

Comparative Study to Evaluate Efficacy of Bipolar Electrosurgical Unit Versus Monopolar Electrosurgical Unit in Transurethral Resection of Prostate

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ABSTRACT

Introduction: Transurethral resection of the prostate (TURP) is the gold standard in the management of benign prostatic hyperplasia. Electrocautery devices that have been used during TURP procedures have monopolar design and cannot be used with electrolyte rich irrigation fluid. Now use of bipolar TURP has challenged monopolar TURP. Bipolar cautery allows TURP to be performed in a normal saline environment, which addresses a fundamental concern of conventional monopolar TURP. As a result, the risks of dilutional hyponatremia and transurethral resection (TUR) syndrome are eliminated, allowing for longer and safer resection. Study aimed to compare the safety and efficacy of bipolar Electrocautery unit using saline as irrigant against monopolar Electrocautery unit using glycine as irrigant.

Material and methods: A total of 100 patients who underwent Monopolar TURP (group A: 50 patients) or Bipolar TURP (group B: 50 patients) were analyzed in dept of surgery, Muzaffarnagar Medical College And Hospital from May 2015 to December 2016. Variables analyzed were, hemoglobin, serum sodium, serum potassium, IPSS, Qmax, QoL Intraoperative resection time, amount of irrigant, resection volume were recorded. Post-operative hemoglobin, Na⁺, K⁺ were assessed within 6 hour of surgery. Patients were followed after 6 weeks to assess the IPSS, Qmax, QoL.

Results: The mean Hemoglobin, S. Na⁺ and K⁺ level were comparable between both groups. The mean resection time [56.24min and 59.2min] and resected weight [22.68 gm and 21.09 gm] in monopolar and bipolar TURP was not statically significant. For both groups amount of irrigant fluid used was same. The statically significant decline in hemoglobin was seen in monopolar group (1.25g%, p< 0.0001) as compared to the bipolar group (0.64g%,p<0.01) but, no patient required blood transfusion. When in follow up Patients of both the group after 6 weeks showed comparable alleviation in all IPSS, Qmax, QoL.

Conclusion: Bipolar Electrocautery is comparable in terms both safety and efficacy to monopolar Electrocautery

Keywords: TURP, Hemoglobin, Bipolar, IPSS, Monopolar, Qmax, QoL

the technical changes led to improved hemostasis and outcome, with reduced blood transfusion rates and low peri-operative mortality.³⁻⁴

Electrocautery device that have been used during TURP procedure have monopolar design using glycine as irrigant. The use glycine of has been associated with dilutional hyponatremia and variable degree of hypo-osmolality. In recent years, other techniques, including the use of bipolar TURP have challenged conventional monopolar TURP.⁵ Bipolar TURP also results in better visibility, less thermal damage and importantly, allows use of normal saline for irrigation.⁶ Therefore large prostate gland can be resected in cardiac patients. Bipolar cautery allows TURP to be performed in a normal saline environment, which removes the concern of monopolar cautery using hypo-osmolar irrigation. Thus, the risk of dilutional hyponatremia and TUR syndrome are omitted, allowing for safer and longer resection time.

In this study the efficacy and safety of monopolar cautery and bipolar cautery based TURP systems was evaluated.

MATERIAL AND METHODS

This study was a Randomized Study conducted in the Department of Surgery, Muzaffarnagar Medical College, Muzaffarnagar, UP. A total of 100 cases were included in study and distributed between two groups after chit picking who were admitted from May 2015 to January 2016 fulfilling all the inclusion criterion and giving consent. The Ethical Committee approved protocol before the start of study. A completely written and informed consent was taken from the indorsed patient. Inclusion Criterion: All patients of lower urinary tract symptoms, patient failure to medical treatment. Size-30-100 gm prostate, Age between 50 to 85 years. Exclusion Criterion: Patients with history of TURP, BPH with bladder diverticula, calculus, bladder tumour, urethral stricture. Patients with cardiac disease or bleeding diathesis or renal disease.

Pre-operatively detailed history of patients was taken. IPSS, Uroflowmetry and QoL was evaluated, Physical Examination

INTRODUCTION

Benign prostatic hyperplasia (BPH) is a highly prevalent problem in the elder male with more than 50% of the males over 60 years having histologically proven BPH and at least half reporting moderate to severe lower urinary tract symptoms(LUTS).¹ Transurethral resection of prostate using bipolar electrocautery with normal saline is an advancement in surgical management of BPH. Despite the introduction of alternative techniques, transurethral resection of the prostate (TURP) still represents the gold standard in the operative management of benign prostatic hyperplasia (BPH).² The advancement of TURP and

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How to cite this article: Singla Mamta, Gupta K Akhil, Zea M. Iqbal, Garg Sahaj, Mishra R K, Jain Shaleen. Comparative study to evaluate efficacy of bipolar electrosurgical unit versus monopolar electrosurgical unit in transurethral resection of prostate. International Journal of Contemporary Medical Research 2017;4(2):565-568.

with DRE was done. Hemoglobin, creatinine, S.PSA, sodium, potassium was done. An Ultrasonography was done preoperative to assess prostate size. Written consent was taken for surgery. Intra-operative: Resection time from the first cut to catheter insertion, Amount of irrigation fluid used, net Resected weight of prostate chips. Postoperative: Within 6 hours of surgery hemoglobin, sodium and potassium was measured. Triway Catheter was removed when urine became clear. IPPS, QoL, Uroflowmetry were assessed After six weeks.

Materials used were Uroflowmeter, Karl-Storz bipolar resection system with bipolar TUR loop and Karl-Storz monopolar resection system with monopolar TUR loops and Erbe Electrosurgical unit

STATISTICAL ANALYSIS

The statistical inference was calculated by a statistician using mean, Z test and calculating P value. P value < 0.05 was considered statistically significant.

RESULTS

This study was a Randomized Study conducted in the Department of Surgery, Muzaffarnagar Medical College, Muzaffarnagar, UP. A total of 100 cases were included in study and distributed between two groups after chit picking who were admitted from May 2015 to January 2016 fulfilling all the inclusion criterion and giving consent.

The mean resection time between monopolar and bipolar TURP is statically significant. Amount of irrigant used in both the groups does not show any statistical difference. The resection volume in monopolar and bipolar TURP is comparable in both groups (table-1).

As shown in Table 2, there was significant hemoglobin % decrease in monopolar group as compared to bipolar group which is statically significant. The monopolar group (1.25gm%, p<0.0001) showed a statically significant decline in hemoglobin as compared to the bipolar group(0.64gm%,p<0.01),but none of patient required any transfusion.

In our study Both the groups show no serum sodium and Potassium changes postoperatively as shown in table 3.

There was the significant improvement in IPSS of patients in both monopolar and bipolar groups. There was significant improvement in QoL and Qmax of patients in both monopolar and bipolar groups. P value > 0.05 which was not statistically significant.

DISCUSSION

Transurethral resection of prostate with bipolar electro-cautery and normal saline is advancement for management of BPH. Introduction of different techniques, transurethral resection of the prostate (TURP) still is the gold standard in the operative management of BPH. During the last decade TURP showed significant technical advances influencing reduction of intra and post-operative complications

One of the most significant recent advancements in transurethral resection of the prostate (TURP) is the incorporation of bipolar technology This review discusses the principles and applications of electrosurgery in conventional monopolar as well as new bipolar saline-based TURP systems.

The gold standard for management of BPH is transurethral resection of the prostate, which was earlier performed using a monopolar electro-cautery. This led to development of latest procedures such as vaporization of the prostate and bipolar electro-cautery systems. We have conducted randomized study to evaluate and compare the efficacy and safety of monopolar versus bipolar TURP in benign prostatic hyperplasia

The mean resection time of prostate during monopolar TURP in our study was 57.24min where as in Bipolar TURP it was 59.2min (Table 1) which was statistically significant. However in his study Engeler et al⁸ had mean resection time of 50.3mins in bipolar TURP and 41.8mins in monopolar. this slight increase in resection time in bipolar TURP to the more cutting strokes that were required to resect the same amount of tissue due to small diameter of the bipolar resection loop. Neyer et al¹⁰ explained it due to a small delay (0.8sec) of plasma corona is

Parameter	Monopolar		Bipolar		Z Value	P Value
	Mean	SD	Mean	SD		
Resection time (min)	57.24	4.75	59.2	3.34	2.38	<0.17
Resected weight (gm)	22.68	4.06	21.09	1.19	2.65	<0.00079
Amount of irrigant (L)	18.78	1.28	18.50	1.34	1.06	<0.28

Table-1: Comparison of resection time, resected weight and amount of irrigant in monopolar and bipolar study groups

Hemoglobin (gm%)	Monopolar		Bipolar		Z Value	P Value
	Mean	SD	Mean	SD		
Pre-operative	12.48	1.19	12.99	0.95	2.36	<0.0179
Post-operative	11.23	0.88	12.35	0.86	6.43	<0.0001
Hemoglobin Drop	1.25gm%		0.64gm%			

Table-2: Comparison of pre and post-operative Hemoglobin in monopolar and bipolar study groups:

	Monopolar		Bipolar		Z Value	P Value
	Mean	SD	Mean	SD		
Pre-op Sodium (mEq/L)	138.46	2.26	135.05	4.89	4.476	<0.0001
Post-op Sodium (mEq/L)	137.09	2.04	134.91	4.90	2.91	<0.0035
Pre-op Potassium (mEq/L)	4.01	0.19	3.83	0.46	2.55	>0.05
Post-op Potassium (mEq/L)	3.92	0.25	3.75	0.42	2.459	>0.05

Table-3: Comparison of pre and post-operative Sodium and Potassium in monopolar and bipolar study groups

	Monopolar		Bipolar		P Value
	Mean	SD	Mean	SD	
Pre-op IPSS	20.84	3.13	22.08	10.02	>0.05
Post-op IPSS (6 weeks)	6.32	1.14	6.80	0.91	>0.05
Pre-op QoL	3.52	0.71	3.52	0.65	>0.05
Postop QoL (6 weeks)	1.24	0.52	1.24	0.44	>0.05
Pre-op Qmax ml/sec	7.48	1.36	6.88	0.88	>0.05
Post-op Qmax ml/sec (6 weeks)	19.36	1.73	18.6	1.04	>0.05

Table-4: Comparison of pre and post IPSS, Quality of life (QoL) and Comparison of Q-max in monopolar and bipolar study groups

formation with each cut.

The mean resected weight of prostate during bipolar TURP was 21.09gm and monopolar TURP in our study was 22.68gm which was not statistically significant (P Value >0.05). Neyer et al¹⁰ in his study had mean resected prostate volume of 21.9gm in bipolar and 23.5gm in monopolar group.

The mean amount of irrigant used during monopolar TURP in our study was 18.78 liters glycine while in bipolar TURP it was 18.50 liter saline which was not statistically significant (P value >0.05). Singhania et al⁷ in his study had 19.87 l mean irrigation used in monopolar group and 18.11 l in bipolar group. He commented on faster coagulation and clearer operative field with bipolar unit. This explains a lesser amount of irrigant used in bipolar surgery.

The advantages of bipolar electrocautery is the ability to use normal saline during surgery, lesser blood loss and lower thermal damage to the surrounding tissue. In our study post-operative hemoglobin during monopolar TURP was 11.23gm/dl with drop of 1.25gm%, where as in bipolar TURP it was 12.35gm/dl with drop of 0.64gm%(Table 2) which was statistically significant (P value <0.005). However, none of the patient in required blood transfusion. Singhania et al⁷ in his study showed statistically significant hemoglobin drop(0.94 gm%, p value <0.005) as compared to bipolar group (0.58 gm%, p value=0.014). Patankar et al¹¹ in his study found significant blood loss among patients undergoing monopolar versus bipolar TURP.

Bipolar cautery allows TURP in a normal saline, which reduces the risks of dilutional hyponatremia and TUR syndrome are eliminated, allowing for safer and longer resection. monopolar group showed mean pre-operative Na⁺ 138.46 mEq/L and mean post-operative Na⁺ 137.02 mEq/L while bipolar group showed mean preoperative Na⁺ 135.05 mEq/L and mean post-operative Na⁺ 134.9 mEq/L, p value in both pre and post-operative groups was <0.05, which was statistically significant (Table 3). On comparison of pre and post-operative K⁺ monopolar group had mean pre-operative K⁺ 4.01 mEq/L and post op K⁺ 3.92 mEq/L, bipolar group had mean pre-operative K⁺ 3.83 mEq/L and post op K 3.75 mEq/L, p value was < 0.05 which was statistically significant. Singhania et al⁷ in his study had decreased serum sodium compare to bipolar saline group, but was not significant statistically. He explained that not only serum sodium level osmolality of the absorbed irrigant is equally responsible for the TUR syndrome

In our study, there is significant improvement in IPSS of patients in both monopolar and bipolar group (Table 4). In our study monopolar group showed mean post-operative IPSS (6.32) while bipolar group showed mean postop IPSS (6.80), which is not significant statistically. Mamoulakis et al⁶ in his study had improvement in the IPSS of patients in both monopolar

and bipolar group which was not statistically significant. This study require a longer follow up for assessing bladder neck contracture and urethral stricture. Mamoulakis et al⁶ explained a factors including instruments size, surgeon's skill and urethral diameter that are responsible for urethral stricture. He explained electric current leakage provokes stenosis.

In our study, there is significant improvement in QoL of patients in both monopolar and bipolar group (Table 4). Monopolar group showed mean post-operative QoL 1.26. Bipolar group also showed mean post-operative QoL 1.27 and the p-value >0.05, which is significant statistically. in both monopolar and bipolar TURP patients Engelar et al⁸ had significant improvement in QoL score postoperatively.

In our study, Qmax of patients in both monopolar and bipolar group there is significant improvement in (Table 4). Monopolar group showed mean post op Q max [19.36 ml/sec] Bipolar group showed mean post op Qmax [18.6 ml/sec] which is not statistically significant. Patankar et al¹¹ in his study had comparable improvement in Qmax in both groups postoperatively.

CONCLUSION

The amount of blood loss was more in monopolar group as compared to bipolar group though none of the patient required blood transfusion at any time. There was a statistically significant change in serum sodium and serum potassium levels in monopolar groups but no change in bipolar group. There was significant improvement in IPSS of patients in both monopolar and bipolar groups. There was significant improvement in Qmax of patients in both group. There was significant improvement in QoL of patients in both monopolar and bipolar group.

In view of above conclusions, the safety and efficacy of Bipolar electrocautery is similar to Monopolar electrocautery. However, there was small sample size with prostate size up to 100gm and limited follow-up. Hence we recommend a randomized trial study involving more number of patients with larger prostate gland size, extended follow-up.

DECLARATION OF INTEREST

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper

REFERENCES

1. AUA Practice Guidelines Committee AUA on management of benign prostatic hyperplasia. Chapter 1: diagnosis and treatment recommendations. J Urol. 2003;170:530-47.
2. Reich O, Gratzke C, Stief CG. Techniques and long-term results of surgical procedures for BPH. Eur Urol. 2006;49:970-8.
3. Rassweiler J, Teber D, Kuntz R, Hofmann R. Complications

- of transurethral resection of prostate (TURP)-incidence, management, and prevention. *Eur Urol.* 2006;50:969-70.
4. Hueber PA, Asker AA, Zorn KC. Monopolar vs. bipolar TURP: assessing their clinical advantages. *Can Urol Assoc J.* 2011;5:390–391.
 5. Yoon CJ, Kim JY, Moon KH, Jung HC, Park TH. Transurethral Resection of the Prostate with a Bipolar Tissue Management System Compared to Conventional Monopolar Resectoscope: One-Year Outcome. *Yonsei Med J.* 2006;47:715–720.
 6. Mamoulakis C, Schulze M, Skolarikos A, Alivizatos G, Scarpa RM, Rassweiler JJ et al. Midterm Results from an International Multicentre Randomized Controlled Trial Comparing Bipolar With Monopolar Transurethral Resection of the prostate. *Eur Urol.* 2013;63:667-76.
 7. Singhania P, Nandini D, Sarita F, Hemant P, Hemalata I. Transurethral resection of prostate: A comparison of standard monopolar versus bipolar saline resection. *Int Braz J Urol.* 2010;36:183-9.
 8. Engeler DS, Schwab C, Neyer M, Grun T, Reissigl A, Schmid H-P. Bipolar versus Monopolar TURP: A prospective controlled study at two urology centers. *Prostate Cancer Prostatic Dis.* 2010;13:285-91.
 9. Fagmerstrom T, Nyman CR, Hahn RG. Complications and clinical outcome 18 months after bipolar and monopolar transurethral resection of the prostate. *Journal of Endourology.* 2011;25:1043-1049.
 10. Neyer M, Reissigl A, Schwab C, Pointner J, Abt D, Bachmayer C, Schmid HP, Engeler DS. Bipolar versus monopolar transurethral resection of the prostate: Results of a comparative prospective bicenter study-perioperative outcome and long-term efficacy. *Urol Int.* 2013;90:62-67.
 11. Patankar S, Jamkar A, Dobhada S, Gorde V. PlasmaKinetic Superpulse Transurethral Resection versus Conventional Transurethral Resection of Prostate. *Journal of Endourology.* 2006;20:215-19.
 12. Jain S, Garg S, Singla M. Bipolar versus monopolar transurethral resection of prostate – a prospective randomized study. *J. Evolution Med. Dent. Sci.* 2016;5:10.14260.

Source of Support: Nil; **Conflict of Interest:** None

Submitted: 08-02-2017; **Published online:** 20-03-2017