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Efficacy of Holmium Laser Enucleation of the Prostate Based on Patient Preoperative Characteristics

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Purpose: To evaluate the efficacy of holmium laser enucleation of the prostate (HoLEP) in relation to prostate size and urodynamic parameters, including bladder outlet obstruction index (BOOI), presence of detrusor overactivity, and detrusor contractility, and to investigate factors predictive of HoLEP success.
Methods: This retrospective analysis of prospective data included 174 consecutive patients treated with HoLEP at Samsung Medical Center from 2009 to 2013. Prostate-specific antigen, prostate size, urodynamic parameters, and International Prostate Symptom Score (IPSS)/quality of life (QoL) were evaluated preoperatively, while prostate-specific antigen, uroflowmetry/postvoid residual (PVR) urine, and IPSS were measured six months after HoLEP. Two definitions of treatment success were established based on the following three variables: IPSS, maximum flow rate (Qmax), and QoL index. Factors predictive of HoLEP success were identified using multiple logistic regression analysis.
Results: IPSS/QoL, Qmax, and PVR improved significantly following HoLEP. Improvements in IPSS and PVR were more significant in the BOOI ≥ 40 group compared to the BOOI < 40 group, with overall success rates of 93.7% and 73.6%, respectively. Thus, the BOOI ≥ 40 group had a significantly higher success rate, and BOOI ≥ 40 was a significant predictor of HoLEP success based on the multivariate analyses.
Conclusions: We found good surgical outcomes after HoLEP, and specifically patients with a higher BOOI had a greater chance of surgical success.

Keywords: Holmium; Lasers; Prostatic Hyperplasia; Urinary Bladder Neck Obstruction; Urinary Bladder, Overactive

• **Ethics Research:** This study was approved by the Institutional Review Board of Samsung Medical Center (SMC IRB No.: 2011-06-082).
• **Conflict of Interest:** No potential conflict of interest relevant to this article was reported.

INTRODUCTION

Since holmium laser enucleation of the prostate (HoLEP) was first described in 1995, it has gained popularity [1-5] such that it is now considered one of the standard treatments for relief of benign prostatic obstructions [3,5-7]. Consequently, there are many studies regarding the efficacy of HoLEP, as well as those comparing HoLEP to other treatment modalities for benign prostatic hyperplasia (BPH) (e.g., transurethral resection of the prostate [TUR-P]) [4,7-10]. However, the efficacy of HoLEP based on patient preoperative characteristics including urodynamic parameters have not been evaluated. Therefore, using

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previous research and, more specifically, the study by Homma et al. [11], we evaluated the success rate of HoLEP, considering preoperative factors including prostate size, the bladder outlet obstruction index (BOOI), presence of detrusor overactivity (DO), and detrusor contractility. Finally, we evaluated factors predictive of HoLEP success.

MATERIALS AND METHODS

Patients

This study was approved by the Institutional Review Board of Samsung Medical Center (SMC IRB No.: 2011-06-082). A total of 265 consecutive patients underwent HoLEP for BPH from 2009 to 2013 at Samsung Medical Center. After excluding patients with underlying neurologic disorders or other urologic diseases, such as urinary calculi, urethral stricture, or prostate cancer, 174 patients who were followed-up for at least six months after surgery were enrolled in the final analysis.

Study Design

All patients underwent clinical evaluations preoperatively and at six months postoperatively. The preoperative evaluations included measurements of the International Prostate Symptom Score (IPSS) and the quality of life (QoL), uroflowmetry, postvoid residual (PVR) urine, urodynamic study (UDS), serum prostate-specific antigen (PSA), and transrectal ultrasonography. UDS was performed according to the recommendations of the International Continence Society [12]. Urodynamic values, such as maximum flow rate (Qmax) and detrusor pressure at Qmax (PdetQmax) were recorded. With these parameters, we calculated the bladder outlet obstruction index (BOOI = PdetQmax–2Qmax) and the bladder contractility index (BCI = PdetQmax+5Qmax) [13,14]. Based on the BOOI, the benign prostatic hyperplasia in patients was categorized as obstructed (≥40) or unobstructed (<40). We divided patients according to bladder contractility based on the BCI into normal (BCI≥100) or weak (BCI<100) [13,14]. DO is an urodynamic variable characterized by involuntary detrusor contractions during the filling phase.

Surgical outcomes were analyzed based on the prostate size (<40 mL, 40–80 mL, >80 mL), BOOI (<40, ≥40), DO (present or absent), and BCI (<100, ≥100) values. We evaluated IPSS, QoL, Qmax, and PVR six months after HoLEP and compared the changes in each group.

The definition of treatment success was based on the criteria developed by Homma et al. [11], who presented a table with four domain symptoms, function, anatomy, and QoL, which constitute the efficacy of treatment standards. The domains were evaluated with four variables, IPSS, Qmax, prostate volume, and the QoL index. Overall efficacy was defined as the median efficacy grades from the symptoms, function, and QoL domains. Efficacy grades (excellent, good, fair, and poor) for each domain are summarized in Table 1.

Table 1. Criteria for determining the efficacy of individual domains (symptoms, QoL, and function) and proportion of patients for each efficacy grade

Efficacy	Post/pre ratio of IPSS	Pre-post of QoL index	Post-pre of Qmax (mL/sec)	No. of patients
Symptom				
Excellent	≤0.25			85/174 (48.85)
Good	≤0.50			59/174 (33.91)
Fair	≤0.75			18/174 (10.34)
Poor	>0.75			12/174 (6.90)
QoL				
Excellent		≥4		51/174 (29.31)
Good		3		41/174 (23.56)
Fair		2, 1		64/174 (36.78)
Poor		≤0		18/174 (10.34)
Function				
Excellent			≥10	99/174 (56.90)
Good			≥5	29/174 (16.67)
Fair			≥2.5	21/174 (12.07)
Poor			<2.5	25/174 (14.37)

Overall efficacy is the median of efficacy grades of 3 domains.
QoL, quality of life; Qmax, maximum flow rate.

In our study, treatment was considered successful if the overall efficacy demonstrated an improvement that was "fair or greater" (definition 1) and "good or greater" (definition 2).

A multiple logistic regression analysis was used to identify predictive factors for the success of HoLEP. Age, PSA, IPSS, QoL, Qmax, PVR, prostate size, BOOI, BCI, PdetQmax, and DO were included in our analyses.

Statistical Analyses

Statistical analyses were performed with the IBM SPSS Statistics ver. 20.0 (IBM Co., Armonk, NY, USA). The independent t-test was used to compare the improvement in differences between the two score groups for each of the following measurements: BOOI, DO, and BCI. A one-way analysis of variance (ANOVA) was used to compare the improvement in differences among the three score groups analyzed according to prostate size. If factors that were significantly different among the three groups were present, the *post hoc* Tukey test was used to determine which specific groups were driving the differences. The chi-square test was used to compare success rates between the groups analyzed according to prostate size, BOOI, DO, and BCI. Multiple logistic regression models identified factors predictive of HoLEP success. In order to derive a final model of independently significant variables predicting success of HoLEP, all variables with a P-value < 0.20 on univariate analyses were incorporated into the multivariate analyses. A P-value < 0.05 was considered significant.

RESULTS

Patient Dispositions, Baseline Characteristics, and Operative Parameters

The mean age of patients evaluated was 69.3 years (range, 52–88 years). Table 2 shows preoperative patient characteristics. Mean prostate size, BOOI, and BCI were 66.2 ± 34.3 mL, 57.9 ± 29.2, and 111.8 ± 33.1, respectively. Ninety-two patients were diagnosed with DO. Preoperative baseline PSA was significantly higher in the following groups: BOOI ≥ 40, BCI ≥ 100, and prostate size > 80 mL (P = 0.015, P = 0.021 [independent t-test], and P < 0.001 [one-way ANOVA], respectively). Preoperative Qmax was significantly lower (P = 0.029) and PVR was significantly higher (P = 0.011) in the BOOI ≥ 40 group compared to the other groups. The mean total operative, enucleation, and morcellation times were 78.53 ± 43.48, 49.21 ± 25.12, and 14.56 ± 16.45 minutes, respectively. The duration of postoperative indwelling catheter and hospitalization were 1.79 ± 1.00 and 3.92 ± 1.31 days, respectively.

Improvement of Parameters Following HoLEP

Six months after undergoing HoLEP, all parameters showed significant improvement. Fig. 1 shows changes in the parameter values. The mean total IPSS score decreased significantly from 21.7 ± 6.6 to 6.8 ± 5.2; the QoL score also decreased significantly (from 4.5 ± 2.4 to 1.7 ± 1.3). The mean values of Qmax (from 8.7 ± 3.8 to

Table 2. Preoperative baseline characteristics

Characteristic	Age (yr)	PSA (ng/mL)	IPSS	QoL	Qmax (mL/sec)	PVR (mL)
Patients (n = 174)	69.3 ± 7.1	5.0 ± 6.8	21.7 ± 6.6	4.5 ± 2.4	8.7 ± 3.8	107.7 ± 111.0
Prostate size (mL)						
< 40 (n = 27)	67.0 ± 6.3	1.3 ± 1.1	23.0 ± 7.7	4.5 ± 0.9	9.2 ± 4.0	113.1 ± 120.6
40–80 (n = 107)	69.0 ± 7.0	3.7 ± 3.1	21.1 ± 6.4	4.3 ± 1.0	8.7 ± 3.7	107.4 ± 117.7
> 80 (n = 40)	71.7 ± 7.2	11.1 ± 11.3*	22.4 ± 6.6	5.1 ± 4.8	8.3 ± 3.8	105.0 ± 85.7
BOOI						
< 40 (n = 57)	69.3 ± 5.3	3.2 ± 3.1	21.2 ± 7.6	4.4 ± 0.9	9.6 ± 3.7*	77.2 ± 62.4
≥ 40 (n = 117)	69.3 ± 7.8	5.9 ± 7.9*	21.9 ± 6.2	4.6 ± 2.9	8.3 ± 3.7	122.6 ± 125.8*
DO						
Yes (n = 92)	71.1 ± 6.9	5.5 ± 6.9	22.2 ± 6.9	4.8 ± 3.3	8.4 ± 3.8	100.7 ± 83.6
No (n = 82)	67.2 ± 6.7	4.4 ± 6.8	21.1 ± 6.4	4.3 ± 1.0	9.0 ± 3.7	115.7 ± 135.5
BCI						
< 100 (n = 71)	69.2 ± 6.2	3.6 ± 4.6	21.9 ± 6.7	4.3 ± 0.9	8.0 ± 3.3	116.9 ± 121.3
≥ 100 (n = 103)	69.3 ± 7.7	6.0 ± 7.9*	21.6 ± 6.6	4.7 ± 3.1	9.2 ± 4.0	101.4 ± 103.5

Values are presented as mean ± standard deviation.
PSA, prostate-specific antigen; IPSS, International Prostate Symptom Score; QoL, quality of life; Qmax, maximum flow rate; PVR, postvoid residual; BOOI, bladder outlet obstruction index; DO, detrusor overactivity; BCI, bladder contractility index.
*P < 0.05, compare preoperative values between groups according to prostate size, BOOI, DO, and BCI.

24.1±35.1) and PVR (from 107.7±111.0 to 25.6±24.3) improved significantly (P<0.05 for each).

Table 3 shows the postoperative changes in the parameter values for prostate size, BOOI, DO, and BCI values. No significant differences were observed in the postoperative improvement of prostate size, DO, or BCI. IPSS and PVR values significantly improved in the BOOI≥40 group than in the BOOI<40 group. On the contrary, there were no significant changes in QoL and Qmax based on the BOOI.

HoLEP Success Rate

Efficacy grades and proportions of patients for each efficacy grade are summarized in Table 1. Of the 174 patients, treatment in 163 patients (93.7%) was deemed successful based on success definition 1, while the overall success rate according to success definition 2 was 73.6%.

Table 4 shows success rates based on prostate size, BOOI, DO, and BCI values satisfying definitions 1 and 2. The success rate was significantly higher in the BOOI≥40 group than in the

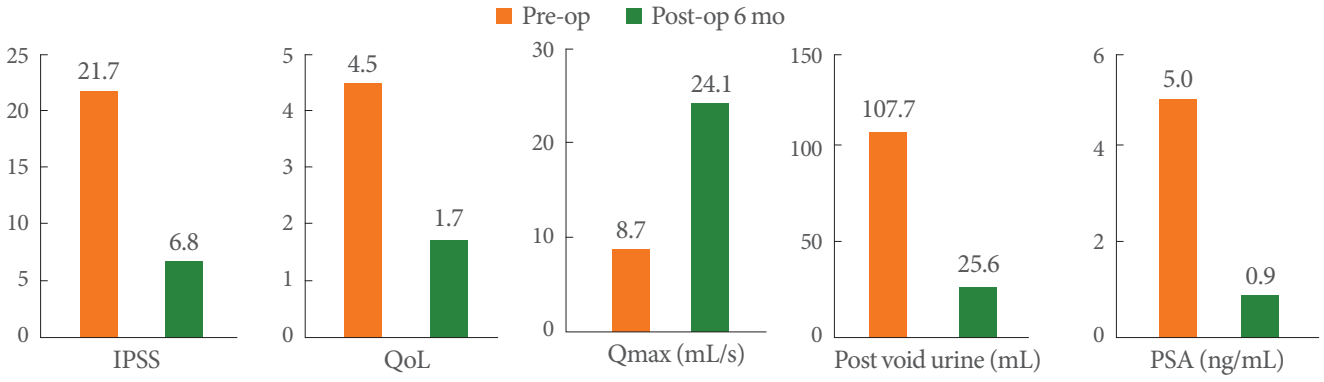

Fig. 1. Changes in preoperative and postoperative six months values. The mean total International Prostate Symptom Score (IPSS) score for all patients decreases significantly from 21.7±6.6 to 6.8±5.2; the quality of life (QoL) score also decreases (4.5±2.4 to 1.7±1.3). Meanwhile, the mean values of maximum flow rate (Qmax) (8.7±3.8 to 24.1±35.1) and postvoid residual urine (PVR) (107.7±111.0 to 25.6±24.3) improve significantly (P<0.05 for each).

Table 3. Change in parameters preoperatively and six months postoperatively according to prostate size, BOOI, DO, and BCI values

Parameter	Prostate size (mL)			BOOI		DO		BCI	
	<40 (n=27)	40–80 (n=107)	>80 (n=40)	<40 (n=57)	≥40 (n=117)	Yes (n=92)	No (n=82)	<100 (n=71)	≥100 (n=103)
IPSS									
Pre-op	23.0±7.7	21.1±6.4	22.4±6.6	21.2±7.6	21.9±6.2	22.2±6.9	21.1±6.4	21.9±6.7	21.6±6.6
Post-op	8.3±5.2	6.3±4.9	6.9±5.8	8.4±6.0	6.0±4.5	6.5±5.3	7.1±5.0	7.7±5.5	6.1±4.8
Changes	−14.7±8.1	−14.8±7.2	−15.5±7.8	−12.8±9.0*	−15.9±6.4*	−15.7±7.6	−14.0±7.3	−14.2±7.8	−15.5±7.2
QoL									
Pre-op	4.5±0.9	4.3±1.0	5.1±4.8	4.4±0.9	4.6±2.9	4.8±3.3	4.3±1.0	4.3±0.9	4.7±3.1
Post-op	2.0±1.4	1.7±1.3	1.7±1.4	2.1±1.3	1.6±1.3	1.6±1.5	1.9±1.2	2.0±1.3	1.6±1.3
Changes	−2.5±1.5	−2.6±1.6	−3.4±4.9	−2.4±1.5	−3.0±3.1	−3.1±3.4	−2.4±1.5	−2.3±1.6	−3.1±3.2
Qmax (mL/sec)									
Pre-op	9.2±4.0	8.7±3.7	8.3±3.8	9.6±3.7	8.3±3.7	8.4±3.8	9.0±3.7	8.0±3.3	9.2±4.0
Post-op	18.2±8.1	26.1±44.2	22.9±8.6	20.1±9.0	26.1±42.3	22.4±15.7	26.0±48.5	19.5±8.4	27.3±45.0
Changes	9.0±7.5	17.3±43.6	14.6±9.2	10.5±8.5	17.8±41.7	14.0±15.2.	17.0±47.9	11.5±8.4	18.1±44.4
PVR (mL)									
Pre-op	113.1±120.6	107.4±117.7	105.0±85.7	77.2±62.4	122.6±125.8	100.7±83.6	115.7±135.5	116.9±121.3	101.4±103.5
Post-op	27.1±40.9	25.3±20.6	25.5±18.6	19.6±17.3	28.5±26.6	25.0±19.3	26.2±29.0	24.5±26.8	26.3±22.5
Changes	−86.0±90.5	−82.1±112.7	−79.6±85.8	−57.6±63.7*	−94.1±116.3*	−75.7±85.7	−89.4±120.3	−92.3±108.5	−75.1±99.6

Values are presented as mean±standard deviation.
BOOI, bladder outlet obstruction index; DO, detrusor overactivity; BCI, bladder contractility index; PSA, prostate-specific antigen; IPSS, International Prostate Symptom Score; QoL, quality of life; Qmax, maximum flow rate; PVR, postvoid residual.
*P<0.05; compare improvements between groups according to prostate size, BOOI, DO, BCI.

Table 4. Success rates according to definitions 1 and 2 according to prostate size, BOOI, DO, and BCI values

Success rate	All patients	Prostate size (mL)			BOOI		DO		BCI	
		< 40	40–80	> 80	< 40	≥ 40	Yes	No	< 100	≥ 100
Definition 1[a]										
Rates (%)	93.7	96.3	93.5	92.5	84.2	98.3	93.5	93.9	91.5	95.1
P-value			0.813		< 0.001		0.359		0.909	
Definition 2[b]										
Rates (%)	73.6	77.8	72.9	72.5	61.4	79.5	76.1	70.7	70.4	75.7
P-value			0.863		0.032		0.424		0.435	

BOOI, bladder outlet obstruction index; DO, detrusor overactivity; BCI, bladder contractility index.
[a]Success definition 1: The overall efficacy demonstrates an improvement that was "fair or greater". [b]Success definition 2: The overall efficacy demonstrates an improvement that was "good or greater".

Table 5. Multiple logistic regression analysis of factors influencing holmium laser enucleation of the prostate success at 6 months postoperatively

Variable	Success definition 1				Success definition 2			
	Univariable analysis		Multivariable analysis		Univariable analysis		Multivariable analysis	
	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value	OR (95% CI)	P-value
Age	1.03 (0.95–1.13)	0.450			1.01 (0.96–1.06)	0.676		
PSA	1.07 (0.91–1.27)	0.424			1.01 (0.96–1.07)	0.634		
IPSS	1.04 (0.95–1.14)	0.406			1.00 (0.95–1.05)	0.974		
QoL	1.10 (0.66–1.83)	0.719			1.10 (0.79–1.53)	0.591		
PVR	1.00 (1.00–1.01)	0.481			1.00 (0.99–1.00)	0.817		
Prostate size								
< 40	Reference				Reference			
40–80	0.55 (0.07–4.67)	0.583			0.77 (0.28–2.09)	0.607		
> 80	0.47 (0.05–4.82)	0.528			0.75 (0.24–2.36)	0.627		
BOOI ≥ 40	10.8 (2.25–51.76)	0.003	14.47 (1.22-171.00)	0.034	2.44 (1.21–4.89)	0.012	1.55 (0.59-4.11)	0.377
BCI ≥ 100	1.81 (0.53–6.18)	0.344			1.31 (0.66–2.59)	0.436		
PdetQmax	1.04 (1.00–1.07)	0.031	0.99 (0.95–1.04)	0.752	1.02 (1.00–1.03)	0.012	1.01 (0.99-1.03)	0.215
DO	0.93 (0.27–3.17)	0.909			1.32 (0.67–2.59)	0.425		

OR, odds ratio; CI, confidence interval; PSA, prostate-specific antigen; IPSS, International Prostate Symptom Score; QoL, quality of life; Qmax, maximum flow rate; PVR, postvoid residual; BOOI, bladder outlet obstruction index; BCI, bladder contractility index; PdetQmax, detrusor pressure at Qmax; DO, detrusor overactivity.

BOOI < 40 group (98.3% vs. 84.2%) according to definition 1 (P < 0.001). Likewise, success rate in the BOOI ≥ 40 group was significantly higher than that in the BOOI < 40 group (79.5% vs. 61.4%) (P = 0.032) according to definition 2. However, no significant differences were observed in success rates between the groups based on prostate size, DO, or BCI values.

Evaluation of Predictors for HoLEP Success

Among the preoperative variables that were suspected of affecting HoLEP treatment success, BOOI and PdetQmax were found to be independently significant factors that correlated with success definitions 1 and 2 on univariate analyses (Table 5). On multivariate analyses, only BOOI was found to be significantly associated with success definition 1 (odds ratio, 14.47; 95% confidence interval, 1.22–171.00; P = 0.034). However, no variables were found to be associated with success definition 2 on multivariate analyses.

DISCUSSION

In the present study, we evaluated the efficacy of HoLEP based on preoperative urodynamic parameters (BOOI, bladder con-

tractility, DO) and prostate size. Although significant improvements in all parameters were observed, no significant differences were observed in the postoperative parameters with the exception of BOOI between the success and nonsuccess groups. The improvements in IPSS and PVR were significantly higher in the BOOI ≥ 40 group than in the BOOI < 40 group. The overall success rates were 93.7% and 73.6% based on definitions 1 and 2, respectively. The success rate was significantly higher for the BOOI ≥ 40 group. However, no significant differences were found based on the prostate size, BCI, or DO by definitions 1 and 2. In addition, we identified factors associated with HoLEP success using multiple logistic regression analysis. Degree of BOO and PedtQmax were significantly associated with HoLEP success on univariate analysis, but on multivariate analysis, degree of BOO was the only significant prognostic factor that was able to satisfy success definition 1.

Despite our goal of conducting an objective evaluation, consistent criteria for determining success of HoLEP are not yet available. In situations where definite criteria exist, it is possible to compare treatment efficacy objectively on a common scale. Additionally, when we know which factors are related to success, we are more likely to select patients who need treatment. Therefore, criteria for evaluating HoLEP success should be standardized, and factors related to its success should be identified. It is important that not only patients' subjective symptoms (e.g., IPSS/QoL) but also objective indicators (e.g., uroflowmetry) be considered when developing success criteria to accurately evaluate efficacy. Homma et al. [11] established the following four domains for efficacy evaluation criteria: symptoms, function, anatomy, and QoL. They defined overall efficacy as the median efficacy grades from the symptoms, function, and QoL domains. These proposed criteria are fairly accurate and practical. Thus, we utilized them in our assessment of the clinical efficacy of HoLEP. This efficacy grading method proved simple and easy to measure as well as cost effective.

Seki et al. [15] arbitrarily established definitions of treatment success for each variable (IPSS, QoL, and Qmax) using the criteria suggested by Homma et al. [11]. They identified factors related to success for each outcome variable by performing multiple logistic regression analyses. Because the prognostic value of each variable may be affected by the criteria used to estimate the outcome, that study was designed to identify predictive variables using two different definitions in order to minimize any bias arising from the estimation criteria themselves. After reviewing these studies, we established two definitions of treatment success, and identified factors related to HoLEP success. Our results indicated that BOOI is an important parameter for predicting HoLEP efficacy.

Prior to our research, to our knowledge, there have been no investigations into the efficacy of HoLEP based on patient characteristics, particularly urodynamic parameters. However, BOO relief is believed to be the primary treatment objective in patients with BPH, and many surgical treatment methods have emerged based on this principle. Among the many surgical options for BPH, TUR-P is one of the most common. Many studies have evaluated the effects of TUR-P based on urodynamic parameters of patients [14,16-18].

In our previous study [14] patients were divided into a detrusor underactivity (DUA) group and BOO or normal detrusor contractility group according to BOOI and BCI values. We investigated the differences in IPSS, QoL, Qmax, and PVR before and after TUR-P between the groups. In this study, the postoperative improvement rates for IPSS were lower in the DUA group than in the other group. However, a different study [17] reported that changes in IPSS, QoL, Qmax, and PVR after TUR-P were not significantly different across the three groups evaluated (urodynamically unobstructed, equivocal, and obstructed). They insisted that TUR-P could be expected to improve LUTS in patients with BPH without definite urodynamic obstruction. Although some studies have suggested that the degree of obstruction does not significantly affect TUR-P efficacy, most indicate that the efficacy of TUR-P improves as the preoperative degree of BOO worsens [16,18]. Because HoLEP treats BPH by relieving BOO like TUR-P, we expect that the degree of BOO also has an important role in the efficacy of HoLEP, and our study results support this notion.

Although there has been no study investigating predictors of HoLEP success, a few studies have mentioned predictors of TUR-P outcome [15,19,20]. Most studies have suggested that the degree of BOO is a predictor of TUR-P outcome. Few studies have reported that detrusor contractility is also a significant predictor of TUR-P efficacy. Seki et al. [15] reported that the presence of DO was a negative predictor for QoL improvement after TUR-P. Furthermore, other studies [19,20] have reported that not only the degree of BOO, but also detrusor contractility, can reliably predict TUR-P outcome. However, in our study, the multivariate analysis indicated that detrusor contractility was not a significant predictor of HoLEP outcome. A BOOI ≥ 40 was the only factor significantly associated with HoLEP success. We believe this is the first attempt at examining the relationship

between urodynamic parameters and HoLEP success.

Our study has some limitations. Before conducting this study, we suspected that HoLEP might be less effective for patients with low BOOI and BCI values. Therefore, few patients with these characteristics were chosen to undergo HoLEP treatment (low BOOI, n = 57; low BCI, n = 71; both, n = 38). Most of the patients who did not have definite BOO were enrolled because of their subjective symptoms related to voiding difficulty and large prostatic size on transrectal ultrasonography. However, as suspected, these patients presented a worse outcome. This could have resulted in a selection bias in our study because the patients who were most likely to benefit from HoLEP treatment were those who were selected for treatment; thus, this might be the reason why we observed a significant improvement in the mean values of all parameters examined in this study.

In conclusion, we found that the improvement in IPSS and PVR was significantly higher in the BOOI ≥ 40 group than in the BOOI < 40 group. No significant between-group differences were observed for any of the parameters postoperatively based on prostate size, DO, or BCI values. Success rate of the BOOI ≥ 40 group was significantly higher than that of the BOOI < 40 group. According to our multivariate analyses, degree of BOO is the only factor among several variables that affects the success of HoLEP.

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