Original Article

Clinical outcomes of Holmium Laser Enucleation of the Prostate (HoLEP) in benign prostatic hyperplasia patients in Rajavithi Hospital

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Keywords:
HoLEP, holmium laser, enucleation, benign prostatic hyperplasia

Abstract

Objective: To evaluate the outcomes and safety of the surgical technique holmium laser enucleation of the prostate (HoLEP) in patients with benign prostatic hyperplasia (BPH) for whom surgeryis indicated.

Materials and Methods: The demographic characteristics, duration of surgery, blood transfusion rate, weight of tissue removed, catheterization time and complications were recorded in 25 patients who underwent HoLEP surgery between January 2021 and May 2022 in Rajavithi Hospital. The International Prostate Symptom Score (IPSS), quality of life score (QoL), peak flow rate (Q-max), post-void residual urine volume (PVR), hematocrit (Hct) and prostate-specific antigen (PSA) levels were comparedbefore and after surgery.

Results: The mean age of the patients was 71.28±7.54 years. There were statistically significant differences between mean preoperative and postoperative Hct (%) (40.5± 5.9 and 38.4±5.1), $p = 0.001$. Only 1 in 25 patients had 1 unit of blood transfusion. One month postoperatively the mean PSA had decreased from 4.55 to 1.2 ng/ml ($p < 0.001$); mean IPSS had improved from 21.0 to 7.0 ($p < 0.001$); mean QoL score had improved from 4.47 to 1.10 ($p < 0.001$); mean PVR had decreased from 98.0 to 39.7 ml ($p = 0.002$) and the mean Q-max had increased from 8.0 to 17.8 ml/sec ($p = 0.015$). The mean catheterization time was 2.40±0.57 days. There were no serious complications or incidence of TUR syndrome in this study.

Conclusion: HoLEP is a safe alternative to the current gold standard transurethral resection of the prostate for BPH patients as there are fewer complications with similar functional outcomes

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Introduction

Benign prostate hyperplasia (BPH) is the most common cause of the pathologies that affect bladder outlet obstruction in men. The incidence of BPH is up to 50% in the sixth decade.[1] Transurethral resection of the prostate (TURP) has been the gold standard for the endoscopic surgical treatment of BPH for many years.[2] Holmium laser enucleation of the prostate (HoLEP) has been used as an alternative treatment for BPH since 1995 by Gilling et al.[3] Now a days, according to the recent European Association of Urology (EAU) guidelines, HoLEP is an alternative to TURP or open prostatectomy due to similar mid to long term efficacy.[4] Also, the American Urology Association (AUA) guidelines recommend HoLEP as the surgical treatment for all sizes of BPH especially in the patients being treated with anticoagulant and / or antiplatelet therapy.[5,6] In this study, we report the surgical techniques and outcomes of HoLEP in our hospital.

Materials and Methods

A total of 25 patients underwent HoLEP by a single surgeon between January 2021 and May 2022 in Rajavithi Hospital for treatment of BPH. This study was approved by the Research Ethics Committee of Rajavithi Hospital in May 2021 with the protocol number 64090.

We performed cystoscopy every patients before HoLEP procedure to evaluate the prostate anatomy and exclude other causes of lower urinary tract symptoms.

The following parameters were recorded underlying disease, mean age, operative time, weight of tissue removed, catheterization time, length of hospital stay, pathologic result and complications. The pre-operative IPSS, QoL, PSA, Q-max, and PVR were compared with the same parameters 1 month postoperatively. Pre-post operative Hct was also compared with post-operative readings. A paired Student t-test was used to compare the data with $p < 0.05$ considered as significant.

In this study,the three-lobe HoLEP technique was carried out in all patients by the same surgeon who used a 26 Fr laser resectoscope with a 30 degree lens Wolf brand. The laser device was a Holmium-YAG laser 120-watt Lumenis with 550 microns of laser fiber. The laser power setting was 2J and 50Hz for cutting, and 1J and 20Hz for coagulation. The morcellator used was a PIRANHA Wolf model connected with a 0 degree nephroscope for removal of prostatic adenoma. The irrigating fluid was normal saline.

The operation was begun with the patient in the lithotomy position after general or spinal anesthesia, the 26 Fr laser resectoscope and sheath were inserted and the bladder was evaluated, and the ureteric orifices, bladder neck and verumontanum were identified. We inserted the resectoscope with an obturator lens (Wolf brand) without dilating the urethra but in narrow urethral lumen cases we used a metal dilator before inserting the resectoscope. First, the author made the inverted-U shaped incision by laser around the verumontanum to identifythe surgical capsule of the median lobe (Figure 1). Then the incision was made at 5 and 7 o'clock depth to the surgical capsule (Figure 2). Then the median lobe was enucleated to the bladder in a retrograde fashion. The left lateral lobe enucleation was started by mucosal incision from the 5 to 12 o' clock position at the

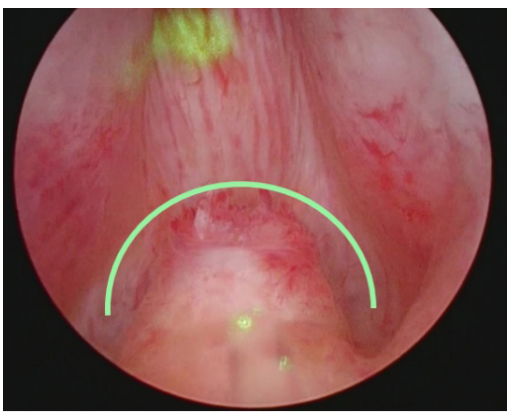

Figure 1. Inverted-U shape incision was made around the verumontanum.

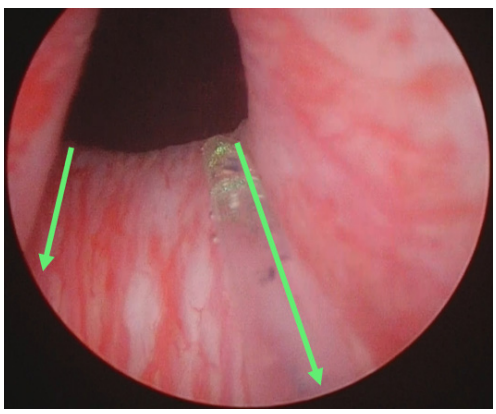

Figure 2. The incision was made in the 5 and 7 o'clock positions at the bladder neck deep into the surgical capsule to connect to the inverted-U shape incision.

apex of the prostate to release the adenoma tissue from the urethral sphincter (Figure 3). The incision was then made at the anterior commissure of the prostate. The left lateral lobe was enucleated by retrograde fashion towards the bladder (Figure 4). The right lateral lobe enucleation was begun by mucosal incision from the 7 to the 12 o'clock position at the apex of the prostate then the right lateral lobe was enucleated by retrograde fashion to the bladder same in a similar way to the left lobe. After completing the enucleation of three lobes of the prostate, the author used the laser to stop any bleeding of the prostatic fossa before morcellation. Then ephroscope was changed to the same sheath and the morcellator was used to remove the floating adenoma from the bladder. At the end of operation, the author inserted a 22 Fr three-way urethral catheter with 30 mL of balloon with continuous bladder irrigation by normal saline. Urethral traction was made in some cases if the urine became red.

Results

The demographic data of patients who underwent HoLEP are shown in Table 1. Mean age was 71.28±7.54 years. Twenty four percent of patients had diabetes mellitus, 40% had hypertension, and 12% had heart disease. All of patients who took antiplatelet or anticoagulant drug stopped the medication before surgery. Seven out of the 25 patients had an indwelling urethral catheter before surgery due to urinary retention. The mean operative time was 185.4±77.1 minutes. The mean resected tissue volume was 44 g. Estimated blood loss was 225.60±77.13 ml as estimated by the anesthesiologist. Catheterization time was 2.40±0.57 days and length of stay was 2.6±0.7 days. Pathological result of H0LEP tissue were mostly BPH except one patient who was diagnosed with prostate cancer adenocarcinoma Gleason 3+4.

Preoperative and postoperative data are compared in Table 2. There were statistically significant differences between mean preoperative and postoperative Hct (%) (40.5±5.9 and 38.4±5.1), p = 0.001. Only 1 out of 25 patients had 1 unit of blood transfusion. At 1 month postoperatively, mean PSA had decreased from 4.55 to 1.2ng/ml ($p < 0.001$). Mean IPSS improved from 21.0 to 7.0 ($p < 0.001$). Mean QoL score improved from 4.47 to 1.10 ($p < 0.001$). Mean PVR had decreased from 98.0 to 39.7 ml (p = 0.002). Mean Q-max had increased from 8.0 to 17.8 ml/sec (p = 0.015).

No serious complications or TUR syndrome developed in any patient in our study. The total rate of complications was 20% (5 of 25 patients), 1 patient (4%) required one unit of blood trans-

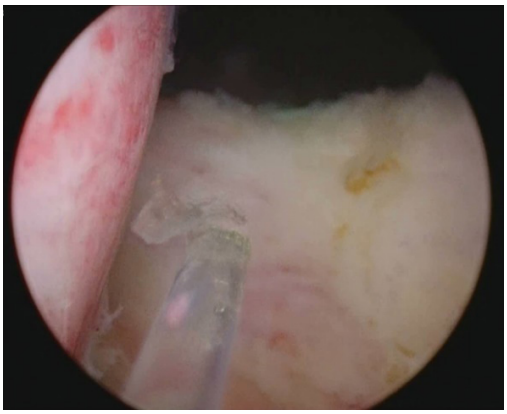

Figure 4. Median and left lobes of the prostate were enucleated to the bladder.

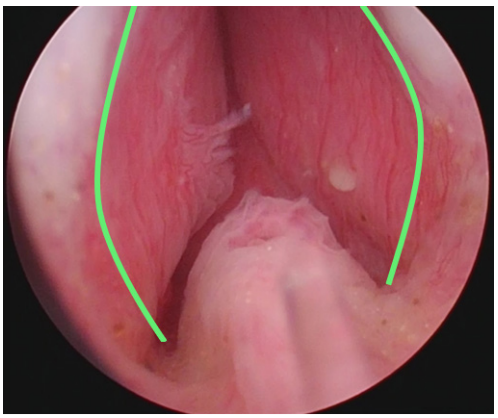

Figure 3. The green lines showed the mucosal incision at the apex of the prostate (urethral sphincter release left and right lobe).

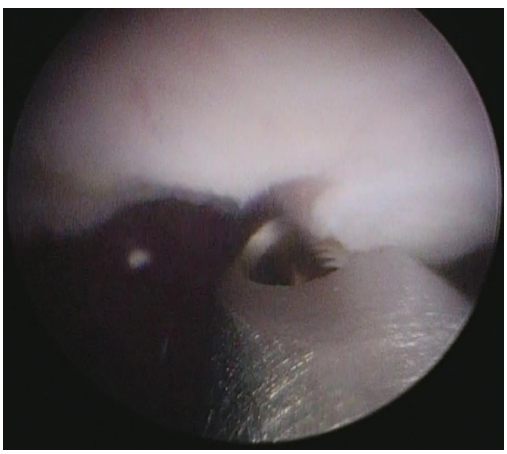

Figure 5. Morcellator (facing up) was used to remove the floating adenoma from the bladder.

Table 1. Demographic and clinical characteristics of the patients.

Data	Total (n=25)
Age (years), mean (min-max)	71.3 (51-86)
Operative time (minutes), mean (min-max)	185.4 (60-360)
Resected tissue volume (g) (min-max)	44.0 (5.0-82.0)
Blood loss (ml) mean ±SD	225.60±77.13
Catheterization (days) mean±SD	2.40±0.57
Length of stay (days), mean (min-max)	2.6 (2-5)
Pathology n (%)	
BPH	19 (76.0)
BPH with prostatitis	5 (20)
Adenocarcinoma Gleason 3+4	1 (4.0)

SD = standard deviation, BPH = benign prostatic hyperplasia.

Table 2. Comparison between preoperative and postoperative parameters.

Data	Preoperative	Postoperative	P-value
Hct (%), mean±SD	40.5±5.9	38.4±5.1	0.001*A
QoL, mean±SD	4.47±1.21	1.10±1.37	< 0.001*A
PSA (ng/ml), median (min-max)	4.55 (0.6-86.0)	1.2 (0.1-37.8)	< 0.001*B
IPSS, median (min-max)	21.0 (6.0-32.0)	7.0 (1.0-17.0)	< 0.001*B
Q-max (ml/sec), median (min-max)	8.0 (0.0-20.4)	17.8 (8.5-38.5)	0.015*B
PVR (ml), median (min-max)	98.0 (0.0-500.0)	39.7 (0.0-183.0)	0.002*B

Values were represented as n (%), The p-value from paired t-testA and Wilcoxon signed Rank testB, *significant at $p < 0.05$.
Hct = hematocrit, SD = standard deviation, QoL = quality of life, PSA = prostate specific antigen, IPSS = International Prostate Symptom Score, Q-max = maximum flow rate, PVR = post-voided residual.

fusion, 1 patient (4%) had capsular perforation needing prolonged urethral catheterization, 1 patient (4%) had overflow incontinence from a prior neurogenic bladder, and 2 patients (8%) had contracture of the bladder neck at 3 months of follow up and a transurethral incision of bladder neck was required.

Discussion

TURP has been established as the gold standard for conventional surgical procedures for many decades[7] but complication rates increase in cases involving more enlarged prostate glands (> 80 g) such as TUR syndrome and bleeding.[8] In treatment of a large prostate gland, open prostatectomy (OP) is one of the most effective surgical treatments but it is the most invasive surgical method and is now used less in this endoscopic era.[9] HoLEP is one of the endoscopic surgical methods which uses a Holmium laser to enucleate the prostate gland as in an open prostatectomy, pushing the prostate tissue into the bladder and then removing the tissue by morcellator.

Jhanwar et al.[10] reported the outcome of prospective randomized study which included 164 patients in whom TURP was performed in comparison with HoLEP. The prostate volumes of TURP and HoLEP patients were 74.5±12.56 and 75.6±12.84 g, respectively ($p = 0.60$). The resected prostatic volumes in TURP and HoLEP were 44.80±9.87 and 48.49±10.87, respectively ($p = 0.03$). The hemoglobin loss (g/dl) in TURP and HoLEP was 0.63±0.6 and 0.47±0.46 g/dl, respectively ($p = 0.08$). No patients in either group required a blood transfusion or involved complications such as TUR syndrome. Postoperative bladder irrigation time, catheterization time, and postoperative length of stay in the hospital were significantly higher in the TURP group. There were no significant differences in the IPSS, Q-max and PVR between groups. The disadvantage of HoLEP found in this study is the longer operative time than the TURP procedure.

Zhang et al.[11] carried out a meta-analysis of efficacy and safety of HoLEP versus TURP in 26 randomized controlled trials (3,283 patients). The outcomes between HoLEP and TURP in IPSS, Q-max, and QoL at 1, 3, and 6 months postoperative were not significantly different. At 12 months postoperatively, IPSS and Q-max in the HoLEP group were significantly better than in the TURP group. The benefits of the HoLEP group over the TURP group are shorter hospital stay, lower hemoglobin loss, and a decrease in serum sodium and transfusion rate. However, there was a shorter operative time in the TURP than in the HoLEP group.

Li et al.[12] carried out a meta-analysis of efficacy and safety of endoscopic enucleation (HoLEP, bipolar plasma vaporization enucleation, plasmakinetic enucleation) versus open prostatectomy for large BPH (> 80 g) in 7 randomized controlled trials (735 patients). There were no significant differences in IPSS, Q-max, QoL and PVR at 3, 6 and 12 months postoperatively between the two groups. The catheterization time and hospital stay were shorter in the endoscopic enucleation group. The decrease in hemoglobin was less in the endoscopic enucleation group and fewer blood transfusions were required. There were no significant differences in complication rates between two groups. The operative time was longer in endoscopic enucleation in comparison with OP.

Higazy et al.[13] reported a randomized controlled trial of the outcome of H0LEP versus bipolar transurethral enucleation of the prostate (120 patients). The prostate volume was 135.2±34.8 ml and 125±26.9 ml for HoLEP and bipolar enucleation of the prostate (BPEP), respectively. The HoLEP group had a shorter operative time of 83.43±6.92 minutes in comparison with 94.7±12.2 minutes in the BPEP group. HoLEP was associated with an earlier catheter removal time (days) (1±0.23 vs 1.79±1.6, p = 0.02) and shorter hospital stay (days) (1±0.24 vs 1.49±0.6, p = 0.01) in comparison with BPEP. Postoperative IPSS, QoL, Q-max, PVR, PSA, prostate volume reduction and perioperative complications were comparable between the two groups. Regarding the cost analysis, HoLEP was more cost-effective than BPEP.

The disadvantage of HoLEP is related to the long learning curve, the literature showing that a satisfactory level of competence is reached after between 25 and 50 operations.[14] A structured mentoring program seems to enable faster progress.[15] Also the higher cost of HoLEP instruments such as the laser fiber and morcellator may be limiting factors of this surgical method in developing countries.

In this study, there were significant improvements in IPSS, QoL, Q-max and PVR postoperatively without serious complications or incidence of TUR syndrome. The carrying out of conventional TURP requires additional bladder traction on postop day 0, continued bladder irrigation on day 1, stopping bladder irrigation on day 2 and removal of the urethral catheter on day 3. Thus, the mean catheterization time of HoLEP may be shorter than the conventional use of the TURP procedure.

The main limitation of this study is that the surgeon is in the early stage of experience of this technique. However, the small number of patients and the lack of directly comparative data such as is needed for a randomized controlled trial are also limitations.

Conclusion

HoLEP is a safe alternative to the current gold standard practice of transurethral resection of the prostate for BPH patients as there are fewer complications with similar functional outcomes. This team believe that HoLEP might be positioned in the guidelines as the recommended gold standard surgical treatment for any size of the prostate in the future.

Conflict of Interest

The author declares no conflict of interest.

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