International Journal of Research in Medical Sciences
Pradiptha NT et al. Int J Res Med Sci. 2019 Dec;7(12):4438-4442
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012
DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20195207

Original Research Article

Prospective cohort study comparison of bipolar and monopolar transurethral resection of prostate for benign prostatic hyperplasia: haemoglobin, sodium levels, and urethral catheter traction application

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Received: 26 October 2019
Accepted: 12 November 2019

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ABSTRACT

Background: Bipolar Transurethral Resection of Prostate (TURP) and monopolar TURP has been widely used for surgical management of bladder outlet obstruction due to benign prostatic hyperplasia. The aim of this study is to prove the difference of haemoglobin (Hb), sodium levels (Na^+), application of urethral catheter traction between two groups.
Methods: Prospective cohort study was conducted for 82 patients as eligible sample which divided into two groups, bipolar TURP and Monopolar TURP from September 2018 to August 2019. The patient's demographics, preoperative, postoperative data, and application of urethral catheter traction were recorded.
Results: The result shows basic characteristic data seem comparable. The decline levels of Hb before surgery 14.2(2.6) and after surgery 13.6(2.6) in monopolar group was significant (p=0.01), and also in bipolar group 13.7(2.1) vs 13.4(2.1) was significant (p=0.033), despite decreasing Hb levels between two groups were insignificant (p=0.639) but decline levels of Na between two groups were significant (p=0.013) Na^+ level in bipolar 0(3) and monopolar 1(4). The application of urethral catheter traction in bipolar (19.5%) lower than monopolar (80.5%) were statistically significant (p<0.001).
Conclusions: Based on the results of this study, bipolar TURP surgery can be an optional recommendation in treating Benign Prostate Hyperplasia (BPH) in terms of better preserving blood sodium during surgery and low use of traction without significant bleeding complications.

Keywords: Benign prostatic hyperplasia, Bipolar, Catheter traction, Monopolar, SF-36 questionnaire, Transurethral resection of prostate

INTRODUCTION

Life expectancy in Indonesia is increasing, followed by higher rates of degenerative and metabolic diseases. Benign Prostatic (BPH) or benign prostate enlargement is a degenerative disease in men. Although this disease does not cause life-threatening complications, lower urinary tract disorders can reduce the quality of life of patients. About 25% of men over the age of 65 use aspirin.[1] The use of Aspirin as primary prevention against cardiovascular disease is becoming increasingly popular, in addition to being easily obtained, health financing can be reduced, especially in developing countries, where cardiovascular disease is the main cause of death.[2] However, widespread use of aspirin, especially in old age, has an impact on iatrogenic blood clotting disorders. This makes the technical procedure for transurethral prostate resection difficult, due to numerous bleeding complications during surgery. Discontinuation of aspirin

treatment before Transurethral Prostate Resection (TURP) surgery can minimize the risk of bleeding.[3]

Based on data from the World Health Organization (WHO), the incidence of BPH sufferers is between 0.5-1.5/100,000 world population, with a very rare mortality rate.[4] At Sanglah Central General Hospital (RSUP Sanglah) during 2013, 103 BPH patients underwent transurethral resection of the prostate (TURP) of 1,161 total urological surgeries.[5,6]

Monopolar TURP is still the gold standard of surgical therapy for benign prostate enlargement because it is less invasive and has lower complications than open prostate surgery procedures.[7] Nevertheless, 33-35% of patients with benign prostate enlargement with retention, have a chance to LUTS after TURP surgery, especially 2-6 weeks after surgery.[8] Several techniques have been developed, including the use of bipolar TURP (B-TURP) which is a rival to monopolar TURP (M-TURP) as conventional ones as well as the gold standard of prostate surgery therapy. In a multicenter study in Canada, which compared the impact of B-TURP and M-TURP, there were no significant differences in terms of duration of surgery and length of resection, where "functional outcome" increased significantly in both types of action.[9] In other studies mention, the use of B-TURP in benign prostate enlargement with large size can reduce the incidence of bleeding and "dilutional hyponatremia".[10]

Complete hemostasis is difficult to achieve, both in TURP and open prostate resection. This results in the importance of postoperative care and is even more important than the surgery itself. One attempt to control postoperative bleeding, using traction from a urine catheter, is fixed on the thigh. Where there is continuous suppression of the bladder neck by traction, it causes blockages in both the veins and arteries that enter the prostate capsule through the vesicoprostatic junction. in bleeding control.[11]

METHODS

This study was approved by the research ethics committee at the Faculty of Medicine, Udayana University, Sanglah Hospital Denpasar (IRB No. 2272/UN14.2.2.VII.14/LP/2019).

This prospective cohort study was conducted to compare between monopolar TURP surgery as standard procedure and bipolar TURP surgery for patient with BPH (benign prostate hyperplasia). Samples in this study were taken from September 2018 - August 2019, from 3 hospitals in Denpasar City. A total of 82 patients met the inclusion and exclusion criteria of the study. The study inclusion criteria were BPH patients aged ≥40 years old, with the prostate volume of 20-100 grams, and performed monopolar or bipolar TURP surgery. Patients with prostate cancer, residif cases, sepsis, unwilling to join the study, and experiencing severe mental disorders will be excluded from the study. The independent variables of this study were monopolar TURP and bipolar TURP, while the dependent variables in this study were hemoglobin, blood sodium levels and the application of catheter urethral traction. Patients with indications for TURP were given informed consent and the patient's basic identity and characteristics were recorded in the form of age, body mass index, education level, blood pressure, and prostate size from trans abdominal ultrasonography. Then the patient will be operated on by a single urology surgeon in each hospital. Blood sample taken before and after surgery to evaluate hemoglobin and sodium levels. The use of catheter traction based on indication and recorded.

All data collected and recorded in Microsoft Excell sheet and was analyzed using SPSS IBM version 24 software. Descriptive data were compared by Independent T-Test and bivariate analyzed using Mann Whitney Test and Wilcoxon Test. p value <0.05 was considered statistically significant.

RESULTS

During the period September 2018 to August 2019, recorded 89 patients diagnosed with BPH undergoing TURP surgery, there were 7 patients included in the exclusion criteria including 4 patients with prostate cancer histology results, 1 patient died 2 weeks after surgery, 1 patient was a residif case, and 1 patients with sepsis. So that leaves 82 patients. The sample was divided into two groups, namely the bipolar TURP (B-TURP) group as the treatment group and the Monopolar TURP (M-TURP) group as the control group. Each group with a sample of 41 people.

Data on the basic characteristics of the samples in each group are shown in Table 1.

Table 1: Basic characteristics of sample.

Characteristic	Groups		p value
	Bipolar (n=41)	Monopolar (n=41)	
Age	668±7.9	67.1±7.8	0.813
BMI	24.1±3.1	24.1±2.5	0.944
Education			
No school	3(7.3%)	1(2.4%)	0.215
Elementary-junior	18(43.9%)	16(39%)	0.215
Senior	10(24.4%)	12(29.3%)	0.215
Bachelor	10(24.4%)	12(29.3%)	0.215
Sistole	130(20)	130(20)	0.918
Diastole	80(20)	80(20)	0.426
TAUS (min-max)	41(18,9) 24.3-80.5	49(27,5) 25.0-91.5	0.012

Distribution data on age and Body Mass Index (BMI) were normal, an independent T test was used. The mean age in the bipolar group was 66.8±7.9, with age range 51

to 82 years. Whereas in the monopolar group, the mean age was 67.1±7.8, with an age range of 50-91 years. The mean Body Mass Index (BMI) was similar in the two groups, in the normal area. The level of education was tested with a 2x2 table using a likelihood ratio, the results obtained were not statistically different between the two groups, the most education of patient who underwent TURP procedures in the two groups above were 34 elementary-junior high schools, followed by senior high school 22 people, bachelor 22 people and not school 4 people. Whereas in variable blood pressure and prostate volume with abnormal data distribution, a non-parametric test was performed with the Mann Whitney test. Mean blood pressure in each group in the normal range of 130/80 mmHg. However, prostate volume based on Transabdominal Ultrasonography (TAUS), there were significant differences in the two groups (p=0.012). The median in the bipolar group was 41 grams with a range of 24.3-80.5 grams while in the monopolar group 49 grams with a range of 25.0-91.5 grams.

Table 2: Comparison of Hb levels.

Hb Level	Groups		p value
	Bipolar (n=41)	Monopolar (n=41)	
Pre, median (IQR)	13.7(2.1)	14.2(2.6)	0.111[a]
Post, median (IQR)	13.4(2.1)	13.6(2.6)	0.328[b]
Decline in Hb, median (IQR) (Hb Pre-Hb Post)	0.4(1.1)	0.4(1.6)	0.639[b]
Difference result Pre-post	(p=0.033)[c]	(p=0.010)[c]	-

a: independent T Test. b: Mann Whitney test. c: Wilcoxon test.

In comparing hemoglobin levels, an independent T test was used because the normal data distribution for Hb pre in both groups. Whereas at the Hb post and Hb reduction with abnormal data distribution, a non-parametric test was performed with the Mann Whitney test. To assess pre and post Hb in each group, because of the abnormal distribution of data, the Wilcoxon test was performed. Based on the table above, there appears to be no significant difference between Hb pre in the two groups (p=0.111) and Hb post in both groups (p=0.328). The comparison of Hb reduction or Hb delta in the two groups also did not differ statistically (p=0.639). There were significant differences in the changes in Hb pre and Hb post in each group. In the bipolar group (p=0.033) and in the monopolar group (p=0.010).

In comparing blood sodium levels in the two groups, due to the abnormal distribution of data in Na pre, Na post and Na delta, a nonparametric test was performed using the Mann Whitney test. To evaluate changes in Na pre and Na post in each group, a Wilcoxon test was performed. The Wilcoxon test is to assess whether there are significant differences in changes in Na Pre and Na post in each group, without comparing the differences between the two groups. From these tests the results obtained as in the Table 3. There was no significant difference between Na pre in the two groups (p=0.276) and Na post in the two study groups (p=0.192). There was a statistically significant difference in the reduction of Na or delta Na (p=0.013) between the two study groups, in bipolar with a mean (-0.78) while in monopolar (0.96). There was a significant difference in changes in Na pre and Na post in the monopolar group (p=0.028). Whereas the bipolar group was not statistically significant (p=0.119).

Table 3: Comparison of Na levels.

Na level	Groups		p value
	Bipolar (n=41)	Monopolar (n=41)	
Pre, median (IQR)	138(3)	137(5.5)	0.276[a]
Post, median (IQR)	138(2.5)	138(4)	0.192[a]
Decline Na, median (IQR) (Na Pre-Na Post)	0.0(3)	1.0(4)	0.013[a]
Difference result Pre-Post	(p=0.119)[b]	(p=0.028)[b]	-

a: Mann Whitney test b: Wilcoxon

The application of catheter urethral traction with a categorical data scale was compared between the two study groups, using the Pearson chi square test. In the bipolar group only 8 people (19.5%) used catheter traction while the remaining 33 people (80.5%) did not use traction. While on the contrary monopolar is the opposite, most 31 people (75.6%), while the remaining 10 people (24.4%) do not use traction. There was a difference in the use of traction between bipolar and monopolar, where in the bipolar group less use of catheter traction was statistically significant (p<0.001). Its show on Table 4.

Table 4: Comparison of urethral catheter traction by study group.

Application of traction	Groups		p value
	Bipolar (n=41)	Monopolar (n=41)	
Yes	8(19.5%)	33(80.5%)	<0.001
No	31(75.6%)	10(24.4%)	<0.001

DISCUSSION

Based on the basic characteristics data, appear to be mostly not statistically different. This shows the comparability of data in each group looks similar. Although in terms of prostate volume appear different, but these differences are not clinically significant. This shows the differences that occur in the outcomes obtained in this study due to differences in treatment that occurs in

the group of independent variables (monopolar TURP and bipolar TURP).

This study aims to compare two procedures in Benign Prostate Surgery (BPH), bipolar TURP and monopolar TURP. In several studies comparing monopolar TURP and bipolar TURP, mentioning bipolar TURP is superior, where bleeding, time of catheter use, postoperative complications such as hematuria, clot retention, blood transfusion is more frequent in the monopolar TURP group.[12] Intraoperative hemorrhage is one of the important complications that can result in clot retention and anemia. In this study, a decrease in Hb levels between the bipolar and monopolar groups, as a reflection of bleeding complications in TURP surgery, found no significant differences, (0.4(1.3) vs 0.3(1.6)).

Several studies support this finding, where bipolar (-1.75±0.77) and monopolar (-1.57±0.71) do not differ significantly.[10] Other studies also mention similar, allegedly because in bipolar who use a resection unit with hemostasis is better and in monopolar that is done by experienced operator doctors, so the decrease in Hb seems not significant significantly.[7] But if you see changes in Hb Pre and Hb Post in each group, statistical differences are obtained. In the bipolar group, the median values of Hb pre and post (13.7 vs. 13.4) were significantly different (p=0.033). Whereas in the monopolar group, the median values of Hb pre and Hb post (14.2 vs 13.6) were also significantly different (p=0.010). This shows that even though the decrease in Hb compared between the two groups there was no significant difference, the change in Hb in each group, by looking at the pre and post Hb levels in each group, looked statistically different. This shows that there is indeed bleeding due to TURP, but in both groups the decrease occurred slightly so that clinically there was not much change.

In this study, a statistical difference was found in the reduction in sodium levels that occurred between the two study groups (p=0.013). This is consistent with a study that states that sodium levels in the monopolar group were lower than the bipolar group (p=0.001).[7] In the same study mentioned, the monopolar group experienced the incidence of TUR syndrome in 2 patients, but in this study there was no TUR syndrome in either the bipolar or monopolar groups. Judging from its pathophysiology, this is closely related to the procedure performed by the surgical operator, which begins with the opening of the prostate sinus during resection, and is followed by the entry of irrigation fluid, causing delusional hyponatremia. But in each study, it has not been able to compare the expertise of the surgical operator. Other findings in this study showed blood sodium levels in the bipolar group did not change significantly, although the median values were similar, the mean values actually seemed to increase where na pre 137.1 and na post 137.9. This is related to the advantage of using bipolar devices, where the use of sodium chloride is 0.9% as the irrigation liquid. Supported by giving sodium chloride infusion 0.9% so that blood sodium levels appear stable and have increased 0.8 points. This is in accordance with several similar studies where the level of sodium in TURP with bipolar technique did not experience significant changes, even increased even though the value was not significant.[7] Other studies mention a decrease of 1.2-1.5 meq/L but do not differ statistically.[13] Whereas in the monopolar group, changes in Na and post Na levels were significantly different (p=0.028). In this study it appeared that bipolar TURP surgery, was able to maintain sodium levels, whereas in monopolar TURP surgery, it actually experienced a decrease in Na levels which statistically looked significantly different. This shows that bipolar TURP is better than monopolar TURP in terms of maintaining blood sodium.

The use of urethral catheter traction after TURP surgery has been carried out for a long time as an effective effort in controlling bleeding, where this procedure is followed by bladder irrigation. The procedure is simple, using a three way catheter 22 or 24 French, the catheter balloon is filled with aquabides until it inflates intravesical, then pulls/ traction, with adhesive tape fixation on the distal femoral or abdominal thigh, although it is useful, it has some disadvantages that requires that patients for immobilization of the lower limb which increases the risk of thrombosis (DVT).[11] In a study comparing the use of urethral catheter traction or not, data obtained in a group of patients without catheter traction experienced significant blood loss within the first 30 minutes after surgery. The use of traction during this period can significantly reduce blood loss. When the traction was loosened/ released, there was no statistically significant blood loss between the two groups.[14]

In this study, author compared the use of traction catheters between the bipolar group and the monopolar group. In the bipolar group only 8 people (19.5%) used catheter traction while the remaining 31 people (75.6%) did not use traction. Whereas in monopolar the opposite is true, most 33 people (80.5%), while the remaining 10 people (24.4%) do not use traction. There was a difference in the use of traction between bipolar and monopolar, where in the bipolar group less catheter traction was used and statistically significant (p<0.001). This could explain that the need to use traction to control bleeding is lower in the bipolar group. The use of traction can contribute to statistically different Hb pre and post change data, but because of its low value, it is clinically insignificant. This shows that patients in each group get a fair and best treatment in controlling the incidence of bleeding.

In one study, early (1 day) catheter withdrawal did not increase morbidity and significantly reduced hospital stay compared to 2-day catheter withdrawal after surgery. The same study shows the shorter duration of use of catheter has the advantage of improving the quality of life and reducing the rate of infection and symptoms of urinary

irritability.[15] With the findings in this study, it is possible to use a short urethral catheter, and have an impact on the length of stay and quality of life of patients.

CONCLUSION

Based on the results of this study, bipolar TURP surgery can be an optional recommendation for treating Benign Prostate Enlargement (BPH) in terms of better preserving blood sodium during surgery, low use of traction without significant bleeding complications.

ACKNOWLEDGEMENTS

Author would like to thank grammarly.com which provided English grammar support.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: 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. Int J Res Med Sci 2019;7:4438-42.