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ORIGINAL ARTICLE

Transurethral Monopolar versus Bipolar Enucleation of the Prostate: A Prospective Randomized Study

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ABSTRACT

Background: Transurethral enucleation and resection of the prostate (TUERP) is a recently developed procedure. In which the prostate is transurethrally enucleated and resected using a bipolar and monopolar resectoscope. The aim of this study is to compare efficacy and safety of monopolar (M-TUERP) versus bipolar (B-TUERP) in medium volume prostate.

Methods: The study was conducted in the Department of Urology, Zagazig University Hospitals, between the period of March 2018 and February 2019 on 24 patients divided in to 2 groups (12 patients in monopolar group and 12 patients in bipolar group).

Results: During the operative period, resected tissue was significantly higher in monopolar TUERP group compared to bipolar TUERP group. There was a significant increase in the catheter time and hospital stay among patients in monopolar TUERP group compared to bipolar TUERP group. Regarding post-operative follow up of patients, there was no significant difference in the mean values of IPSS, Qmax and PVR and IIEF between both groups.

Conclusions: Our study concluded that, monopolar enucleation of prostate adenoma is feasible and effective, but associated with high complications, Moreover B-TUERP associated with lower complications and hospital stay, catheter time and less Hg and Na loss than M-TUERP, moreover resected prostatic tissue was significant higher in M-TUERP than B-TUERP.

Keywords: Enucleation of The Prostate, benign prostatic hyperplasia, medium volume prostate

INTRODUCTION

Transurethral resection of the prostate (TURP) is considered the gold standard for treatment of symptomatic benign prostatic hyperplasia (BPH) when medical therapy fails [1].

Conventional TURP uses a monopolar electrocautery system in which distilled water or Glycine are used as an irrigant [2].

Although monopolar TURP (M-TURP) has a high success rate (90%-95%), it is associated with a morbidity rate of 15% to 18% and a mortality rate of 0.001% [3].

Bipolar TURP with the use of normal saline as irrigant, significantly eliminates the risk of

transurethral resection syndrome [4]. B-TURP is associated with significantly less fluid absorption than monopolar TURP, but the operative duration and the weight of resected prostatic tissue are similar between the two procedures [5].

In addition, postoperative bleeding, blood transfusion requirements, early and late complications such as clot retention, urinary retention, bladder neck stenosis and urethral stricture did not significantly differ between the two procedures [6]. Transurethral enucleation and resection of the prostate (TUERP) is a recently developed procedure created [7],[8]. In which the prostate is transurethrally enucleated

and resected using a bipolar plasma kinetic resectoscope [9]. Studies have suggested that TUERP is a safe and feasible treatment for BPH with few complications [9]. This study aimed to compare the efficacy and safety of monopolar (M-TUERP) versus Bipolar (B-TUERP) in the management of medium volume prostate. The aim of the study is to compare monopolar versus bipolar TUEP for management of male LUTS secondary to medium volume prostate.

METHODS

The study was conducted in the Department of Urology, Zagazig University Hospitals, between the period of March 2018 and February 2019. Our study included a total of 24 patients with symptomatic benign prostatic hyperplasia. The patients divided randomly into two equal groups; Group (1): included 12 patients, treated by M-TUEP and Group (2) also included 12 patients, treated by treated by B-TUEP. All male patients with LUTS due to BPH scheduled for endoscopic prostatectomy with prostate volume 50-80 cm on TRUS.

Inclusion criteria:

Absolute indication for active intervention for BPH. Bothersome urinary symptoms not responding to medical therapy with alpha blockers. Patients with BPH (50 – 80gm) scheduled for Endoscopic management.

Exclusion criteria:

Uncontrollable Bleeding tendency. Associated bladder or urethral pathology. Previous prostatectomy. Neurological disease. Skeletal deformity Prevent lithotomy position. All patients undergone for complete history taking including IPSS, clinical examination including DRE, pelvic-abdominal U/S, PVR, TRUS. Some serum biochemical analysis as Hb, serum sodium and total PSA were performed pre and post operative techniques. Outcomes of preoperative parameters, intra-operative and post-operative measures were detected. Patients follow up were recorded post-operative at 1, 3 and 6 months. Also, changes assessment in the monopolar and bipolar TUERP were identified.

Method of Study:

Institutional Ethics Committee approval was obtained. Informed consent was taken from all patients who underwent surgery. Patients were randomized closed method (1:1) into two groups of 12 each to undergo Transurethral Enucleation Prostate either with Monopolar TUEP (Group 1) or saline bipolar transurethral enucleation (Group 2). We used the Erbe Medical UK Ltd Electrosurgery System and used thick loop for enucleation for bipolar group. The settings we employed were 160W cutting and 80W coagulation for bipolar enucleation. Erbe Medical UK Ltd Electrosurgery monopolar system was used for monopolar TUEP, and the setting used was 100W for cutting and 60W for coagulation in monopolar loops. (Figure I)

Transurethral Technique Both Monopolar and Bipolar Enucleation:

The process of enucleation begins using 24fr-continuous flow resectoscope with saline irrigation and plasmakinetic device. In the presence of median lobe, the procedure starts with resection of few chips at 5 and 7 o'clock from the bladder neck to verumontanum and deep till reaching the prostatic capsule. The resectoscope tip was inserted into the cleavage plane between adenoma of the median lobe and capsule. The gland is dissected from the capsule in a retrograde fashion, so the median lobe is detached and pushed to the bladder.

The next step started with deep longitudinal incision at 12 o'clock till reach the capsule to separate the two lateral lobes from each other, then from the 5 and the 7 o'clock at the apex of the prostate in upward and retro grade manner till the two lateral lobes are detached completely and pushed to the bladder. The process of enucleation is accompanied with immediate electro cauterization of any source of bleeding at the capsule.

In the absence of median lobe, the procedure starts with deep longitudinal resection at 12, 5 and 7 o'clock from the bladder neck till the veru and down to the capsule. Then both lobes were enucleated as mentioned before. Furosemide (20 mg /hour, IV) is administered after one hour of surgery to Correct the fluid absorption and provide clear vision.

Once the lobes have been enucleated into the bladder, hemostasis within the prostatic fossa is ensured. In the absence of a morcellator, the lobes have been left attached by their mucosal tags and resected *in situ* using the standard resection loop.

When resection was completed, all adenoma fragments were extracted using an Ellik evacuator, following completion of the procedure, a 22-24 Fr 3-way Foley's urethral catheter is left in the bladder.

The enucleation time of both procedures were calculated from the period of initiation of enucleation to end procedure, any intraoperative complication were noted and irrigation was started and continued postoperatively, the irrigation fluid used in Bipolar enucleation was saline. After the procedure specimens were packed properly and sent to pathology department for histopathological examination.

Postoperative:

Continuous bladder irrigation with saline until hematuria clears. The specimen was measured then prepared to be sent for histopathological examination. Blood samples were taken for assessment of hemoglobin and serum Na immediately after the operation. The patient continues parenteral antibiotic till catheter removal. Removal of the catheter was done according to the hospital protocol in both groups within 24 hours after urine becomes clear.

The following data were recorded:

Any complications in the postoperative period [clot retention, postoperative bleeding, acute urinary retention, recatheterization... etc].

Catheter time. Hospital stays: The patient was discharged on oral antibiotic (quinolones) and analgesic when needed. The patient was instructed to avoid straining and to come back after 1week to receive the result of histopathology.

Ethical Clearance:

Written Informed consent was taken from the patient and relative to participate in the study. Approval for performing the study was

obtained from Urology Departments, Zagazig University Hospitals after taking Institutional Review Board (IRB) approval. The work has been carried out in accordance with the code of ethics of the world medical association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

Data collected throughout history, basic clinical examination, laboratory investigations and outcome measures coded, entered, and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) (Statistical Package for the Social Sciences) software for analysis. According to the type of data qualitative represent as number and percentage, quantitative continues group represent by mean \pm SD, the following tests were used to test differences for significance difference and association of qualitative variable by Chi square test (X²). Differences between quantitative independent groups by t-test or Mann Whitney, paired by paired t or sign. P value was set at < 0.05 for significant results and < 0.001 for high significant result.

RESULTS

Consort flow chart of the participant (Figure 2): Age was distributed between groups as 66.91 \pm 5.86 and 67.16 \pm 5.5 with no significant difference between groups regard age, also there was no significant difference between groups regard all other parameters. Table (1)

Significant change except in K and International Index Erectile Functional Table (2)

Resected tissue was significantly larger in monopolar group, No significant difference in operation time between groups. Table (3)

Catheter time and Hospital stay significantly longer in Monopolar group which were 3.08 \pm 0.66 in monopolar Versus 2.41 \pm 0.66 in bipolar and 43.0 \pm 6.17 in monopolar Vs 33.0 \pm 9.04 in bipolar. Prostate size no significant different between both groups, which was a little larger in bipolar group. Table (4)

There were statistically significant differences between the both groups regarding intra and post-operative complications, 2 cases (16.7%) needed blood transfusion (one unit of packed RBCS) due to intraoperative bleeding in M-TUERP group. 1 case (8.3%) with TUR syndrome in M-TUERP group, due to the decreased serum sodium (Na +) levels. There

are 3 cases (25.0%) with capsular perforation in M-TUERP group VS 2 cases (16.7%) in B-TUERP group during enucleation which no significant different between to group. The cases with urge incontinence in both groups resolved within 3 months with the aid of anti-mascarinic drugs. Table (5)



Fig. (1): Working Elements with Bipolar and Monopolar loops

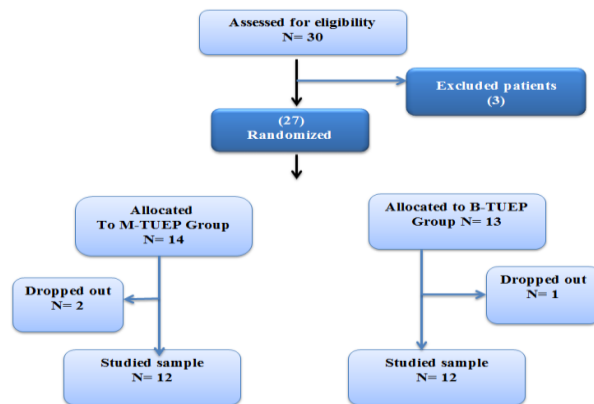


Fig. (2): Consort flow chart of the participant

Table 1: Basal preoperative demographic and clinical data distribution between studied groups

Variable	Monopolar Group (N=12)	Bipolar Group (N=12)	t/ Mann Whitney	P
Age	66.91±5.86	67.16±5.5	-0.108	0.915
PVR (ml)	133.75±3.53	135.0±3.77	-0.683	0.506
TRUS Value (gm)	68.33±9.95	69.0±9.54	-0.167	0.869
Qmax Pre	7.08±0.51	6.91±0.66	0.684	0.501
Pre IPSS	32.08±2.31	33.0±1.85	-1.070	0.296
Pre IIEF	21.58±1.33	21.91±1.24	-0.658	0.517

Table 2: Change assessment in monopolar and bipolar group at 6 months

	Mean		Paired t	P
	Pre	Pre		
Monopolar Group				
HB	12.1±0.7	9.8±0.4	12.186	0.00**
HTC	49.9±1.1	43.1±1.0	11.095	0.00**
Na	140.4±2.8	120.2±2.1	20.136	0.047*
K	3.9±0.2	4.0±0.2	0.506	0.623
Qmax	7.0±0.5	22.6±0.7	-74.630	0.00**
IPSS	32.0±2.3	8.1±0.9	47.501	0.00**
IIEF	21.5±1.3	20.6±1.2	-0.432	0.674
TRUS	68.3±9.9	25.0±4.3	32.136	0.049*
Bipolar Group				
HB	12.3±0.7	10.6±0.8	9.974	0.00**
HTC	50.4±1.3	44.5±1.0	5.461	0.00**
Na	140.5±2.5	135.1±1.7	-2.071	0.049*
K	4.0±0.2	3.9±0.2	1.121	0.286
Qmax	6.9±0.6	22.7±0.9	-56.625	0.00**
IPSS	33.0±1.8	7.0±0.9	46.382	0.00**
IIEF	21.9±1.2	20.5±1.1	1.541	0.152
TRUS	69.0±9.5	29.0±3.1	24.136	0.00**

Table 3: Resected tissue and operative time

	Monopolar Group (N=12)	Bipolar Group (N=12)	t	P
Resected tissue (gm)	45.5±3.94	33.5±2.01	4.127	0.001**
Operative time (minutes)	75±3.09	72±3.0	3.879	0.09

Table 4: Catheter time, hospital and prostate size determined by TRUS at 6 months

	Monopolar Group (N=12)	Bipolar Group (N=12)	t	P
Resected tissue (gm)	4.08±0.66	2.41±0.66	2.443	0.023*
Operative time (minutes)	43.0±6.17	33.0±9.04	3.162	0.005*
Estimate prostate weight (gm) by TRUS at 6 months	25±4.3	29±3.1	2.890	0.070

Table 5: Intra and post operative complications

Variable	Mono-polar (group)		Bipolar (group)		X2	P
	N	%	N	%		
Intraoperative bleeding	2	16.7	0	0.0	14.7	0.0001**
Blood transfusion	2	16.7	0	0.0	14.7	0.0001**
Capsular perforation	3	25.0	2	16.7	1.65	0.19
UTI	2	16.7	3	25.0	1.65	0.19
Urge incontinence at first 3 months	5	41.6	4	33.3	0.99	0.31
TUR syndrome	1	8.3	0	0.0	31.1	0.11

DISCUSSION

The ideal surgical treatment for moderate prostates (30–80 ml) by monopolar TURP (M-TURP) which considered as both clinically and cost effective [10],[11]. However, the M-TURP procedure is associated with perioperative complications such as bleeding, bladder neck contractures or transurethral resection syndrome, urethral strictures [12]. However, despite of the improvement made for TURP surgical equipment, the principle of this endoscopic surgery and some of the subsequent complications such as the high rate of postoperative recurrence remains unchanged, calling for a substantial innovation on the surgical technique [13].

Another alternative of classic TURP, the endoscopic enucleation, was developed to overcome these problems. Bipolar transurethral enucleation of the prostate (B-TUERP) is consisting of the enucleation of the adenoma by conventional bipolar energy and dedicated loops [14] [15]. Bipolar enucleation has its own advantage in that the equipment is easily accessible and highly cost-efficient [16]. However, this procedure has not been widely accepted and still a need to upgrade this technique to improve its efficacy and safety [17].

In developing countries not all centers are equipped with bipolar machines, so the idea to use a commonly available power source like monopolar was raised as an alternative for bipolar in enucleation, So in moderate sized

glands which can be enucleated is monopolar enucleation is possible as bipolar.

Operative time is an important efficacy parameter that should be discussed when comparing M-TUERP and B-TUERP. In our study the mean operative time was 75 ± 3.09 minutes in M-TUERP group and 72 ± 3.0 minutes in B-TUERP group it was little, shorter in B-TUERP group which was not significant.

The removed prostatic weight is another important efficacy parameter that should be discussed when comparing (M-TUERP) and (B-TUERP). In our study, the mean prostate gland size as measured by TRUS was 68.33 ± 9.95 gm. in monopolar group and 69.0 ± 9.54 gm. in bipolar group. The mean removed prostatic weight was 45.5 ± 3.94 and 33.5 ± 2.01 gm.

In our study two case (16.7 %) in the M-TUERP group needed blood transfusion due to intra operative bleeding, but no cases needed that in the B-TUERP group, however there was a significant difference between the two groups. Post-operative HB was significantly lower in M-TUERP group (9.88 ± 0.46 gm./dl in M-TUERP VS 10.69 ± 0.83 gm./dl in B-TUERP) ($P=0.008$). The post-operative haemoglobin loss was significantly higher in the same group (2.27 ± 0.3 in M-TUERP VS 1.66 ± 0.1 in B-TUERP) ($P=0.00$).

Concerning hospital stay, in our study M-TUERP group was significantly longer which was 43.0 ± 6.17 hrs. In M-TUERP vs 33.0 ± 9.04 hrs. In B-TUERP ($p=0.005$). In study done by Pansadoro and colleges (2017) hospital stay

duration was 3.72 ± 1.44 days respectively in monopolar enucleation prostate.

In our study TUR syndrome occurred in 1 patient of M-TUERP group. Post-operative Na level was lower in M-TUERP group (120.25 ± 2.17 mmol/l in M-TUERP VS 140.1 ± 1.78 mmol/l in B-TUERP) ($P=0.070$). The post-operative loss was significantly higher in M-TUERP (20.16 ± 0.67 in M-TUERP VS 0.1 ± 0.79 in B-TUERP) ($P=0.00$).

In our study we found the preoperative values of IPSS, Qmax, PVR, and IIEF were 34.08 ± 2.31 , 9.08 ± 0.51 , 133.75 ± 3.53 , and 18.58 ± 1.33 , respectively among patients in monopolar TUERP group and the mean of this parameters were 33.0 ± 1.85 , 9.91 ± 0.66 , 135.0 ± 3.77 , 69.0 ± 9.54 and 18.91 ± 1.24 , respectively in bipolar TUERP group which was not significant.

The obtainable Follow up data regarding the mean values of post-operative Qmax in 1st, 3rd, 6th months (19.33 ± 1.3 , 21.5 ± 0.79 and 22.16 ± 0.71 in monopolar group vs 19.58 ± 1.44 , 21.75 ± 1.05 and 22.17 ± 0.93 in bipolar group) showed no significant difference between M-TUERP and B-TUERP groups respectively. The mean values of IPSS follow up are (10.08 ± 0.66 , 9.41 ± 0.51 and 8.16 ± 0.93 vs 9.21 ± 0.9 , 9.25 ± 0.62 and 7.08 ± 0.9) showed no significant difference between M-TUERP and B-TUERP groups at 1, 3 and 6 months, respectively. Also, IIEF showed no significant difference between M-TUERP and B-TUERP groups at 1, 3 and 6 months.

In our study regarding prostate size measured by TRUS at 6 months post-operative was no significant different between the both groups (25 ± 4.3 gm. in M-TUERP group VS 29 ± 3.1 gm. in B-TUERP group).

In our study, there were statistically significant differences between the both groups regarding intra and post-operative complications such as intra-operative bleeding 2 patients (16.7%) in M-TUERP group VS no patient in B-TUERP group which was significant higher in M-TUERP group. Two cases (16.7%) had blood transfusion in M-TUERP group VS no case in

B-TUERP group which was significant higher in M-TUERP group. Moreover 1 patient (8.3%) had TUR syndrome in M-TUERP group VS no patient in B-TUERP group these outcomes were due to the decreased serum sodium (Na^+) levels. And two cases (16.7%) intraoperative shifted to open surgery to remove the adenoma in M-TUERP group VS no patient in B-TUERP group.

Three cases (25%) had capsular perforation in M-TUERP group during enucleation versus two cases (16%) in B-TUERP which no significant difference. And five (41.6%) patients had urge incontinence in M-TUERP VS 4 (33.3%) in B-TUERP which no significant difference. Two patients (16.7%) had fever due to urinary tract infection in M-TUERP VS 3 (25.0%) in B-TUERP which no significant difference.

CONCLUSION

Our study concluded that, monopolar enucleation of prostate adenoma is feasible and effective, but associated with high complication, Moreover B-TUEP associated with lower complication and hospital stay, catheter time and less Hg and Na loss than M-TUEP, moreover resected prostatic tissue was significant higher in M-TUEP than B-TUEP. Our study had certain limitations small sample size which necessitate further studies with large number of cases. Absence of morcellator that Prolonged the procedure time.

Conflict of Interest

The authors of this manuscript declare no relevant conflicts of interest, and no relationships with any companies, whose products or services may be related to the subject matter of the article.

Financial Disclosures

None.

RECOMMENDATIONS

Although both monopolar and bipolar TUR enucleation are available, (Bipolar) enucleation should be used instead of (Monopolar) enucleation to reduce the complication rate.

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