Original Article

FIRST FIFTY CASES WITH EN-BLOC HOLMIUM LASER ENUCLEATION OF THE PROSTATE

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Summary

In the last decade, the Holmium Laser Enucleation of the Prostate (HoLEP) has become the new gold standard for surgical treatment of benign prostatic hyperplasia (BPH). This treatment has several modifications, and the latest one is en bloc (single piece) enucleation. This new method reduces the operative time and risk of early incontinence. The long-term effect is much better than transurethral resection of the prostate (TURP). We applied an effective method for treating benign prostatic hyperplasia with maximum safety, minimal hospital stays, short operative time, and minimal complications. We operated on 50 patients with BPH with a prostate volume between 30-120 cc. Transrectal ultrasound, uroflowmetry, PSA test, IPSS (International Prostate Symptom Score), residual urine, digital rectal examination, and laboratory blood and urine tests were performed preoperatively. We used Holmium laser (Auriga XL) 50 W, 600 µm fiber and morcellator (Richard Wolf PIRANHA). During the procedure, the laser's operating power was 36 W. En bloc Holmium enucleation was performed in all patients, followed by morcellation of the prostatic tissue. The time for enucleation was 11-52 min, morcellation time - 1-10 min, the weight of the enucleated tissue - 15-100 g, enucleation efficiency - 0.67-3.03 g/min, postoperative catheterization time - 24-72h, and hospital stay was 1 to 3 days. One blood transfusion was required. There were no patients with postoperative incontinence or other complications. We conclude that en bloc Holmium enucleation in BPH is an effective method of treatment that offers maximum performance combined with short operative time, shorter hospital stays, and minimal risk of complications. The learning curve requires at least twenty cases. The recommended prostate gland size for the initial trial should be between 50-60 cc. Starting with small-sized glands increases the risk of capsule perforation, and the enucleation plane is more difficult to find.

Keywords: benign prostatic hyperplasia, holmium laser, en-bloc enucleation, morcellation

Introduction

Holmium laser prostate enucleation has been proven to be an effective and safe treatment option for patients with bladder outlet obstruction (BOO) resulting from benign prostatic hyperplasia (BPH) [1]. The advantages of HoLEP have long been established, making it a valid substitute for open prostatectomy [2, 3]. The technique of laser prostatectomy has constantly been evolving since its introduction by Gilling in 1995 - most notably in advancing from three-lobe to en-bloc enucleation [4].

Materials and Methods

A single established urological surgeon (GSG), not familiar with transurethral resection of the prostate (TURP), was tasked with performing the HoLEP procedure for symptomatic BPH patients for one year. The initial case of HoLEP was in November 2017. Prior to that, he had observed several hundred operations and had performed two operations under the supervision of a mentor. Between November 2017 and June 2019, 50 patients underwent the HoLEP procedure performed by the surgeon in question.

Perioperative evaluation

Preoperative evaluation included total PSA test, IPSS score, transrectal ultrasound, postvoid residual urine (PVR), uroflowmetry (UFM), digital rectal examination (DRE), and urinalysis.

The individual stages of morcellation and enucleation were timed, and the weight of the enucleated tissue was recorded. Follow-up was performed at the one-month mark and included IPSS, UFM, and PVR.

Surgical technique

In the majority of cases, spinal anesthesia was given. The procedure did not differ from those previously described in the literature [5]. The en-bloc technique was used. The equipment included a 50W holmium: YAG laser with 600 µm laser fiber (Auriga XL) and a 26 Fr Richard Wolf laserscope. Continuous irrigation was performed with normal saline. The enucleation was conducted with the power set at 36W. The enucleated tissue was morcellated using a PIRANHA morcellation system (Richard Wolf), introduced via a 0-degree nephroscope. Then a 20-22 Fr 3-way silicone catheter was placed in situ, allowing for continuous irrigation. In most cases, the irrigation flow was gradually reduced until morning, when it was terminated. The catheter was removed after hematuria cessation was noted [6].

Procedure

Step 1. Calibration of the urethra

Patient were placed in the dorsolithotomy position, with maximal thigh abduction to facilitate the resectoscope manipulation during apical dissection of the lateral lobes. Following sterile field preparation and draping, the urethra was calibrated up to 28Fr using the Otis-urethrotome. The calibration had to be limited only to the anterior urethra, as injuring the prostatic lobes can lead to excessive bleeding, resulting in an impaired visual field. A 28F calibration had to be accomplished without excessive effort; otherwise, a distal urethrotomy was considered. This approach reduced the chances of iatrogenic strictures.

Step 2. Resectoscope insertion

The continuous flow resectoscope (26Fr) was introduced into the urethra and the obturator. The camera was attached to the lens and the handpiece loosened so that the resectoscope could be mobile without affecting the camera. Finally, the 550 µm fiber was introduced. The distal portion of the fiber (3-5cm) was stripped of its cladding. Normal saline irrigation was initiated. The outflow valve had to be constantly open to avoid bladder overdistention and related complications.

Step 3. Identifying anatomical landmarks

Before taking further steps, ureteral orifices were located. This could be a considerable challenge in some cases, such as an overly enlarged median prostatic lobe. Lobar hypertrophy was assessed by retracting the resectoscope back into the prostatic fossa. Finally, the verumontanum and the external sphincter were identified.

Step 4. Apical sphincter dissection

The en-bloc technique was started with a 12 o'clock incision to mark the anterior part of the sphincter. The next step was lateral dissection. Finally, the crista urethralis was divided just before the verumontanum. We believe that detaching the sphincter makes it more mobile and subjected to less trauma during enucleation, and postoperative traumatic incontinence is prevented.

Step 5. Enucleation of the prostate

After sphincter detachment, the operator proceeded with enucleation, starting posteriorly and continuing laterally to a 12-o'clock position, striving to connect both planes, then moving forward circularly. It is crucial to keep in mind that the anterior distance between the sphincter and the bladder neck is shorter than the posterior so that the neck is approached at the 12-o'clock position. The safest approach into the bladder is at 1 or 11 o'clock, as this can prevent going above it, followed by lateral dissection. Another critical point of the dissection is the posterior base of the prostate, especially when retrotrigonal growth is present. In such cases, posterior deviation from the dissection plane (under the bladder) is especially easy. The operator had to reach as close to the adenoma as possible to prevent this complication while moving up the plane.

Step 6. Morcellation

Tissue morcellation is a faster and less traumatic procedure for extracting the enucleated adenoma. When swapping the instruments to begin morcellation, it is essential to prevent emptying the bladder – this causes pressure loss, which, in turn, leads to bleeding and compromises the procedure [7, 9]. Another critical moment is keeping the morcellating blade window always on top, avoiding any rotation and in the center of the bladder. Bladder perforation is a common complication if the procedure is not performed with precision.

Step 7. End of the operation

After morcellation and coagulation, a 3-way Foley catheter was inserted -20-24Fr, depending on prostate size, and irrigation is initiated until the following day.

Results

Our patient cohort included patients aged 44 - 84 years (mean 68). Prostate volumes ranged from 30-120g (mean 59.78). The time of enucleation ranged from 11 to 52 minutes (mean 29.72), morcellation time ranged from 1 to 10 minutes (mean 3.00) (Table 1). The efficiency of enucleation ranged from 0.67 to 3.03g/min (mean 1.3) (Figure 1), and the efficiency of morcellation ranged from 7.5 to 30g/min (mean 14.7) (Figure 2). The catheterization time ranged from 24 to 72 hours (mean 27), and the hospital stay ranged from 1-3 days (mean 1.04). Comparison between the IPSS score before and one month after the operation showed significant improvement of the symptoms and quality of life (Figure 3).

Table 1. Characteristics of the patients and procedures

	RANGE	MEAN
AGE (years)	44-84	68
Preoperative PSA (ng/ml)	0.30-10.58	3.60
Total prostate volume (g)	30-120	59.78
Enucleation time (min)	11-52	29.72
Morcellation time (min)	1-10	3.00
Enucleation weight (g)	15-100	40.12
Efficiency of enucleation (g/min)	0.67-3.03	1.36
Efficiency of morcellation (g/min)	7.5-30	14.7
Catheterization time (hours)	24-72	27.36
Hospital stay (d)	1-3	1.04
Preoperative IPSS	11-34	19.84
Postoperative 1m IPSS	1-9	4.44
Max flow (ml/sec)	3.6-15.5	8.43
Max flow 1m (ml/sec)	15-28	20.67

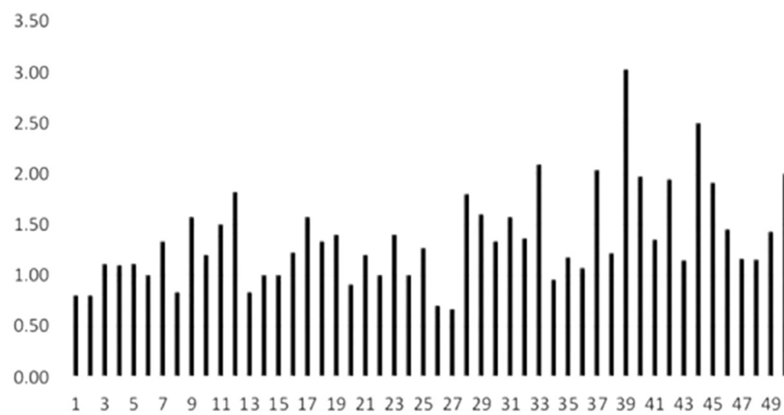

Figure 1. Efficiency of enucleation

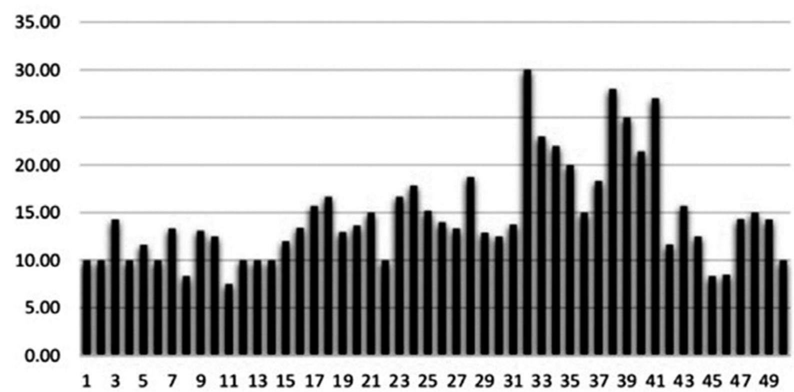

Figure 2. Efficiency of morcellation

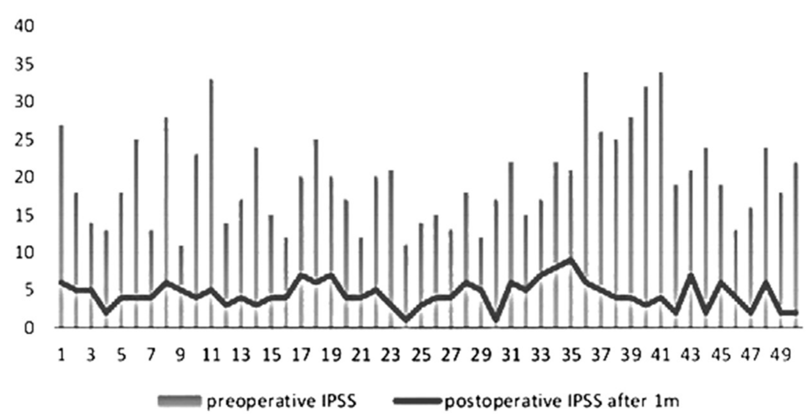

Figure 3. IPSS score before and one month after the operation

Discussion

An essential strategy for beginners is a continuous review of videos of the procedure carried out by experienced surgeons [10]. Even after acquiring some experience, repetition is beneficial due to the new perspective gained. Patient selection is of crucial importance. Ideally, a surgeon's initial experience should be with prostates sized 50 to 60 g. Following the dissection planes in smaller glands (less than 50 g) is challenging to an inexperienced surgeon. On the other end of the spectrum, a larger prostate is associated with a higher risk of intraoperative bleeding, hence an obstructed endoscopic view. Approximately twenty cases are necessary to achieve a basic confidence level [11]. A strict level of self-scrutiny when reviewing one's self-recorded surgical videos is a must to keep thorough records of the operative protocols. Multiple reviews are essential [12]. Consulting with senior surgeons when possible is highly recommended. Detailed planning of the dissection plane and depth of incision is essential [10-12].

Conclusion

HoLEP has been proving to be an effective and efficient BPH treatment modality. Because the technique differs substantially from the already established TURP, the learning curve could be the main obstacle before introducing the technique to a broader range of centers. In this communication, we aimed to share our experience in the early stages of introducing HoLEP, and hopefully help other medical teams facing difficulty implementing this procedure.

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