

# INPLASY PROTOCOL

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**Corresponding author:**  
Milian Chen

milianchen.doctor@outlook.com

**Author Affiliation:**  
Shehong people's Hospital,  
Sichuan Province, People's  
Republic of China

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None declared.

## Comparison of holmium laser enucleation of prostate and transurethral resection of prostate in patients with benign prostatic hyperplasia: a systematic review and meta-analysis

Chen, F<sup>1</sup>; Chen, YJ<sup>2</sup>; Zou, YS<sup>3</sup>; Wang, YX<sup>4</sup>; Wu, XG<sup>5</sup>; Chen, M<sup>6</sup>.

**Review question / Objective:** Transurethral resection of the prostate (TURP) is the gold standard and classical method for the treatment of benign prostatic hyperplasia (BPH). In recent years, with the development of minimally invasive surgery, Holmium laser enucleation of the prostate (HoLEP) is considered as an alternative option. This meta-analysis aims to comprehensively evaluate the advantages and disadvantages of TURP and HoLEP in the treatment of BPH.

**INPLASY registration number:** This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 15 May 2023 and was last updated on 15 May 2023 (registration number INPLASY202350065).

### INTRODUCTION

**Review question / Objective:** Transurethral resection of the prostate (TURP) is the gold standard and classical method for the treatment of benign prostatic hyperplasia (BPH). In recent years, with the development of minimally invasive surgery,

Holmium laser enucleation of the prostate (HoLEP) is considered as an alternative option. This meta-analysis aims to comprehensively evaluate the advantages and disadvantages of TURP and HoLEP in the treatment of BPH.

**Condition being studied:** A considerable number of elderly patients suffer from benign prostatic hyperplasia (BPH), which can cause obvious lower urinary tract symptoms and seriously affect the lives of patients (1). In view of its efficacy and safety, transurethral resection of the prostate (TURP) has been the gold standard for the treatment of BPH in recent decades (2,3). With the development of science and technology, new surgical procedures have been explored and applied in clinic to reduce the possible harm to patients caused by TURP, such as postoperative bleeding and transurethral resection syndrome. Among these new surgical procedures, Holmium laser enucleation of the prostate (HoLEP) proposed by Gilling et al. (4) was once considered as an attractive alternative for TURP due to its shallow penetration and excellent hemostatic property.

Previous studies have compared HoLEP with TURP, but they failed to reach a unanimous conclusion. Some studies suggested that HoLEP can achieve better long-term curative efficacy and have a lower incidence of complications (5,6). However, the results obtained by Jhanwar et al. (7) did not support this view. In recent years, Zhong et al. (8) have conducted a systematic review to comprehensively analyze the advantages and disadvantages of HoLEP and TURP respectively. The results show that HoLEP offered safer clinical outcomes and better long-term relief of bladder outlet obstruction in patients with small to mid-sized prostates. However, none of the included randomized controlled trials (RCTs) in this systematic review compared the outcomes among patients with large prostate and patients on anticoagulants/antiplatelets.

In view of the above deficiencies, more RCTs were included in this meta-analysis, aiming to providing a detailed evaluation of HoLEP and TURP and finally obtain a more comprehensive and convincing conclusion.

## METHODS

**Participant or population:** Patients who have undergone transurethral resection of

the prostate (TURP) or holmium laser enucleation of the prostate (HoLEP).

**Intervention:** transurethral resection of the prostate (TURP) or holmium laser enucleation of the prostate (HoLEP).

**Comparator:** transurethral resection of the prostate (TURP) or holmium laser enucleation of the prostate (HoLEP).

**Study designs to be included:** Randomized Controlled Trials.

**Eligibility criteria:** None.

**Information sources:** PubMed, Cochrane Library, EMBASE and Web of Science databases.

**Main outcome(s):** Primary outcomes: data related to curative efficacy as follows: maximum urinary flow rate (Q<sub>max</sub>), post-void residual volume (PVR), the International Prostate Symptom Score (IPSS).

**Quality assessment / Risk of bias analysis:** Cochrane Collaboration tool (Cochrane, London, UK).

**Strategy of data synthesis:** The meta-analysis was conducted using Review Manager Software (Revman 5.4, Cochrane Collaboration, Oxford, United Kingdom). Continuous data was expressed by weighted mean difference (WMD) and 95% confidence interval (CI). If the mean was too different or the unit of measurement was inconsistent, the data was expressed by standard Mean Difference (SMD) and 95% CI. For dichotomous variable data, we used the Mantel-Haenszel method (11). Cochran's Q test and Higgins' I<sup>2</sup> statistical test were used to assess the statistical heterogeneity. The results showed low level of heterogeneity when I<sup>2</sup> < 50%, and a fixed-effects model would be used. The results showed significant heterogeneity when I<sup>2</sup> ≥ 50%, then sensitivity analysis and subgroup analysis would be conducted to find the source of the heterogeneity. If the heterogeneity could not be eliminated,

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a random-effects model that estimated the uncertainty of results with sampling error and studies variance would be used. Descriptive analysis was used for data that cannot be merged. The results of each data item are visually represented using a forest plot.

**Subgroup analysis:** None.

**Sensitivity analysis:** We explored the extent to which the studies influenced the combined effect size and the robustness of the results by excluding one study at a time, recalculating the combined effect size and comparing it with the results of the meta-analysis before the exclusion. If the results did not change significantly after the exclusion, the sensitivity was considered to be low and the results were regarded as more robust and credible. Conversely, if the exclusion yielded widely different or even diametrically opposed conclusions, we considered this to indicate higher sensitivity and less robust results; therefore, great care was taken when interpreting the results and drawing conclusions. In this case, the results suggested the presence of important and potentially biasing factors related to the effect of the intervention, which required further clarification of the source of these factors and adjustment of possible influencing factors in subgroup analysis.

**Country(ies) involved:** China.

**Keywords:** transurethral resection; holmium laser enucleation; benign prostatic hyperplasia; meta-analysis.

**Contributions of each author:**

Author 1 - Feng Chen.

Author 2 - Yijin Chen.

Author 3 - Yongsheng Zou.

Author 4 - Yunxiao Wang.

Author 5 - Xiaogang Wu.

Author 6 - Milian Chen.