurogenic bladder, nodular or hard prostate on digital rectal examination (DRE), history of prostate or urethral surgery, use of specific medications like finasteride, aspirin, warfarin, or heparin, and coagulopathic disorders.

Data collection commenced following ethical approval from the ethical committee of Fatima Jinnah Medical University (FJMU) / Sir Gangaram Hospital Lahore. Eligible participants provided informed written consent prior to enrollment. Blood samples were obtained 24 hours pre-surgery for various tests, including renal and liver function test, complete blood count, HbA1c, Serum Electrolytes and Pt / Aptt. Additionally, prostate size was recorded from ultrasound reports, and hypertensive status was assessed through history and blood pressure monitoring.

Participants were consecutively allocated to either Group M (Monopolar Transurethral Resection of Prostate) or Group B (Bipolar Transurethral Resection of Prostate). The surgical procedures were performed by an experienced Endo Urologist Team under spinal anesthesia, with standard equipment and techniques utilized for each group.

Post-operatively, blood specimens were collected 24 hours after surgery to estimate hemoglobin levels. Data analysis was conducted using SPSS version 24, with quantitative variables presented as Mean ± SD and qualitative variables as frequency and percentage. Stratification was performed for age, history of hypertension, and history of diabetes, followed by t-test application with a probability value of 0.05 or less was taken significant.

RESULTS

A total of 136 patients were included which were divided in two groups. The average age in group A (monopolar TURP) patients was 62.32±1.79 years and in group B (Bipolar TURP) the mean age was 62.98±1.90 years. The age distribution of patients is shown in Table I. The prostate size in group A was 53.04±4.41 gm and in group B the mean prostate size was 52.42±4.50 (p=0.421). The pre-operative hemoglobin level in group A was 12.29±0.13 g/dl and in group B the mean pre-operative hemoglobin was 12.26±0.13 (p=0.000). The post-operative hemoglobin level in group A was 11.19±0.09 g/dl and in group B the mean pre-operative hemoglobin was 11.82±0.06 (p=0.000) (Table II). Frequency of diabetes mellitus in group A was 30 (51.7%) and in group B the 28 (48.3%) (p=0.862). (Table III). Frequency of hypertension was 32 (54.2%) and 27(45.8%), respectively (p=0.489). (Table III). Tables IV shows stratification of mean post-operative hemoglobin in both groups based on age, history of hypertension, and diabetes mellitus.

Table I: Distribution of age

Age group	Groups		Total	p-value
	Monopolar TURP group	Bipolar TURP group		
55-60 years	10 (58.8%)	7(41.2%)	17 (100.0%)	0.605
61-70 years	58 (48.7%)	61(51.3%)	119 (100.0%)	
Total	68 (50.0%)	68 (50.0%)	136 (100.0%)	
Mean±SD (Monopolar TURP group) = 62.32±1.79 years				
Mean±SD (Bipolar TURP group) = 62.98±1.90 years				

Table II: Distribution of Prostate size, pre-post operative hemoglobin level

	Group A (Monopolar TURP)		Group B (Bipolar TURP)		p-value
	Mean	SD	Mean	SD	
Prostate size	53.04	4.41	52.42	4.50	0.421
pre-op hemoglobin level	12.29	0.13	12.26	0.13	0.310
post-op hemoglobin level	11.19	0.09	11.82	0.13	0.000

Table III: Distribution of diabetes mellitus and hypertension

	Groups		Total	*p*-value
	Monopolar TURP group	Bipolar TURP group		
Diabetes mellitus				
Yes	30 (51.7%)	28(48.3%)	58 (100.0%)	
No	38 (48.7%)	40(51.3%)	78 (100.0%)	
Total	68 (50.0%)	68 (50.0%)	136 (100.0%)	0.862
Hypertension				
Yes	32 (54.2%)	27(45.8%)	59 (100.0%)	0.489
No	36 (46.8%)	41(53.2%)	77 (100.0%)	
Total	68 (50.0%)	68 (50.0%)	136 (100.0%)	

Table IV: Stratification of post-operative hemoglobin in both groups w.r.t to age, history of hypertension and diabetes using independent sample t

		Groups	N	Mean	S.D	*p*-value
Age	55-60 years	Monopolar TURP	10	11.20	0.08	0.000
		Bipolar TURP	7	11.85	0.05	
	61-70 years	Monopolar TURP	58	11.18	0.09	0.000
		Bipolar TURP	61	11.82	0.06	
History of hypertension	Yes	Monopolar TURP	32	11.16	0.07	0.000
		Bipolar TURP	27	11.83	0.06	
	No	Monopolar TURP	36	11.21	0.10	0.000
		Bipolar TURP	41	11.81	0.05	
History of diabetes	Yes	Monopolar TURP	30	11.18	0.10	0.000
		Bipolar TURP	28	11.82	0.05	
	No	Monopolar TURP	38	11.20	0.09	0.000
		Bipolar TURP	40	11.82	0.07	

DISCUSSION

Benign prostatic hyperplasia is frequent in elderly men older than 50 years. This condition involves increased urine frequency and urgency, burning pain during urination, nocturia and often UTIs, bladder stones and upper urinary tract dilation. These symptoms affect the patients' quality of life. Hence, there is a need for quick and effective treatment to manage the BPH. Conventionally, drugs are prescribed but they are not effective in managing lower urinary tract symptoms in majority of patients especially individuals with chronic condition. Therefore, surgery is recommended to achieve satisfactory outcomes. With the advancement in medical sciences, safe, less invasive and efficient techniques such as monopolar and bipolar TURP, photo-selective prostate vaporization and holmium LASER prostate enucleation are recommended to replace traditional open surgery and drug treatment.[9]

The frequently preferred technique for benign prostatic hyperplasia is monopolar TURP. Due to its increased efficacy as compared to other methods it is now regarded as the gold standard for treating BPH. Although this method poses limited adverse effects but still patients complain of complications like hemorrhage, urethral strictures disease and transurethral resection syndrome. The introduction of bipolar technology has further improved the efficacy of TURP recently. As it is performed under normal saline, the complications faced during monopolar TURP like transurethral resection syndrome and water intoxication can be avoided in bipolar TURP. Additionally, increased time to perform resection allows safe achievement of homeostasis.[10]

This study was conducted on 136 patients divided in two groups. The mean age in group A (monopolar TURP) patients was 62.32±1.79 years and in group B (Bipolar TURP) the mean age was 62.98±1.90 years. According to age distribution there were 10 (58.8%) patients in the age range of 55-60 years in

group A and 7 (41.2%) in group B. There were 58 (48.7%) patients in the age range of 61-70 years in group A and 61 (51.3%) in group B. The prostate size in group A was 53.04±4.41 gm and in group B the mean prostate size was 52.42±4.50 (p=0.421). The pre-operative hemoglobin level in group A was 12.29±0.13 g/dl and in group B the mean pre-operative hemoglobin was 12.26±0.13 (p=0.000). The post-operative hemoglobin level in group A was 11.19±0.09 g/dl and in group B the mean pre-operative hemoglobin was 11.82±0.06 (p=0.000). Among co-morbidities studied, diabetes mellitus in group A was 30 (51.7%) and in group B the 28 (48.3%) (p=0.862), hypertension in group A was 32 (54.2%) and in group B the 27(45.8 %) (p=0.489).

In a similar study conducted by Bruce et al. individuals treated with monopolar TURP had significantly lower mean PSA level (1.92± 0.89) as compared to individuals treated with bipolar TURP (3.28± 3.20), the difference was statistically significant (p=0.02).[11] In Archa et al. the mean PSA in M-TURP patients was 2.6 ± 0.8 and that in B-TURP patients was 2.0 ± 0.4.[12] These results are similar to another study where the mean PSA in M-TURP group was 2.69 ± 0.87 and in B-TURP group was 2.92 ± 1.40.[13]

Literature comparing complications, outcomes and irrigation fluids after performing M-TURP and B-TURP did not report any statistical difference between he two methods. Shrama et al. conducted a meta-analysis of 69 studies and concluded no difference in quality of life, prostate volume, IPSS, Qmax and post-void residual volume after 1 year of both methods. The methods also did not differ with respect to incidence of infection and operative time. Patients treated with bipolar TURP did not show any incidence of TUR syndrome and showed improved outcomes related to hospital stay and catheterization, transfusions and retention. These results are backed by meta-analyses by Xie et al [14]and Huang et al[15] reporting functional outcomes and reduced complications in B-TURP patients after a year.

These results are in contrast to the case study conducted by Rojo et al including 1000 patients.[16] The study reported that urethral stricture occurred in 2-10% patients treated with M-TURP in comparison to 1% in patients treated with B-TURP which is in accordance to expected results of these methods.

CONCLUSION

These findings suggest a potential advantage of B-TURP over M-TURP in preserving post-operative hemoglobin levels, highlighting its potential as a preferred surgical modality for BPH management.

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