Original Article

Comparison of the results of bipolar transurethral enucleation and resection of the prostate with and without morcellation in treatment of benign prostatic hyperplasia

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Keywords:
Benign prostatic hyperplasia, bipolar transurethral enucleation and resection of the prostate, morcellation

Abstract

Objective: To compare the result of bipolar transurethral enucleation and resection of the prostate with morcellation (B-TUERP-M) and without morcellation (B-TUERP) in treatment of benign prostatic hyperplasia.

Materials and Methods: This was a prospective single centre cohort study of 101 patients with prostate enlargement of more than 60 ml who underwent B-TUERP by a single surgeon between January 2020 and June 2022. Patients were divided into two groups, a B-TUERP group of 49 patients and a second group of 52 patients classed as B-TUERP-M. The perioperative outcomes followed up at 1, 3 and 6 months after surgery were evaluated.

Results: There were no significant differences in the preoperative parameters of the two groups. Comparisons between the two groups showed a shorter operative time (63.94 ± 12.01 vs 77.77 ± 11.80 min, p-value 0.000), more resected prostate tissue (65.73 ± 14.67 vs 60.73 ± 5.45 gm, p-value 0.027) and a higher post-operative hematocrit level (35.16 ± 3.97 vs 33.18 ± 3.22%, p-value 0.007) in the patients who underwent B-TUERP with morcellation. At 6 months after the procedure, better results were found in patients who had undergone B-TUERP-M regarding urine flow rate (26.33 ± 5.33 vs 20.66 ± 5.08 ml/sec, p-value 0.000), post-void residual urine volume (24.19 ± 10.93 vs 36.04 ± 16.90 ml, p-value 0.000), post-operative PSA (0.72 ± 0.43 vs 1.22 ± 0.54 mg/ml, p-value 0.000) and International Prostate Symptom Scores (5.01 ± 1.36 vs 5.71 ± 1.33, p-value 0.001).

Conclusion: Better outcomes occurred following B-TUERP with morcellation with regard to operative time, resection weight of prostatic adenoma, post-operative urine flow rate, Post-void residual urine volume, PSA and International Prostate Symptom Score than in patients treated with B-TUERP without morcellation.

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Introduction

The first monopolar transurethral resection of the prostate (M-TURP) was introduced in 1963 by Maximilian Sterm and remains the gold standard for surgical treatment of benign prostatic hyperplasia (BPH)[1] but still has some limitations, especially when prostate size is over 80 ml.[2,3] BPH can result in bleeding and transurethral resection of prostate (TURP) syndrome[4,5] with can cause serious complications. The bipolar TURP (B-TURP) was introduced to reduce the risk of TURP syndrome by using saline as the irrigation fluid but this does not reduce the risk of intra-operative bleeding, especially in surgery involving a large prostate gland.[6] Currently, there is increasing use of the technique known as bipolar transurethral enucleation and resection of the prostate (B-TUERP) to enucleate the prostate adenomas in an endoscopic fashion. This technique removes more of the obstructing adenoma and the result is an effective and safe treatment of BPH.[7-9]

The extraction of adenoma of the prostate in a fragmentary fashion is a recognized practice. First, a loop electrode is used to resect the adenoma then all adenoma fragments are extracted using either an Ellic or Toomey syringe[8] with potential secondary use of the morcellator.[9] To our knowledge, there is no published data comparing these two techniques. This article aims to study the comparison of the results of bipolar transurethral enucleation and resection of the prostate without use of a morcellator (B-TUERP) and with use of a morcellator (B-TUERP-M).

Materials and Methods

The study was approved by the Research Ethics Committee of Lampang Hospital (study number: 80.1/64). A prospective cohort study was performed into 101 consecutive patients who were treated for benign prostatic hyperplasia using TUERP. The same surgeon carried out all the surgery between January 2020 and June 2022. Patients were divided into two groups: one group of 49 patients who underwent B-TUERP without morcellation and a second group, of 52 patients who underwent B-TUERP-with morcellation. The inclusion criteria were as follows: patients between 50 and 90 years of age, a prostate size of more than 60 ml measured using transrectal ultrasound and refractory to medical treatment. Exclusion criteria were diagnosis with a neurogenic bladder, prostate cancer, urethral stricture or any previous prostatic, bladder neck or urethral surgery. The author recorded and analyzed data including mean age, International Prostate Symptom Score, quality of life score, urine flow rate, post-void residual urine volume, PSA pre-operatively. Follow-up data from patients were collected 1, 3 and 6 months postoperatively.

The prostate volume, operative time, resection weight, catheterization time, pre and post-operative Hematocrit, percentage of blood transfusion and sepsis were also recorded. In the B-TUERP group, the author followed the technique described by LIU.[8] The procedure was performed in each case by a single surgeon with a 26 Fr resectoscope with bipolar loop. Normal saline served as the irrigation fluid. Under general or regional anesthesia, the patient was placed in the lithotomy position. The 26 Fr resectoscope was placed in the bladder under video assisted endosurgical system guidance. The ureteric orifice, 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 deeply incised to the level of the surgical capsule (Figure 1). The distal mid lobe and mucosa were dissected in retrograde fashion toward the bladder neck using the resectoscope tip 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. Thus, adenoma of distal mid lobe was detached from the surgical capsule and the smooth surgical capsule was identified (Figure 2). The partial mid lobe was raised. The loop electrode was used to cauterize them and block the lobe blood supply (Figure 3). This procedure was used progressively towards the bladder neck until the circular fibers of the bladder neck were identified (Figure 4). The bilateral lobes along the surgical capsule were then detached clockwise or counterclockwise from the 5 or 7 o'clock position of the prostatic apex to the 12 o'clock position in the same direction. The loop electrode was used to cut from the 11 to 1 o'clock position (Figure 5) care being taken at the 12 o'clock position not to damage the external urethral sphincter. In a trilobe enlarge prostate the 3-lobe technique was used. This involved both

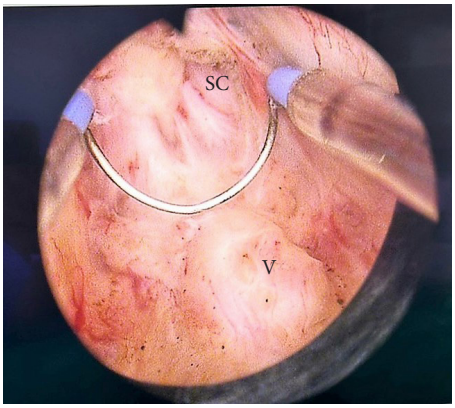

Figure 1. The incision was begun close to the verumontanum (V) from the 5 to the 7 o'clock positions and a deep incision was made in the urethral mucosa to the level of the surgical capsule (SC).

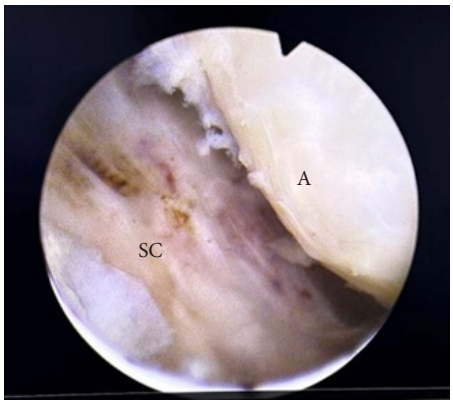

Figure 2. The adenoma (A) was detached from the surgical capsule and the smooth surgical capsule (SC) was identified.

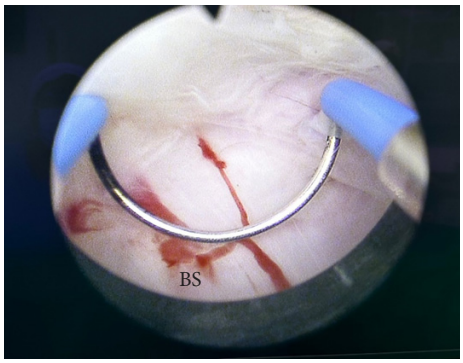

Figure 3. The loop electrode was used to cauterize them and block the lobe blood supply (BS).

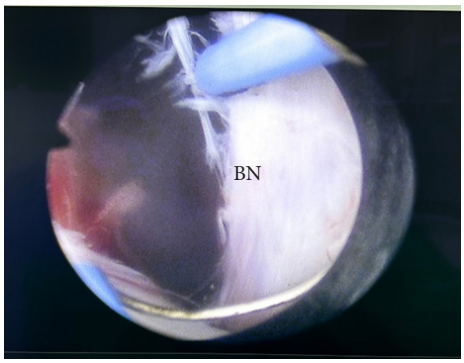

Figure 4. The circular fibers of the bladder neck (BN) were identified.

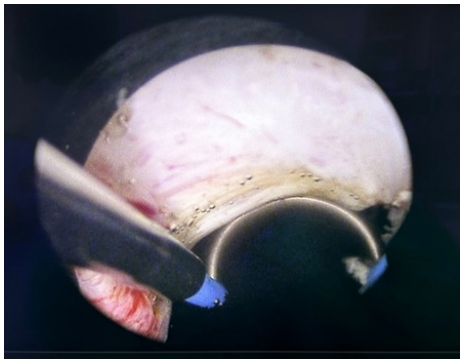

Figure 5. The loop electrode was used to cut from 11 to 1 o'clock position.

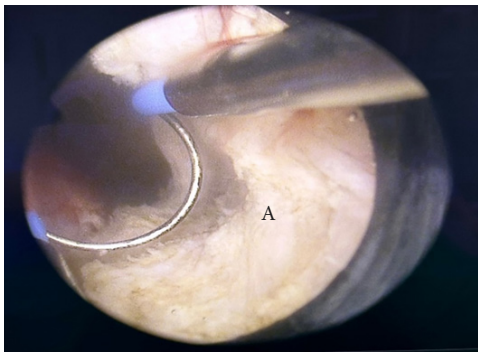

Figure 6. The adenoma(A) was resected rapidly by the loop electrode without serious hemorrhage.

a 5 and 7 o'clock incision with median lobe enucleation and subsequent enucleation of the bilateral lobe with the technique described. At this point, all the lobes of prostate attached to the bladder neck and most of the blood supply to the lobes were blocked. The adenoma was resected rapidly using the loop electrode without incidence of serious hemorrhage (Figure 6). All adenoma fragments were extracted by Toomey syringe. A 22 Fr 3-way catheter was inserted. Bladder irrigation was necessary until hematuria was sufficiently resolved. In the B-TUERP-M group, the author followed the technique described by Thaidumrong.[9] Equipment and the techniques used for enucleation of all lobes of the prostate are identical to those used in the B-TUERP group. When all lobes were detached from the surgical capsule, the loop electrode was used to cut the point of attachment on the bladder neck to free the adenoma. The tip of resectoscope was used to

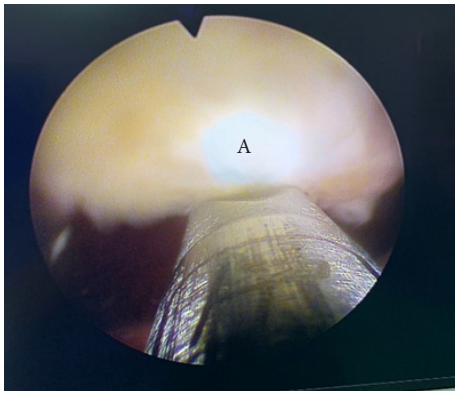

Figure 7. All adenomas(A) were pushed to float into the bladder.

push all adenomas to cause them to float into the bladder (Figure 7). In the final step, a morcellator was used to remove the floating adenoma from the bladder. A 22 Fr 3-way catheter was inserted. Bladder irrigation was necessary until hematuria was sufficiently resolved.

Statistical analysis

The data were analyzed using Stata/SE17. The data are presented as mean ± standard deviation (SD) and percentages. The perioperative and postoperative data between the B-TUERP and B-TUERP-M groups was compared via independent t-test. A p-value of less than 0.05 was considered statistically significant.

Results

Table 1 represents the baseline preoperative parameters of the patients fitting the inclusion criteria. There was no statistical difference between the two groups regarding preoperative parameters; both groups had comparable preoperative values regarding age, IPSS, QOL, PVR, Pre-test PSA, prostate volume, and pre-test hematocrit.

Table 2 represents the perioperative parameters in the two groups. The perioperative data showed significant differences between the groups with regard to operative time, which was longer in the B-TUERP group than in the B-TUERP-M group (77.77 ± 11.80 vs 63.94 ± 12.01 min, p-value 0.000); the tissue resection weight was significantly less in the B-TUERP group in relation the B-TUERP-M group (60.73 ± 5.45 vs 65.73 ± 14.67 gm, p-value 0.027), and the post-operative hematocrit was significant lower in the B-TUERP group than in the B-TUERP-M group (33.18 ± 3.22 vs 35.16 ± 3.97%, p-value 0.007). However, there were no statistical differences between the two groups in catheterization time, post-operative sepsis and blood transfusion.

Table 3 shows the outcomes. With regard to the post-operative parameters, there were

Table 1. Baseline preoperative parameters of the included patients

Variables	B-TUERP group (n=49) Mean ±SD	B-TUERP-M group (n=52) Mean ±SD	P-value
Age (year)	72.30±7.26	70.01±7.31	0.124
IPSS	22.12±2.55	22.03±1.57	0.878
QOL	4.63±0.65	4.42±0.50	0.175
Qmax (ml/sec)	6.81±1.66	7.11±1.57	0.475
PVR (ml)	147.15±37.46	148.5±26.57	0.873
Pre-test PSA	4.86±1.15	4.85±1.21	0.975
PV (ml)	80.10±10.50	81.90±16.09	0.508
Pre-test Hct	37.77±3.54	38.80±3.88	0.166

B-TUERP-M = Bipolar transurethral enucleation and resection of the prostate with morcellator, IPSS = International Prostate Symptom Score, QOL = quality of life score, Qmax = urine flow rate, PVR = post-void volume residual urine, PSA = prostate specific antigen, PV = prostate volume

Table 2. Perioperative parameters in the two groups

Variables	B-TUERP group (n=49) Mean ±SD	B-TUERP-M group (n=52) Mean ±SD	P-value
Operative time (min)	77.77±11.80	63.94±12.01	0.000
Resection weight (gm)	60.73±5.45	65.73±14.67	0.027
Catheterization time (day)	2.42±0.95	2.25±0.86	0.326
post-operative Hct (%)	33.18±3.22	35.16±3.97	0.007
post-operative sepsis (%)	3 (5.7)	2 (3.8)	0.659
Blood transfusion n (%)	9 (17.0)	4 (7.7)	0.096

Table 3. Post-operative parameters in the two groups

Variables	B-TUERP group (n=49) Mean ±SD	B-TUERP-M group (n=52) Mean ±SD	P-value
Postoperative Q max (ml/sec)			
1 month	15.21±3.65	22.02±5.60	0.000
3 months	18.49±4.49	24.89±5.98	0.000
6 months	20.66±5.08	26.33±5.33	0.000
Postoperative PVR (ml)			
1 month	62.67±24.29	32.42±19.81	0.000
3 months	50.26±19.97	27.51±14.49	0.000
6 months	36.04±16.90	24.19±10.93	0.000
Postoperative PSA (ng/ml)			
1 month	1.84±0.73	1.08±0.73	0.000
3 months	1.43±0.60	0.85±0.47	0.000
6 months	1.22±0.54	0.72±0.43	0.000
Postoperative IPSS			
1 month	10.59±1.98	10.34±1.73	0.509
3 months	7.67±1.57	7.38±1.34	0.322
6 months	5.71±1.33	5.01±1.36	0.001
Postoperative QOL			
1 month	2.48±0.68	2.38±0.63	0.422
3 months	1.61±0.57	1.46±0.54	0.176
6 months	0.97±0.43	0.88±0.37	0.242

B-TUERP-M = Bipolar transurethral enucleation and resection of the prostate with morcellator, Qmax = urine flow rate, PVR = post-void volume residual urine, PSA = prostate specific antigen, IPSS = International Prostate Symptom Score, QOL = quality of life score

significant differences between the groups in the post-operative Qmax values which were lower in the B-TUERP group than in the B-TUERP-M group at 1, 3 and 6 months (15.21 ± 3.65 vs 22.02 ± 5.60 ml/sec, p-value 0.000, 18.49 ± 4.49 vs 24.89 ± 5.98 ml/sec, p-value 0.000 and 20.66 ± 5.08 vs 26.33 ± 5.33 ml/sec, p-value 0.000). The post-operative PVR was higher in the B-TUERP group than in the B-TUERP-M group at 1, 3 and 6 months (62.67 ± 24.29 vs 32.42 ± 19.81 ml, p-value 0.000, 50.26 ± 19.97 vs 27.51 ± 14.49 ml, p-value 0.000 and 36.04 ± 16.90 vs 24.19 ± 10.93 ml p-value 0.000). Post-operative PSA readings were higher in the B-TUERP group than in the B-TUERP-M group at 1, 3 and 6 months (1.84 ± 0.73 vs 1.08 ± 0.73 ng/ml, p-value0.000, 1.43 ± 0.60 vs 0.85 ± 0.47 ng-ml, p-value 0.000 and 1.22 ± 0.54 vs 0.72 ± 0.43 ng/ml, p-value 0.000). Also, the post-operative IPSS was higher in the B-TUERP group than the B-TUERP-M group at 6 months (5.71 ± 1.33 vs 5.01 ± 1.36, p-value 0.001). There was no significant difference between the two groups in post-operative IPSS at 1 and 3 month follow ups and post-operative QOL at 1, 3 and 6 months.

Discussion

BPH is a common disease in aging men, resulting in cumbersome lower urinary tract symptoms.[10] M-TURP is still the mainstream line of surgical management for relieving outlet obstruction in men with BPH. However, M-TURP is associated with a high complication rate ranging between 7% to 43% and a mortality rate of 0.2%.[11] The major complications are bleeding, TURP syndrome, extravasation and bladder neck stenosis.[9] The use of the B-TURP procedure can reduce the risk of TURP syndrome by using saline as the irrigation fluid but it does not reduce the risk of intraoperative bleeding especially in surgery involving an enlarged prostate gland.[6] The TUERP is a new surgical technique that replicates the open enucleation of prostate adenoma in an endoscopic fashion for treatment of BPH with a bipolar system. TUERP involves enucleation using the tip of a resectoscope in a similar fashion to index finger enucleation in open simple prostatectomy.[9] Neill et al, who first reported bipolar prostate enucleation, concluded that the technique was safe and technically feasible for BPH.[12] Subsequently, there have been many reports on the results of B-TUERP. Liu et al, have reported on the results of B-TUERP in 1,100 patients and suggest that TUERP is a safe, technically feasible treatment for BPH.[8] Davide et al, make a comparison between B-TUERP and B-TURP, carrying out an ESUT systematic review and cumulative analysis and they concluded that B-TUERP is an effective and safe surgical treatment for BPH. They went on to report that B-TUERP offers several advantages over standard B-TURP, including the resection of a larger amount of tissue within the same operative time, shorter hospitalization, lower risk of complications and a lower re-intervention rate.[13] Thaidumrong et al carried out a study in Thailand and reported on the results of TUAEP (the same technique as TUERP described by Liu with some modifications)[9] and used a morcellator to remove prostate adenoma from the bladder in 40 patients. They concluded that TUERP was potentially the best modern alternative to TURP and open prostatectomy for BPH.[9] However, the step involving a morcellator in TUERP after enucleation that can separate the prostate adenoma from the capsule of the prostate and remove the prostate adenoma from the bladder is not yet available. A loop electrode was used to resection the adenoma over and over to result in small fragments, which are removed using either an Ellic or Toomey syringe.[8] Later a morcellator was used to remove the prostate adenoma from the bladder. Julia et al reviewed 26 studies from 1998 to 2020 involving 5,652 patients treated with a morcellator for BPH. The team concluded that the morcellator is an efficient and safe for prostate morcellation in the TUERP technique.[14] To our knowledge, there is no published data comparing the results between using and not using a morcellator in TUERP. This article aimed to compare the results of the two techniques B-TUERP and B-TUERP-M. The perioperative parameters show that the B-TUERP-M group have a shorter operative time than the B-TUERP group (63.94 VS 77.77 min, p-value 0.000). The author found that use of the loop electrode in resection of the adenoma had a level of difficulty because of poor vision due to bleeding and obstruction of the equipment movement from prostate adenoma. To the contrary, use of a morcellator, after the adenoma has been pushed into the bladder facilitated fast removal of the tissue from the bladder. With regard to the resection weight, more prostate adenoma tissue was removed in the B-TUERP-M group can than the B-TUERP group (65.73 VS 60.73 gm, p-value 0.027). In the B-TUERP group the adenoma attaches to the bladder neck, which may be a cause of retention of some adenoma. It was also found in this study that the post-operative hematocrit was lower in the B-TUERP group than in the B-TUERP-M group (33.18% vs 35.16%, p-value 0.007). However, the blood transfusion requirements were no different between the two groups (17.0% vs 7.7%, p-value 0.096). Regarding the post-operative results, better outcomes were achieved in the B-TUERP-M, specifically Qmax, PVR and PSA at 1, 3 and 6 month, which corresponds to the more effective resection weight removed in the B-TUERP-M group than the B-TUERP group. Chawat et al reported that the amount of resected prostate tissue from transurethral prostatectomy was related to outcome and concluded that the amount of resected prostate tissue had a slight influence on the difference in LUTS and QoL after TURP.[15] In this study, only IPSS at 6 months that the B-TUERP-M group is lower than the B-TUERP group. There was no difference between the two groups in post-operative QOL at 1, 3 and 6 months.

The main limitation of this study was the relatively short follow-up time and further studies with longer follow-up and randomized control trials are warranted to assess and compare the durability and the results of these two techniques.

Conclusion

Use of a morcellator in TUERP for surgical treatment of benign prostatic hyperplasia can achieve a better outcome with regard to operative time, resection weight of prostatic adenoma, post-operative urine flow rate, post-void residual urine volume, PSA and International Prostate Symptom Score than TUERP without morcellation.

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