MAINTENANCE OF HOMEOSTASIS – AN OBSERVATIONAL STUDY COMPARING BIPOLAR AND MONOPOLAR TURP

Rajesh K. Maurya¹, Vinay Kumar², Kumar Vineet³

¹MS(General Surgery), Professor, Dept. of General Surgery, GSVM Medical College & Associated LLR Hospital, Kanpur

²M.Ch(Urology), Associate Professor, Dept of General Surgery, GSVM Medical College & Associated LLR Hospital, Kanpur

³MBBS, Resident, Dept of General Surgery, GSVM Medical College & Associated LLR Hospital, Kanpur

Conflicts of Interest: Nil

Corresponding author: Kumar Vineet

DOI: <https://doi.org/10.32553/ijmsdr.v5i7.829>

Abstract:

Background: Benign prostatic enlargement is a condition affecting old age population. Open and endoscopic procedures are available for its surgical treatment. Resection of prostate via trans urethral route (TURP) is the gold standard surgical procedure for prostatic enlargement. It is usually performed in two ways either using bipolar energy source or using monopolar energy sources. Many studies in the past have been done to compare resection of prostate using above mentioned energy sources. Most of them have preferred bipolar TURP over monopolar TURP in terms of development of complications.

Methods: In this study, we have observed maintenance of post operative homeostasis in terms of blood loss and changes in electrolytes in bipolar and monopolar TURP. Patients were divided into two groups. P value <0.05 was taken as significant.

Results: First group underwent M-TURP and second group was operated by B-TURP. There was no statistical difference between both groups in terms of blood loss. Also, change in blood sodium and potassium concentration was comparatively insignificant between two groups.

Conclusions: This observational study have yielded that there is no difference between bipolar and monopolar TURP in maintaining post operative homeostasis.

Keywords: TURP, Monopolar, Bipolar, Prostate, Glycine, Saline

Introduction:

Benign prostatic enlargement affects older males. It is a noncancerous increase in size of the Prostate.^[1] Symptoms are divided into two categories- storage and voiding. Incomplete voiding results in residual urine or urinary stasis, which can lead to an increased risk of urinary tract infection.^[2]

Transurethral resection of prostate is considered most effective and gold standard surgical treatment of benign prostatic enlargement. It is performed by visualizing prostate through urethra and cutting prostatic chips using energy sources.^[3] TURP can be performed either by

using monopolar energy (M-TURP) source or bipolar energy (B-TURP) source.

Monopolar energy source uses a wire loop with electrical current flowing through it in single direction. Loop is used to resect prostatic chips. A non conducting irrigation fluid is required to prevent this current from damaging surrounding tissues along with ESU grounding pad. Bipolar energy source on the other hand uses a conducting fluid such as normal saline for irrigation and also eliminates need for ESU grounding pad. In this there is modified current flow which passes from the resection loop

through the conductive irrigation fluid to the metal resection sheath, an additional loop or an extra shackle. Since the impedance of the patient is 10-fold higher than that of the irrigation fluid, the patient no longer constitutes a direct part of the current circle.^[4]

In our study, we observe changes of haemoglobin and electrolytes in monopolar and bipolar TURP between pre operative and post operative values.

Methods:

It is a type of prospective observational study comparing two groups. The study was conducted on patients who were admitted with the diagnosis of benign prostatic enlargement in out patient department.

Patients undergoing TURP were kept in two groups, even number patients in which energy source used was monopolar and odd number patients in which energy source used was bipolar.

All patients were more than 45 years of age with no co morbidity. Formal written consent was taken for operation and study.

Information about volume of irrigant used, type of irrigant used, resection time, weight of gland, changes in hemoglobin concentration, serum sodium and potassium levels were collected.

Bipolar resection was performed using Olympus bipolar resection system and monopolar resection was performed using L&T (maestro plus) with cutting and coagulation. Barnes method of resection was used in all our patients. The height of irrigation fluid was standardized. To prevent thermal damage to urethra, copious amounts of jelly around the sheath was used.

Eighty (80) symptomatic patients of benign prostatic enlargement were studied. Per rectal examination (Digital Rectal Examination, DRE) was done after emptying the bladder to assess the size and nature of prostate enlargement. Suprapubic ultrasonography was used to assess weight and volume of prostate pre operatively along with residual urine volume in all patients.

Surgery was performed under spinal anesthesia in all patients in lithotomy position. Ringer lactate

infusion was continued in the intra operative period. 1.5% glycine was used in Monopolar TURP and normal saline was used for Bipolar TURP.

Bipolar instrument was used for cutting at 160-180W and for coagulation at 90-100W. Similarly, monopolar instrument was used for cutting at 110-160 W and for coagulation at 80-90W.

Pre operative investigations were done 24 hours before surgery. Post operative values are taken 2 hours after surgery.

Ethical committee clearance was taken for this study along with patient's consent. Statistical analysis was done by unpaired t-test and two values were considered statistically significant at P value <0.05.

Results:

First group (n=40) underwent TURP performed by monopolar electro cautery using 1.5% glycine as an irrigant. In second group (n=40), bipolar energy source was used with 0.9% saline as irrigant. Weight of prostate gland was between 30-80 cc. There was no statistical significant difference between weights of glands in both groups. It was comparable.

Changes in level of hemoglobin concentration pre operatively and post operatively were compared in both groups. It was found that though there is more change in hemoglobin concentration in monopolar electrocautery group (mean change-1.73g/dl) compared to bipolar electrocautery group (mean change- 1.63g/dl) but statistically, there is no difference between level of change in hemoglobin concentration in Monopolar TURP group or Bipolar TURP group. (Table 1) The two-tailed P value equals 0.7428.

Further, changes in level of blood sodium and potassium pre operatively and post operatively were compared in both groups. Though, change in blood sodium concentration were more in monopolar cautery group compared to bipolar cautery group and change in blood potassium level was more in bipolar group compared to monopolar group, there was no statistically significant difference between both groups. Mean

difference of pre operative and post operative blood sodium in monopolar group was 9.38 mEq/l and it was 9.08 mEq/l in bipolar group. (Table 2) The two-tailed P value equals 0.7923.

Similarly, mean difference of pre operative and post operative blood potassium was 0.74 mMol/l in mono polar TURP and 0.75 mMol/l in bipolar TURP. (Table 3) The two-tailed P value equals 0.8905.

Table1:

Monopolar group	Bipolar group	Inference
n- 40 mean- 1.73 sd – 0.78	n- 40 mean- 1.68 sd – 0.56	Non significant

Changes in Hemoglobin concentration Pre & Post operatively

Table 2:

Monopolar group	Bipolar group	Inference
n- 40 mean – 9.38 sd – 6.45	n- 40 mean – 9.08 sd – 3.16	Non significant

Changes in Sodium concentration Pre & post operatively

Table 3:

Monopolar group	Bipolar group	Inference
n- 40 mean- 0.74 sd – 0.37	n- 40 mean – 0.75 sd – 0.27	Non significant

Changes in blood potassium concentration Pre & post operatively

Discussion:

Our study shows there is no statistically significant difference in levels of hemoglobin concentration between pre op & post op patients operated by monopolar energy source in comparison to bipolar energy source. Although, blood loss was more in monopolar group but none of the patient required blood transfusion.

The main disadvantage of TURP is blood loss during operation and afterwards. In a study conducted by **Tang Y, *et al*^[5], (2014)**, it was stated that there is no difference in blood transfusion frequency between Monopolar TURP and Bipolar TURP, which simply suggests that blood loss in M-TURP and B-TURP group is comparable.

Also, decrease in sodium concentration was observed more in patients operated by M-TURP

in the study. In a study conducted on 40 patients who underwent TURP by **Muhammad AT, *et al*^[6], (2010)**, 28 patients developed hyponatremia. In our study, there was no statistical difference in level of change in blood sodium concentration between Pre operative patient and Post operative patient operated by monopolar and bipolar energy sources. Same was seconded by **D S Engeler, *et al*^[7], (2010)** where they found no statistically significant difference in blood sodium level prior to and after the operation between monopolar TURP & bipolar TURP.

Change in blood potassium level between pre op patients and post op patients was observed more in patients operated by Bipolar TURP but there was no significant statistical difference between the change in levels observed in Bipolar TURP and Monopolar TURP group. Same results about

change in potassium concentration was obtained by T. Akman, *et al*^[8], (2013) in their study.

Above discussion indicates that though decrease in hemoglobin concentration and blood sodium concentration was more in patients of M-TURP group and change in blood potassium level was more in B-TURP group, there was no significant difference between the two groups. On the basis of above changes, it can be safely assumed that bipolar energy sources are as per to monopolar energy sources in terms of blood loss and electrolyte disturbances.

The lack of blinding in the treatment arm to the operating surgeon could be a source of bias.

Conclusions:

In this study, we concluded that Monopolar TURP is equal to Bipolar TURP in terms of maintenance of post operative homeostasis.

Abbreviations:

TURP- Trans Urethral Resection of Prostate

B-TURP- Bipolar Trans Urethral Resection of Prostate

M-TURP – Monopolar Trans Urethral Resection of Prostate

References:

1. Roehrborn CG. Benign prostatic hyperplasia: an overview. *Rev Urol.* 2005;7 Suppl 9(Suppl 9):S3-S14.
2. Carlos, J; Almeida, Flavio (July 2008). "Residual Urinary Volume and Urinary Tract Infection- when are they linked?". *The Journal of Urology.* 180 (1): 182–185.
3. Rocco B, Albo G, Ferreira RC, et al. Recent advances in the surgical treatment of benign prostatic hyperplasia. *Ther Adv Urol.* 2011;3(6):263-272
4. Bach T, Herrmann TR, Cellarius C, Geavlete B, Gross AJ, Jecu M. Bipolar resection of the bladder and prostate--initial experience with a newly developed regular sized loop resectoscope. *J Med Life.* 2009;2(4):443-446.
5. Tang Y, Li J, Pu C, et al. Bipolar transurethral resection versus monopolar transurethral resection for benign prostatic hypertrophy: a systematic review and meta-analysis. *J Endourol.* 2014;28(9):1107-1114.
6. Muhammad A., Shaikh A., Devrajani B. R., Shah Z., Das T., Singh D. Serum sodium level in transurethral resection of the prostate (TURP) (a cross sectional descriptive study at two hospitals) *Medical Channel.* 2010;16(2):218–220.
7. Engeler, D., Schwab, C., Neyer, M. *et al.* Bipolar versus monopolar TURP: a prospective controlled study at two urology centers. *Prostate Cancer Prostatic Dis* 13, 285–291 (2010).
8. Akman, T., Binbay, M., Tekinarslan, E., Tepeler, A., Akcay, M., Ozgor, F., Ugurlu, M. and Muslumanoglu, A. (2013), Outcomes of bipolar vs monopolar TURP. *BJU Int*, 111: 129-136.