

Comparative Study between Bipolar Transurethral Resection and Bipolar Transurethral Enucleation of the Prostate for Managing Benign Prostatic Hyperplasia

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Abstract

Introduction: Benign prostatic hyperplasia is considered a common disorder that occurs with advancing age in males. The bladder outlet obstruction is the main complaint associated with this condition that could be managed with different endoscopic approaches the traditional one is the transurethral prostatic resection and recently the transurethral prostatic enucleation has emerged. This study aimed to compare between both techniques.

Methods: This was a clinical trial performed at Ahmed Maher Teaching hospital. Patients were randomized to either Group (1): (TUEP) patients subjected to the bipolar transurethral enucleation of prostate and Group (2): (TURP) patients subjected to the bipolar transurethral resection of the prostate. After the surgical procedures, the patients were compared regarding the success rate and the perioperative complications. Three months after surgery, assessment was done through uroflowmetry studies, post-voiding residual volume of urine and the International Prostate Symptom Score.

Results: The mean duration of the procedure showed no significant differences between both groups in TUEP (82.8±8.4 min) vs (79.7±8.80 min) TURP (P=0.262). Post-operative drop of haemoglobin level was less in TUEP vs TURP (0.79±.14 vs 1.41±.42) g/dl (P=0.007), in addition to shorter time needed for catheters (46.10±10.18 vs 56.65±13.14 hr; P=0.036) and less duration of hospital stay (53.70±9.13 vs 62.40±12.06 hr; P=0.001). A significant improvement was observed between baseline and 3 months postoperatively regarding uroflowmetry (Qmax), IPSS and PVR in both groups.

Conclusion: The mean operative time was nearly similar in both groups, however TUEP was associated with less bleeding, shorter time needed for catheters, less time needed for hospital stay. After 3 month, uroflowmetry Qmax, PVR and IPSS were similar in both procedures.

Key words: BPH, TURP, transurethral enucleation, transurethral resection, TUEP

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Introduction

Bladder outlet obstruction could be caused mainly by BPH that affects mainly adults and elderly males [1]. Several methods of management are available for BOO induced by BPH. These methods include the conservative treatment, drugs, minimal invasive therapy, TURP and open prostatectomy [2].

The main surgical procedure for management of BPH is the TURP and is considered by many surgeons to be a surgical procedure with a high degree of safety and efficacy. However, post-operative bleeding the absorption of the solution used for irrigation remain the main complications leading to transurethral resection (TUR) syndrome [3].

To overcome these complications and provide an effective surgical procedure for management of BPH, different modalities have evolved like the transurethral resection in saline with better results in decreasing the TUR syndrome [4]. Another procedure using the holmium-laser for the enucleation of the prostate after dissection of the capsule. Its main advantage is better haemostasis reducing the incidence of bleeding and TUR syndrome [5]. Bipolar electro-surgical system was also used and short term follow up of patients showed minimal complications compared to the standard TURP [6].

Recently, the TUEP could be considered to be promising to involve anatomical removal of the prostatic tissue in a minimal invasive endoscopic approach. Different devices have been used like holmium [7], thalium [8] and diode LASER that have a high degree of vaporization and coagulation, however their use may be limited due to the fact that this approach is expensive, and enucleation time is prolonged [9]. Another device tried was the plasmakinetic device with loop electrode with comparable results in efficacy to LASER but with lower safety and coagulation, so it should be avoided in patients having multiple comorbidities [10].

We performed this study to evaluate TUEP and TURP in management of BPH and compare between both techniques regarding the time of operation and complications.

Methods:

This clinical trial was performed at the Urology Department, Ahmed Maher Teaching Hospital, Egypt during the period between August 2017 to September 2018 after obtaining the approval from the institutional review board.

Patients aged 50-75 years with a prostate size 60-80 gm complicated with refractory retention of urine and failed the conservative medical treatment were included in the study. Also, patients complained from recurrent attack of infections to the urinary tract and bleeding were included. Excluded from the study patients who were diagnosed with cancer prostate, patients with neurological diseases or neurogenic bladder and those unfit for the surgery.

Following the preoperative evaluation, patients were randomized to two groups; group (A) 20 patients subjected to bipolar TUEP, and group (B) 20 patients subjected to bipolar TURP. Randomization was done using a computerized method using numbers to which the computer randomly assigned.

Evaluation of the patients preoperatively included full history, IPSS and those with 18 or more score included in the study and digital rectal examination. Full preoperative investigations were done including CBC, coagulation profile, urea, creatinine, SGOT, SGPT and prostatic specific antigen (PSA). Pelvi-abdominal US was done to measure the size of prostate and PVR. Also, maximum uroflow rate (uroflowmetry Qmax) was assessed for all patients and included patients having less than 15 ml/sec.

Table (1): Patients' characteristics.

Characteristics	TUEP (n=20);	TURP (n=20);	P-value
	Mean±SD	Mean±SD	
Age(years)	58.95±4.62	59.25±5.54	.840
Pre-operative prostatic volume(g)	69.10±6.76	69.40±5.4	.184
IPSS	25.60±6.48	25.15±6.75	.566
Qmax(ml/s)	7.05±4.9	6.50±5.10	.840
PSA(ng/ml)	2.7500±.61	2.63±.51	.092
Postvoid residual volume(ml)	100.5±50.86	110.0±40.71	.518

Table (2): Causes of operations.

Characteristics	TUEP (n=20)	TURP (n=20)	P-value
Causes of operation			
➤ Retention	6 (30.00%)	7 (35.00%)	0.943
➤ Failed medical treatment	13 (65.00%)	12 (60.00%)	
➤ Recurrent hematuria	1 (5.00%)	1 (5.00%)	
Perioperative data			
Weight of resected prostate (g)	42.5±5.27	41.2±5.27	.451
Operating time (min)	82.8±8.4	79.7±8.80	.262
Hemoglobin loss (g/dl)	.79±.14	1.41±.42	.007
Duration of catheterization (hr)	46.10±10.18	56.65±13.14	.036
Duration of hospital stay (hr)	53.70±9.13	62.40±12.06	.001
Complication	1 (5%)	1 (5%)	1.0
urinary retention requiring catheterization			

Reported numbers are frequency (%) or mean ± standard deviation

Table (3): Comparison of preoperative (baseline) data versus 3-months follow up among the whole cohorts (n=40)

Outcomes	Preoperative	3-months	Mean	P-
	Data	follow up	difference	value
	(n=40)	(n=40)	±SE	
Qmax (ml/s)	6.78±5.0	12.35±5.17	-5.57±1.13	<0.001
IPSS	25.4±6.5	3.3±1.4	22.1±1.1	<0.001
Post voiding residual volume (ml)	105.3±46.3	38.8±19.2	66.50±7.9	<0.001

SD: standard deviation

Table (4): Comparison of preoperative (baseline) data and 3-months follow up among the TUEP and TURP cohorts.

Outcomes	TUEP (n=20)	TURP (n=20)	P- value
Qmax (ml/s)	13.2±5.04	11.5±5.15	0.298
IPSS	3.50±1.43	3.15±1.3	0.423
Post voiding residual volume (ml)	40.0±20.7	37.5±17.4	0.682

Operative techniques:

The surgical procedure of both techniques were performed by the same consultant surgeon who used the bipolar generator with a high frequency (UES-40), Surg Master; Olympus, manufactured in Tokyo, Japan.

Patients were asked to ly in a lithotomy position and spinal anaesthesia was used for all patients. Anti-septic preparation was done from the umbilicus to the mid-thigh then a diagnostic urethro cystoscopy was performed.

Follow-up

Closed patient monitoring for 3 days after the procedure by the vital data, CBC and urine monitoring and any complication was recorded. The catheter was removed, and the patients were observed for voluntary micturition. In absence of complications the patients were discharged and scheduled for follow up visits for 3 months.

The patients were evaluated after 3 months by urine analysis or culture and sensitivity, pelviabdominal US with post-voiding residual urine measurement, uroflowmetry and IPSS questionnaire.

Outcomes:

Comparing between both techniques as regards to the operative time was the primary outcome of our study. The Secondary outcomes included the duration of hospital admission and the complications after the surgery, the weight of resected prostate, haemoglobin loss peri-operatively and catheter time. Also, a 3-months follow up of the PVR, uroflowmetry and IPSS.

Statistical analysis

Data analysis was performed using the statistical package SPSS-24. Categorical data were described

as frequency and percentage with the comparison across groups by the Chi (X²) test. Continuous data were described as a mean and a standard deviation (SD) by t-test. Comparison between the preoperative and 3 months postoperative data was done by Paired t-test. At a P-value less than 0.05 the values were considered to be significant.

Results

This study included 40 patients who were randomized into two groups (20 patients in each arm). The mean age of the studied patients was 58.95 vs 59.25 in TUEP vs TURP respectively (P= 0.84). There were no statistically significant differences between both groups regarding the pre-operative prostatic volume, IPSS and Qmax as shown in (Table 1).

The most common indications for surgery were failed medical treatment ((65% vs 60%) in TUEP vs TURP respectively) followed by retention of urine and recurrent hematuria with no significant differences between both groups (P=0.943) (Table 2).

The mean operative time was comparable between both groups (82.8±8.4 min) vs (79.7±8.80 min) in TUEP vs TURP respectively with no significant differences between both groups (P=0.262). TUEP had the advantage of less post-operative hemoglobin loss (0.79±.14 g/dl) vs 1.41±.42 g/dl in TURP (P=0.007). Also, the mean time of catheterization significantly decreased in TUEP compared to TURP (46.10±10.18 vs 56.65±13.14 hr; P=0.036) respectively. The mean duration of hospital stay was 53.70±9.13 hrs for patients in TUEP group and 62.40±12.06 hrs for patients in TURP group (P=0.001) (Table 2). There were no significant differences between both groups as regards to the post-operative complications and the weight of resected prostate.

Post-operative follow-up of patients in

both groups for 3 months showed a significant improvement in the uroflowmetry, IPSS score, Q_{max} and post voiding residual volume when compared to the baseline measurements (Table 4).

Discussion

Our study demonstrated that, the mean operative time in TUEP was approximately 82 minutes with average prostate size 69 gm. In consistence with these results was the study of Abou-Taleb et al who revealed that the prostatic enucleation procedure lasted for about 77 min and the patients had a prostate with a mean volume 97.1gm (40-230). Their study compared the open prostatectomy technique and the prostatic enucleation. Also, the study conducted by Antonio et al demonstrated that their surgical procedure took about 30-90 minutes, and found that the prostate volume was between 40-120 gm. [11].

In our TUEP group, the mean time the catheter remained in the patients was 46 hours and patients stayed in the hospital stay for about 53 hours. Several studies evaluated the catheter time and hospital stay time following TUEP like that of [12] who found that the catheter time and patients remained in the hospital for about one day. Also, the study of Antonio et al reported that the hospital stay ranged 24-48h and the catheter time was between 4-5 days [13].

On the other hand, Bulai et al disagreed with our results and reported a longer catheter time (2.5 day) and hospital stay time (3 days) [14]. The catheter remained till the fluid comes clear and the shorter time in our study could be attributed to adequate haemostasis performed with absence of bleeding and haematuria.

As regards to the early post-operative complications, only 1 patient (5%) in each group complained of urinary retention for which catheterization was essential. Also, no cases were presented with secondary hemorrhage in both groups. Similarly, Bulai et al found that only 1 patient (4.2%) out of 24 in their study had post-operative urinary retention managed with catheterization and only 1 patient (4.2%) had secondary hemorrhage [14]. Chen et al in their study revealed absence of post-operative urinary retention [15].

Our study also showed a statistically significant difference as regards to the change in hemoglobin level post-operatively between both groups. Patients in TUEP group had less drop in Hb level than patients in TURP group (0.79 vs 1.4 respectively). The study performed by Bulai et al demonstrated that enucleation was associated with decrease in Hb level by 1.5 gm/dl [11]. Also, the study of Bogdan et al noticed a drop of about 1.2 gm/dl in the hemoglobin level following the transurethral resection of prostate in saline [16].

Evaluation after 3 months of the surgery in our study revealed that the IPSS, Q_{max} and PVR significant improved compared to the preoperative measurements. These results run in parallel with the study of Giulianelli et al who observed at 1 and 3 months postoperatively these parameters improved [17].

Similarly, Geavlete et al reported in their study that the quality of life, Q_{max} , IPSS, and PVR improved in within 1 year of follow up post-operatively [18].

Based on their institutional experience, Hirasawa et al showed in their comparison between the results of TUEB and TURis for the management of BPH and revealed that IPSS, QoL, Q_{max} , PVR in addition to the PSA level improved postoperatively [19].

Strengths and Limitations:

Our study was performed the same experienced consultant surgeon in the same centre to eliminate any bias of experience or learning curve between the two groups. Otherwise, a larger sample size is recommended to be recruited in further studies with longer duration of post-operative follow up to investigate any long-term complications.

Conclusion

Both surgical techniques were effective in management of BPH with improvement in IPSS, Q_{max} and PVR. Both techniques were performed in a comparable operative time, however TUEP was associated with decreased blood loss, time needed for catheters to remain in the patient and duration of stay in hospital.

Compliance with ethical standards:

1. Disclosure of potential conflicts of interest: The Authors declare that they have no conflicts of Interest.
2. Research involving Human participants and/or Animals: This article does not contain any studies with animals performed by any of the Authors. The study has been performed in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

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