Original Article

The *en bloc* method is feasible for beginners learning to perform holmium laser enucleation of the prostate

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Background: Holmium laser enucleation of the prostate (HoLEP) is a new alternative method for the treatment of benign prostatic hyperplasia (BPH); however, most surgeons are hesitant to use this new technique due to its steep learning curve. Notably, most beginners start with the traditional multi-incisional method rather than the *en bloc* method. Thus, we sought to explore the feasibility of beginners adopting the *en bloc* method in HoLEP.

Methods: A clinical development project was established at Department of Urology, Affiliated Nantong Rehabilitation Hospital of Nantong University in December 2019 to promote HoLEP. The study included 1st 132 consecutive patients treated by a single surgeon between January and December 2020. The overall pre-, peri-, and post-operative metrics were documented and evaluated. The 132 patients were divided into Group A (1st 50 patients) and Group B (the following 82 patients), and these two groups were compared to each other.

Results: No conversion of operative methods occurred. The major significant differences between Groups A and B related to the enucleation time and enucleation efficiency. We found that 20–30 procedures needed to be performed for the surgeon to become relatively comfortable with the *en bloc* method. Further, skill improvement was continuous but tended to stabilize with case accumulation. The main short-term complications observed in the hospital and 30 days post-operatively included acute urinary retention, urinary tract infection, transient incontinence, and gross hematuria. In the 18-month follow-up period, the complications consisted of urethral stricture and bladder-neck contracture, which required endoscopic urethrotomy or bladder-neck incisions.

Conclusions: The *en bloc* HoLEP provided a significantly improved voiding with low complications and recurrence, and this technique could feasibly be adopted to teach beginners.

Keywords: Benign prostatic hyperplasia (BPH); *en bloc*; holmium laser enucleation of the prostate (HoLEP); learning curve

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Introduction

Benign prostatic hyperplasia (BPH) is the non-malignant enlargement of prostate, it mainly involves the transitional zone of the prostate. It leads to benign prostatic obstruction (BPO) which is a common cause of male lower urinary tract symptoms (LUTS), affecting more than half of all men over 50 years old. Up to one third of patients over 60 years old suffer from LUTS caused by BPO (1-4). When those patients get more symptomatic after

conservative management failure, surgical treatment may be necessary (5).

Transurethral resection of the prostate (TURP) was regarded as "gold standard" of BPO treatment especially in smaller prostates before the introduction of laser techniques. However, patients who underwent TURP usually get longer catheterization time, increased length of hospital stay and more complications i.e., gross hematuria and recurrence of prostatic hyperplasia (6). Since holmium laser enucleation of the prostate (HoLEP) was introduced as a treatment option for BPH, it has been compared to other traditional procedures, such as open prostatectomy (OP) and TURP. Following rigorous testing, HoLEP has proven itself to be a new alternative solution to BPH. It has a number of advantages, including those related to its efficacy in treating substantially enlarged glands, reduced catheterization time, shortened length of hospital stay, improved subjective symptom scores, and decreased post-operative complication rates (6-12). However, HoLEP is still not the most common technique used in BPH surgeries. One of the main obstacles to its employment is its well-known steep learning curve. Despite extensive experience in transurethral procedures, some surgeons are hesitant to try this new technique. During 1st attempts a conversion from HoLEP to TURP might be required due to capsular perforation or uncontrolled bleeding (13).

Highlight box

Key findings

- The *en bloc* method provided a significantly improved voiding with low complications and recurrence and it could feasibly be adopted to teach beginners learning to perform holmium laser enucleation of the prostate (HoLEP). The surgeon needed to perform 20–30 procedures to become relatively comfortable with the *en bloc* method. However, the surgeon's skills improved continuously with no obvious plateau and tended to stabilize with the increase of the number of operations.

What is known and what is new?

- Most surgeons are hesitant to try HoLEP due to the steep learning curve. Most beginners start with the traditional multi-incisional method rather than the *en bloc* method. Thus, little is known about the true learning curve for the *en bloc* approach or whether it can be successfully adopted to teach learners.
- Our findings suggest that the *en bloc* method could feasibly be adopted to teach beginners learning to preform HoLEP.

What is the implication, and what should change now?

- The *en bloc* method is feasible, and it should be adopted to teach beginners learning to perform HoLEP.

The following two approaches are commonly adopted in HoLEP: (I) standard multi-incisional enucleation; and (II) *en bloc* enucleation. The *en bloc* method has been recommended to surgeons as it has a number of advantages. Notably, it eases the recognition of the surgical plane, preserves more external sphincter's mucosa, and decreases post-operative stress urinary incontinence (14). In addition, *en bloc* enucleation is reported to be faster than the standard approach with similar outcomes (15,16). However, most learners of HoLEP start with the traditional method rather than *en bloc* method. Thus, little is known about the true learning curve of *en bloc* method or if it is feasible to adopt this technique to teach new learners to perform HoLEP. Thus, this study sought to explore the feasibility of teaching beginners to perform HoLEP using the *en bloc* method. We present the following article in accordance with the TREND reporting checklist (available at https://tau.amegroups.com/article/view/10.21037/tau-23-106/rc).

Methods

Patient population and study design

A clinical development project was established at our institution in December 2019 to promote the use of HoLEP in BPH patients. The technique was used to treat patients who had been informed about the possibility of using HoLEP based on their pre-operative disease evaluation results. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). This study was approved by the Ethics Committee of Affiliated Nantong Rehabilitation Hospital of Nantong University (No. 2022090) and informed consent was taken from all the patients.

The patients would be enrolled if they meet the following inclusion criteria: (I) suffer from lower urinary tract syndrome (LUTS); (II) be unable to accept the changes to their lifestyle any longer; (III) have undergone a previous examination that suggested a diagnosis of BPH; (IV) have no evidence indicating neurogenic bladder; and (V) have an American Society of Anesthesiology score of <3.

The patients were assessed, a detailed history was taken, and a physical examination was performed. Age, body mass index (BMI), Eastern Cooperative Oncology Group (ECOG) score, years of disease course, BPH-related medication, previous prostate surgery and BPH-related adverse event were counted. The patients' prostate specific antigen (PSA) levels were recorded, and their prostate volume and post void residual volume (PVR) were

determined by ultrasound and computed tomography. Their international prostate symptom score (IPSS) and quality of life (QoL) score were also measured to assess their subjective feelings. Afterwards, operative characteristics and post-operative outcomes were evaluated. All the patients were advised not to take their anti-coagulant or anti-platelet medication one week before the surgery.

Ultimately, 1st 132 consecutive patients treated by a single surgeon between January and December 2020 were included in the study. The surgeon has performed at least 400 cases of TURP but no experience of HoLEP before this study. The 132 patients were divided into Group A (1st 50 patients) and Group B (the following 82 patients), which were compared to each other. The entire study process was supervised by a single endourology fellowship-trained urologist.

HoLEP technique

The HoLEP was performed using high power 100 W holmium laser unit (Lumenis Ltd.) and SiimLine EZ 550 holmium laser fiber (Lumenis Ltd.), with an energy setting of 80 W (2.0 J, 40 Hz). A 26-F continuous-flow resectoscope (Karl Storz, Tuttlingen, Germany) was inseted and a mechanical tissue morcellator (R. Wolf, Piranha™, Knittlingen, Germany) were used to perform morcellation.

We adopted an *en bloc* method with an early apical release in the procedure. The *en bloc* technique was defined as a single continuous laser incision in the process of enucleation. In brief, an incision proximal to the verumontanum was first made at 6 o'clock of a depth sufficient to ensure the identification of the surgical capsule. This incision was inverted U-shaped. Next, an incision was made in the urinary mucosa at 12 o'clock to divide the apex of the gland from urinary sphincter. An early apical release could then be achieved based on the incisions above. The incisions at 6 and 12 o'clock could also define the initial enucleation plane. Beginning at the 6 o'clock position, the enucleation plane was extended clockwise and counterclockwise, respectively, until it converged at 12 o'clock. In the process of enucleation, effective hemostasis timely was very critical, especially for the surgeon in the learning curve. Finally, the entire prostatic adenoma was enucleated in a retrograde manner. A blunt dissection and sharp incision were both performed to separate adenoma from the capsule. Gentle operation and appropriate use of laser energy always need to be remembered. After finishing enucleation, laser energy was used to control any bleeding before morcellation. The double inflow maintained bladder distension, and prevented injuries to bladder mucosa. In the end, all patients got a 22-F 3-way Foley catheter (Beijing Futai Minde Pharmaceutical Technology Co., Ltd) inserted to ensure continuous bladder irrigation.

The entire study process was supervised by a single endourology fellowship-trained urologist.

Statistical analysis

The categorical variables are presented as the number, and the continuous variables are presented as the mean and standard deviation (SD). The categorical variables were converted using a contingency table and compared by the chi-square test. The Fisher's exact test was employed when the sample sizes were <5. The Mann-Whitney U test was used for the statistical analysis of the continuous variables. All the statistical analyses were performed in Statistical Product and Service Solutions (SPSS) 22.0 (IBM Statistics, Chicago, IL, USA). A corresponding 2-tailed P value <0.05 was considered significant.

Results

Baseline metrics

The demographic characteristics and pre-operative parameters of the patients are summarized in *Table 1*. The overall mean age was 73.2 years old and mean BMI was 24.8 kg/m^2. ECOG score was also be recorded with 0 (n=7, 5.3%), 1 (n=71, 53.8%), 2 (n=49, 37.1%), 3 (n=5, 3.8%). According to years of disease course, the overall groups were divided <1 (n=23, 17.4%), 1–5 (n=90, 68.2%), 6–10 (n=18, 13.6%) and >10 (n=1, 0.8%). In addition, 12/132 (9.1%) patients had BPH-related medication and 7/132 (5.3%) patients had previous prostate surgery. The history of BPH-related adverse events was composed of urinary retention (n=33, 25%), catheterization (n=10, 7.6%), bladder stones (n=12, 9.1%) and urinary tract infection (n=21, 15.9%). What's more important, the prostate volume, pre-operative PVR, PSA, IPSS and QoL were all documented. Notably, there were no significant differences in the baseline metrics of Groups A and B.

Perioperative assessment and post-operative outcome

The perioperative data of the patients are set out in *Table 2*. No conversion of HoLEP to TURP occurred.

Table 1 Demographic characteristics and pre-operative parameters of patients

Variables	Overall (N=132)	1st 50 procedures	Following 82 procedures	P value
Age (years)	73.2 (8.9)	72.4 (9.6)	73.8 (8.5)	0.49
BMI (kg/m^2)	24.8 (3.5)	24.2 (3.6)	25.5 (3.5)	0.51
ECOG (score)				0.45
0	7 (5.3%)	4 (8%)	3 (3.7%)	
1	71 (53.8%)	23 (46%)	48 (58.5%)	
2	49 (37.1%)	21 (42%)	28 (34.1%)	
3	5 (3.8%)	2 (4%)	3 (3.7%)	
Disease course (years)				0.85
<1	23 (17.4%)	7 (14%)	16 (19.5%)	
1–5	90 (68.2%)	36 (72%)	54 (65.9%)	
6–10	18 (13.6%)	7 (14%)	11 (13.4%)	
>10	1 (0.8%)	0	1 (1.2%)	
BPH-related medication	12 (9.1%)	6 (12%)	6 (7.3%)	0.37
Previous prostate surgery	7 (5.3%)	1 (2%)	6 (7.3%)	0.25
History of urinary retention	33 (25%)	12 (24%)	21 (25.6%)	1.0
History of catheterization	10 (7.6%)	3 (6%)	7 (8.5%)	0.74
History of bladder stones	12 (9.1%)	5 (10%)	7 (8.5%)	0.77
History of UTIs	21 (15.9%)	9 (18%)	12 (14.6%)	0.63
Prostate volume (cc)				0.40
<40	22 (16.7%)	11 (22%)	11 (13.4%)	
40–80	68 (51.5%)	23 (46%)	45 (54.9%)	
>80	42 (31.8%)	16 (32%)	26 (31.7%)	
Pre-operative PVR (mL)	118.4 (124.4)	116.0 (141.2)	119.8 (113.8)	0.48
Pre-operative PSA (ng/mL)				0.79
<4	69 (52.3%)	25 (50%)	44 (53.7%)	
4–10	40 (30.3%)	17 (34%)	23 (28%)	
>10	23 (17.4%)	8 (16%)	15 (18.3%)	
Pre-operative prostatic tissue biopsy	12 (9.1%)	5 (10%)	7 (8.5%)	0.77
Pre-operative IPSS				0.52
Mean (SD)	19.0 (2.5)	19.1 (2.8)	19.0 (2.4)	
Range	13–25	13–25	14–25	
Pre-operative QoL				0.26
Mean (SD)	5.0 (0.7)	5.1 (0.7)	5.0 (0.7)	
Range	4–6	4–6	4–6	

Data are presented as n (%) or mean (SD). BMI, body mass index; ECOG, Eastern Cooperative Oncology Group; UTI, urinary tract infection; PVR, post void residual volume; PSA, prostate specific antigen; IPSS, international prostate symptom score; SD, standard deviation; QoL, quality of life.

Table 2 Perioperative metrics and post-operative outcomes

Variables	Overall (N=132)	1st 50 procedures	Following 82 procedures	P value
Surgical procedure				0.92
HoLEP	105 (79.5%)	39 (78%)	66 (80.5%)	
HoLEP + bladder stone lithotripsy	11 (8.3%)	5 (10%)	6 (7.3%)	
HoLEP + hernia operation	7 (5.3%)	3 (6%)	4 (4.9%)	
HoLEP + other surgeries	9 (6.8%)	3 (6%)	6 (7.3%)	
HoLEP time (min)	110.2 (46.5)	127.90 (52.5)	99.3 (39.0)	0.001
Enucleation time (min)	92.9 (39.9)	105.9 (44.6)	84.9 (34.8)	0.005
Morcellation time (min)	14.0 (8.4)	15.51 (8.62)	13.13 (8.21)	0.15
Pathology volume (g)	41.5 (22.3)	42.53 (21.75)	40.91 (22.78)	0.61
Enucleation efficiency (g/min)	0.45 (0.25)	0.39 (0.18)	0.50 (0.27)	0.02
Catheter time (days)				0.22
POD#1	90 (68.2%)	30 (60%)	60 (73.2%)	
POD#2	15 (11.4%)	6 (12%)	9 (11%)	
POD#3	7 (5.3%)	5 (10%)	2 (2.4%)	
≥ POD#4	20 (15.2%)	9 (18%)	11 (13.4%)	
Removal of catheter in hospital				1.0
Yes	120 (90.9%)	46 (92%)	74 (90.2%)	
No	12 (9.1%)	4 (8%)	8 (9.8%)	
Pathology				0.21
BPH	119 (90.2%)	48 (96%)	71 (86.6%)	
BPH + focal atypical hyperplasia	10 (7.6%)	2 (4%)	8 (9.6%)	
Prostate cancer	3 (2.3%)	0	3 (3.7%)	
Short-term complications				
Acute urinary retention	23 (17.4%)	10 (20%)	13 (15.9%)	0.64
Urinary tract infection	16 (12.1%)	6 (12%)	10 (12.2%)	1.0
Transient incontinence	13 (9.8%)	3 (6%)	10 (12.2%)	0.37
Gross hematuria	1 (0.8%)	0	1 (1.2%)	1.0
30-day readmission	4 (3%)	3 (6%)	1 (1.2%)	0.15
18 months follow-up				
IPSS	5.8 (1.6)	5.7 (1.7)	5.9 (1.5)	0.41
QoL	1.5 (0.6)	1.4 (0.5)	1.6 (0.4)	0.32
PVR (mL)	16.3 (20.1)	20.7 (30.7)	13.5 (8.2)	0.09
PSA (ng/mL)	1.58 (2.12)	0.91 (0.59)	0.85 (0.57)	0.59
Stress incontinence	2 (1.5%)	2 (4%)	0	0.14
Urethral stricture	3 (2.3%)	1 (2%)	2 (2.4%)	1.0
Bladder-neck contracture	2 (1.5%)	0	2 (2.4%)	0.53

Data are presented as n (%) or mean (SD). HoLEP, holmium laser enucleation of the prostate; POD, post-operative day; BPH, benign prostatic hyperplasia; IPSS, international prostate symptom score; QoL, quality of life; PVR, post void residual volume; PSA, prostate specific antigen; SD, standard deviation.

The major significant differences between Groups A and B were observed in the HoLEP time, enucleation time, and enucleation efficiency. Enucleation efficiency was defined as the weight (in grams) of the prostate tissue removed per enucleation minute. In addition, we also established a correlation model of overall average enucleation efficiency and procedures (*Figure 1*). The model indicated that 20–30 procedures had to be performed before the surgeon became relatively comfortable with the *en bloc* technique. Further, the skill improvement was continuous, but tended to stabilize with case accumulation.

The main short-term complications that occurred in the hospital or 30 days post-operatively included acute urinary retention (n=23, 17.4%), urinary tract infection (n=16, 12.1%), transient incontinence (n=13, 9.8%), and gross hematuria (n=1, 0.8%). The overall 30-day readmission rate was very low (4/132, 3%). In the 18-month follow-up period, we re-evaluated the IPSS, QoL, PVR, PSA, and the post-operative complications of the patients, and the results are set out in *Table 2*. Overall, no significant difference was observed in the post-operative outcomes of Groups A and B.

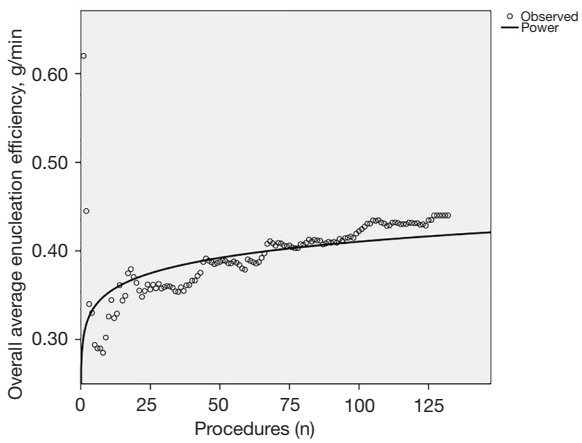

Figure 1 A power model was established according to overall average enucleation efficiency and procedures numbers by SPSS 22.0 (IBM Statistics, Chicago, IL, USA) (P<0.001). SPSS, Statistical Product and Service Solutions.

The post-operative-related complications were further classified by Clavien-Dindo grade, and the treatment strategies are presented in *Table 3*. Notably, all instances of urinary retention occurred after catheter removal on post-operative day 1. It's resolved through re-catheterization and catheter was removed again successfully after 2–3 days. All instances of transient and stress incontinence were relieved, and patients recovered well following functional training or pelvic floor physiotherapy. A slight post-operative hematuria was observed in 1 patient, who received prolonged bladder irrigation. Urinary tract infections occurred but were cured with sensitive antibiotics. In the 18-month follow-up period, the complications included stress incontinence (n=2, 1.5%), urethral stricture (n=3, 2.3%) and bladder-neck contracture (n=2, 1.5%), which required pelvic floor physiotherapy or internal urethrotomy or bladder-neck incisions.

Discussion

Following the development of modern laser technology, HoLEP plays a positive role in the treatment of BPH. HoLEP makes the best use of the clear anatomical planes to remove large enough prostate adenoma, even the entire transition zone, and as it is essentially endoscopic, it is equivalent to a simple prostatectomy (17). Tamalunas *et al.* (18) reported that HoLEP was size-independent and an effective method for the treatment of LUTS in prostates ≥30 cc. HoLEP is on its way to replacing TURP as the new gold-standard treatment for BPH. European Association of Urology has strongly recommended HoLEP as an alternative to TURP for males with moderate-to-severe LUTS, while American Urological Association

Table 3 Clavien-Dindo grade and treatment strategies of post-operative complications

Clavien-Dindo grade	Complication	Treatment
I	Post-voidal urinary retention	Re-catheterization
	Transient/stress incontinence	Functional training/pelvic floor physiotherapy
	Gross hematuria	Prolonged irrigation
II	Urinary tract infection	Antibiotics
IIIa	Urethral stricture/bladder-neck contracture	Internal urethrotomy/bladder-neck incisions

only noted the superiority of HoLEP compared to other surgical options, as a size-independent treatment for LUTS secondary to BPH (19,20).

There is still considerable reservation among urologists about the use of this technique. The learning curve of HoLEP is considered to be steep, and even experienced surgeons cannot prevent the prolonged operative time or the difficulties that arise in 1st enucleation attempts (8,21). To become comfortable with the technique, the learning curve for the standard 3-lobe HoLEP has been reported to be 20–30 procedures through structured mentorship, and 50 procedures without proper instructions (22,23).

On another hand, the common main types of enucleation technique consist of standard 3-lobe method and *en bloc* method. Since Gilling *et al.* (24) introduced HoLEP in 1996, traditional 3-lobe enucleation acquired major support in the urologists, especially for the learners of HoLEP (25). *En bloc* technique was reported in recent years, some surgeons proposed some modified enucleation techniques, such as "en-bloc no touch" or "omega" technique, respectively (26,27). Contrasting to 3-lobe enucleation, the latest studies (15,28) suggest *en bloc* method indeed leads to shorter operation time with comparable postoperative outcomes, which not only refers to enucleation time but also morcellation time is included. Meanwhile, less laser energy is necessary for enucleation, which means *en bloc* method is more efficient than 3-lobe incisions. However, these two studies both enrolled experienced high-volume surgeons (>2,000 HoLEP procedures) and it's supposed to be not applicable for the learners of HoLEP.

Evidence on the precise learning curve for the *en bloc* HoLEP is extremely scant. Further, most urologists start by using the traditional muti-incisional method rather than the *en bloc* method when learning HoLEP. Thus, we conducted this prospective study of *en bloc* HoLEP to provide evidence of the number of procedures required in the initial learning curve. This study is unique in that one surgeon performed *en bloc* HoLEP by self-teaching. The surgeon had performed at least 400 procedures of TURP previously, but he had not completed any HoLEP procedure before this study. We monitored the process of this 1 experienced surgeon in learning to perform *en bloc* HoLEP. We evaluated the peri-operative and post-operative metrics to investigate the operative efficiency and outcomes of the *en bloc* method. As mentioned above, we also compared 1st 50 procedures to the following procedures.

In baseline metrics, 12/132 (9.1%) patients had received BPH-related medication, and the patients had an average prostate volume of 63.5 cc. These objective metrics remain important reference resources; however, the subjective feelings of patients (measured by their IPSS and QoL scores) should also be taken into account in selecting surgical treatments. Heiman *et al.* (29) found that there was no increase in the operative or postoperative complication rates of octogenarians, but other factors, such as anesthesia risk and an increased age, could cause potential geriatric recipients to miss the optimal surgical opportunity. A recent study demonstrated that HoLEP offered acceptable perioperative complication rates even in the oldest patient cohort (≥80 years). Therefore, the authors suggest that HoLEP is a safe and efficient option even in oldest patients (30). However, we noticed that IPSS seemed to decrease less in the older patients than the younger patients. Meanwhile, the specific anesthesia methods for patients were yet not provided and evaluated. Thus, we maintain a cautious attitude to the finding of this study. Comprehensive consideration was necessary in deciding whether or not to perform an operation on each BPH patient.

In terms of the *en bloc* method, Saitta *et al.* (14) recently reported using a similar method to perform enucleation of the prostate; however, they made an early apical release in 1st step. We are of the view that early release of the prostatic apex avoids stretching the external sphincter during dissection and reduces the likelihood of post-operative stress urinary incontinence (14).

Given that other operations were performed simultaneously in some cases, both the HoLEP and enucleation time were recorded. We found that the HoLEP time and enucleation times of Group B (which comprised patients who underwent the subsequent 82 procedures) were significantly shorter than those of Group A (which comprised patients who underwent 1st 50 procedures). Additionally, the enucleation efficiency as calculated was better in Group B than Group A. We defined enucleation efficiency as the weight (in grams) of the prostate tissue removed per enucleation minute. Enucleation efficiency is a good way to evaluate the learning curve of HoLEP. It removes the base effect of the prostate volume (13).

Based on our findings, the question arises as to whether surgical performance will plateau after at least 50 cases. Most urologists have expressed the view that about 50 procedures are needed to be comfortable with the 3-lobe procedure by self-teaching; however, some studies have suggested that enucleation efficacy plateaus after 25–30 procedures (13,30). Our findings suggest that

20–30 procedures need to be performed for a surgeon to become relatively comfortable with the *en bloc* procedure. We also found that skill improvement was continuous even after 1st 50 procedures but tended to stabilize with case accumulation.

After HoLEP was finished, patients usually received continuous bladder irrigation for hours, and were discharged from hospital after successful catheter removal and a voiding trial. When the introduction of the scope failed due to a tight urethra before HoLEP, gentle urethrotomy was performed (14). This led to prolonged catheterization in some patients in our study. In the post-operative short term, we found that 23 of the 132 (17.4%) patients had acute urinary retention, which all occurred when the catheter was removed on post-operative day 1. It may be that the tissue edema of surgical wound caused urethral obstruction. There was no significant difference in the post-operative outcomes between Groups A and B. Notably, Westhofen *et al.* (31) reported similar results in the evaluation of the learning curve of HoLEP with and without a structured training program. An experienced surgeon will have a clear concept of how the prostatic cavity needs to be shaped. Thus, while the initial steps of enucleation might be time consuming, in the end, the surgeon will assure that the final result is adequate. Kosiba *et al.* (32) implemented a structured mentoring program and reported that the safety and efficacy of laser enucleation of the prostate could be ensured even during the learning period with a very good-quality outcome. Only the operating time decreased significantly as the experience of the surgeon increased.

Though it's certain about the advantages of HoLEP compared to OP or TURP according to previous mentioned aspects, different modifications of the enucleation technique have still been up for discussion. Surgeons will attempt to improve their approach with a more optimal technique. Here, we provide some clear data that *en bloc* approach indeed provides an efficient way for surgical treatment of BPH and it's also feasible for beginners in the learning curve. However, surgeons must feel comfortable with their tried technique in the end, due to the objective need for a good and safe outcome of the patients.

Our study had some limitations. First, the results are only based on one single surgeon's experience, and relatively small sample size of 132 also limits the generalizability of our conclusions. Second, time of follow-up wasn't sufficient, although the results are promising. Finally, uroflowmetry, erectile, and sexual functions, etc. need to be evaluated and documented in relation to these surgeries. The lack of comparison with standard multi-incisional enucleation is also a limitation that should be mentioned. These issues need to be addressed in further studies.

Conclusions

In summary, *en bloc* HoLEP provides good and steady post-operative outcomes, and this technique could feasibly be adopted to teach beginners in the initial learning period. If the surgeons are self-teaching, they will need to perform 20–30 procedures to become relatively comfortable with the *en bloc* method. Further studies need to be conducted to confirm our findings.

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Footnote

Reporting Checklist: The authors have completed the TREND reporting checklist. Available at https://tau.amegroups.com/article/view/10.21037/tau-23-106/rc

Data Sharing Statement: Available at https://tau.amegroups.com/article/view/10.21037/tau-23-106/dss

Peer Review File: Available at https://tau.amegroups.com/article/view/10.21037/tau-23-106/prf

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://tau.amegroups.com/article/view/10.21037/tau-23-106/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Ethics Committee of Affiliated Nantong Rehabilitation Hospital of Nantong University (No. 2022090) and informed consent was taken from all the patients.

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