



Efficacy and Safety of Monopolar Transurethral Resection of the Prostate on Bleeding Control in the Treatment of Benign Prostatic Obstruction: Is It Still a Good Option in Developing Countries?

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Abstract

Objective: The objective of this study is to investigate the bleeding control safety along with the need for preoperative blood preparation and postoperative blood transfusion in the transurethral resection of the prostate with monopolar system (M-TURP) for the treatment of benign prostatic obstruction (BPO).

Materials and Methods: We retrospectively analysed 379 patients with BPO who underwent M-TURP procedure between January 2016 and December 2019 at a single centre. Importantly, we collected the demographic data, use of 5-alpha-reductase inhibitor (5-ARI), postoperative haemoglobin (Hb) and haematocrit levels, platelet counts, and transfusion rates of these patients.

Results: The minimum, maximum and the mean ages of the patients were 43, 79 and 67.44±7.74 years, respectively. The minimum, maximum and the mean prostate volumes of the patients measured via transrectal ultrasonography were 30, 95 and 53.42±18.12 mL, respectively. In total, 99 patients (26.1%) had received 5-ARI for at least three months before surgery. The mean decrease of the preoperative Hb in the postoperative 48th hour was 0.99±0.87 gr/dL. Only 9 patients (2.4%) received the transfusion of blood products (erythrocytes or fresh frozen plasma). The preoperative Hb level was inversely and significantly correlated with the decrease in postoperative Hb and the need for transfusion ($p<0.05$). The preoperative use of 5-ARI was not associated with postoperative decrease in Hb and the need for transfusion. The preoperative cut-off value of Hb for predicting a substantial decrease in Hb and transfusion need after M-TURP was calculated as 12.45 gr/dL with a sensitivity and specificity of 77.8% and 86.8%, respectively.

Conclusion: M-TURP is still a safe and effective option in BPO treatment in developing countries. Importantly, we do not recommend the routine preoperative blood preparation in index patients with Hb level higher than 12.45 gr/dL.

Keywords: Benign prostatic obstruction, bleeding control, haemoglobin, monopolar transurethral resection, transfusion

Introduction

Transurethral resection of the prostate (TURP) is the gold standard in the treatment of lower urinary tract symptoms caused by benign prostatic obstruction (BPO) (1). With the observation of its long-term efficacy in randomised controlled trials, TURP has maintained its success in the surgical treatment of BPO (2).

Bleeding is one of the most severe complications of TURP. Its persistence may necessitate blood transfusion and can lead to clot retention in the postoperative period (3). Although

TURP is one of the most common and currently performed urological procedures, there are some doubts as to whether the routine tests for blood group or antibody screening should be conducted on these patients. The major international urological associations do not have specific recommendations regarding the routine tests for blood group or antibody screening before TURP and post-TURP haemoglobin (Hb) control; however, these tests are performed routinely in many hospitals (4).

Despite the technological improvements in the endoscopic surgery of BPO, TURP with monopolar system (M-TURP) is

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commonly performed in developing countries because of the economic reasons. The purpose of this study is to assess the effects of M-TURP on bleeding control, the need for blood transfusion after M-TURP and the problems of preoperative blood preparation.

Materials and Methods

Study Design

Due to the fact that this study is a retrospective, ethical committee approval was not obtained. We retrospectively collected the records of the patients with the diagnosis of BPO (after other failed medical treatment) who underwent M-TURP between January 2016 and December 2019.

Inclusion and Exclusion Criteria

This study included patients with BPO who were resistant to medical treatment, aged between 40 and 79 years, and underwent M-TURP. The exclusion criteria of this study were: age equal or greater than 80 years, presence of haematuria, antithrombotic/anticoagulant use, heart failure, patients with platelet (Plt) count and/or function anomaly, additional urinary tract disease such as bladder tumour or bladder stone, and inadequate data. Few patients who had a prostate gland volume (PV) equal or greater than 100 mL and who underwent the M-TURP procedure were not included because within the study period nearly all of the patients who had a PV equal or greater than 100 mL underwent open prostatectomy.

We collected the information regarding the age of the patients, use of 5 α -reductase inhibitor (5-ARI) and other medications, demographics, PV measured by transrectal ultrasonography, complete blood count preoperatively and in the postoperative 48th hour, and transfusions. In four patients, who were re-hospitalised because of late bleeding after discharge, the complete blood count in the 48th hour of the second admission was used in the calculations.

The patients were grouped according to their age, older or younger than 65 years, and whether blood transfusion was performed or not. We compared the study parameters among these groups. Additionally, we assessed the correlation between Hb changes from the preoperative period to the postoperative 48th hour and the other study parameters.

Blood Transfusion

We adopted a restrictive transfusion strategy (5). No transfusion was performed in the patients with a Hb level greater than 10 g/dL, whereas all the individuals with a Hb level lower than 7 g/dL received erythrocyte suspension (ES) transfusion. Between these threshold Hb levels, the decision of transfusion was made according to the concurrent organ ischaemia, predicted consequences of the bleeding, intravascular volume status of the patient and the risks arising out of inadequate oxygenation. Fresh frozen plasma (FFP) was administered in the patients who received high amounts of ES to prevent dilutional coagulopathy. Other blood products were not used in the study.

Surgical Technique

All the surgical procedures were performed in a routine manner by specialist urologists with an experience of performing more

than 100 TURP operations. M-TURP was conducted in a standard manner by using the 26 Fr continuous flow resectoscope (Karl Storz GmbH & Co. KG, Tuttlingen, Germany) or 24 Fr single-flow resectoscope (Karl Storz GmbH & Co. KG, Tuttlingen, Germany) with a monopolar loop electrode. The electrocautery system (Valleylab Force FXTM, Boulder, CO, USA) was used with the power settings of 120 and 80 Watts for cutting and coagulation, respectively. About 0.5% mannitol solution [Rezosele® (OSEL, Istanbul, Turkey)] was used as irrigation fluid during surgery. Postoperatively, a 22 Fr three-way latex Foley catheter was placed in all the patients, and the catheters were removed 48-72 h after the operation.

Statistical Analysis

We conducted statistical analyses by using IBM SPSS Statistics 22 (IBM SPSS, Turkey) computer program. We controlled the normal distribution of the data by Shapiro-Wilks test. Besides the descriptive statistical methods (mean, standard deviation and frequency), we used Mann-Whitney U test for comparison because of the non-normal distribution of the qualitative data. We used Fisher's exact test for analysing the quantitative data. We investigated the correlations between the non-normally distributed data by Spearman's rho correlation analysis. The best cut-off point was calculated with the receiver operating characteristic (ROC) curve analysis. A p value of less than 0.05 was considered statistically significant for this study.

Results

We enrolled 379 patients in this study. The mean age of patients was 67.44 \pm 7.74 years; moreover, 135 (35.6%) patients were younger than 65 years and 244 (64.4%) were equal to or older than 65 years. In total, 99 (26.1%) patients were taking 5-ARI treatment for at least three months before surgery (Table 1). The minimum, maximum and mean PV measured via transrectal ultrasonography were 30, 95 and 53.42 \pm 18.12 mL, respectively. Transfusion (erythrocytes and FFP) was performed in only 9 (2.4%) of the 379 patients. The age, PV, Plt count, international

Table 1. Demographic data and laboratory findings of the patients who underwent transurethral resection of the prostate with monopolar system

	Min-max	Mean \pm SD	
Age (year)	43-79	67.44 \pm 7.74	
PV (mL)	30-95	53.42 \pm 18.12	
Hb (preoperative) (g/dL)	10.1-18	14.21 \pm 1.48	
Plt ($10^3/mm^3$)	101-450	219.95 \pm 59.94	
INR (0.8-1.2)	0.73-1.20	1.03 \pm 0.8	
Hb decrease (g/dL)	0.1-6	0.99 \pm 0.87	
	n	%	
5 α -reductase inhibitor use	Yes	99	26.1
	No	280	73.9
Blood product transfusion	Yes	9	2.4
	No	370	97.6

PV: Prostate volume, Hb: Haemoglobin, Plt: Platelet, INR: International normalised ratio for prothrombin time, Min: Minimum, Max: Maximum, SD: Standard deviation, α : Alpha

normalised ratio (INR) for prothrombin activity and the use of 5-ARI of the patients were not different between the transfusion and non-transfusion groups ($p>0.05$). The preoperative Hb level of the transfusion group was significantly lower than that of the non-transfusion group ($p=0.004$) (Table 2). The mean decrease of preoperative Hb in the postoperative 48th hour was 0.99 ± 0.87 gr/dL. The preoperative Hb level was found to be inversely correlated with the postoperative decrease in Hb ($p=0.000$). The decrease in Hb was not associated with age, PV, Plt count, INR and use of 5-ARI ($p>0.05$) (Table 3).

The patients were grouped according to their age: whether they were younger than 65 years or not. The decrease in Hb was not different between the groups ($p>0.05$). The transfusion rates were 3% and 2% in the younger and older groups, respectively. There was no statistically significant difference between the groups ($p>0.05$). The correlations between decrease in Hb and other study parameters in both the groups were investigated individually, and the preoperative Hb level was found to be

inversely correlated with postoperative decrease in Hb in both younger and older groups ($p=0.000$ and $p=0.022$, respectively) (Table 3).

The area under curve (AUC) was 0.777, and the standard error was 0.11 in the ROC curve analysis for the preoperative Hb level, which predicted significant Hb decrease and need for transfusion after M-TURP. The AUC was significantly higher than 0.5 ($p=0.015$). The cut-off value for preoperative Hb level, which predicted significant Hb decrease and need for transfusion after M-TURP, was calculated as 12.45 gr/dL with a sensitivity and specificity of 77.8% and 86.8%, respectively (Figure 1).

Discussion

Since the 1970s, TURP has been the gold standard for the treatment of BPO after the failure of other medical treatments. TURP is a relatively safe procedure because of advancements in the surgical technique, instrumentation and perioperative management including anaesthesia (6). Postoperative complications such as haematuria or clot retention may prolong the length of hospital stay and increase the estimated medications for treating the complications. Even blood transfusions may be required because of acute haemorrhage.

The incidence rate of transfusion-requiring bleeding after M-TURP was 0.4-7.1% in the trials conducted before 2010 (7,8). A recent randomised controlled study reported the incidence rate of transfusion-requiring bleeding after M-TURP to be 6.3% (9). The most common causes of the bleeding after TURP are inadequate bleeding control during the procedure, anticoagulant drug use, comorbidities such as ischaemic heart disease, uncontrolled hypertension in the postoperative period,

Table 2. Observed parameters in the transfusion and non-transfusion groups

	Transfusion		p
	(-)	(+)	
	Mean \pm SD	Mean \pm SD	
Age (Year)	67.45 \pm 7.66	66.67 \pm 11.17	¹ 0.873
PV (mL)	53.39 \pm 18.21	54.67 \pm 14.95	¹ 0.579
Hb (preoperative) (g/dL)	14.26 \pm 1.44	12.32 \pm 2.07	¹ 0.004*
Plt ($10^3/mm^3$)	219.77 \pm 59.73	227.22 \pm 71.53	¹ 0.585
INR (0.8-1.2)	1.03 \pm 0.08	1.05 \pm 0.05	¹ 0.425
Hb decrease (g/dL)	0.95 \pm 0.8	2.89 \pm 1.46	¹ 0.000*
5 α -reductase inhibitor use n (%)			
No	274 (%74.1)	6 (%66.7)	² 0.702
Yes	96 (%25.9)	3 (%33.3)	

¹Mann-Whitney U test, ²Fisher's exact test, * $p<0.05$, PV: Prostate volume, Hb: Haemoglobin, Plt: Platelet, INR: International normalised ratio for prothrombin time, SD: Standard deviation

Table 3. Correlations between haemoglobin decrease and observed parameters

	Hb decrease					
	<65 years		\geq 65 years		Total	
	r	p	r	p	r	p
Age (year)					-0.004	¹ 0.945
PV (mL)	-0.032	¹ 0.715	0.077	¹ 0.231	0.034	¹ 0.508
Hb (preoperative) (g/dL)	-0.300	¹ 0.000*	-0.147	¹ 0.022*	-0.194	¹ 0.000*
Plt ($10^3/mm^3$)	-0.088	¹ 0.310	-0.089	¹ 0.164	-0.087	¹ 0.091
INR	0.068	¹ 0.436	0.070	¹ 0.276	0.069	¹ 0.177
5 α -reductase inhibitor use		² 0.359		² 0.307		² 0.791

¹Spearman Rho Correlation analysis, ²Mann-Whitney U test, * $p<0.05$, PV: Prostate Volume, Hb: Haemoglobin, Plt: Platelet, INR: International normalised ratio for prothrombin time

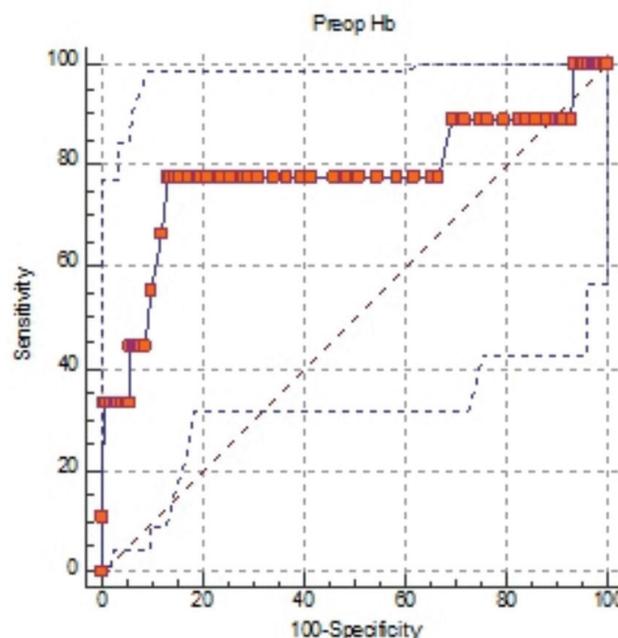


Figure 1. ROC analysis results and AUC for the preoperative Hb cut-off value predict the substantial decrease in Hb and transfusion need after M-TURP
 ROC: Receiver operating characteristic, AUC: Area under curve, M-TURP: Transurethral resection of the prostate with monopolar system, Hb: Haemoglobin

exercises increasing the intra-abdominal pressure, coughing and constipation. In addition to all these factors, the preferred TURP method may be the determinant of bleeding. There are several studies demonstrating that bleeding, clot retention and need for transfusion are more common in M-TURP as compared to bipolar TURP (10,11,12). However, it is reported that these two methods are comparable in terms of bleeding, clot retention and need for transfusion (9). A randomised controlled study reported that the long-term outcomes of M-TURP, photoselective vaporisation of the prostate and need for postoperative transfusion were not different between the two methods (13). The modified M-TURP methods, which reduce bleeding and transfusion rates as compared to the standard M-TURP, are also in use (14).

The mean Hb decrease with M-TURP was 0.99 ± 0.87 gr/dL in our study and in nearly all of the patients; importantly, we did not encounter any clinically important bleeding. The incidence rate of transfusion-requiring bleeding rate 2.4% with M-TURP in our study, which was consistent with the literature. Among all the parameters, only the preoperative lower Hb level was found to be associated with clinically important bleeding. The cut-off value of preoperative Hb level for predicting the substantial decrease of Hb and the need for transfusion after M-TURP was calculated as 12.45 gr/dL. Of the nine patients who underwent transfusion, seven (77.8%) had a preoperative Hb level lower than this cut-off level.

It is apparent from the literature that the patients undergoing TURP are older than 65 years and are likely to be on multiple medications due to the various co-existing chronic conditions thus more susceptible to postoperative complications (15). These complications may result in more serious conditions due to the delicate physiologies of the older patients (16). In our study, 64.4% of our patients were equal to or older than 65 years. The patients were grouped according to their age, that is, whether they were younger than 65 years or not. Contrary to the literature, the decrease of Hb and transfusion rates did not differ between the groups. We believe that this may be due to the study design that included only the index patients after the exclusion of patients who were older than 80 years of age, receiving antithrombotic/anticoagulant drugs, and who had comorbidities.

The preoperative PV, perioperative excessive resection of the prostate and prolonged duration of the operation may increase the risk of bleeding after TURP (17). Reich and colleagues reported that the risk of transfusion-requiring intraoperative/postoperative bleeding increased with resection weight. Transfusion rates for resection weights greater than 60 grams, 30-60 grams and less than 30 grams were 9.5%, 3.4% and 2.0%, respectively (18). Some studies showed correlations between the mean resected prostate weight and transfusion rates (4,19). PV in our study ranged widely from 30 to 95 mL with a mean PV of 53.4 mL. The resected PV was not measured routinely in this study; therefore, it is not shown in the analyses. In our study, preoperative PV measured via transrectal ultrasonography was not found to be associated with a decrease in Hb in the postoperative 48th hour and transfusion.

Several studies (from 2005 to present) demonstrated that the preoperative use of 5-ARI reduced perioperative bleeding

(3,20,21,22). However, there were also reports of contrary results (23,24,25). In our study, 99 (26.1%) patients were on 5-ARI treatment for at least three months before surgery, and a decrease in Hb in the postoperative 48th hour and transfusion was not associated with the preoperative use of 5-ARI.

There are few studies investigating the need for blood preparation before TURP and the routine control of Hb level after TURP. Shah and Nethercliffe (26) demonstrated that Hb decrease in 48 hours after TURP was negligible and except for clinical deterioration, the routine control of Hb level was unnecessary. Additionally, Hakeem et al. (4) reported that routine biochemical analyses were significantly expensive (\$45), and these analyses should be performed selectively rather than on a routine basis for a standard TURP procedure.

In our clinic, the preoperative blood group analysis, antibody screening and postoperative Hb level control were performed routinely because of legal concerns in the study period. However, these tests and controls did not yield the expected benefits in the management of the patients, and nearly all of the patients were discharged without necessity of transfusion. These tests, which are performed because of legal concerns and are under debate in terms of medical indications, appeared to cause a great waste of resources in four years.

As a clinical consequence, patients should not routinely be tested for blood group or antibody screening before M-TURP, except for the following clinical conditions: Hb level lower than 12.4 g/dL preoperatively, the absence of an active transfusion unit of the centre where the operation is performed, or rare blood group of the patient.

Study Limitations

The retrospective design of this study and the heterogeneity between groups are some limitations of this study. Additionally, a separate statistical evaluation could not be made for this group of patients because the number of cases for M-TURP with PV over 80 mL was not sufficient to obtain a good-quality statistical data.

Conclusion

M-TURP is still a safe and efficient method for bleeding control in BPO treatment in developing countries despite some potential risks. Additionally, routine tests for blood group or antibody screening do not alter the clinical management. The authors recommend selective blood testing based on the clinical need of patients.

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Ethics

Ethics Committee Approval: Due to the fact that this study is a retrospective, ethical committee approval was not obtained.

Informed Consent: Retrospective study.

Peer-review: Internally peer-reviewed.

Authorship Contributions

Supervision: Ö.Y., H.H.T., Critical Review: Ö.Y., Concept: S.A., Design: S.A., C.E., Data Collection or Processing: E.Ö., M.P., Analysis or Interpretation: C.E., K.K., Literature Search: H.H.T., Writing: S.A., C.E.

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