A PROSPECTIVE STUDY COMPARING MONOPOLAR AND BIPOLAR TRANSURETHRAL RESECTION OF PROSTATE

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ABSTRACT

In the past few years, the bipolar technique of resecting the prostate has become available worldwide, and currently alongside other minimally invasive techniques, especially different laser modalities, challenges the monopolar transurethral resection of the prostate (TURP) as being the gold standard in treating benign prostatic hyperplasia (BPH). The proposed advantages of bipolar resection are improved haemostasis, better intraoperative visualisation, use of saline as an irrigant, which reduces the risk for TUR syndrome, shorter catheterisation time and reduced hospital stay. This study compares monopolar and bipolar TURP with respect to safety, efficacy and complications.

MATERIALS AND METHODS

This study was performed in the Department of Urology, Rajarajeswari Medical College and Hospital, Bangalore from March 2015 to March 2016 after ethics committee clearance. Fifty patients with bladder outlet obstruction due to BPH were randomised into two groups (the first managed by standard monopolar TURP and the second managed by bipolar TURP).

RESULTS

Resection and operative time is comparable in both groups. Volume of the irrigation fluid used was less in Bipolar group, but this difference was statistically insignificant. In Bipolar TURP, change in Serum Na levels postoperatively is less compared to monopolar group and this difference is statistically significant. Postoperative catheter duration was found same in both groups. Although postoperative hospital stay and patients requiring blood transfusion was less in bipolar group, this difference was not found significant statistically. Postoperative complication rate in bipolar group was less but it was not statistically significant.

CONCLUSION

Bipolar TURP has an equivalent complication profile; however, the elimination of a patient return electrode pad and toxicity from hypo-osmolar irrigation fluids may provide an extra level of patient safety. Longer followup is needed to determine if this technology will eventually supplant monopolar TURP as the new gold standard.

KEYWORDS

Benign Prostatic Hyperplasia, Monopolar TURP, Bipolar TURP, IPSS, PVR.

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INTRODUCTION: Benign prostatic hyperplasia (BPH) is a highly prevalent condition in adult males, with more than 50% of the males over 60 having histologically proven prostatic hyperplasia and at least half reporting moderate-to-severe lower urinary tract symptoms (LUTS).[1] Currently, the gold standard for the surgical treatment of BPH-related LUTS is transurethral resection of the prostate (TURP).[1,2] Despite its excellent clinical outcomes, monopolar TURP is associated with well-known and potentially serious complications in 0.8% to 1.4% of patients.[3-5] TURP-syndrome, bleeding and urethral stricture, remains significant at 11.1%, based on prospective, multicentre study of 10,654 men.[6]

In the past few years, the bipolar technique of resecting the prostate has become available worldwide,[7-9] and currently alongside other minimally invasive techniques, especially different laser modalities, challenges the monopolar transurethral resection of the prostate (TURP) as being the gold standard in treating benign prostatic hyperplasia (BPH). Bipolar electrocautery offers the advantage of active and return electrodes being placed on the same axis on resectoscopes using high current locally but with limited negative effects at a distance, which provides an advantage over the monopolar system in which the current passes through the patient's body, from the active electrode, placed on the resectoscope, toward the return plate placed on the patient's leg, with several disadvantages such as heating of deeper tissue, nerve or muscle stimulation, and possible malfunction of the cardiac pacemaker.[10] The proposed advantages of bipolar resection

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are improved haemostasis, better intraoperative visualisation, use of saline as an irrigant, which reduces the risk for TUR syndrome, shorter catheterisation time and reduced hospital stay.[11,12] This study compares monopolar and bipolar TURP with respect to safety, efficacy and complications.

MATERIALS AND METHODS: This study was performed in the Department of Urology, Rajarajeswari Medical College and Hospital, Bangalore from March 2015 to March 2016 after ethics committee clearance. Fifty patients with bladder outlet obstruction due to BPH were randomised into two groups (The first managed by standard monopolar TURP and the second managed by bipolar TURP).

Inclusion Criteria:

1. Prostate Size: 40-90 g.
2. Patients fit for surgery.
3. INR ≤1.3.

Exclusion Criteria:

1. Prostatic size less than 40 g or more than 90 g.
2. Proven prostate cancer.
3. Voiding disorders not related to BPH (e.g. neurogenic bladder, stricture urethra).
4. International prostate symptoms score (IPSS) score less than 12.
5. Qmax greater than 12 mL/s.
6. Irreversible bleeding diathesis.
7. Bladder tumours.
8. Large bladder diverticulum or bladder stones.
9. Patient not willing to give consent.
10. Patients unfit for surgery.

Patients were preoperatively evaluated in detail by means of medical history taking, physical examination including DRE, laboratory investigations including serum sodium level and complete blood count, and imaging evaluation including abdominopelvic and transrectal ultrasonography to evaluate the urinary tract for associated pathology, to measure Post Void Residual (PVR) urine volume, and to estimate the preoperative prostate size. IPSS was determined in all cases. Patients were further assessed by uroflowmetry (Qmax). Assessment of IPSS, Qmax, and PVR urine volume was omitted in men presenting with urinary retention. PSA estimation was done in all cases. Bipolar TURP was performed with Karl Storz 26-Fr bipolar TURP resectoscope using Karl Storz Autocon II 400 HF unit which ensures a very deep coagulation effect during cutting. Normal saline (0.9% NaCl) was used as irrigant. Monopolar TURP was performed with a Karl Storz 26-Fr resectoscope, using an ERBE ICC 350 generator set at 120/70 W (Cutting/Coagulation mode).

All resections were carried out with standard loops and sterile water was used as irrigating fluid. Treatment with anticoagulants was discontinued 5 days before surgery. Prothrombin time/international normalised ratio was measured before surgery, and a level of ≤1.3 was accepted. Antibiotic prophylaxis was given to patients on the day of surgery. Patients with a confirmed infection were treated with antibiotics for 7 to 10 days. The other patients received no antibiotics.

At the end of the procedure, a 20-Fr three-way Foley catheter was inserted and continuous irrigation was commenced with saline at a rate sufficient to maintain a light pink return. Irrigation was stopped as soon as the colour of the returning fluid became clear. All procedures were evaluated for operative time, resection time and amount of irrigation fluid used. All patients were evaluated for intraoperative blood loss, intraoperative complication, and for the need for blood transfusion. Immediate postoperative measurement of haemoglobin, haematocrit, and serum sodium was obtained to estimate the intraoperative loss of those values. Intraoperative blood loss was estimated by measuring the patient's preoperative haemoglobin concentration, volume of irrigation fluid used, and haemoglobin concentration in irrigation return obtained immediately after finishing the procedure. Postoperative irrigation time, catheter time, and hospital stay were recorded for all patients. IPSS, uroflowmetry (Qmax), and measurements of PVR urine were evaluated at 3 months postoperatively.

RESULTS:

	Monopolar (n=25)	**Bipolar (n=25)**	**P-value**
Mean Age±S.D. (in years)	69.24±7.58	68.42±8.02	n.s
PSA (ng/dL) (Range)	2.53±1.38 (1-6.4)	2.89±1.0 (0.90-5.2)	n.s
Prostate size±S.D. (Range)	67.86±12.27 (40 -90)	65.16±14.24 (40 -86)	n.s
PVR (mL) (Range)	152.13±85.26 (80-325)	150.28±70.34 (60-300)	n.s
IPSS	17.20±6.32	15.27±6.20	n.s
Q_{max} (mL/sec)	6.46±3.18	6.24±2.94	n.s
Hb (g %) (Range)	12.64±0.84 (11.2-16)	13.05±0.90 (12-15.40)	n.s
Serum Na Concentration (mmol/L) (Range)	140.53±3.12 (134-145)	139.26±2.52 (134-145)	n.s
Patients on preoperative catheter	5/25	4/25	n.s

Table 1: Baseline and Preoperative Parameters of Both Groups

Both the groups were similar in terms of baseline and preoperative characteristics.

	Monopolar (n=25)	Bipolar (n=25)	P-value
Operative time (min.)	62.24±6.18	62.96±6.26	n.s
Resection time (min.)	50.54±4.38	51.58±4.20	n.s
Irrigation fluid volume (litres)	18.38±4.71	16.64±4.25	n.s
Change in Hb (g %)	1.06±0.96	0.92±0.82	n.s
Change in Na (mmol/dL)	5.08±2.42	1.72±2.81	<0.001
Intraoperative blood loss	320±98.24	284.22±82.41	n.s
Catheter duration (days)	4	4	n.s
Hospital stay (days)	7	6	n.s
Blood Transfusion	2	1	n.s

Table 2: Comparison of Operative and Postoperative Data of Both Groups

Resection and operative time is comparable in both groups. Volume of the irrigation fluid used was less in Bipolar group but this difference was statistically insignificant. In Bipolar TURP change in Serum Na levels postoperatively is less compared to monopolar group and this difference is statistically significant. Postoperative catheter duration was found same in both groups. Although postoperative hospital stay and patients requiring blood transfusion was less in bipolar group, this difference was not found significant statistically. No patient in each group had TURP syndrome. 2 patients in monopolar group and 1 patient in bipolar group had sepsis which was managed conservatively. One patient in monopolar group developed clot retention for which clot evacuation was done. Urethral stricture was reported in 1 patient in each. For both patients, VIU was done under spinal anaesthesia.

	Monopolar (n=25)	Bipolar (n=25)	P-value
TUR Syndrome	0	0	n.s
Delayed Haematuria	1	0	n.s
Sepsis	2	1	n.s
Clot retention	1	0	n.s
Stricture-urethra	1	1	n.s
Total	**5(20%)**	**2(8%)**	

Table 3: Comparison of Peri-operative and Postoperative Complications in Both Groups

	Monopolar (n=25)	Bipolar (n=25)	P-value
IPSS	5.28±2.94	5.02±1.92	n.s
Q_{max} (mL/sec)	17.22±2.14	18.86±2.08	n.s
PVR (mL)	30.14±22.84	26.52±19.43	n.s

Table 4: Comparing Followup Data at 3 months in Both Groups

DISCUSSION: Our results were in accordance with those reported by Giulianelli et al[13] and Tefekli et al[14] In contrast, Michielsen et al[15] found that bipolar TURP required significantly more time than monopolar TURP (56±25) vs. (44±20) min. He attributed it to the learning curve and the use of a small-sized resectoscope 24-Fr in bipolar TURP. Poh et al[16] also in contrast to our results, found that bipolar TURP has a significantly slower resection rate than monopolar TURP. The reason may again be due to the smaller size of the resectoscope used for bipolar TURP 24-Fr. In our study, serum Na+ loss was significantly lower in the bipolar group 1.72±2.81 mmol/L than in the monopolar group 5.08±2.42 mmol/L because of the use of normal saline as an irrigant, the result being comparable to that of Singhania et al[17] who reported a greater decline in serum sodium in the monopolar group (4.12 vs. 1.3 mmol/L). In another study, Michielsen et al[15] also reported less intraoperative serum Na+ loss in the bipolar group (1.44 vs. 2.23 mmol/L). Our results were similar to those mentioned by Tefekli et al[14] Singhania et al[17] and Giulianelli et al[13] All of them concluded that, although there was a highly significant improvement in each group compared with baseline with respect to IPSS, Qmax, and PVR urine volume after 1 and 3 months postoperatively, the differences between the two groups were statistically insignificant.

No differences were seen in catheterisation time, associated infections, or hospital stay. As reported previously, the surgical haemorrhage and the transfusion rate were smaller during bipolar TURP, whereas the bleeding during postoperative irrigation was negligible after both types of surgery.[18] in our study less complications were reported in the bipolar group. Starkman and Santucci[11] reported an acute complication rate of 33% in the monopolar group and 16% in the bipolar group, and a long-term complication rate of 11% after monopolar TURP and 8% after bipolar TURP. A limitation of the study is that the sample size is too small to be a subject to meaningful analyses of the groups.

CONCLUSION: Bipolar TURP has an equivalent complication profile; however, the elimination of a patient return electrode pad and toxicity from hypo-osmolar irrigation fluids may provide an extra level of patient safety. Longer followup is needed to determine if this technology will eventually supplant monopolar TURP as the new gold standard.

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