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Original Article

Efficacy of holmium laser enucleation of the prostate (HoLEP) in men with bladder outlet obstruction (BOO) and non-neurogenic bladder dysfunction

Jong Hyun Pyun, Sung Gu Kang, Seok Ho Kang, Jun Cheon, Je Jong Kim, Jeong Gu Lee*

Department of Urology, Korea University College of Medicine, Seoul, Republic of Korea

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Abstract We aimed to compare the short-term outcomes of men who had urodynamic evidence of detrusor underactivity (DU) or detrusor overactivity (DO) of a non-neurogenic etiology as well as bladder outlet obstruction (BOO) and who underwent Holmium Laser Enucleation of the prostate (HoLEP). A database of 322 patients who underwent HoLEP between 2010 and 2014 was analyzed. Patients were classified into three groups according to the results of a preoperative urodynamic study. Preoperative parameters such as International Prostate Symptom Score (IPSS), Quality of Life (QoL) index, IPSS grade, uroflowmetry were compared with postoperative parameters measured at 6 months. There were 138 patients with BOO-only and 89 patients with BOO and detrusor dysfunction including 56 with DO and 33 with DU. The degree of improvement in IPSS-total (BOO: 10.7, DO: 8.3, DU: 7.0; $p = 0.023$) was greater in the BOO-only group than in the DU group. There were more patients whose IPSS grade improved in the BOO-only group (71%) than in the detrusor dysfunction group (DO: 53.6% and DU: 45.5%). Postoperative IPSS-voiding (4.5 vs 7.0), and Qmax (18 vs 13.7) in the BOO-only group were significantly better than those in the DU group. Additionally, postoperative IPSS-storage (4.7 vs 6.7), and IPSS-total (9.1 vs 12.3) in the BOO-only group were significantly better than in the DO group (all $p < 0.05$). In conclusion, early surgical management for men with severe LUTS and associated BPH before secondary degeneration occurs may be beneficial for preserving detrusor function and yield better treatment outcomes.

Conflicts of interest: All authors declare no conflicts of interest.

* Corresponding author. Department of Urology, Korea University College of Medicine, Anam-dong 5-ga, Sungbuk-gu, Seoul, 136-705, Republic of Korea.
E-mail address: jeongkl@kumc.or.kr (J.G. Lee).

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Introduction

Benign prostatic hyperplasia (BPH) is a common condition in men as they age. It causes lower urinary tract symptoms (LUTS) associated with reduced health-related quality of life and can induce severe complications. More than 80% of men >50 years of age have some degree of bladder outlet obstruction (BOO) secondary to BPH and experience bladder problems as the result of an enlarged prostate [1].

BOO not only causes LUTS but also induces secondary bladder dysfunction that may result in either overactive bladder (OAB) or impaired bladder contractility [2]. OAB symptoms, with and without associated detrusor overactivity (DO), are often with BOO and benign prostatic enlargement. Accordingly, transurethral resection of the prostate (TURP) for resolving BOO has been the standard treatment for BPH with LUTS. Several studies examining the effects of TURP on men with detrusor hypocontractility have shown good short-term outcomes, with restoration of acceptable voiding parameters and high patient satisfaction [3,4]. However, there is debate concerning whether TURP has a favorable outcome in patients with DO [5]. Recently, by using a holmium laser to perform complete enucleation of the prostate, Holmium Laser Enucleation of the prostate (HoLEP) has replaced TURP as the current standard operation, which has been shown to be an effective and safe surgical treatment for benign prostatic obstruction without any size limitation [6]. HoLEP offers excellent short-term results for men with both hypocontractile and a contractile bladder [7], and overactive bladder symptoms and urodynamic parameters were also reported to improve significantly after HoLEP surgery in a short-term follow-up study [8]. However, studies on the efficacy of HoLEP in comparison to preoperative urodynamic findings are scarce. In this study, we aimed to compare the postoperative short-term outcomes of men with BOO-only and men with additional DO or detrusor underactivity (DU) who underwent HoLEP.

Materials and methods

Study design

We reviewed medical records using a prospectively maintained Institutional Review Board—approved database of patients treated for BPH. We identified 322 consecutive patients who underwent HoLEP between December 2010 and December 2014 at Korea University Medical Center. They had bothersome LUTS that did not respond to medication in primary care. Patients with a known previous neurogenic etiology such as uncontrolled diabetes mellitus (HbA1c > 7), stroke (recent event or sequelae), parkinsonism, previous spinal surgery, or pelvic surgery were excluded from the study. Ultimately, a total of 227 patients were analyzed to compare short-term outcomes of men with urodynamic evidence of abnormal detrusor function.

All patients had transrectal ultrasonographic evidence of BPH with prostate volume of 25 ml or above that was consistent with BOO [9]. Patients were divided into three groups according to the results of urodynamic study (UDS) just before the surgery: one comprised patients with BOO-only and others comprised patients with BOO and detrusor dysfunction. The detrusor dysfunction group was identified as having a secondary change of detrusor function due to prolonged BOO on preoperative UDS. Detrusor dysfunction was further divided into two subgroups (DO and DU) and these were compared to the BOO-only group. The BOO was defined as BOO index >40, using ICS nomogram [10]. The bladder contractility index (BCI) was calculated according to the standardized definition (BCI = pdetQmax +5 Qmax), with DU defined as BCI <100 [11]. The patients with DO showed occurrence of involuntary detrusor contractions during the filling phase.

Preoperative parameters such as International Prostate Symptom Score (IPSS), Quality of Life (QoL) index, IPSS grade, uroflowmetry to evaluate the maximum urinary flow rate (Qmax), and post-void residual urine volume (PVR) measured by transabdominal ultrasonography were compared with postoperative parameters measured at postoperative 6 months. IPSS grades were categorized as mild (1—7), moderate (8—19), or severe (20—35) according to the degree of total IPSS.

Statistical analysis

The values for continuous variables are presented as mean (standard deviation). Statistical comparisons of the mean values between the three groups were performed using an ANOVA test. Fisher's exact test and the chi-square test were used for categorical variables, which are presented as frequency (percentage). All statistical analyses were processed with SPSS version 18.0, and a p-value below 0.05 was considered statistically significant.

Result

A total of 138 patients with BOO-only and 89 patients with BOO and detrusor dysfunction including a DO group of 56 patients and a DU group of 33 patients on preoperative UDS underwent HoLEP during the study period. The characteristics of these patients are shown in Table 1. There were no significant differences between the three groups in mean age, serum PSA level, prostate volume, preoperative IPSS-voiding index score, IPSS-total index score, QoL index, preoperative Qmax, and preoperative PVR. However, there were significant differences in body mass index (BOO: 24.5 vs DO: 23.5 vs DU: 25.2; p = 0.034) between the DO group and the DU group, in the duration of preoperative LUTS (BOO: 52 months vs DO: 77.2 months vs DU: 60.6 months; p = 0.025) between the BOO-only group and the DO group, and in the IPSS preoperative IPSS-storage index score (BOO: 8.3 vs DO: 9.5 vs DU: 6.9; p = 0.016) between the DO group and DU group.

The patients were grouped according to total IPSS index. In the BOO-only group, there were five patients (3.6%) in the mild group, 68 patients (49.3%) in the moderate group, and 65 patients (47.1%) in the severe group. In the DO group, there were two patients (3.6%) in the mild group, 20 patients (35.7%) in the moderate group, and 34 patients (60.7%) in the severe group. In the DU group, there were five patients (15.2%) in the mild group, 13 patients (39.4%) in the moderate group, and 15 patients (45.5%) in the

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