

## Classification of Perioperative Complications after Holmium Laser Enucleation of the Prostate: The Modified Clavien Classification System

**Introduction and Objective:** The aim of this study was to evaluate the applicability of the modified Clavien classification system (MCCS) in grading perioperative complications of holmium laser enucleation of the prostate (HoLEP).

**Materials and Methods:** All patients treated with HoLEP for BPH from July 2008 to January 2011 by single surgeon were evaluated for complications occurring up to the end of the 3rd postoperative month and classified them into 5 grades according to MCCS. Grade 1 included minor risk events not requiring therapy (with exception of analgesics, antipyretics, antiemetics, diuretics, electrolytes and physiotherapy). Grade 2 was defined as complications requiring pharmacological treatment with drugs other than such allowed for grade 1 complications, blood transfusions and total parenteral nutrition. Grade 3 was defined as complications requiring surgical, endoscopic or radiological intervention. Grade 4 was defined as life threatening complications (including CNS complications). Grade 5 complications indicated death of patient.

**Results:** Mean patient age, prostate volume, operation time, hospital stay and follow-up period were 68.8 years old (52~84), 53.2g (23~228), 58.2 minutes (20~230), 4.5 days (2~7) and 9 months (4~27), respectively. Total 81 complications were recorded in 73 out of 401 patients (overall perioperative morbidity rate: 18.2%). Grade 1 complications were recorded in 14.2% (57 cases), grade 2 in 4.0% (16 cases), grade 3 in 1.7% (7 cases), grade 4 in 0.25% (1 case) of patients. Negative outcomes, such as mild dysuria, hematuria, urgency, urge incontinence during this early postoperative period or retrograde ejaculation were considered sequelae and were not recorded. Classification of perioperative complications are shown in table.

**Conclusions:** HoLEP is a safe surgical technique with mostly mild complications and the MCCS is easily applicable tool for grading perioperative complications.

Grade	Complication	Management
I(n=57)	Hematuria, ± blood clot retention (n=7)	Bedside bladder irrigation , clot evacuation
	Acute urinary retention after catheter removal (n=9)	Bedside recatheterization
	Transient elevation of serum creatinine (n=3)	Watchful regulation of fluid balance
	Dysuria (n=3)	Analgesics
	Bladder mucosal layer injury (n=13)	
	Transient incontinence (n=22)	
II (n=16)	Intraoperative hemorrhage/hematuria(n=5)	Transfusion
	Permanant incontinence (n=1)	Drug medication
	Urgency (n=2), urge incontinence (n=5)	Drug medication
	Low urinary tract infection (n=3)	Antibiotics
III(n=7)	Urethral stricture (n=3)	Visual internal urethrotomy
	Remnant adenoma in bladder (n=3)	Re-morcellation
	Severe hematuria (n=1)	Transurethral coagulation
IV (n=1)	Cerebral ischemic stroke (n=1)	
V (n=0)	Death (n=0)	