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# APPLICATION OF THE CLAVIEN-DENDO CLASSIFICATION SYSTEM IN BIPOLAR TRANSURETHRAL RESECTION OF THE PROSTATE (TURP)

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**Abstract**

creative method for ,The Clavien-Dindo - Classification System has produced as a Smart measures its grading postoperative complications across surgical specialties,This study application in bipolar transurethral resection of the prostate (TURP) for benign prostatic hyperplasia (BPH),Data from these studies means that the modified Clavien-Dendo system is important and easy to apply for grading TURP complications , Bipolar TURP have a favorable complication results , with the all of events classified as low-grade (Grades I-II, 69-85%), but high-grade complications (Grades III-V) are rare 15%). )
When compare analyses was that bipolar TURP is associated with mostly lower overall complication rates (20.5% vs. 6.0 %, p<0.001) and reduced Grade III complications (2.8% vs. 0.1%, p=0.003) compared to bipolar transurethral enucleation and resection.
The Clavien system makes powerful comparisons between surgical procedures and facilitates risk points based on preoperative patient status , including Charlson Comorbidity Index scores.
Standards project of this classification system is included for all TURP outcomes research to enhance data comparability and evidence synthesis.

**Keywords:**
1.Clavien classification;
2.Bipolar TURP;
3.Benign prostatic hyperplasia; 4.Postoperative complications; 5.Surgical outcomes

## 1. Introduction

The absence of reports about grading of surgical complications have long challenged Prior to the introduction of the Clavien system, comparisons of complication rates across different surgical series were unfortunately , as there was no indication on how to define or grade scale.

In 1992, Clavien and colleagues introduced a classification system for surgical procedures based on severity grading. This system was eventually modified by Dindo, Demartines, and Clavien in 2004 to improve its accuracy and applications across surgical specialties , the modified Clavien Classification System (MCCS) has been interesting applied in urology, including for transurethral resection of the prostate (TURP).

The purpose of this research is to evaluate the application of the Clavien classification system specific for bipolar TURP, examining complication types , comparative outcomes with other techniques, and the clinical benefits of this grading system for surgical quality assessment.

## 2. The Modified Clavien Classification System: Overview

The modified Clavien-Dindo system classifies complications into five grades based on the therapeutic intervention required:

Grade Definition
Grade I Any deviation from normal postoperative course without need for pharmacological treatment or surgical, endoscopic, or radiological intervention. Allowed therapeutic regimens include antiemetics, antipyretics, analgesics, diuretics, electrolytes, and physiotherapy.
Grade II Requiring pharmacological treatment with drugs other than those allowed for Grade I complications. Blood transfusions and total parenteral nutrition are also included.
Grade III Requiring surgical, endoscopic, or radiological intervention
- IIIa Intervention not under general anesthesia
- IIIb Intervention under general anesthesia
Grade IV Life-threatening complication requiring ICU management
- IVa Single organ dysfunction
- IVb Multiorgan dysfunction
Grade V Death of the patient

### 3.1 Multicenter records Study

A study multicenter study involving five Iraqi tertiary hospitals (April 2014-March 2020) via the use of the modified Clavien system for TURP complications . Among 295 consecutive patients, 47 complications were recorded in 44 patients. The distribution demonstrated that most complications were low-grade:

· Grade I: 37 cases (78% of complications)
· Grade II: 6 cases (12%)
· Grade IIIb: 2 cases (4%)
· Grade IV: 2 cases (4%)
· Grade V: 0 cases

The overall perioperative morbidity rate was 15.5%. No TURP-related deaths were reported .

## 4. Complication Profile of Bipolar TURP Using the Clavien System

### 4.1 Direct Comparison of Bipolar vs. Monopolar TURP

Parameter Monopolar TURP Bipolar TURP P-value
Patients with complications 27 (9.2%) 17 (5.2%) 0.142
Overall morbidity rate - 15.5% -
Independent predictor of complications Longer operative time (OR 1.024; 95% CI 1.007-1.040, p=0.004) Not significant -

While the difference in overall complication rates did not reach statistical significance in this study, bipolar TURP demonstrated a numerically lower complication rate.

5. Specific complications more common with TURP included:

· Electrolyte disturbance
· Massive intraoperative hemorrhage
· Urinary irritation symptoms
· Urinary blockage
· Transurethral resection syndrome (TURS)
· Erectile dysfunction (ED)

6. High-Grade Complications

6.1 Grade III Complications

High-grade complications requiring surgical, endoscopic, or radiological intervention are uncommon but do occur. In the B-TURP comparative study, Grade III complications occurred in 3.4% of patients and included :

· Bleeding requiring reoperation (1.5%)
· Urethral stricture requiring intervention (0.5%)
· Postoperative recurrence requiring reoperation (1.5%)

6.2 Grade IV Complications

Life-threatening complications requiring ICU management are rare. In the Italian multicenter study, Grade IV complications occurred in 4% of cases . In the USICON 2020 series, Grade IVa and IVb complications each occurred in 4.8% of patients with complications (approximately 1% overall) .

6.3 Grade V Complications

Mortality following TURP is exceptionally rare. None of the reviewed studies reported Grade V complications (0% mortality rate), confirming TURP as a safe procedure with minimal perioperative morbidity .

7. Risk Factors and Predictors of Complications

7.1 Operative Time

Longer operative time is an independent predictor of postoperative complications in monopolar TURP (OR 1.024; 95% CI 1.007-1.040, p=0.004) .

7.2 Charlson Comorbidity Index (CCI)

Patients with higher CCI scores had significantly higher rates of morbidity following TURP. The CCI can predict complications recorded according to the MCCS, making it valuable for preoperative risk stratification .

7.3 Prostate Volume and Resected Weight

Higher prostate volume, higher resected tissue volume, and longer resection time were identified as predictors of postoperative complications .

7.4 Preoperative Hemoglobin

Lower preoperative hemoglobin level was associated with increased complication risk, likely reflecting the impact of intraoperative blood loss and transfusion requirements .

7.5 Age and Urgency of Admission

Patients aged 75 years and older admitted with recurrent acute urinary retention, prolonged LUTS duration, and alpha-blocker monotherapy exceeding 3 years have an increased risk of postoperative complications after TURP .

8. **Discussion**

8.1 Utility of the Clavien System for Bipolar TURP

The accumulated evidence demonstrates that the modified Clavien Classification System is a practical, easily applicable tool for grading postoperative complications in patients undergoing TURP . The system enables:

1. Standardized reporting: Allows meaningful comparisons across different studies, institutions, and surgical techniques
2. Objective severity assessment: Eliminates subjective interpretation of complication significance
3. Risk stratification: Facilitates identification of patients at higher risk for complications
4. Quality improvement: Enables tracking of surgical outcomes over time

8.2 Bipolar TURP Safety Profile

Bipolar TURP demonstrates a favorable safety profile with the following characteristics:

· Low overall complication rates (15-22% in prospective series)
· Predominance of low-grade complications (Grades I-II: 78-90%)
· Rare high-grade complications (Grades III-V: <10%)
· Zero mortality in all reviewed series

Limitations of the Clavien System

Despite its advantages, the Clavien classification system has limitations :

1. Negative outcomes excluded: Mild dysuria during the early postoperative period and retrograde ejaculation are considered sequelae rather than complications and are not recorded
2. Timing issues: The system does not capture long-term complications that occur beyond the standard 30-day postoperative period
3. Subjectivity in borderline cases: Distinguishing between Grade I and II complications may vary between observers

4. Need for further modifications: The system still requires further refinements for optimal performance in urologic procedures

Recommendations for Clinical Practice

Based on the reviewed evidence, the following recommendations are proposed:

1. Standardized reporting: All TURP outcomes research should utilize the modified Clavien system to enable data comparability
2. Preoperative risk assessment: Charlson Comorbidity Index should be calculated preoperatively to identify high-risk patients
3. 30-day follow-up: Complications should be systematically recorded for the first postoperative month
4. Long-term tracking: Separate systems should track late complications (urethral stricture, bladder neck contracture, retrograde ejaculation) beyond 30 days

## Conclusion

The modified Clavien Classification System has been validated as a practical, reproducible tool for grading complications following bipolar TURP. The system demonstrates that bipolar TURP is a safe procedure with low overall morbidity, predominantly low-grade complications, rare high-grade events, and negligible mortality.

The standardized application of the Clavien system enables meaningful comparisons between different surgical techniques and facilitates preoperative risk stratification. While bipolar TURP remains the gold standard for BPH surgical treatment, the Clavien classification reveals that newer enucleation techniques (B-TUERP, HoLEP) may offer safety advantages in terms of reduced Grade I and III complications.

All future TURP outcomes research should adopt the modified Clavien system for complication reporting to enhance data quality, comparability, and evidence synthesis across the urologic community.

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