

Bipolar versus monopolar transurethral resection for benign prostatic hypertrophy: A prospective observational study

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Abstract

Background: Benign prostatic hyperplasia (BPH) is one of the most common diseases that affect aging males. The lower urinary tract symptoms (LUTS) caused by BPH-related obstruction (BPO) continue to be a major problem in the medical care of aging males. Aim: To compare the effects of bipolar and monopolar TURP in terms of symptom improvement and perioperative results for benign prostatic hyperplasia (BPH).

Methods: A total of 80 patients who underwent transurethral resection of prostate (TURP) surgical procedure, (n = 40 for monopolar TURP) and (n = 40 for bipolar TURP) for BPH enrolled at the Department of Urology in Government Medical College Srinagar. Patients were grouped into group I, who underwent bipolar TURP and group II, who underwent monopolar. Preoperatively, by using IPSS (international prostate symptom scale) and IIEF-5 (international index of erectile function-5) questionnaires severity of LUTS and Erectile function were assessed. All patients were submitted to transrectal ultrasonography and PSA determination. Surgical and immediately postsurgical variables and complications were recorded. Urethral stricture incidence, post-surgical reoperation rate, total postoperative catheter time and hospital stay, change in serum sodium, and hemoglobin were also recorded in two groups.

Results: Study groups were comparable with regard to demographic profile with statically no significant differences $p > 0.05$. Significant differences were found in operating time in minutes (48.11 ± 5.29 vs 43.99 ± 6.28 , $P < 0.025$) between Group I and Group II. A significant drop in serum sodium was seen in post-operative period in Group I as compared to Group II which was statistically significant ($P < 0.5$). Catheterization time and duration of hospitalization were clearly shorter in the Group II. Transurethral resection (TUR) syndrome was reported in two patients who had undergone monopolar resection without any incidence in bipolar group. Fall in haemoglobin (Hb) and packed cell volume (PCV) was more in Group I as compared to Group II, but statically insignificant ($p > 0.05$).

Conclusion: Bipolar TURP is safe and equally effective as monopolar TURP that is correlated with a distinctly shorter catheterization time, shorter hospital stay, less decrement in the levels of serum sodium.

Keywords: Benign prostatic hyperplasia, Transurethral Resection of Prostate, Monopolar TURP, Bipolar TURP, LUTS

Introduction:

Benign prostatic hyperplasia (BPH) is one of the most common problems of aging males all over the world. Benign prostatic hyperplasia produces variety of lower urinary tract symptoms (LUTS) which can lead persistent bothersome symptoms affecting the quality of life. [1] Enlargement produce wide variety of symptoms which are known as lower urinary tract symptoms (LUTS) and they can be classified as obstructive and irritative. It includes hesitancy, thin stream, intermittency, post void dribbling, decreased force of urination, straining, nocturia, frequency and dysuria. [2]

Numerous surgical techniques are approved for the surgical treatment of benign prostatic obstruction (BPO). They include minimally invasive procedures such as the newly introduced prostatic urethral lift and water vapor thermal therapy, transurethral resection, vaporization or enucleation of the prostate and open or laparoscopic/robotic assisted prostatectomy and have been recommended by the guidelines of the most distinguished scientific organizations. [3,4] In clinical practice for many decades, transurethral resection of the prostate (TURP) remains the standard by which subsequent surgical modalities for the treatment of BPH have been compared.

Among the endoscopic options, TURP is considered as a “gold standard” treatment for enlarged benign prostate and most commonly done surgical procedure for BPH. [5] Indications and treatment methods for enlarged prostate are well established. TURP can be done by using monopolar cautery or bipolar current. Monopolar is already established and gold standard procedure against which all other modalities are compared. Improvements in technology and

modifications in instruments and various new advances in electro cautery have brought about huge reductions in morbidity and mortality, but the basic principles of TURP remain the same. Bipolar TURP using the Gyrus™ plasma kinetic system is as effective as monopolar TURP with the additional advantage of shorter duration of catheter use, hospital stay and reduced complications.

Guidelines recommend that either monopolar or bipolar TURP may be used, for patients with a moderately enlarged prostate, of up to 80 cc, depending on the surgical expertise of the practitioner. [3,4] In bipolar TURP (B-TURP), the energy does not travel through the body to reach a skin pad, as is the case for monopolar TURP (M-TURP). It is confined between the active and passive poles situated on the resectoscope tip (resection loop). [6] It may be performed in 0.9% NaCl solution and does not require the use of isoosmolar solutions (mannitol, glycine), greatly reducing the risk for acute dilutional hyponatremia and the TUR syndrome. This is especially important for larger prostates requiring prolonged surgery. [7]

Methods:

This prospective observational study was carried out among the patients who suffered from LUTS (lower urinary tract symptom) related to BPH. After taking informed consent from all patients, we performed a prospective analysis of 80 patients of BPH who underwent TURP with (n = 40) each for monopolar and bipolar group. Patients were evaluated by clinical examination, trans abdomino pelvic USG, uro-flowmetry, IPPS questionnaire, serum prostate specific antigen (PSA), urine analysis, urine culture, complete blood count, renal function test, blood sugar analysis and coagulation profile before the procedure. We preferred the surgical procedure according to patient's choice.

Indications for surgery included failed medical management, acute urinary retention with failed voiding trial, recurrent urinary tract infection and haematuria. Patients with documented or suspected prostate cancer, neurogenic bladder, previous prostate surgery, urethral stricture, associated bladder stones and renal impairment were excluded from the study. Abnormal PSA or digital rectal examination findings were triggers for a transrectal ultrasound sonography (USG-guided) prostate biopsy before inclusion in the study.

All the TURP procedures were performed under spinal anaesthesia under lithotomy position. Preliminary cystourethroscopy was done to assess urethra, verumontanum, prostate gland, bladder mucosa and ureteric orifice. The resectoscope used was 26 Fr Modified Iglesias double sheath continuous irrigation resectoscope with thumb operating working element. Monopolar resection was performed using Erbee cautery with cutting and coagulation setting of 100 W and 60 W respectively with glycine 1.5 % as irrigant fluids.

Bipolar resection was performed using the Gyrus PK bipolar resection system. Generator settings for cutting and coagulation were 160W and 180 W respectively with 0.9 % normal saline as irrigant fluid.

The resection time of all procedures were calculated from initiation of resection to removal of resectoscope sheath. For all patient's resection time, intra-operative complications were noted and 22 - F, 3 - way Foley's catheter was inserted at the end of procedure and irrigation of bladder with normal saline was started and continued for 24 hours post-operative period. The resected prostatic specimens were sent to pathology lab for histopathological (HP) study.

During post-operative period, all patients were monitored for hematuria, altered sensorium and any change in vital parameters. In the post-operative period, blood was sent for hemogram, serum electrolytes. Catheter was removed on 3rd post-operative day and after voiding the patient was discharged on same day. Patients were followed-up at 1, 3 and 6 months.

Statistical Analysis

The chi - square test was applied to compare the proportions between 2 groups. Continuous variables were presented as mean $\pm$ SD and were compared using the student's t-test when the data followed a normal distribution. The adjusted calculation was performed using statistical package for social sciences (SPSS) package with binary logistic regression. A P value of < 0.05 was considered as statistically significant.

Results:

All the patients in treatment groups were compared with respect to age, weight, and height. The statistical analysis between two groups was not significant (p>0.05) [Table 1].

Table 1: Demographic profile among the study population

Variables	Group A	Group B	P Value
Age	64.55 $\pm$ 12.56	66.80 $\pm$ 11.37	0.810
Weight	61.50 $\pm$ 8.87	62.50 $\pm$ 9.88	0.721
Height	166.2 $\pm$ 3.61	168.5 $\pm$ 4.21	0.642

The mean of prostate size, PSA, age, IPSS score, IIEF-5 scores, serum sodium levels, and haemoglobin concentration were alike in two groups, preoperatively (Table 2). Duration of hospitalization, catheterization time, and the IPSS and IIEF-5 scores, which were measured in three and six months beyond the surgery, are represented in (Fig 1).

Table 2: Preoperative Characteristics

Variables	Group I	Group II	P Value
IPSS score	21.50± (2.70)	21.66± 3.06	>0.5
IIEF-5 score	14.98± 4.9	15.04± 5.3	>0.5
PSA, ng/mL	2.1± 0.7	2.3± 0.8	>0.5
Hb, mg/dL	12.9±2.4	12.7± 1.5	>0.5
Na, mg/dL	139.2± 1.98	140.3± 1.61	>0.5
Prostate volume, gm	39.6± 10.7	39.9 ± 9.98	>0.5

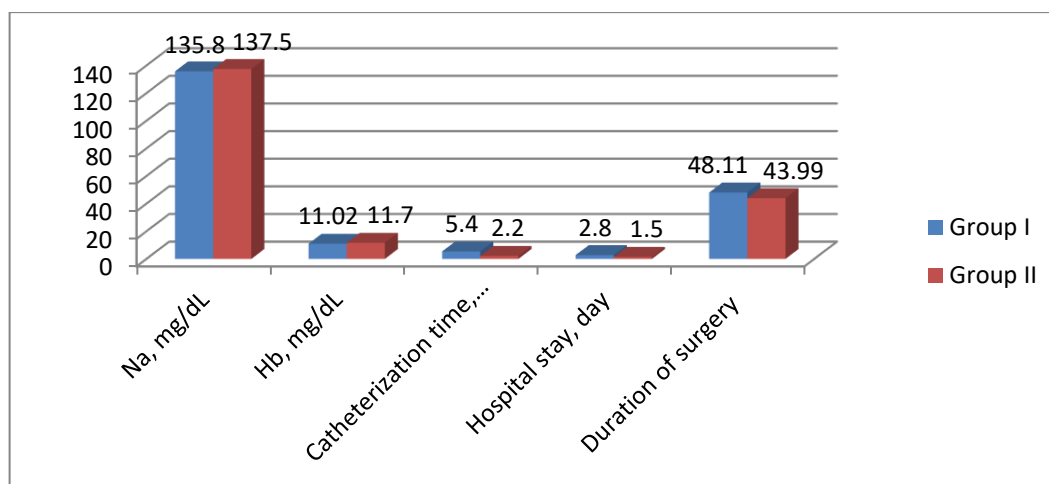


Fig 1.

Discussion:

Over the past few decades, the traditional M-TURP has remained the gold standard surgical treatment for BPO. In recent years, however, bipolar technology, in which the positive and negative poles are on the same axis and isolated from each other by a ceramic connecting piece, has developed. [9] The absence of a return current has improved hemostasis during resection and minimized blood loss. [10] The hemostatic capability of B-TURP may be better than MTURP because the mean coagulation depth in B-TURP is greater than the maximum microvessel diameter. [11] Bipolar technology can coagulate small venous bleeding and provides a clearer view compared with M-TURP during surgery, thereby resulting in a decrease in operation time as well as in the incidence of early complications. M-TURP is performed using glycine or mannitol irrigating solutions that may cause TUR syndrome, which is one of the most important complications of this surgery. In contrast, B-TURP uses normal saline during resection, which protects against TUR syndrome.

Recent studies providing comparative study between bipolar vs. monopolar TURP were encouraging though majority of the studies were retrospective (hence subject to confounders). There is no clear agreement or comparison among the two types of TURP procedures regarding efficacy and safety of both these procedures.

In our study, mean prostate size undergoing monopolar TURP was 39.6 ± 10.7 and in bipolar TURP was 39.9 ± 9.98, which were quite similar as compare to other studies. [11,12,13] The mean operative time for monopolar and bipolar TURP was 48.11 ± 5.29 minute and 43.99 ± 6.28 minute respectively which is statically significant. Similar results were shown by studies done by M.I.Karaman et al. & Patankar S et al. which shows shorter operating times, less blood loss, shorter periods of irrigation and catheterization with bipolar resection. [14,15] Michielsen et al. have reported significantly longer operating times with bipolar resection. 18 In the study done by Vijay Kumar Sarma Madduri et al. the resection took a mean of 51.75 ± 14.28 min in the M-TURP group while it took a mean of 82.14 ± 29.60 min for the B - TURP group. This difference was statistically significant (P < 0.001). The longer operative time in the B-TURP group is because of the considerably larger size of the gland resected using bipolar technology. [16] This may be attributed to the generalised perception of the operating surgeon that B - TURP can be done for large prostate glands with better safety profile. [17]

In our study there was no significant blood loss in both groups, post-surgery based on the insignificant difference in the preoperative and postoperative hemoglobin levels. Similar findings were obtained by Madduri et al. [17] Other studies, too, have noted a statistically insignificant blood loss between M -TURP and B-TURP.

In the post-operative period, the mean fall in sodium concentration in M - TURP is 5.1 mEq while B - TURP had a mean drop of 3.17 mEq/L, which is statistically significant (P< 0.05). Similar results were found by Kong et al. (1.03 mEq/L in B - TURP vs. 5.01 mEq/L in M - TURP (P = 0.01).21 In our study, TUR syndrome occurred in two patients (2.6 %) in the M - TURP group, whereas in B - TURP group not a single patient developed TUR syndrome. This result

is in concordance with literature which shows B - TURP leads to less decline in serum sodium levels and virtually eliminates the risk of TUR syndrome. However, the fluid absorption in B - TURP is the same as in M - TURP and hence volume overload can still occur, which may be of concern in patients with cardiac problems. [18] In around 22 studies between 2004 and 2011 which compared M - TURP with B - TURP, not a single case of TUR syndrome reported in 1401 patients of the B - TURP group, whereas in same studies, 35 cases of TUR syndrome occurred out of a total of 1375 patients who underwent M-TURP. However, one study has not reported any TUR syndrome in a cohort of 51 patients undergoing M - TURP, even though there was a statistically significant drop in serum sodium levels in the M – TURP group. [19]

In our study, during the follow up in first post-operative month there was significant symptomatic improvement with fall in IPPS score of 10.70 and 10.29 in monopolar and bipolar group respectively which indicates successfulness of surgical procedure. Clot retention occurred in 2 (5 %) patients of the M-TURP group and 1 (2.5 %) patients of the B-TURP group. The result was clinically insignificant. Similar to our results, Lee et al. [20] reported a clot retention rate of 10.3 % in the M-TURP group and 5.3 % in the B-TURP group (P = 0.389).²⁵ However, larger number of samples are required to validate the advantage of any one procedure in respect to post operative clot retention.

Conclusion:

Bipolar TURP is safe and equally effective technique as monopolar TURP with advantage of shorter duration of surgery time and low consequences of hyponatremia and TUR syndrome, but needs large randomized trials with long follow up to confirm its efficacy and safety.

Conflict of Interest: Nil

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