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하부요로증상 및 전립선비대증 환자에서 수술 전 요폐가 holmium laser enucleation of prostate 수술 결과에 미치는 영향: 전향적 연구

The Effect of Urinary Retention on the Surgical Outcome of Holmium Laser Enucleation of Prostate in Patients with Lower Urinary Tract Symptom/Benign Prostatic Hyperplasia: A prospective study

2018 년 10 월

서울대학교 대학원

의학과 비뇨의학 전공

육 형 동

A Thesis of the Master's Degree

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하부요로증상 및 전립선 비대증 환자에서 수술 전 요폐가 Holmium laser enucleation of prostate (HoLEP) 수술 결과에 미치는 영향: 전향적 연구

지도교수 오 승 준

이 논문을 의학석사 학위논문으로 제출함

2018 년 10 월

서울대학교 대학원

의학과 비뇨기과학 전공

육 형 동

육형동의 의학석사 학위논문을 인준함

2018 년 10 월

위 원 장 구 자 현 (인)

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Abstract

Purpose: To evaluate the effect of urinary retention on Holmium laser enucleation of the prostate (HoLEP) in patients with lower urinary tract symptoms.

Subjects and Methods: A prospective analysis was performed on patients who underwent HoLEP from January 2010 to December 2016. Perioperative factors including international prostate symptom score, overactive bladder symptom score, prostate-specific antigen, urodynamic study results, uroflowmetry results, transrectal ultrasound prostate volume, operative time, morcellation time, enucleation weight, and complications were evaluated. Postoperative evaluation was performed at 2 weeks, 3 months, and 6 months.

Results: A total of 903 patients were identified. Mean age and follow-up were 68.3 years and 6.0 months, respectively. Among the patients, 135 (14.9%) had a history of acute urinary retention (AUR) and 36 patients (3.9%) had chronic urinary retention (CUR). The mean detrusor pressures at maximum flow of NON-UR, AUR, CUR were 64.4, 74.3, and 77.7 cmH_2O ($p<0.001$). The mean maximum flow rates (Qmax) were 7.6, 6.6, and 4.8 ml/s ($p<0.001$), and the mean bladder outlet obstruction indices were 49.5, 61.1, and 69.4 ($p<0.001$). The mean operation time were 54.0, 68.5, and 68.7 mins ($p<0.001$), and the mean enucleation weights were 20.7, 35.0, and 34.1 g ($p<0.001$), respectively. Postoperative Qmax was improved in all three groups. The mean postvoid residual volumes were 55, 75, and 333 ml preoperatively; 20, 29, and 66 ml at 2 weeks; 16, 23, and 45 ml at 3 months; and 15, 22, and 52 ml at 6 months ($p<0.001$).

Conclusion: Baseline history of AUR and CUR did not adversely affect the postoperative outcome of HoLEP nor did these conditions increase postoperative complications

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Keywords: Benign prostatic hyperplasia, Enucleation of the prostate, Holmium laser, prostate, Transurethral resection of prostate

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Introduction

Benign prostatic hyperplasia (BPH) and related lower urinary tract symptoms (LUTS) and urinary symptoms are the most common male urinary problems that have a major effect on the quality of life of older men(1). BPH is one of the most common urologic diseases of men after their 50s(1, 2). There are several treatment options for BPH, depending on the severity of the disease(1). If disease severity is low, watchful waiting or pharmacotherapy is recommended, and if disease severity is high, surgical treatment is recommended(1).

Traditionally, transurethral resection of the prostate (TURP) has been widely applied as the oldest surgical procedure(3). In recent years, there has been a growing interest in non-invasive surgery, and surgical procedures using lasers have become popular in BPH surgery(4-7). The Holmium laser enucleation of the prostate (HoLEP) procedure is a BPH procedure using these lasers. Recently, the standard treatment of surgery has been shifted from TURP to HoLEP, which is a surgical therapy for the treatment of BPH and is recommended by the American Urologic Society(5-7). The efficacy and safety of HoLEP surgery have already been confirmed in several randomized trials(3, 8-10), which showed similar or better results in resolving bladder outlet obstruction (BOO) compared to other BPH surgeries(3, 8-10).

Previous studies have demonstrated that many patients have improved LUTS after BPH surgery, but in patients with preoperative urinary retention (UR), postoperative results are unsatisfactory(11, 12). However, there are

limited studies and detailed analyses on this subject. Hence, this study aimed to evaluate the effect of UR on HoLEP in patients with LUTS.

Materials and Methods

This study retrospectively analyzed the existing prospective cohort after approval from the institutional review board (IRB number: H-0810-027-260). The prospective cohort of LUTS/BPH patients who underwent HoLEP between January 2010 and December 2016 as a part of BPH Database Registry were enrolled in this study. The inclusion criteria were patients age over 50 years, patients diagnosed with BPH by clinical symptoms and related tests, and patients who underwent HoLEP surgery. Patients with genitourinary cancer, previous pelvic surgical history, and neurogenic bladder were excluded.

Baseline evaluation included careful history taking, underlying disease and taking medications, digital rectal examination, international prostate symptom score (IPSS), overactive bladder symptom score (OABSS), 72-h voiding diary, serum prostate antigen (PSA) level, cystourethroscopy, uroflowmetry, post-void residual volume (PVR) measurement, urodynamic study (UDS), and prostate volume measured by transrectal ultrasonography (TRUS).

The preoperative antibiotic was cefotetan, a second-generation cephalosporin. Under spinal or general anesthesia, HoLEP was performed with patient placed in the lithotomy position. Enucleation was performed using the three- or four-lobe techniques in an 80 W (2 J × 40 Hz) setting of Holmium:YAG laser with a 550-mm end fire laser fiber, followed by morcellation of adenomas using the morcellator. Continuous bladder irrigation was performed using normal saline. Intraoperative parameters included total operative time, morcellation time, enucleation weight, using energy, and intraoperative complications. Intraoperative complications included bladder injury and perforation of the prostate capsule during surgery. Typically, on

postoperative day 1, Foley catheter was removed. After removing the Foley catheter, PVR was measured and urination pattern was observed twice. No antibiotics were used on postoperative day 1. Postoperative evaluation was performed at 2 weeks, 3 months, and 6 months. At 2 weeks postoperatively, IPSS, OABSS, uroflowmetry, 72-h voiding diary, and urine analysis were examined. At 3 and 6 months postoperatively, IPSS, OABSS, uroflowmetry, 72-h voiding diary, urine analysis, and PSA were evaluated. Postoperative complications included urinary incontinence, urgency, re-continuous bladder irrigation, transfusion, transurethral coagulation, re-insertion of the urethral catheter due to retention, urethral stricture, and bladder neck contracture for 6 months postoperatively.

Patients were categorized into non-UR, acute urinary retention (AUR), and chronic urinary retention (CUR) groups, and clinical parameters were compared among these groups. AUR was defined as a sudden spontaneous onset of being unable to pass urine and using an indwelling Foley catheter or a clean intermittent catheter, and CUR was defined non-transient voiding difficulty with a PVR of more than 300 ml. Most of the patients with UR were converted to CIC from Foley catheter indwelling, and UDS was performed whenever patients can void spontaneously. The surgery was planned after confirming the recovery of bladder contraction in UDS.

All statistical tests were performed using IBM SPSS Statistics version 22.0 (IBM, Armonk, NY, USA). The mean values with standard deviation were used for analysis of continuous variables. Categorical variables were analyzed by the ratio of events (%). χ^2-test and ANOVA test were used to compare postoperative changes. All statistical tests were two-sided, and statistical significance was defined as a p-value ≤ 0.05.

Results

The data collected from 903 patients who underwent HoLEP between January 2010 and December 2016 were prospectively analyzed. Of these patients, 732 patients had no UR, 135 had pre-operative AUR, and 36 had CUR. All patients were followed up for up to 6 months postoperatively. Baseline patient characteristics are presented in Table 1. In case of AUR, clean intermittent catheterization (CIC) was more frequent than indwelling Foley catheterization in the treatment of UR. Of the 135 patients with AUR, 95 had CIC, 30 had indwelling Foley catheterization, and 10 had indwelling Foley catheterization and CIC. The mean Foley indwelling catheterization duration was 5.1 days, and the mean CIC duration was 2.2 days. In case of CUR, the ratio of CIC to indwelling Foley catheterization was comparable. Of the 36 patients with AUR, 12 had CIC, 9 had indwelling Foley catheterization, and 1 had indwelling Foley catheterization and CIC. There was no significant age difference between the three groups. The mean indwelling Foley catheterization duration was 3.5 days, and the mean CIC duration was 13.2 days.

Perioperative outcomes are presented in Table 2. All patients underwent preoperative prostate ultrasonography to measure prostate size, and all patients underwent preoperative UDS. The UR groups had larger prostate size than the non-UR group. In UDS, the detrusor pressure at the mean maximum urinary flow (Pdet Qmax) was significantly higher in the UR groups. However, the mean maximum urinary flow (Qmax) is lower in the UR groups. Moreover, the mean BOO index is also significantly higher in the UR groups. Detrusor overactivity and bladder compliance decrease was rare in all groups.

Underactive detrusor was higher in the AUR and CUR groups than in the non-UR group, but not significant.

The incidence of most common postoperative complications was not significantly different among the three groups. There was no significant difference in the incidence of short-term and long-term complications after HoLEP. In the short-term postoperative period, one patient (0.1%) in the AUR group and one patient (2.2%) in the non-UR group have met the Clavien-Dindo grade 3 complications requiring intervention. Furthermore, in the postoperative long-term period, about 0.6-3.7% of patients showed complications requiring intervention, and there was no difference between the groups. Urgency was significantly higher in the non-UR group than in the other groups, but there was no difference between the groups at 6 months postoperatively.

Preoperative mean IPSS and OABSS were not significantly different among the three groups. Moreover, at 3 and 6 months postoperatively, the mean IPSS and OABSS were also not significantly different. The mean preoperative Qmax was significantly lower in the AUR and CUR groups than in the non-UR group. However, there was no significant difference between the groups during the follow-up period at 6 months postoperatively. The mean Qmax was over 20 in all groups. The mean preoperative PVR is the highest in the CUR group, followed by the AUR and non-UR groups, and there were significant differences. Postoperative PVR was still significantly higher in the CUR and AUR groups than that in the non-UR group. The difference in urine volume was about 30-40 ml between CUR and non-UR groups. The mean PVR was less than 60 in all groups. We performed a subgroup analysis of patients with residual urine flow between 200ml and 300ml, but there was no difference in results after HoLEP.

Discussion

In many studies of patients' natural course after BPH surgery, there is no disagreement about the improvement of LUTS in patients with BPH. However, there was a debate about the postoperative results of BPH patients with preoperative UR(11-16). In a retrospective study of 1242 AUR patients, 9.2% of the patients who had preoperative UR still had UR after open prostatectomy(16). The risk of perioperative complications such as uncontrolled bleeding, transfusion, cardiopulmonary complications, and reoperation also increased(16). In addition, the greater the risk of prostate enlargement, the greater the risk of postoperative voiding symptoms(16). In a prospective study of 388 patients with TURP, preoperative CUR patients were more likely to have worse general health status, and preoperative AUR patients may have morbidity, such as heart problems or infection, and postoperative urinary symptoms were more severe(13). In another retrospective study of 3885 TURP patients, the preoperative AUR was reported to be one of the factors that increase postoperative morbidity. Moreover, 11% of the patients who had preoperative UR still had UR after TURP. Furthermore, the prevalence of infection after TURP in patients with preoperative AUR is about three times higher than that in patients without UR(15). However, a prospective study compared the effects of CIC and TURP in 41 CUR patients and reported that TURP is effective in the treatment of CUR patients(14). IPSS was significantly increased, and voiding pressure was significantly decreased in UDS at 6 months postoperatively(14). In a retrospective study of 164 HoLEP patients, only one

of the patients with preoperative UR required postoperative retreatment, but no complications were reported(11).

A recent retrospective study of 95 patients with UR reported that the risk of UR after HoLEP was not increased even if preoperative UR was present. In addition, patients with preoperative UR had improved urination-related indicators after HoLEP(17).

However, most of the previous studies had some differences from ours. The surgical technique used in previous studies was conventional TURP and open prostatectomy, not HoLEP. In most large or prospective studies, open prostatectomy or TURP is the most common surgical method, not HoLEP, and most of the studies on HoLEP and UR were retrospective studies. Our study is the only large, prospective cohort study on this topic, and our results demonstrate that HoLEP is an effective and safe surgical treatment for BPH patients with preoperative AUR or CUR. Sub-analysis was performed by dividing the patients into preoperative AUR and CUR groups. Patients with AUR and CUR had a larger prostate and more severe BOO compared to non-UR patients, which might have resulted in longer operation and morcellation times in patients with UR. Nevertheless, our results showed no significant difference in postoperative voiding symptoms or complications between non-UR and UR groups. In addition, there was no significant difference in the incidence of intraoperative complications. Qmax was significantly lowered before HoLEP, but there was no difference after HoLEP preoperatively. Only a few PVRs remain in patients with AUR and CUR preoperatively. After 6 months postoperatively, PVR was about 1.5 times higher in the AUR group and about three times more in the CUR group than in the UR group. However, if the maximum difference of the PVR volume was about 30 ml, assuming clinical

care, it was not a big challenge for the patient's outcome. Furthermore, the AUR and CUR groups showed higher BOO index and Pdet Qmax than the non-UR group. However, despite the high Pdet Qmax, Qmax is lower. The BOO index is increased in AUR or CUR patients than in non-UR patients due to the relatively large prostate and retention. Patients with AUR and CUR before HoLEP had an average of about 30-35% larger prostate size than non-UR patients in our study. BPH is associated with irregular proliferation of prostate glandular epithelium, smooth muscle, and connective tissue(18). BPH compresses the prostatic urethra, resulting in a BOO that interferes with urine flow through the urethra(19). The causes of BOO are static component, such as BPH, and dynamic component, such as stromal smooth muscle tone. These stromal smooth muscle tones are related to UR(20). In a UDS, when BOO is present, outlet obstruction causes the pressure of the detrusor to increase when the urine exits the bladder. However, the urine flow is weak compared to the detrusor pressure(20). In our study, because of increased BOO, the AUR and CUR groups have higher detrusor muscle. The surgical technique used in previous studies was traditional TURP and open prostate resection, not HoLEP. Pressure during urination than the non-UR group. However, urine flow is not better.

Symptom scores such as IPSS and OABSS tended to improve after HoLEP. In this study, there was no significant difference in HoLEP outcome compared to non-UR patients. However, in the AUR and non-UR groups, IPSS continues to improve. In the CUR group, the 3-month and 6-month IPSS are the same and no longer improve. Three patients (8.33%) in the CUR group, four patients (2.96%) in the AUR group, and six patients (0.82%) in the non-UR group continued CIC even after 6 months postoperatively. The results of

uroflowmetry performed at 6 months postoperatively showed that PVR in one patient (2.78%) was over 400 ml, in two patients (5.56%) was over 200 ml, and in one patient (2.78%) was over 100 ml. In the AUR group, two patients (1.48%) had PVR over 200 ml and two patients (1.48%) had over 100 ml. In the non-UR group, 1 patient (0.14%) had PVR over 300 ml, two patients (0.27%) had over 200 ml, and 5 patients (0.68%) had over 100 ml. These changes in IPSS and the proportion of CIC patients suggest that CUR has already caused irreversible functional changes in the bladder.

Our study has some limitations. Patients who underwent HoLEP surgery with BPH were excluded because of follow-up loss. Since most patients are followed up for up to 6 months according to our protocol, there is limited long-term follow-up results such as re-growth of the prostate gland, recurrent retention after 6 months, long-term voiding parameters, and long-term complications. More research is needed in the future.

Conclusion

Most of the clinical indicators of BPH patients with preoperative AUR and CUR were significantly improved after HoLEP, similar to those without preoperative UR.

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Table 1. Baseline patient characteristics

Variable	NON-UR (N=732)	AUR (N=135)	CUR (N=36)	P-value
Age (years)	68.6 ± 7.7	70.6 ± 6.9	68.4 ± 8.3	0.139
BMI (kg/m2)	24.1 ± 3.0	23.6 ± 3.0	24.8 ± 2.7	0.780
Comorbidities				
Diabetes	131 (17.9%)	19 (14.1%)	12 (33.3%)	0.028
Hypertension	311 (42.5%)	54 (40.0%)	16 (44.4%)	0.832
Cardiovascular diseases	60 (8.2%)	10 (7.4%)	2 (5.6%)	0.821
Chronic kidney disease	8 (1.1%)	6 (4.4%)	2 (5.6%)	0.005
Cerebrovascular accidents	14 (1.9%)	2 (1.5%)	2 (5.6%)	0.280
Neurologic diseases	78 (10.7%)	9 (6.7%)	5 (13.9%)	0.280
Medical treatment				
Alpha blockers	452 (61.7%)	107 (79.3%)	23 (63.9%)	< 0.001
Anticholinergics	30 (4.1%)	2 (1.5%)	3 (8.3%)	0.129
Five alpha reductase	162 (22.1%)	44 (32.6%)	13 (36.1%)	0.008
Desmopressin	17 (2.3%)	2 (1.5%)	2 (5.6%)	0.354
Duration of LUTS (months)	54.3 ± 54.6	47.3 ± 61.4	42.6 ± 43.5	0.083
Previous BPH operation	35 (4.8%)	8 (5.9%)	3 (8.3%)	0.570
Initial visit status				< 0.001
LUTS	732 (100.0%)	100 (74.0%)	27 (75.0%)	
On CIC	0 (0.0%)	4 (3.0%)	6 (16.6%)	
On urethral catheter	0 (0.0%)	22 (16.3%)	1 (2.8%)	
Unable to void	0 (0.0%)	9 (6.7%)	2 (5.6%)	
Treatment for UR				< 0.001
None	732 (100.0%)	0 (0.0%)	14 (38.9%)	
CIC	0 (0.0%)	95 (70.4%)	12 (33.3%)	

urethral catheter	0 (0.0%)	30 (22.2%)	9 (25.0%)	
CIC + urethral catheter	0 (0.0%)	10 (7.4%)	1 (2.8%)	
Catheter duration of UR (day)	0.0 ± 0.0	5.1 ± 16.6	3.5 ± 10.0	< 0.001
CIC duration of UR (day)	0.0 ± 0.0	2.2 ± 6.8	13.2 ± 38.0	< 0.001

AUR: acute urinary retention; BMI: body mass index; CUR: chronic urinary retention; LUTS: low urinary tract symptoms; BPH: benign prostatic hyperplasia; CIC: clean intermittent catheterization; UR: urinary retention;

Table 2. Perioperative outcomes of Non-UR, AUR and CUR groups

Variable	NON-UR (N=732)	AUR (N=135)	CUR (N=36)	P-value
Preooperative parameters				
Prostate volume (mL)	66.1 ± 31.5	89.9 ± 44.8	85.3 ± 38.1	< 0.001
Underactive detrusor	28 (3.8%)	11 (8.1%)	2 (5.6%)	0.082
Pdet Qmax (cmH_2O)	64.4 ± 25.4	74.3 ± 31.0	77.7 ± 42.0	< 0.001
Qmax (ml/s)	7.6 ± 4.9	6.6 ± 6.8	4.8 ± 3.8	< 0.001
BCI	102.0 ± 28.5	107.5 ± 46.7	103.8 ± 43.6	0.157
BOOI	49.5 ± 28.0	61.1 ± 33.4	69.4 ± 43.0	< 0.001
Perioperative parameters				
Morcellation time (min)	9.7 ± 9.0	12.9 ± 9.5	12.1 ± 10.2	0.001
Total operation time (min)	54.0 ± 27.9	68.5 ± 32.9	68.7 ± 31.7	< 0.001
Enucleation weight (g)	20.7 ± 17.0	35.0 ± 25.6	34.1 ± 25.3	< 0.001
Energy used (KJ)	139.5 ± 759.4	96.9 ± 75.8	83.1 ± 45.6	0.446
Intraoperative bladder injury	6 (0.8%)	1 (0.7%)	1 (2.8%)	0.464
Intraoperative bladder injury	6 (0.8%)	1 (0.7%)	1 (2.8%)	0.464
Intraoperative bleeding event	32 (5.4%)	4 (4.0%)	2 (6.2%)	0.822
Interoperative capsule perforation	5 (0.7%)	1 (0.7%)	0 (0.0%)	0.880
Immediate postoperative parameters				
Urethral catheter duration (day)	1.6 ± 2.0	1.9 ± 2.9	1.7 ± 2.4	0.241
Additional CBI	18 (2.4%)	16 (12.8%)	1 (2.8%)	< 0.001
Duration of additional CBI				< 0.001

1 day	16 (2.2%)	13 (9.6%)	1 (2.8%)	
2 days	1 (0.1%)	1 (0.7%)	0 (0.0%)	
≥3 days	1 (0.1%)	2 (1.5%)	0 (0.0%)	
Hospitalization				< 0.001
1 day	241 (88.2%)	49 (63.6%)	16 (94.1%)	
2 days	29 (10.6%)	21 (27.3%)	1 (5.9%)	
≥3 days	3 (1.2%)	4 (5.2%)	0 (0.0%)	

BCI: Bladder Contractility Index; BOOI: Bladder Outlet Obstruction Index; CBI: continuous bladder irrigation; Pdet Qmax: the detrusor pressure at the mean maximum urinary flow; Qmax: the mean maximum urinary flow;

Table 3. Postoperative complications of Non-UR, AUR and CUR groups

Variable	NON-UR (N=732)	AUR (N=135)	CUR (N=36)	P-value
Postoperative 2 week				
-Urinary incontinence	127 (17.4%)	19 (14.1%)	5 (13.9%)	0.570
-Urgency	154 (21.1%)	19 (14.1%)	2 (5.6%)	0.016
-Transfusion	0 (0.0%)	2 (1.5%)	0 (0.0%)	0.003
-Recatheterization	39 (5.3%)	11 (8.1%)	2 (5.6%)	0.438
-Continous bladder irrigation	9 (1.2%)	3 (2.2%)	0 (0.0%)	0.506
-Bleeding need for TUC	1 (0.1%)	1 (0.7%)	0 (0.0%)	0.374
Postoperative 3 months				
-Stress urinary incontinence	44 (6.0%)	5 (3.7%)	2 (5.6%)	0.566
-Urgency urinary incontinence	59 (8.1%)	7 (5.2%)	3 (8.3%)	0.507
-Urgency	139 (19.0%)	37 (27.4%)	4 (11.1%)	0.032
-Urethral stricture	4 (0.5%)	1 (0.7%)	0 (0.0%)	0.866
-Bladder neck contracture	1 (0.1%)	0 (0.0%)	0 (0.0%)	0.625
Postoperative 6 months				
-Stress urinary incontinence	13 (1.8%)	3 (2.2%)	0 (0.0%)	0.668
-Urgency urinary incontinence	11(1.5%)	2(1.4%)	0 (0.0%)	0.311
-Urgency	22 (3.0%)	4 (3.0%)	0 (0.0%)	0.573
-Urethral stricture	4(0.5%)	3 (2.2%)	1 (2.8%)	0.564
-Bladder neck contracture	1 (0.1%)	2 (1.5%)	0 (0.0%)	0.760

TUC: transurethral coagulation;

Table 4. Voiding parameters and symptoms scores of Non-UR, AUR and CUR groups

Variable	NON-UR (N=732)	AUR (N=135)	CUR (N=36)	P-value
Qmax preop	9.5 ± 4.8	8.4 ± 4.5	6.3 ± 3.2	< 0.001
Qmax at 2 week	20.9 ± 10.0	19.6 ± 8.9	20.4 ± 12.2	0.276
Qmax at 3 month	23.0 ± 12.7	22.6 ± 11.0	20.7 ± 12.0	0.376
Qmax at 6 month	22.5 ± 12.7	20.9 ± 10.1	21.9 ± 14.5	0.385
PVR preop	55.5 ± 58.9	75.1 ± 70.3	333.7 ± 224.2	< 0.001
PVR at 2 week	20.9 ± 32.4	29.8 ± 38.1	66.5 ± 82.2	< 0.001
PVR at 3 month	16.8 ± 32.2	23.5 ± 38.0	45.3 ± 74.4	< 0.001
PVR at 6 month	15.9 ± 30.0	22.8 ± 46.0	52.2 ± 100.3	< 0.001
IPSS preop	21.4 ± 10.6	21.0 ± 13.0	26.2 ± 14.3	0.128
IPSS at 3 month	7.3 ± 7.2	7.1 ± 6.7	8.1 ± 6.5	0.845
IPSS at 6 month	4.7 ± 5.5	4.3 ± 4.8	8.0 ± 8.4	0.055
OABSS preop	4.7 ± 4.3	4.7 ± 5.3	6.3 ± 8.0	0.134
OABSS at 3 month	2.7 ± 3.3	2.5 ± 2.8	2.1 ± 2.7	0.279
OABSS at 6 month	1.7 ± 2.3	1.5 ± 2.2	1.5 ± 2.5	0.384

Qmax: the mean maximum urinary flow; PVR: post-void residual volume; IPSS: International Prostate Symptom Score; OABSS: overactive bladder symptom score

국 문 초 록

서론: 본 연구에서는 하부요로증상을 동반한 전립선비대증 환자에서 수술 전 요폐가 holmium laser enucleation of prostate (HoLEP) 수술의 결과에 미치는 영향을 알아보고자 하였다.

대상 및 방법: 전향적으로 수집된 Seoul National University Hospital Benign Prostate Hyperplasia 데이터베이스 레지스트리에 포함된 환자 중 2010 년 1 월부터 2016 년 12 월까지 전립선비대증으로 진단받고 HoLEP 수술을 받은 50 세 이상의 환자를 대상으로 하였다. 모든 환자는 전립선특이항원, 요류검사 및 잔뇨량측정술, 요류역학검사, 경직장전립선초음파, 수술 전후의 혈액검사, 소변검사 등을 기본 검사로 시행하였다. 갑자기 자발적인 배뇨가 안되는 급성 요폐, 배뇨후 잔뇨가 300ml 이상인 만성 요폐, 그리고 요폐가 없는 세 그룹으로 나누어 분석하였다. 수술 후 2 주, 3 개월, 6 개월에 국제전립선증상점수설문지 (IPSS), 과민성방광증상점수설문지 (OABSS), 요류검사 및 잔뇨량측정술, 수술과 관련된 합병증 등의 정보를 수집하였다.

결과: 총 903 명의 환자가 포함되었으며, 모든 환자는 수술 후 6 개월간 추적관찰을 시행하였다. 환자의 평균 연령은 68.8±6.4 세였다. 요폐가 없는 환자는 732 명 (91.2%), 급성요폐 환자는 135 명 (14.9%)이었으며 그리고 만성요폐 환자는 36 명 (3.9 %)이었다. 최대요속에서 배뇨근압력의 평균치는 64.4cmH_2O, 74.3cmH_2O 및 77.7cmH_2O ($P < 0.001$); 평균 최대요속 (Qmax)은 7.6 ml/s, 6.6 ml/s 및 4.8 ml/s ($P < 0.001$); 평균 방광출구폐쇄지수(BOOI)는 49.5, 61.1 및 69.4 ($P < 0.001$); 수술 후 최대요속 (Qmax)는 세 군 모두에서

개선되었으며, 평균 배뇨후 잔뇨량은 수술 전 55 ml, 75 ml, 333 ml 이었으며, 수술 후 2 주째, 20 ml, 29 ml 및 66 ml (P <0.001), 수술 후 3 개월 16 ml, 23ml and 45ml (P <0.001) 그리고 수술 후 6 개월 15 ml, 22 ml 및 52 m 였다. (P < 0.001). 수술 전 IPSS, OABS 의 평균은 세 군간의 차이가 없었으며, 수술 후 3 개월, 6 개월의 IPSS, OABSS 의 평균은 이전 보다 향상된 결과를 보였으며, 세 군간의 차이가 없었다.

결론: 급성요폐 및 만성요폐로 인한 과도한 팽창에 따른 방광의 손상은 HoLEP 수술 결과에 영향을 미치지 않았으며, 합병증을 증가시키지 않았다.

주요어: 경요도전립선절제술, 전립선비대증, 전립선종 절제, 홀뮴레이져전립선종절제술,

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