

MONOPOLAR VERSUS BIPOLAR TRANSURETHRAL ENUCLEATION OF THE PROSTATE FOR LARGE VOLUME BENIGN PROSTATIC HYPERPLASIA

Mohamed Sherif Mohamed Adel Mourad, Ahmed Farouk Mahmoud, Waleed El Sayed Mousa, Haitham Mohamed Ali Mohameden

ABSTRACT:

Urology Department, Faculty of Medicine, Ain Shams University

Corresponding Author:

Haitham M. Ali Mohameden

Phone No.: (+2) 01022124909

E-mail:

haithamsaleh@rocketmail.com

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Background: *The choice of treatment modality in patients with Benign Prostatic Hyperplasia (BPH) is one of the most discussed issues in urology. In recent years, the surgical treatment of prostates of large sizes by means of enucleation has become increasingly popular. The emergence of special loops to perform bipolar and monopolar enucleation using standard equipment for TURP has opened up new possibilities for the treatment of patients by transurethral monopolar enucleation.*

Aim of the Work: *To evaluate the efficacy and safety of Monopolar versus Bipolar Transurethral Enucleation of the Prostate for Large volume Benign Prostatic Hyperplasia.*

Patients and Methods: *40 patients with BPH were randomly divided into two groups: Group 1 underwent Monopolar Transurethral Enucleation of the Prostate (M-TUEP) (n=20), and Group 2 underwent Bipolar Transurethral Enucleation of the Prostate (B-TUEP) (n=20). Operation time, incidence of hyponatremia, estimated blood loss by drop of haemoglobin, improvement of International Prostate Symptom Score (IPSS) and Quality of Life (QoL) score, Uroflowmetry (Qmax and Qave), Post Voiding Residual Urine (PVR) and Prostate volume and other complications (as reintervention for clots and bleeding control, recatheterization, UTI, incidence of TUR syndrome, incidence of infarction, incontinence , bladder neck contracture and urethral stricture) were compared.*

Results: *Operation was successfully performed in all 40 cases, and no open surgery was converted in any case or blood transfusion was needed. There was no statistically significant difference between both groups in operative time, postoperative haemoglobin and serum sodium levels decline, or improvement in postoperative IPSS, QoL score, Qmax, Qave, Prostate volume and PVR. All patients were followed up to 6 months postoperatively, and no complications occurred except one patient in Group 1 (5% of Group 1 and 2.5 % of the whole study) developed Urethral stricture.*

Conclusion: *M-TUEP was shown to be a safe and highly effective technique for relief of Bladder Outlet Obstruction (BOO). The clinical efficacy of M-TUEP is sustainable for up to 6 months of follow-up. Our single-center results show that M-TUEP has the same efficacy as B-TUEP for the surgical treatment of symptomatic BPH, so M-TUEP can replace B-TUEP with the same efficacy and comparable safety.*

Keywords: Monopolar Transurethral enucleation of the prostate (M-TUEP), Benign prostate hyperplasia (BPH), Bipolar Transurethral enucleation of the prostate (B-TUEP).

INTRODUCTION:

For decades, transurethral resection of the prostate (TURP) has been the gold standard for the surgical treatment of symptomatic BPH¹. A recent meta-analysis showed that, in terms of outcomes, TURP is still at least equivalent to the latest BPH treatment techniques². However, the procedure is not perfect, with complications such as transfusion (0.4%), clot retention (2%), urinary tract infection (1.7%), urinary retention (3%), late iatrogenic stress incontinence (<0.5%), urethral strictures (2.2%-9.8%), bladder neck contractures (0.3%-9.2%), and a retreatment rate of 3%-14.5% at 5 years.³ Apart from this, the procedure is no longer representative of the gold standard treatment for prostatic adenomas measuring >80 g.⁴ In cases involving markedly enlarged prostates (>80 g), open prostatectomy (OP) is still considered to be the most effective and durable procedure available^{5,6}. However, OP is undoubtedly the most invasive approach and is associated with substantial intraoperative morbidity, which extends the catheterization time and length of hospital stay^{6,7}.

According to recent reports, holmium laser enucleation of the prostate (HoLEP) might offer some advantages over TURP in terms of decreased transfusion rate, catheterization time, and hospital stay⁸. However, HoLEP procedure requires longer operative times and higher costs.⁹ Bipolar transurethral enucleation of the prostate (B-TUEP or TUEB) has been published as a further alternative to TURP, consisting in the enucleation of the adenoma by conventional bipolar energy and dedicated loops¹⁰.

In the present study we present our technique of monopolar enucleation, which combines the use of standard monopolar energy with the advantages of cold mechanical enucleation.

AIM OF THE WORK:

To evaluate the efficacy and safety of Monopolar versus Bipolar Transurethral Enucleation of the Prostate for Large volume Benign Prostatic Hyperplasia.

PATIENTS AND METHODS:

It is a prospective randomized inter-venti-onal study performed at Ain Shams University hospitals from 1-9-2017 till 1-3-2019 and included 40 patients with Large volume Benign Prostatic Hyperplasia (over 80 gm). All patients managed at Ain Shams University hospitals and divided into 2 groups randomly in a 1:1 ratio, **Group 1** included 20 patients underwent Monopolar Transurethral Enucleation of the Prostate(**M-TUEP**) while **Group 2** included 20 patients underwent Bipolar Transurethral Enucleation of the Prostate(**B-TUEP**), using electrocautry device (ERBE VIO 300S) via monopolar or bipolar mode respectively. **Inclusion criteria:** Large prostate over 80 g (by Pelvic U/S) with any of indications for prostatectomy (according to EAU guidelines 2019): Recurrent or refractory urinary retention, Overflow incontinence, Recurrent urinary tract infections, Bladder stones, Bladder diverticula, Treatment-resistant macroscopic haematuria due to BPH, Dilatation of the upper urinary tract due to Benign Prostatic Obstruction (BPO), with or without renal insufficiency, Maximum Flow Rate (Q_{max}) below 10 mL/sec or International Prostate Symptom Score

(IPSS) over 19. **Exclusion criteria:** Previous history of prostatic or urethral surgery, Urethral Stricture proved by ascending and micturating cystourethrogram, Neurogenic bladder proved by Urodynamic studies, Prostate cancer proved by biopsy.

Ethical Considerations: Approval had obtained from the ethical committee at Ain shams University before starting the research.

Study Procedures:

Preoperative work up:

All patients underwent detailed medical, surgical and drug history, International Prostate Symptom Score (IPSS) and quality of life score (QoL), and Abdominal, pelvic and digital rectal examination (DRE).

All patients underwent Haemoglobin level, serum creatinine, urea, sodium, potassium and prostate specific antigen (PSA), Pelvi-abdominal ultrasound with assessment of prostate volume and postvoiding residual urinary volume (PVRU) and Uroflowmetry (Maximum Flow Rate (Q_{max}) and Average Flow rate (Q_{ave})).

Anesthesia:

All patients received regional spinal anesthesia except 3 patients in Group 1 and 4 in Group 2 received General anesthesia.

Equipment:

Electrocautery device (ERBE VIO 300S) via monopolar or bipolar mode, Glycine 1.5% (in Group A) or Normal Saline 0.9% (in Group B) as irrigant solutions, Karl Storz HOPKINS® Forward-Oblique Telescope 30°(diameter 4 mm, length 30 cm), Karl Storz Telescope bridge, with 2 lockable channels, Karl Storz Cystoscope-Urethroscope Sheath, 22 Fr., working length 22 cm, with Obturator, Karl Storz Resectoscope Sheath, 26 Fr, for Continuous flow irrigation and suction, oblique beak, rotating inner sheath with

ceramic insulation, working length 20 cm, with Obturator, Karl Storz Ellik's Evacuator, Karl Storz Monopolar, One-Stem Working element, Karl Storz Monopolar, One-Stem cutting loops and coagulation electrodes, Karl Storz Bipolar, Two-Stem Working element, Karl Storz bipolar, Two-Stem cutting loops and Vaporization electrodes.

Surgical techniques:

Both monopolar and bipolar TUEP procedures were performed by a single surgeon, El Demerdash hospital, the patient was placed in the lithotomy position. The 26 Fr resectoscope was placed into the bladder under video assisted endosurgical system guidance. The ureteral orifices, bladder neck and verumontanum were identified. The incision was begun close to the verumontanum from the 5 to the 7 o'clock positions, and the urethral mucosa was incised deep to the level of the surgical capsule. The distal middle lobe and mucosa were dissected in retrograde fashion toward the bladder neck using the resectoscope beak combined with a loop. The loop was used to cut off the adenoma and adhesive fibers between the lobe and the surgical capsule at any time with the tip inserted into the previous cleavage to efficiently detach the adenoma along the capsule. The partial middle lobe was raised. The denuded supply vessels and hemorrhage spots on the capsule surface were identified and coagulated. This procedure progressed toward the bladder neck until the circular fiber of the bladder neck was identified. The Right and Left lateral lobes along the surgical capsule were then detached clockwise or counterclockwise from the 5 or the 7 o'clock position of the prostatic apex to the 12 o'clock position in the same way. All supply vessels were coagulated as described. This left the lower half of the two lateral lobes and middle lobe attached to the bladder neck. At this point most of the blood supply to the lobes was blocked. The adenoma was resected rapidly and thoroughly by the loop

electrode from the 12 to the 6 o'clock positions without serious hemorrhage (**No morcellator is used**). When resection was completed, all adenoma chips were extracted by Ellik evacuator. This 3-lobe technique was performed in prostates greater than 100 gm with a large mid lobe while in smaller prostates with small middle lobe, we performed the 2-lobe technique (middle lobe resected with cutting lobe with the same principles as TURP, and the two lateral lobes enucleated as described in the other technique). After enucleation and extraction of all adenoma fragments a standard 22 Fr 3-way Foley catheter was inserted and connected to straight drainage. All of the retrieved tissue was collected and examined histopathologically. Bladder irrigation was necessary until hematuria sufficiently resolved. The catheters were removed three to five days after operation. In Monopolar-TUEP group, procedure was performed using the ERBE VIO 300D equipment set at 175 W cutting power and 75 W coagulation power and 1.5% glycine solution irrigation. In Bipolar-TUEP group, procedure was performed by using the ERBE VIO 300D equipment bipolar generator set at 200–280 W and a coagulation mode setting of 80–120 W, Storz bipolar loops in which the return electrode is on the loop opposite the cutting element and normal saline irrigation.

Immediate postoperative care:

Patients evaluated immediately postoperative with vital signs (Blood pressure, Heart rate), Abdominal examination, degree of haematuria, Haemoglobin level and Sodium level.

Follow-up:

Patients re-evaluated at 1 and 6 months postoperatively with the IPSS, QoL, Pelvic U/S (to assess prostate volume and postvoiding residual urinary volume (PVR)), Uroflowmetry (Maximum and Average Flow Rate (Q_{max} , Q_{ave})).

Outcome measures:

The outcome measures contain operation time, incidence of hyponatremia, estimated blood loss by drop of haemoglobin, improvement of IPSS and QoL, Uroflowmetry (Q_{max} and Q_{ave}), PVRU and Prostate volume and other complications (as reintervention for clots and bleeding control, recatheterization, UTI, incidence of TUR syndrome, incidence of infarction, incontinence, bladder neck contracture and urethral stricture).

Statistical Analysis:

IBM SPSS statistics (Version 25.0, IBM Corp., USA, 2017-2018) was used for data analysis. Data were expressed as median and percentiles (25th – 75th Percentile) for quantitative non-parametric measures. We used **Wilcoxon Rank Sum test** to compare between two independent groups for non-parametric data. While **Wilcoxon signed rank test** used for comparison between two dependent groups for non-parametric data. The probability of error (P value) at 0.05 was considered significant, while at 0.01 and 0.001 are highly significant.

RESULTS:

Patients were recruited for participation in the study between 1 October 2017 and 1 March 2019. 40 patients (20 patients in Group 1 (M-TUEP) and 20 patients in Group 2 (B-TUEP)) met the inclusion criteria and were eligible for participation in the study. Descriptive analysis in between the two groups showed no statistical difference as regard age (The median was 62.5 for Group 1 vs 68 for Group 2 with P-value 0.188).

As regard intraoperative time, there is no statistical difference (P-value 0.185). The postoperative haemoglobin decrease was more with Group 1 compared to Group 2, yet it was not of statistically significant value (P-value 0.394). However, there were

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significant differences in postoperative hemoglobin level compared to pre-operative level **in** the both groups. But no patients in any group required blood transfusion. The serum sodium level drop postoperatively showed no significant difference **between** both groups. However, there were significant differences in postoperative serum sodium level compared to pre-operative level **in** both groups. But none of the patients developed TUR Syndrome.

At 1month follow-up, there was statistically **significant** difference between both groups with regard to improvement in postoperative IPSS favouring Group 1. Meanwhile, there was no statistically

significant difference between both groups regarding improvement in postoperative QoL. At 6 month follow-up, there were no statistically significant differences between both groups with regard to improvements in postoperative **IPSS, QoL score, Qmax, Qave, Prostate volume** or **PVR**. Also there were no statistical differences in these same values compared 1month with 6 months after surgery **except** IPSS favouring Group 2, as shown in Tables 2. While when using Wilcoxn Signed Rank Test to compare between pre and post-operative values in both groups showed **statistical difference** with P-value 0 for each group.

Table: Intra-operative time. Delta Change in Hb and serum sodium level (Postoperative – Preoperative). Delta Change in IPSS and QoL (1 month Postoperative – Preoperative), (6 months Postoperative – Preoperative) and (6 months Postoperative – 1 month Postoperative). Delta Change in Prostate size, PVR, Q_{max} and Q_{ave} (6 months Postoperative – Preoperative).

	Group 1			Group 2			Z	P	Sig.
	Median	25 Perc.	75 Perc.	Median	25 Perc.	75 Perc.			
Intraop. time	61	37.5	71.5	70	47.5	80.75	-1.33	0.185	NS
Hb dC.	-0.03	-0.11	-0.02	-0.02	-0.07	-0.01	-0.85	0.394	NS
Na dC.	-0.04	-0.06	-0.01	-0.04	-0.06	-0.002	-0.04	0.968	NS
1month Post-Pre. dC IPSS	-0.52	-0.62	-0.34	-0.29	-0.37	-0.24	-2.67	0.008	HS
6month Post-Pre. dC IPSS	-0.67	-0.81	-0.58	-0.72	-0.8	-0.6	-0.39	0.695	NS
6-1month Post. dC IPSS	-0.30	-0.49	-0.22	-0.57	-0.73	-0.41	-2.91	0.004	HS
1month Post-Pre. dC QoL	-0.5	-0.6	-0.4	-0.5	-0.65	-0.25	-0.21	0.837	NS
6month Post-Pre. dC QoL	-0.75	-0.8	-0.53	-0.775	-0.833	-0.525	-0.51	0.613	NS
6-1month Post. dC QoL	-0.33	-0.5	0	-0.33	-0.75	0	-0.60	0.548	NS
Prostate Size dC.	-0.49	-0.63	-0.36	-0.57	-0.65	-0.36	-1	0.317	NS
PVR dC.	-0.75	-1	-0.55	-0.79	-1	-0.66	-0.96	0.337	NS
Q_{max} dC.	1.54	0.88	2.87	1.09	0.59	2.02	-1.62	0.106	NS
Q_{ave} dC.	1.85	1.28	3.1	1.33	0.68	1.91	-1.96	0.055	NS

NS= non-significant, HS= highly significant.

None of the patients developed any postoperative complication except one patient in Group 1 (5% of Group 1 and 2.5 % of the whole study) developed Urethral

stricture. This complication was diagnosed at 6 month follow up by Retrograde Urethrogram performed due to obstructed uroflowmetry curve.

DISCUSSION:

In light of the available literature so far, the three main principles of prostatic tissue ablation during BPH transurethral surgery are represented by vaporization, resection and enucleation. But the endoscopic treatment of large glands (over 80 gm) continues to pose problems for the contemporary minimally invasive urology and has not yet been proven completely capable to replace open surgery as the standard line of treatment. So far, the holmium laser benefitted from the widest support from the published clinical research, thus gaining the status of an advanced endoscopic method challenging the gold-standard status of Open Prostatectomy (OP) but the longer operative time and higher equipment cost remain the major obstacles¹¹.

Bipolar transurethral enucleation of the prostate (B-TUEP) has been published as a reliable alternative to Holmium laser enucleation of the prostate (HoLEP), consisting in the enucleation of the adenoma by conventional bipolar energy and dedicated loops¹².

In this study we present our technique of monopolar enucleation, which combines the use of standard monopolar energy with the advantages of blunt mechanical enucleation aiming to replace bipolar PlasmaKinetic enucleation technique with comparable safety and efficacy.

We compared, in this study, between M-TUEP (Group 1) and B-TUEP (Group 2) in the management of LUTS due to BPH regarding the intraoperative time, immediate postoperative haemoglobin and serum sodium levels, the postoperative complications, one and six months follow up IPSS and QoL questionnaire scores and six months follow up of uroflowmetry, prostate size and postvoid residual urine. Regarding the median of intraoperative time, it was 61 minutes and 70 minutes for Group 1 and

Group 2 respectively. There was no statistically significant difference in between both groups with P-value 0.185.

In a prospective randomized study, Wang et al compared transurethral enucleation with bipolar system (TUEB) to monopolar resectoscope enucleation of the prostate (mTUEP) for symptomatic benign prostatic hyperplasia. The study randomized 114 consecutive patients with BPH into either a TUEB (n=59) or mTUEP (n=55) treatment group. The authors could not find any statistically significant difference in intraoperative time between the 2 procedures (**46.76 ± 16.16 (TUEB) vs. 52.09 ± 19.27min (mTUEP), P=0.72**).¹³ This was concomitant with our results but the overall intraoperative time of both group was less than of our trial. That may be attributed to the larger preoperative prostate volume in our trial (88.775 to 127.75 grams with median 109.5 (Group 1) vs. 101.25 to 138.65 grams with median 114.95(Group 2)) than in their trial (**58.37 gm ± 17.19(mTUEP) vs. 55.75 gm± 18.91(TUEB)**).

In another prospective randomized study, Pansadoro et al treat 47 patients with monopolar transurethral enucleation of prostatic adenoma (mTUEPA). Mean operating and morcellation times were 126.41 ± 54.25 minutes and 8.55 ± 5.05 minutes, respectively.¹² This is longer than in our trial in spite of smaller preoperative prostate volume (Mean prostate and prostatic adenoma volumes were 64.9 ± 28.5 g and 40.9 ± 21.8 g, respectively). This may be attributed to less experienced surgeon or the use of bad equipment.

Many prospective randomized trials have demonstrated that TUEP could provide sufficient safety during operation. The factors affecting intraoperative safety are mainly hemorrhage and TUR Syndrome. In our trail, although the postoperative haemoglobin decrease was more with Group 1 compared to Group 2 (Median of Delta

Change in Haemoglobin level (postoperative – preoperative) was -0.0321 in Group 1 vs -0.0229 in Group 2) yet it was not of statistically significant value (P-value 0.394). However, there were significant differences in postoperative hemoglobin level compared to pre-operative level in the both groups. But no patients in any group required blood transfusion.

The TUR Syndrome occurs mainly because a great amount of flushing fluid is absorbed rapidly because of capsular perforation, which causes the volume overload of the systemic circulation, and the water and electrolyte imbalance. Our results showed that there is no capsular perforation in the two groups of patients. The serum sodium level drop postoperatively showed no significant difference **between** both groups (Median of Delta Change in sodium level was -0.0429 in Group 1 vs -0.0359 in Group 2 with P-value 0.968). However, there were significant differences in postoperative serum sodium level compared to pre-operative level **in** both groups. But none of the patients developed TUR Syndrome.

None of the patients developed any postoperative complication except one patient in Group 1 (5% of Group 1 and 2.5 % of the whole study) developed Urethral stricture. The absence of a return current in the plasmakinetic system may reduce the risk of burns and urethral or bladder neck stricture. Monopolar current could be related to greater thermal damage.

In Wang et al trial, there was no any statistically significant difference in haemoglobin postoperation compared to preoperation nor in intraoperative blood loss between the 2 procedures (mean of intraoperative blood loss \pm SD(range) = 158.20 ml \pm 57.71(TUEB) vs 171.02 ml \pm 64.42(mTUEP) with P-value=0.2). The intraoperative blood loss calculated by this equation (Volume of haemorrhage=volume of irrigation fluid (L) \times hemoglobin concen-

tration of irrigation fluid (g/L) \times 1000 (ml/L)/hemoglobin concentration (g/L)). There was no capsular perforation in the two groups of patients. The serum sodium level showed no significant difference in TUEB group postoperation compared with preoperation (**143.23 \pm 4.90 mmol/L (Preoperation) vs. 141.89 \pm 4.87 mmol/L (Postoperation), P=0.14**). However, there were significant decreases in sodium level in the mTUEP group compared postoperation to preoperation (**142.85 \pm 4.92 mmol/L (Preoperation) vs. 141.11 \pm 4.93 mmol/L (Postoperation), P=0.07**). But, still within the normal range and none of the patients developed TUR Syndrome. One patient (1.7%) in the TUEB group and two patients (3.6%) in the mTUEP group developed urethral stricture. In these patients, dysuria improved after urethral dilation without internal urethrotomies and all of the patients improved after 2 months.¹³ This was concomitant with our results due to the close age group and the usage of good equipments.

Salam et al performed Transurethral Enucleation and Resection of Prostate (TUERP) using Unipolar Resectoscope for 219 patients with large prostate more than 60 gram. Three patients required postoperative blood transfusions (1.36 %). No deaths, major complications (myocardial infarction or pulmonary embolism), or transurethral resection syndrome episodes recorded. Intraoperative complications consisted of three capsular perforations (1.5%). Of 219 patients, 164 (74.88%) provided follow-up data for delayed complications, including three clot retention episodes (1.36%), five urethral strictures (3.65%) and 12 patients requiring recatheterization (5.47%). These reported few complications attributed to larger sample size (219 patients) than in our study (40 patients) which also supports the safety of M-TUEP technique.¹⁴

Chen et al compare the safety and efficacy of plasmakinetic enucleation of the prostate (PKEP) with holmium laser enucleation of the prostate (HoLEP) in the treatment of benign prostate hyperplasia (BPH). This Retrospective study was performed on 360 cases of BPH, 180 treated by PKEP and 180 treated by HoLEP. There was significant reduction of the hemoglobin level in the PKEP group more than HoLEP (mean of Hemoglobin decrease \pm SD(range) = 1.4 g/dL \pm 0.7 (PKEP) vs 1.2 g/dL \pm 0.5 (HoLEP) with P-value= 0.02). But, no transfusions were required in either group. The serum sodium level drop post-operatively showed no significant difference between both groups (mean of serum sodium decrease \pm SD(range) = 3.0 mmol/L \pm 1.4 (PKEP) vs 2.9 mmol/L \pm 1.0 (HoLEP) with P-value= 0.17) which supports the safety of B-TUEP technique.¹⁵

In our trial, at 1month follow-up, there was statistically **significant** difference between both groups with regard to improvement in postoperative IPSS favouring Group 1 (Median of Delta Change in IPSS was -0.5242 (range from -0.617 to -0.3359) in Group 1 and -0.2838 (range from -0.3722 to -0.2403)in Group2 with P-value 0.008). Meanwhile, there was no statistically significant difference between both groups regarding improvement in postoperative QoL (Median of Delta Change in QoL was -0.5 (range from -0.6 to -0.4) in Group1 and -0.5 (range from -0.65 to -0.25) in Group 2 with P-value 0.837).

At 6 month follow-up, there were no statistically significant differences between both groups with regard to improvements in postoperative **IPSS**(Median of Delta Change in IPSS (6 months Postoperative – Preoperative) was -0.6687 (range from -0.8094 to -0.5832) in Group 1 and -0.7165(range from -0.7983 to -0.5982) in Group 2 with P-value 0.695), **QoL score**(Median of Delta Change in QoL (6 months Postoperative – Preoperative) was -0.75

(range from -0.8 to -0.525) in Group 1 and -0.775 (range from -0.8333 to -0.525) in Group 2 with P-value 0.613), **Qmax** (Median of Delta Change in Q_{max} was 1.54321 (range from 0.88455 to 2.86878) in Group 1 and 1.08519 (range from 0.59411 to 2.02193) in Group 2 with P-value 0.106), **Qave** (Median of Delta Change in Q_{ave} was 1.85 (range from 1.27973 to 3.1) in Group 1 and 1.33425 (range from 0.68493 to 1.9143) in Group 2 with P-value 0.055), Prostate **volume** (Median of Delta Change in prostate volume was -0.4939 (range from -0.6266 to -0.3558) in Group 1 and -0.565 (range from -0.6543 to -0.3595) in Group 2 with P-value 0.317) or **PVR** (Median of Delta Change in PVR was -0.75 (range from -1 to -0.5467) in Group 1 and -0.785 (range from -1 to -0.6556) in Group 2 with P-value 0.337). Also there were no statistical differences in these same values compared 1month with 6 months after surgery except IPSS favouring Group 2. These indicate that M-TUEP can replace B-TUEP with the same efficacy.

In Wang et al trial, there were no statistically significant differences between the two groups in postoperative **IPSS**(Mean of IPSS after 1 month was 7.80 \pm 3.85 in the TUEB group vs 7.60 \pm 2.65 in the mTUEP group with P-value 0.72 and after 1 year was 6.26 \pm 2.62 in the TUEB group vs 5.96 \pm 2.42 in the mTUEP group with P-value 0.49), **QoL score** (Mean of QoL after 1 month was 1.76 \pm 0.82 in the TUEB group vs 2.00 \pm 0.84 in the mTUEP group with P-value 0.72 and after 1 year was 1.60 \pm 0.78 in the TUEB group vs 1.51 \pm 0.64 in the mTUEP group with P-value 0.49), **Qmax** (Mean of Q_{max} after 1 month was 19.59 \pm 3.41 in the TUEB group vs 20.33 \pm 3.55 in the mTUEP group with P-value 0.2 and after 1 year was 21.54 \pm 4.19 in the TUEB group vs 20.55 \pm 3.52 in the mTUEP group with P-value 0.13), or **PVRU**(Mean of PVRU after 1 month was 20.58 \pm 15.79 mL in the TUEB group vs 16.71 \pm 17.43 in the mTUEP group with P-value 0.16 and after 1 year was 15.06 \pm 11.88 in the TUEB group vs 13.27 \pm 14.44

in the mTUEP group with P-value 0.42). There were significant improvements in postoperative IPSS, QoL, Qmax, and PVRU by both modalities at each postoperative assessment compared with their preoperative baseline¹³. This was concomitant with our results due to the close age group and the use of good equipment.

In Proietti et al trial, 250 patients underwent monopolar Transurethral Enucleation of Prostatic Adenomam (mTUEPA) due to lower urinary tract symptoms (LUTS) of benign prostatic enlargement (BPE). There were significant improvements in terms of LUTS (International Prostate Symptoms Score: 14.1 ± 4.3(preoperative) vs 4.8 ± 5 (postoperative) with p < 0.001) and uroflow parameters (Maximum flow: 8.3 ± 2.8(preoperative) vs 25.1 ± 9.3 ml/s (postoperative) with p < 0.001) were observed as early as 3 months after surgery. Which supports the efficacy of M-TUEP technique¹⁶.

In Pansadoro et al trial, there were significant improvements in postoperative **IPSS** (Mean of Preoperative IPSS was 15.2 ± 3.9 vs 5.35 ± 3.05 (1 month after surgery) vs 1.6 ± 2.3 (6 months after surgery) vs 2.7 ± 2.7 (12 months after surgery)), **Qmax** (Mean of Preoperative Qmax was 8.43 ± 2.97 vs 23.4 ± 10.6 (6 months after surgery) vs 18.88 ± 9.25 mL/s (12 months after surgery)), **Qaverage** (Mean of Preoperative Qaverage was 2.33 ± 2.42 vs 13.6 ± 4.8 (6 months after surgery) vs 12.59 ± 7.03 mL/s (12 months after surgery)) and **Post Micturition Residual(PMR)** (Mean of Preoperative PMR was 103.23 ± 90.61 vs 34.5 ± 10.3 (6 months after surgery) vs 25.6 ± 15.3 mL(12 months after surgery)).Which again supports the efficacy of M-TUEP technique.¹²

Feng et al compare the safety and efficacy of thulium laser enucleation of the prostate (ThuLEP) with plasmakinetic enucleation of the prostate (PKEP). There were no statistically significant differences

between both groups in postoperative **IPSS** (Mean after **3 month** was 8.07 ±2.57 in the ThuLEP group and 8.85 ±2.94 in the PKEP group with P-value 0.114, Mean after **6 months** was 7.69 ±2.29 in the ThuLEP group and 8.15 ±2.22 in the PKEP group with P-value 0.249 and Mean after **12 months** was 6.87 ±2.54 in the ThuLEP group and 7.03 ±2.38 in the PKEP group with P-value 0.712), **QoL score** (Mean after **3 month** was 1.64 ±0.59 in the ThuLEP group and 1.74 ±0.71 in the PKEP group with P-value 0.198, Mean after **6 months** was 1.54 ±0.53 in the ThuLEP group and 1.64 ±0.58 in the PKEP group with P-value 0.425 and Mean after **12 months** was 1.32 ±0.47 in the ThuLEP group and 1.38 ±0.49 in the PKEP group with P-value 0.490), **Qmax** (Mean after **3 month** was 20.13 ±4.33 mL/s in the ThuLEP group and 19.14 ±5.34 in the PKEP group with P-value 0.253 , Mean after **6 months** was 21.07 ±3.85 in the ThuLEP group and 20.62 ±3.47 in the PKEP group with P-value 0.312 and Mean after **12 months** was 21.46 ±4.05 in the ThuLEP group and 21.09 ±3.29 in the PKEP group with P-value 0.574) or **postvoiding residual urine (PVR)** (Mean after **3 month** was 21.05 ±12.49 mL in the ThuLEP group and 22.62 ±13.04 in the PKEP group with P-value 0.490, Mean after **6 months** was 18.41 ±12.44 in the ThuLEP group and 19.27 ±11.19 in the PKEP group with P-value 0.681 and Mean after **12 months** was 17.56 ±11.75 in the ThuLEP group and 18.33 ±10.47 in the PKEP group with P-value 0.695). Both groups showed statistically significant improvement after surgery in the aforementioned parameters with P-value <0.001 for each parameter. Which supports the efficacy of B-TUEP technique.¹⁷

There is only one published study (Wang et al trial) comparing transurethral monopolar enucleation of the prostate to enucleation with bipolar system for symptomatic benign prostatic hyperplasia, but without selection of prostate volume. In

our trial, we targeted large glands (more than 80 gm).

We must acknowledge some limitations of our study. This is a single center trial, with a limited population of BPH men (a total of 40 patients). The purpose of the present study, however, was to demonstrate that prostate enucleation can be effectively and safely achieved also by means of a conventional resectoscope equipped with standard monopolar loops, which represents the most basic instrument in every urologic armamentarium. Resorting to conventional tools may result in reduced costs: a costeffectiveness analysis comparing M-TUEP to other enucleation techniques (B-TUEP, HoLEP) should be part of future investigations. Another limit of the present study is that a 6 months' follow-up period is not enough to assess long-term outcomes; so future long-term studies are needed.

Conclusion:

M-TUEP was shown to be a safe and highly effective technique for relief of Bladder Outlet Obstruction (BOO). The clinical efficacy of M-TUEP is sustainable for up to 6 months of follow-up. Our single-center results show that M-TUEP has the same efficacy as B-TUEP for the surgical treatment of symptomatic BPH, so M-TUEP can replace B-TUEP with the same efficacy and comparable safety.

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استئصال البروستاتا عن طريق مجرى البول باستخدام التيار الكهربائي أحادي القطب مقارنة بالتيار الكهربائي ثنائي القطب في علاج تضخم البروستاتا الحميد ذات الحجم الكبير

د. هيثم محمد علي محمد، د. احمد فاروق محمود، د. وليد السيد موسى ، ا.د. محمد شريف محمد عادل مراد

قسم جراحه المسالك البولية- كلية الطب – جامعه عين شمس

الخلفية: يعد اختيار طريقة العلاج في المرضى الذين يعانون من تضخم البروستاتا الحميد أحد أكثر المشكلات التي تمت مناقشتها في المسالك البولية. في السنوات الأخيرة ، أصبح العلاج الجراحي للبروستاتا ذات الأحجام الكبيرة عن طريق التقوير شائعًا بشكل متزايد. إن ظهور حلقات خاصة لإجراء استئصال ثنائي القطب وأحادي القطب باستخدام المعدات القياسية لاستئصال البروستاتا عن طريق مجرى البول قد فتح إمكانيات جديدة لعلاج المرضى عن طريق الاستئصال الاحتكاري أحادي القطب.

الهدف من الدراسة: تقييم فعالية وسلامة استئصال البروستاتا عن طريق مجرى البول باستخدام التيار الكهربائي أحادي القطب مقارنة بالتيار الكهربائي ثنائي القطب في علاج تضخم البروستاتا الحميد ذات الحجم الكبير.

المرضى والساليب: تم تقسيم ٤٠ مريضًا مصابًا بتضخم البروستاتا الحميد بشكل عشوائي إلى مجموعتين: خضعت المجموعة (١) لاستئصال البروستاتا باستخدام التيار الكهربائي أحادي القطب (٢٠ مريض) ، وخضعت المجموعة ٢ لاستئصال البروستاتا باستخدام التيار الكهربائي ثنائي القطب (٢٠ مريض). قد تم مقارنة المجموعتين من حيث وقت العملية ، وحدوث نقص صوديوم الدم ، وفقدان الدم المقدر عن طريق انخفاض الهيموغلوبين ، وتحسين نتيجة استئصال أعراض البروستات الدولية ونقاط جودة الحياة ، قياس تدفق البول ، البول المتبقي بعد التبول وحجم البروستاتا ومضاعفات أخرى (مثل إعادة التدخل من أجل الجلطات والسيطرة على النزيف ، إعادة التبادل ، عدوى المسالك البولية ، حدوث متلازمة تور ، احتشاء ، سلس البول ، تقلص عنق المثانة وتضييق الإحليل).

النتائج: تم إجراء العملية بنجاح في جميع الحالات الأربعين ، ولم يتم تحويل الى جراحة في أي حالة أو كانت هناك حاجة إلى نقل الدم. لم يكن هناك فرق يُعتد به إحصائياً بين المجموعتين في وقت الجراحة ، وانخفاض مستويات الهيموغلوبين والصوديوم في الدم بعد الجراحة ، أو تحسن في استئصال أعراض البروستات الدولية بعد الجراحة ، نقاط جودة الحياة ، قياس تدفق البول ، البول المتبقي بعد التبول وحجم البروستاتا. تمت متابعة جميع المرضى حتى ٦ أشهر بعد الجراحة ، ولم تحدث أي مضاعفات باستثناء حدوث ضيق بمجرى البول لمريض واحد في المجموعة ١.

الاستنتاج: تبين أن تقنية استئصال البروستاتا عن طريق مجرى البول باستخدام التيار الكهربائي أحادي القطب هي تقنية آمنة وفعالة للغاية لتخفيف أعراض تضخم البروستاتا. تعتبر الفعالية السريرية لاستئصال البروستاتا عن طريق مجرى البول باستخدام التيار الكهربائي أحادي القطب مستدامة لمدة تصل إلى ٦ أشهر من المتابعة. تظهر نتائج المركز لدينا أن استئصال البروستاتا عن طريق مجرى البول باستخدام التيار الكهربائي أحادي القطب له نفس فعالية استئصال البروستاتا باستخدام التيار الكهربائي ثنائي القطب للعلاج الجراحي لأعراض تضخم البروستاتا ، لذلك يمكن لاستئصال البروستاتا عن طريق مجرى البول باستخدام التيار الكهربائي أحادي القطب أن يستبدل استئصال البروستاتا باستخدام التيار الكهربائي ثنائي القطب بنفس الفعالية والسلامة.