Original Article

# A systematic review and meta-analysis of efficacy and safety comparing holmium laser enucleation of the prostate with transurethral resection of the prostate for patients with prostate volume less than 100 mL or 100 g

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**Background:** To assess the efficacy and safety of holmium laser enucleation of the prostate (HoLEP) and transurethral resection of the prostate (TURP) for patients with prostate volume less than 100 mL or 100 g.

**Methods:** We searched PubMed, Embase, Cochrane Library and Web of Science from inception to July 2021 to collect randomized controlled trials. Two reviewers independently screened the literature, extracted data, and assessed the risk of bias of the included studies by using the Cochrane risk of bias tool. Review Manager 5.3 software was used for meta-analysis. We synthesised effect estimates using risk ratios (RR), mean difference (MD), and standardized mean differences (SMD).

**Results:** A total of eight studies were included, involving 764 patients, 384 patients in the HoLEP group and 380 patients in the TURP group. The meta-analysis showed that the catheterization time (SMD =−1.44; 95% CI: −2.17 to −0.70; P=0.0001), hospital stay (SMD =−1.01; 95% CI: −1.58 to −0.44; P=0.0005), haemoglobin loss (MD =−0.29; 95% CI: −0.52 to −0.07; P=0.01), and transfusion rate (RR =0.16; 95% CI: 0.05–0.49; P=0.001) in the HoLEP group were lower than those in the TURP group. In addition, the 12-month postvoid residual volume (PVR) of the HoLEP group (MD =−9.93 95% CI: −18.59 to −1.27; P=0.02) were superior to the TURP group. Although the operation time of the HoLEP group was longer (MD =17.89; 95% CI: 9.18–26.60; P<0.0001), more tissues were removed (SMD =0.47; 95% CI: 0.10–0.85; P=0.01).

**Discussion:** Compared with TURP, HoLEP has a shorter catheterization time and hospital stay, with more tissue removed, a lower blood transfusion rate and better results in the short-term follow-up after surgery. Therefore, HoLEP has better efficacy and safety in the treatment of small- and medium-sized benign prostatic obstruction. Our results found that HoLEP is also suitable for patients with prostate volume <100 mL/100 g, suggesting that it is necessary to redefine the prostate size that is best for HoLEP. Overall, the certainty of evidence was assessed to be moderate to low due to potential risk of bias and inconsistent outcome indicators in some studies. More data on the efficacy of HoLEP and TURP on small- and medium-sized prostates are needed to determine the optimal prostate volume of HoLEP.

**Keywords:** Holmium laser enucleation of the prostate (HoLEP); transurethral resection of the prostate (TURP); benign prostatic obstruction; meta-analysis

 

Submitted Nov 13, 2021. Accepted for publication Feb 20, 2022.
doi: 10.21037/tau-21-1005
**View this article at:** https://dx.doi.org/10.21037/tau-21-1005

## Introduction

Lower urinary tract symptoms (LUTS) are a common complaint in adult men with a major impact on quality of life, and have a substantial economic burden (1). Benign prostatic obstruction (BPO) is a common cause of LUTS in older men, affecting more than one third of men over age 60 years (2). For these patients, surgical intervention is usually required when conservative treatment is not used to achieve satisfactory efficacy. Although the European Association of Urology (EAU) recommends transurethral resection of the prostate (TURP) as the first choice for BPO with a volume of 30–80 mL, TURP itself has many limits, such as perioperative bleeding and long hospital stay (1,3).

In recent decades, with the maturity of laser technology, laser enucleation and laser vaporisation resection have gradually been used in clinical practice, in particular holmium laser enucleation of the prostate (HoLEP), first described by Gilling *et al.* in 1998 (4,5). Several studies have shown that HoLEP has sufficient advantages; therefore, EAU recommends it as one of the current surgical standards for large-volume prostates (>80 mL) (1,6-8). However, for small- and medium-sized prostates (<80 mL), EAU still recommends TURP or transurethral incision of the prostate (TUIP) as the first choice (1).

In the past two decades, several meta-analyses have evaluated HoLEP and TURP, in which the prostate size ranged from tens to hundreds of g/mL (7,9-14). However, the previous meta-analyses were not analyzed according to prostate volume, and a large prostate volume can affect the efficacy of HoLEP and TURP, resulting in differences between the two surgery modalities (3,15,16). And there is a prevailing view that HoLEP is becoming the new gold standard for BPO (17,18). To become new gold standard, it is particularly important to compare the efficacy and safety of HoLEP and TURP for small- and medium-sized prostates (e.g., <100 mL/100 g).

The aim of this meta-analysis was to evaluate the efficacy and safety of HoLEP and TURP for patients with prostate volume less than 100 mL or 100 g. This study has been reported in line with Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting checklist (19) (available at https://tau.amegroups.com/article/view/10.21037/tau-21-1005/rc).

## Methods

### *Literature search strategy*

To identify published and unpublished trials, we used electronic databases including PubMed, Embase, Cochrane Library, and Web of Science (inception to July 2021) without language or date restrictions. The following keywords were used in the databases just cited: (randomized OR randomised) AND (prostat*) AND (Holmium OR HoLEP) AND (TURP OR transurethral resection OR bipolar OR monopolar OR plasmakinetic OR PKRP).

We registered the study at PROSPERO (identifier CRD42020196619).

### *Study selection criteria*

Studies selected for the meta-analysis met the following inclusion criteria: (I) randomized controlled trials (RCTs) comparing the efficacy and safety of HoLEP with TURP; and (II) prostate volume less than 100 mL/100 g. The exclusion criteria were as follows: (I) studies without available data; (II) studies with duplicated data; (III) studies updated in subsequent publications; and (IV) studies without merging analysis data.

### *Data abstraction*

Two authors independently carried out literature screening, evaluation, data extraction, and assessed the risk of bias of the included studies by using the Cochrane risk of bias tool. All disagreements were discussed and decided by the third author. The extracted content included the following: the first author, the year of publication, study area, the number of patients in each group, follow-up time, age, prostate size, perioperative outcomes including total operative time (min), catheterization time (days/h), hospital stay (days/h), resected tissue (g), haemoglobin loss (g/dL), blood transfusion rate, postoperative functional outcomes, including American Urological Association Symptom Score (AUA-SS), maximum urinary flow rate (Qmax, mL/s), postvoid residual

 

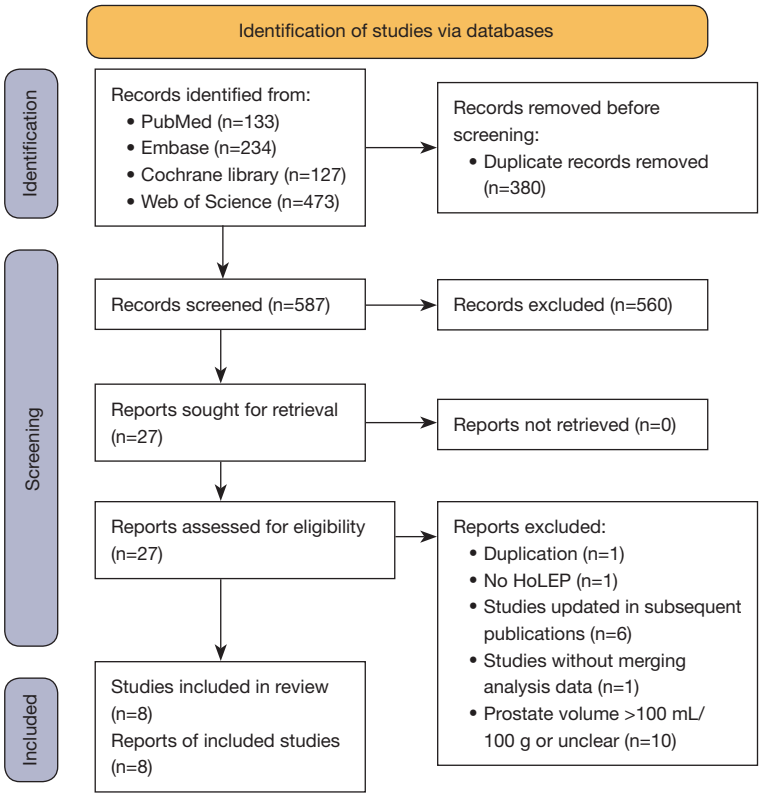


**Figure 1** Flow diagram of our study. HoLEP, holmium laser enucleation of the prostate.

volume (PVR, mL), quality of life (QoL), and complications including stress incontinence, urethral stricture, and bladder neck contracture.

### *Statistical analysis*

The statistical analyses were completed with Review Manager 5.3 software. All the variables that were available in more than one study were synthesized. Dichotomous variables were presented as the relative risk (RR) with a 95% confidence interval (CI), whereas continuous variables were expressed as the mean difference (MD) or standardized mean difference (SMD) with 95% CI. The quantity of statistical heterogeneity was tested by the $I^2$ statistic. When $I^2 \geq 50\%$ was regarded as the presence of heterogeneity, the source of heterogeneity was explored; if required, a random-effects model was conducted for meta-analysis. Otherwise, the fixed-effects model was conducted. Sensitivity analysis was performed to evaluate the stability of pooled results. Moreover, if more than 10 studies were included, funnel plots and Egger's method were used to detect publication bias at the same time; otherwise, Egger's method was used only. The GRADE approach (Grading of Recommendations, Assessment, Development and Evaluation) was used to grade the quality of evidence (20).

## Results

### *Study characteristics*

Following a screening of the available databases, 967 potentially relevant publications were identified, including 133 from PubMed, 234 from EMBASE, 127 from Cochrane Library, and 473 from Web of Science. Ultimately, 8 RCTs were selected for the study, including 384 cases of HoLEP and 380 cases of TURP. Only one study compared HoLEP and bipolar-TURP (B-TURP), and the other seven studies evaluated HoLEP and monopolar-TURP (M-TURP) (21-28). There was one study comparing the effect of HoLEP and TURP on sexual function, but all eight included studies had no sexual function data; therefore, the study was excluded (29). A flow diagram detailing the literature selection process is shown in *Figure 1*. The

 

**Table 1** Characteristics of the studies

| Study | Basic characteristics | | | | Inclusion criteria | | |
|---|---|---|---|---|---|---|---|
| | Study area | No. of patients (HoLEP/M-TURP) | Follow-up, months | Age, years | Prostate size | Qmax, mL/s | AUA-SS |
| Ahyai, 2007 | Europe | 100/100 | 36 | 68.0±7.3/68.7±8.2 | <100 mL | ≤12 | ≥12 |
| Basić, 2013 | Europe | 20/20 | 12 | 63.3±7.4/65.1±6.9 | <50 g | NA | ≥19 |
| El Gohary, 2021 | Africa | 30/30* | 12 | 67.23±6.84/68.47±6.21 | <100 mL | NA | NA |
| Eltabey, 2010 | Asia | 40/40 | 12 | 67.5±8.1/68.3±9.2 | 30–100 g | ≤15 | ≥12 |
| Hamouda, 2013 | Africa | 30/30 | 12 | 68.3±8.718/65.6±7.863 | 20–80 g | ≤15 | ≥12 |
| Rigatti, 2006 | Europe | 52/48 | 12 | 65.14±7.3/64.50±6.4 | <100 g | ≤15 | NA |
| Sayed, 2021 | Africa | 30/30 | 12 | 67.13±6.85/68.47±6.21 | <80 mL | NA | >19 |
| Sun, 2014 | Asia | 82/82 | 12 | 72.16±7.53/71.91±7.53 | <100 g | ≤10 | ≥8 |

*, HoLEP/Bipolar-TURP. HoLEP, holmium laser enucleation of the prostate; M-TURP, monopolar transurethral resection of the prostate; Qmax, maximum urinary flow rate; AUA-SS, American Urological Association Symptom Score; NA, not available.

characteristics of these 8 RCTs are listed in *Table 1*, and the risk of bias is shown in *Figure 2*.

### *Meta-analysis of perioperative outcomes*

#### Total operative time

Seven studies with 704 patients reported the operative time. There were 354 patients in the HoLEP group and 350 patients in the TURP group, and the HoLEP group was significantly associated with a longer operation time than the TURP group (MD =17.89; 95% CI: 9.18–26.60; P<0.0001) (*Figure 3A*).

#### Catheterization time

Eight studies with 764 patients reported catheterization time. There were 384 patients in the HoLEP group and 380 patients in the TURP group, and the HoLEP group was significantly associated with a shorter catheterization time than the TURP group (SMD =–1.44; 95% CI: –2.17 to –0.70; P=0.0001) (*Figure 3B*).

#### Hospital stay

Eight studies with 764 patients reported hospital stay. There were 384 patients in the HoLEP group and 380 patients in the TURP group, and the HoLEP group was significantly associated with a shorter hospital stay than the TURP group (SMD =–1.01; 95% CI: –1.58 to –0.44; P=0.0005) (*Figure 3C*).

#### Resected tissue

Eight studies with 764 patients reported the weight/volume of resected tissue. There were 384 patients in the HoLEP group and 380 patients in the TURP group, and the HoLEP group was significantly associated with more resected tissue than the TURP group (SMD =0.47; 95% CI: 0.10–0.85; P=0.01) (*Figure 4A*).

#### Haemoglobin loss

Seven studies with 600 patients reported the outcome of haemoglobin loss. There were 302 patients in the HoLEP group and 298 patients in the TURP group, and the HoLEP group exhibited lower haemoglobin loss than the TURP group (MD =–0.29; 95% CI: –0.52 to –0.07; P=0.01) (*Figure 4B*).

#### Blood transfusion rate

All eight studies with 764 patients reported the blood transfusion rate. There were 384 patients in the HoLEP group and 380 patients in the TURP group, and the HoLEP group exhibited a lower blood transfusion rate than the TURP group (RR =0.16; 95% CI: 0.05–0.49; P=0.001) (*Figure 4C*).

### *Meta-analysis of functional outcomes*

#### AUA-SS

All eight studies reported the 12-month AUA-SS, five

 

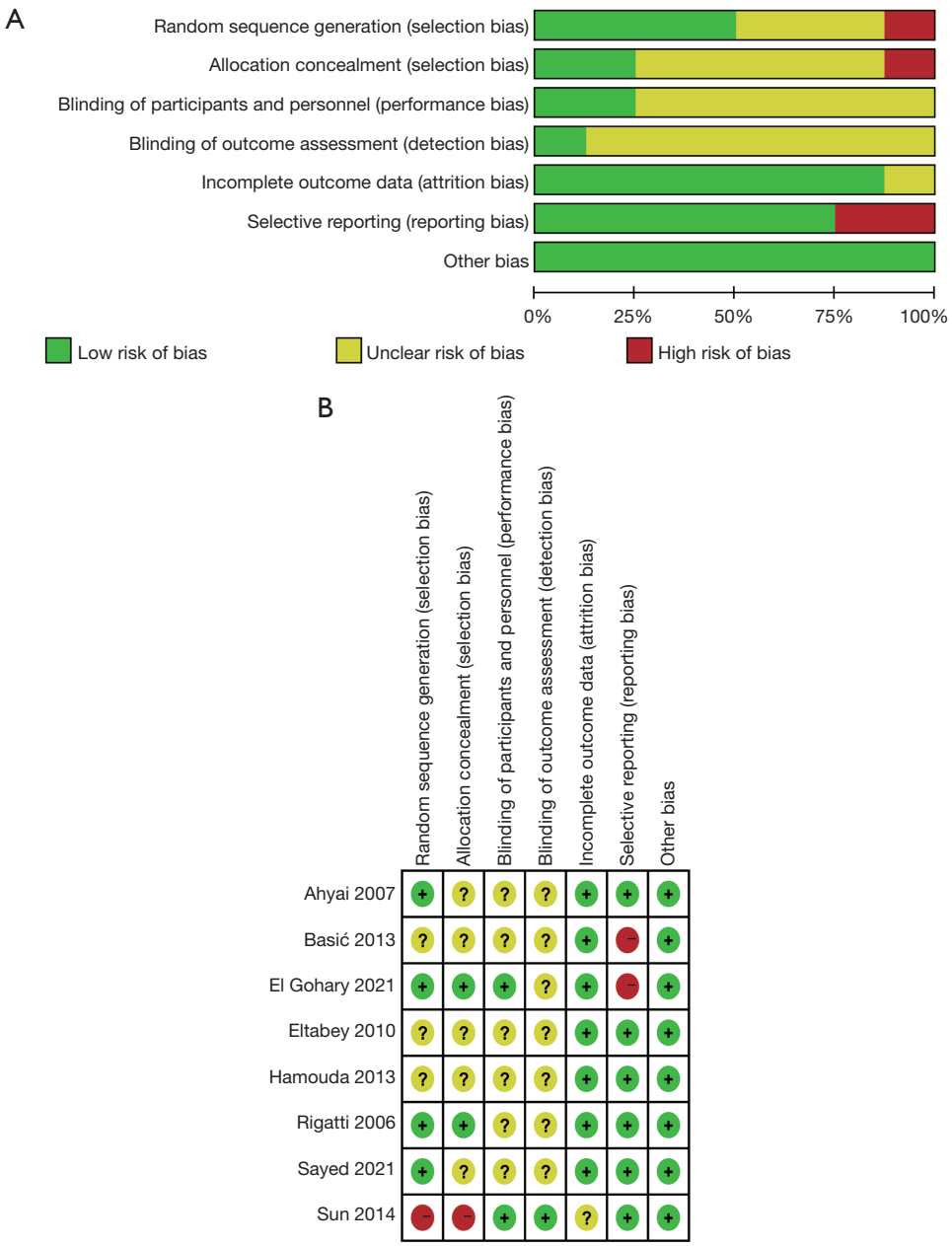


**Figure 2** Risk of bias of included studies. (A) Risk of bias graph; (B) risk of bias summary.

studies compared the 6-month AUA-SS, two studies assessed the 3-month AUA-SS and seven studies reported the 1-month AUA-SS after surgery between HoLEP and TURP. The meta-analysis results showed that there were no significant differences between HoLEP and TURP (*Figure 5*).

### Qmax

Six studies reported the 12-month and 1-month Qmax, and four studies compared the 6-month Qmax after surgery between HoLEP and TURP. The meta-analysis results showed that there were no significant differences between HoLEP and TURP (*Figure 6*).

 

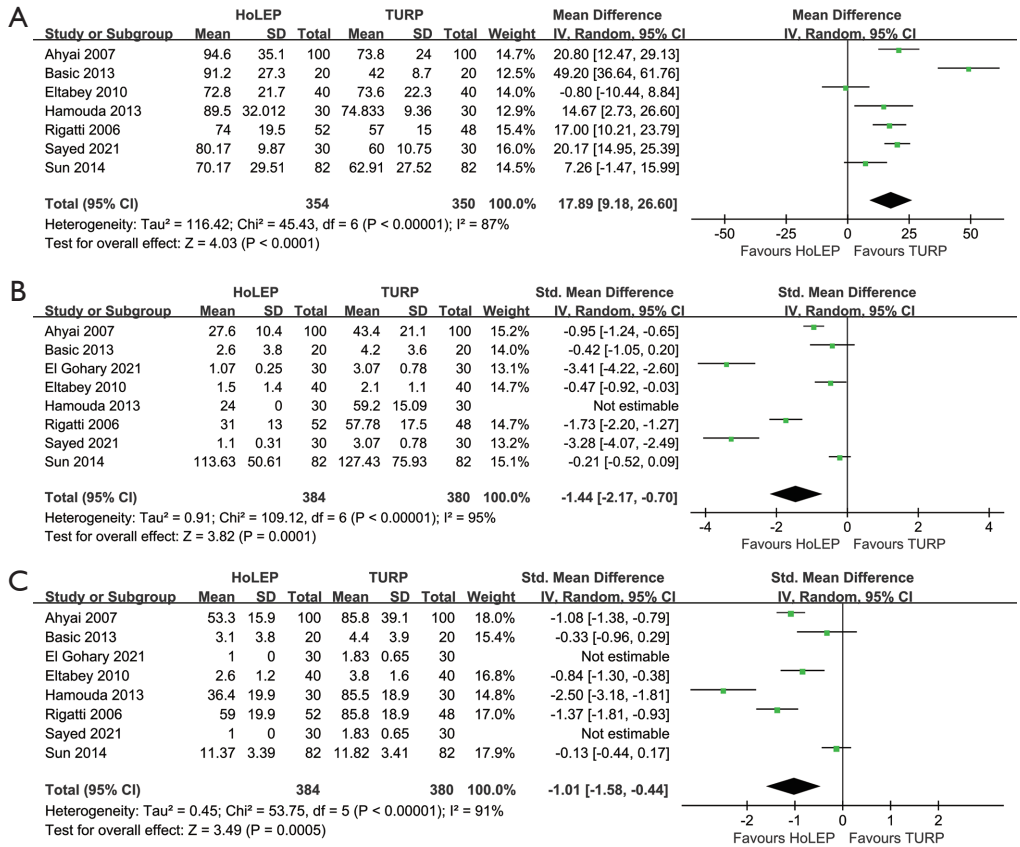


**Figure 3** Meta-analysis of perioperative outcomes. (A) Total operative time; (B) catheterization time; (C) hospital stay.

### PVR

Only five studies reported the 12-month PVR, four studies compared the 6-month PVR, two studies assessed the 3-month PVR, and six studies reported the 1-month PVR after surgery between HoLEP and TURP. The meta-analysis results indicated that the 12-month PVR (MD =−9.93; 95% CI: −18.59 to −1.27; P=0.02) and the 6-month PVR (MD =−9.78; 95% CI: −18.20 to −1.36; P=0.02) in HoLEP was significantly superior to TURP (*Figure 7*).

### QoL

Only four studies reported the 12-month QoL, two studies compared the 6-month QoL, and three studies reported the 1-month QoL after surgery between HoLEP and TURP. The meta-analysis results indicated that there were no significant differences between HoLEP and TURP (*Figure 8*).

## *Meta-analysis of complications*

The pooled results showed no significant difference between the HoLEP and TURP groups with respect to stress incontinence, urethral stricture, and bladder neck contracture (*Figure 9*).

## *Subgroup analysis, sensitivity analysis, publication bias and summary of findings*

### Subgroup analysis

Subgroup analysis was performed according to study area, prostate volume and monopolar /bipolar TURP. In the eight included studies, three were in Europe, three in Africa and two in Asia. Three studies specified that patients with prostate volume <80 mL/80 g in the inclusion criteria could be classified as the group with prostate volume <80 mL/80 g, and the remaining five were classified as the group with prostate volume not <80 mL/80 g. One study compared HoLEP and B-TURP, and the remaining seven studies compared HoLEP and M-TURP. Subgroup analysis was performed on the perioperative outcomes, 12-month AUA-SS, PVR and QoL, which exhibited significant

 

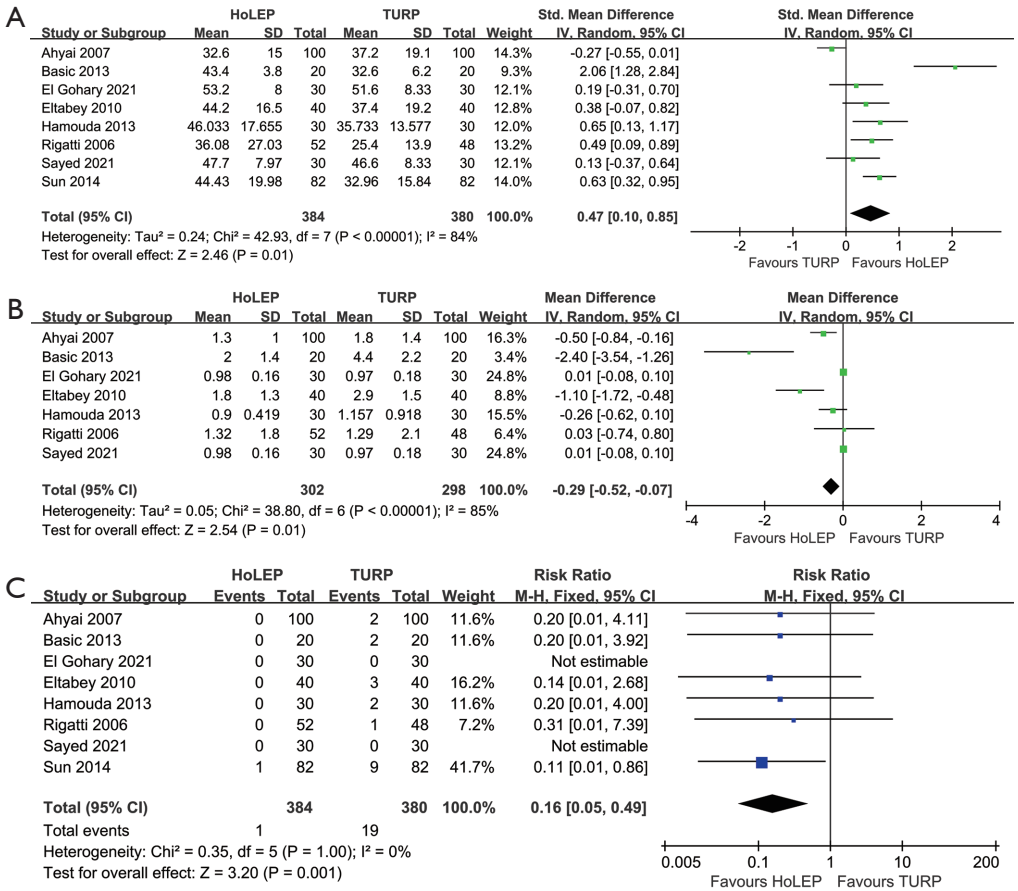


**Figure 4** Meta-analysis of perioperative outcomes. (A) Resected tissue; (B) haemoglobin loss; (C) blood transfusion rate.

heterogeneity in the meta-analysis results. The results showed that the heterogeneity of some outcomes decreased after subgroup analysis, but it was still high.

### Sensitivity analysis

Sensitivity analysis was performed by re-evaluating the meta-analysis omitting each study in turn for perioperative outcomes, complications and postoperative 12-month functional outcomes. The meta-analysis results of haemoglobin loss, 12-month PVR and 12-month AUA-SS showed relatively poor stability (*Figure 10*).

### Publication bias

The Egger's method was used to evaluate publication bias since fewer than 10 articles were included (30). The results showed that the P values of haemoglobin loss (P=0.018), blood transfusion rate (P=0.02) and total operative time (P=0.077) were <0.1, indicating the possible existence of publication bias.

### Summary of findings

GRADEpro GDT was used to assess the evidence from systematic reviews (31), and all results are listed in Tables S1,S2.

## Discussion

Our study is the first meta-analysis to evaluate the efficacy and safety of HoLEP and TURP for patients with prostate volume less than 100 mL or 100 g. There were eight studies included in our study, and the results of this study show that, compared with TURP, HoLEP have a shorter perioperative hospital stay (moderate-certainty evidence) and catheterization time (low-certainty evidence), lower haemoglobin loss (low-certainty evidence) and blood transfusion rate (moderate-certainty evidence), more tissue removed (moderate-certainty evidence), and less 12-month PVR (moderate-certainty evidence). Moreover, HoLEP did not increase the incidence of adverse events

 

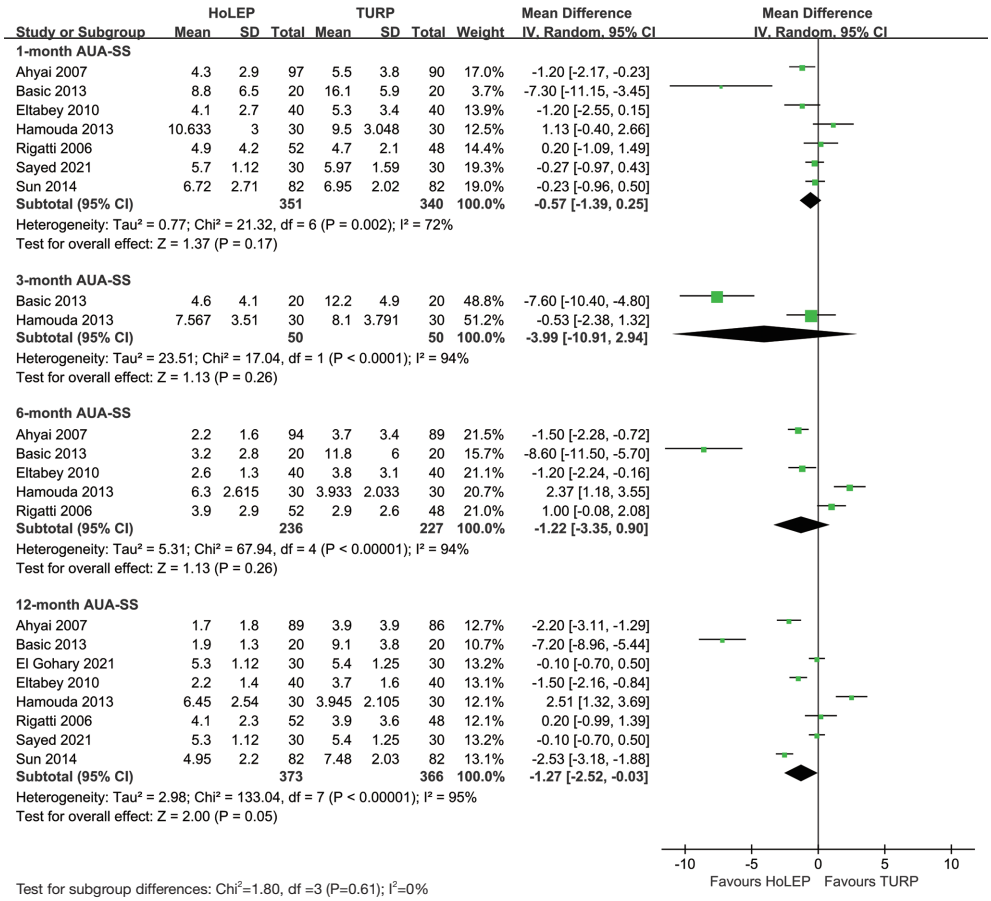


**Figure 5** Meta-analysis of AUA-SS. AUA-SS, American Urological Association Symptom Score.

(moderate-/low-certainty evidence). Therefore, the results of this study support the treatment of patients with prostate volume <100 mL/100 g by HoLEP.

Tan *et al.*'s study was the first meta-analysis comparing HoLEP and TURP, including four RCTs (9). The results of this study suggested that HoLEP had better perioperative outcomes, which was also confirmed by subsequent meta-analyses, and the results of subsequent meta-analysis suggested that HoLEP had certain advantages in functional outcomes (7,10-14). However, the studies included in these meta-analyses were not analyzed according to prostate volume, and a large prostate volume can affect the efficacy of HoLEP and TURP, resulting in differences between the two surgery modalities (3,15,16). Our study was designed to compare the effects of HoLEP and TURP on patients with a prostate volume of less than 100 mL/100 g, and this was the major difference from previous meta-analyses.

According to the results of our study, compared with TURP, the main advantage of HoLEP was perioperative outcomes. Among all eight included studies, seven compared HoLEP and M-TURP, and only one compared HoLEP and B-TURP, including 30 B-TURP patients (23). After removing the B-TURP data, the results of the meta-analysis did not change significantly. B-TURP is the most widely and thoroughly investigated alternative to M-TURP, and the main advantages of B-TURP are also reflected in perioperative outcomes (32,33). Our results cannot completely represent the whole TURP population due to the lack of B-TURP patients, and the grade of evidence in our study is mostly moderate and low. Therefore, the results of this study should be used with caution and need to be further verified.

There are several possible reasons for these differences between HoLEP and TURP. Firstly, TURP cuts blood vessels during each resection process, which causing bleeding, while HoLEP cuts the tissue along the potential

 

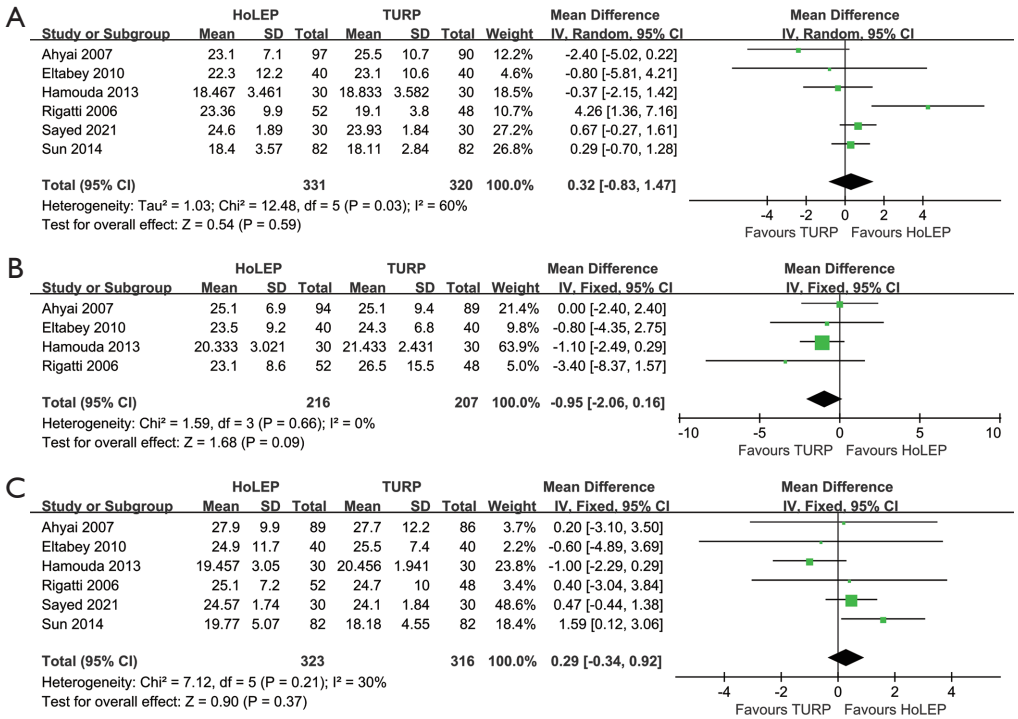


**Figure 6** Meta-analysis of Qmax. (A) 1-month Qmax; (B) 6-month Qmax; (C) 12-month Qmax. Qmax, maximum urinary flow rate.

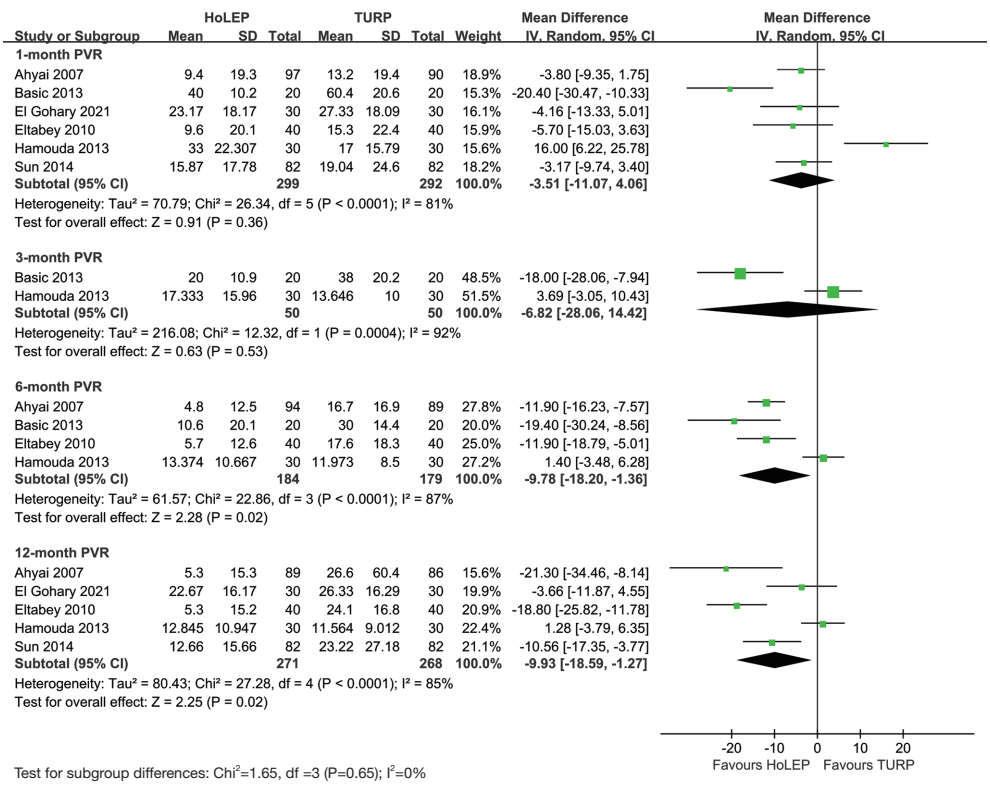


**Figure 7** Meta-analysis of PVR. PVR, postvoid residual volume.

 

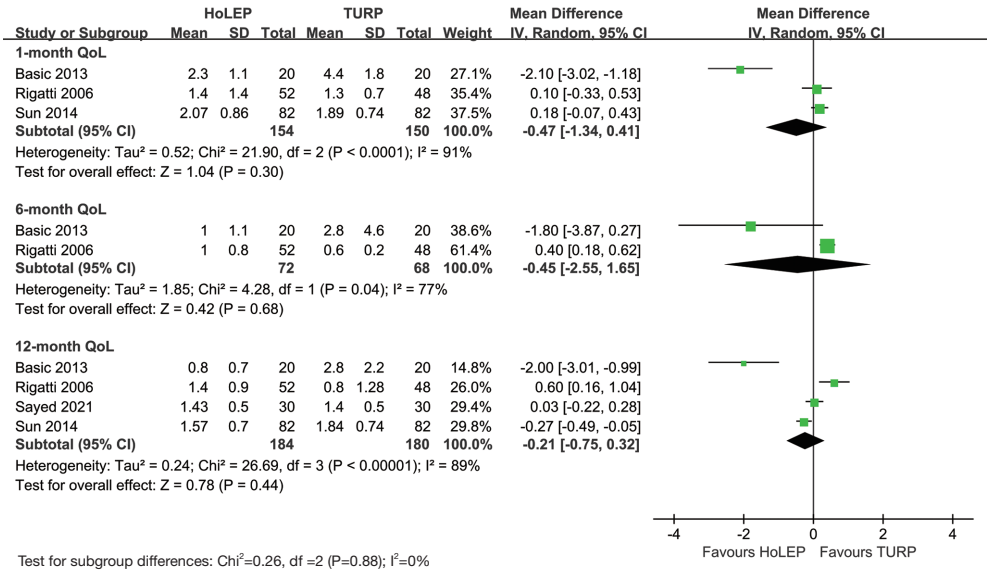


**Figure 8** Meta-analysis of QoL. QoL, quality of life.

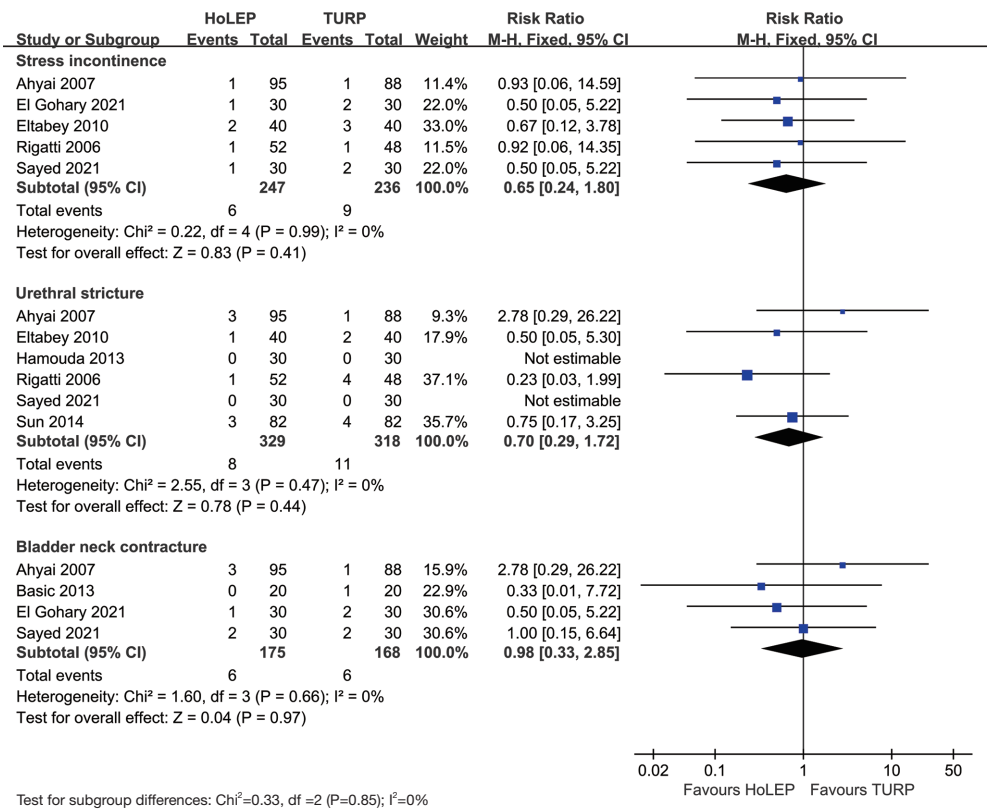


**Figure 9** Meta-analysis of complications.

 

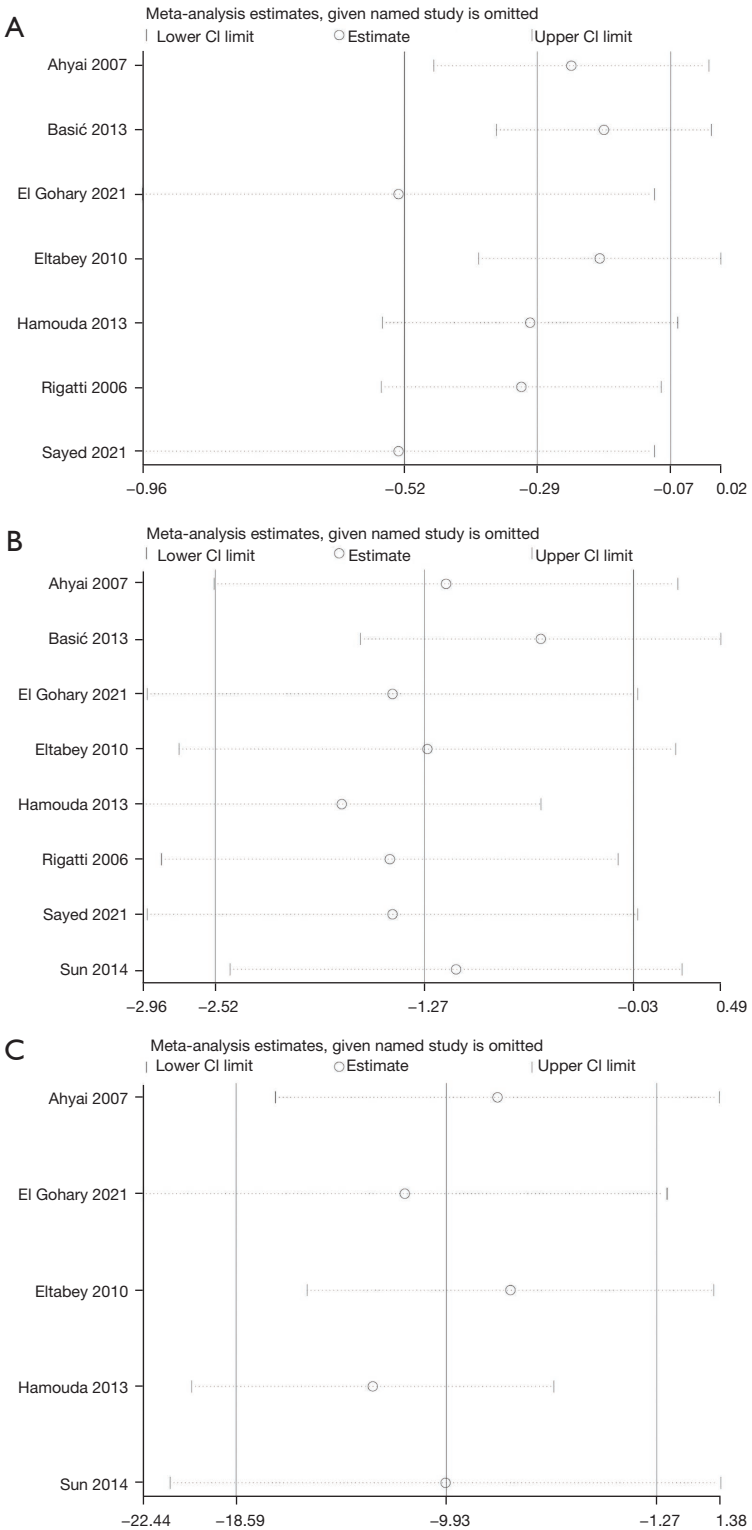


**Figure 10** Sensitivity analysis of haemoglobin loss, 12-month PVR and 12-month AUA-SS. (A) Haemoglobin loss; (B) 12-month PVR; (C) 12-month AUA-SS. PVR, postvoid residual volume; AUA-SS, American Urological Association Symptom Score.

 

gap of the prostate capsule, avoiding the blood vessels in the prostatic tissue; meanwhile, holmium laser can coagulate blood vessels while cutting and produce a tissue coagulation layer of about 3 mm, producing better hemostasis performance (34-36). Secondly, the pulse wavelength of the Ho: YAG laser is 2,140 nm, and the pulse energy can be absorbed by water during the endoscopic operation with normal saline irrigation, which only produces a penetration depth of 0.4 mm and has good safety (6,37). Thirdly, the weight of prostate tissue removed by HoLEP is similar to open prostatectomy (38), suggesting that HoLEP could remove more prostate tissue than TURP. Therefore, HoLEP has better perioperative outcomes and short-term follow-up outcomes than TURP. At last, the operation time of HoLEP includes enucleation time and tissue morcellation time, and tissue morcellation time occupies 18–30% of the total operation time (16). At the same time, the proficiency of the surgeon significantly affects the surgical process of HoLEP (39). These two reasons may lead to a longer operative time of HoLEP.

In the review process, all our processes were completed by two authors independently, and any bias was discussed and decided by the third author to reduce the potential bias. Ultimately, eight studies were included in this paper. However, only three studies included more than 100 patients, and they together accounted for 61% (464/764) of the total patients. Most of the studies did not describe the randomization and blinding methods in detail, one study used the high-risk randomization and blinding methods, and the possibility of selective reporting existed in the two studies. At the same time, in the process of data extraction, we avoided using any means of data transformation to reduce the risk of potential bias.

There are some limitations of our study: (I) the inclusion and exclusion criteria, sample size and experimental design of each study were different, which may lead to high heterogeneity of some outcomes; (II) there were only eight studies that met the standards, and just one study compared HoLEP and B-TURP, and the comparison between HoLEP and B-TURP could not be meta-analyzed; (III) some studies did not provide complete and detailed information on perioperative outcomes, postoperative functional outcomes and complications; (IV) all the included studies did not have sexual function data, and the effect of HoLEP and TURP on sexual function could not be evaluated; (V) most of the studies only provided short-term follow-up data, no mid- and long-term follow-up data, and it was impossible to compare the mid- and long-term effects of HoLEP and TURP.

## Conclusions

For LUTS patients with a prostate volume less than 100 mL/100 g, HoLEP has a shorter catheterization time, shorter hospital stay, higher safety, and more prostate tissue removed. At the same time, in terms of postoperative efficacy, HoLEP has less PVR at 6 and 12 months, and the other efficacy outcomes and complications are not inferior to TURP. Therefore, for patients with small- and medium-sized prostates, HoLEP may be a better choice. The results of this study should be used with caution because the RCT numbers included in this study are limited, the evidence is mostly moderate and low grade, and there are few B-TURP patients, which need to be verified by further studies in the future. Our results found that HoLEP is also suitable for patients with prostate volume <100 mL/100 g, suggesting that it is necessary to redefine the prostate size that is best for HoLEP.

## Acknowledgments

*Funding:* None.

## Footnote

*Reporting Checklist:* The authors have completed the PRISMA reporting checklist. Available at https://tau.amegroups.com/article/view/10.21037/tau-21-1005/rc

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at https://tau.amegroups.com/article/view/10.21037/tau-21-1005/coif). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.



 

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**Cite this article as:** Chen J, Dong W, Gao X, Li X, Cheng Z, Hai B, Pang Z. A systematic review and meta-analysis of efficacy and safety comparing holmium laser enucleation of the prostate with transurethral resection of the prostate for patients with prostate volume less than 100 mL or 100 g. Transl Androl Urol 2022;11(4):407-420. doi: 10.21037/tau-21-1005

 

## Supplementary

**Table S1** Summary of findings for perioperative outcomes: HoLEP compared to TURP for patients with prostate volume less than 100 mL or 100 g

| Outcome | No. of participants | Studies | Relative effect (95% CI) | Anticipated absolute effects (95% CI) | | | Certainty | What happens |
|---|---|---|---|---|---|---|---|---|
| | | | | Without HoLEP | With HoLEP | Difference | | |
| Total operative time | 704 | 7 RCTs | – | The mean total operative time ranged from 42–75 min | – | MD 17.89 min, higher (9.18 higher to 26.6 higher) | ⊕⊕⊕◯, moderate[a] | |
| Catheterization time | 764 | 8 RCTs | – | – | – | SMD 1.44 SD, lower (2.17 lower to 0.7 lower) | ⊕⊕◯◯, low[a,b] | |
| Hospital stay | 764 | 8 RCTs | – | – | – | SMD 1.01 SD, lower (1.58 lower to 0.44 lower) | ⊕⊕⊕◯, moderate[a] | |
| Resected tissue | 764 | 8 RCTs | – | – | – | SMD 0.47 SD, higher (0.1 higher to 0.85 higher) | ⊕⊕⊕◯, moderate[a] | |
| Haemoglobin loss | 600 | 7 RCTs | – | The mean haemoglobin loss ranged from 0.9–4.4 g/dL | – | MD 0.29 g/dL, lower (0.52 lower to 0.07 lower) | ⊕⊕◯◯, low[a,b] | |
| Transfusion rate | 764 | 8 RCTs | RR 0.16 (0.05–0.49) | | Study population | | ⊕⊕⊕◯, moderate[b] | |
| | | | | 5.0% | 0.8% (0.3–2.5) | 4.2% fewer (4.8 fewer to 2.6 fewer) | | |
| | | | | | High | | | |
| | | | | 11.0%[c] | 1.8% (0.6–5.4) | 9.2% fewer (10.4 fewer to 5.6 fewer) | | |

Patient or population: patients with prostate volume less than 100 mL or 100 g; Setting: urology male patient; Intervention: HoLEP; Comparison: TURP. GRADE Working Group grades of evidence: high certainty, we are very confident that the true effect lies close to that of the estimate of the effect; moderate certainty, we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different; low certainty, our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect; very low certainty, we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect. [a], there is significant heterogeneity; [b], there may be publication bias; [c], the value is the extreme number in the control group from the studies included in the review. *, the risk in the intervention group (and its 95% CI) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI). CI, confidence interval; MD, mean difference; RR, risk ratio; SMD, standardised mean difference.


https://dx.doi.org/10.21037/tau-21-1005

**Table S2** Summary of findings for postoperative functional outcomes and complications: HoLEP compared to TURP for patients with prostate volume less than 100 mL or 100 g

| Outcome | No. of participants | Studies | Relative effect (95% CI) | Anticipated absolute effects (95% CI) | | | Certainty | What happens |
|---|---|---|---|---|---|---|---|---|
| | | | | Without HoLEP | With HoLEP | Difference | | |
| 12-month AUA-SS | 739 | 8 RCTs | – | The mean 12-month AUA-SS ranged from 3.7–9.1 | – | MD 1.27 lower (2.52 lower to 0.03 lower) | ⊕⊕⊕◯, moderate[a] | |
| 12-month Qmax | 639 | 6 RCTs | – | The mean 12-month Qmax ranged from 18–28 mL/s | – | MD 0.29 mL/s, higher (0.34 lower to 0.92 higher) | ⊕⊕⊕◯, moderate[b] | |
| 12-month PVR | 539 | 5 RCTs | – | The mean 12-month PVR ranged from 11–27 mL | – | MD 9.93 mL, lower (18.59 lower to 1.27 lower) | ⊕⊕⊕◯, moderate[a] | |
| 12-month QoL | 364 | 4 RCTs | – | The mean 12-month QoL ranged from 0.8–2.8 | – | MD 0.21 lower (0.75 lower to 0.32 higher) | ⊕◯◯◯, very low[a,b,c] | |
| Stress incontinence | 483 | 5 RCTs | RR 0.65 (0.24 to 1.80) | Study population | | | ⊕⊕⊕◯, moderate[e] | |
| | | | | 3.8% | 2.5% (0.9 to 6.9) | 1.3% fewer (2.9 fewer to 3.1 more) | | |
| | | | | High | | | | |
| | | | | 7.5%[d] | 4.9% (1.8 to 13.5) | 2.6% fewer (5.7 fewer to 6 more) | | |
| Urethral stricture | 647 | 6 RCTs | RR 0.70 (0.29 to 1.72) | Study population | | | ⊕⊕⊕◯, moderate[e] | |
| | | | | 3.5% | 2.4% (1 to 5.9) | 1.0% fewer (2.5 fewer to 2.5 more) | | |
| | | | | High | | | | |
| | | | | 8.3%[d] | 5.8% (2.4 to 14.3) | 2.5% fewer (5.9 fewer to 6 more) | | |
| Bladder neck contracture | 343 | 4 RCTs | RR 0.98 (0.33 to 2.85) | Study population | | | ⊕⊕◯◯, low[c,e] | |
| | | | | 3.6% | 3.5% (1.2 to 10.2) | 0.1% fewer (2.4 fewer to 6.6 more) | | |
| | | | | High | | | | |
| | | | | 6.7%[d] | 6.6% (2.2 to 19.1) | 0.1% fewer (4.5 fewer to 12.4 more) | | |

Patient or population: patients with prostate volume less than 100 mL or 100 g; Setting: Urology male patient; Intervention: HoLEP; Comparison: TURP. GRADE Working Group grades of evidence: high certainty, we are very confident that the true effect lies close to that of the estimate of the effect; noderate certainty, we are moderately confident in the effect estimate: the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different; low certainty: our confidence in the effect estimate is limited: the true effect may be substantially different from the estimate of the effect; very low certainty: we have very little confidence in the effect estimate: the true effect is likely to be substantially different from the estimate of effect. [a], there is significant heterogeneity; [b], there may be publication bias; [c], only four studies are included, and some studies rated as having a high risk of bias; [d], the value is the extreme number in the control group from the studies included in the review; [e], with wide confidence intervals. *, the risk in the intervention group (and its 95% CI) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI). CI, confidence interval; MD, mean difference; RR, risk ratio.


https://dx.doi.org/10.21037/tau-21-1005