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Ureteroplasty for the Repair of Ureteral Stricture Using Lingual Mucosa and Buccal Mucosa Grafts: A Meta-Analysis

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Keywords

Buccal mucosa · Lingual mucosa · Oral mucosa · Ureteral stenosis · Ureteral reconstruction · Ureteroplasty · Meta-analysis

Abstract

Introduction: The study aims to analyze the outcomes of buccal mucosa and lingual mucosa graft reconstruction for repairing ureteral strictures, assessing the efficacy and safety of both surgical approaches. ***Methods:*** A computer search was conducted on PubMed, Embase, and Web of Science using keywords such as "buccal mucosa," "lingual mucosa," "oral mucosa," "ureteral stenosis," and "ureteral reconstruction" to gather relevant literature on lingual mucosa and the efficacy of buccal mucosal reconstruction for ureteral repair. The search spanned from January 2000 to March 2024, focusing on experiments that assessed lingual mucosa graft ureteroplasty (LMGU) or buccal mucosa graft ureteroplasty (BMGU). Variables examined included reconstruction success rate, intraoperative blood loss, stricture length, and perioperative complications. Sensitivity analysis was employed to assess result stability, while funnel plots were utilized to evaluate publication bias in the literature. ***Results:*** A total of 16 single-arm studies were included in the analysis. The combined reconstruction success rates for the LMGU group and BMGU group were 99% (95% CI: 95%–100%) and 95% (95% CI: 91%–98%), respectively. The mean operation time for the LMGU group was 208.62 min (95% CI: 181.56–235.68) and for the BMGU group was 190.65 min (95% CI: 164.38–216.93). Intraoperative blood loss volumes for the LMGU group and BMGU group were 62.33 mL (95% CI: 43.15–81.51) and 113.44 mL (95% CI: 77.64–146.23), respectively. Stenosis lengths in the LMGU group and BMGU group were 3.98 cm (95% CI: 3.27–4.69) and 4.12 cm (95% CI: 3.24–5) respectively, with a maximum stenosis length repaired of 8 cm in both groups. The incidence of postoperative complications was 25% (95% CI: 15%–36%) in the BMGU group and 18% (95% CI: 11%–26%) in the LMGU group. ***Conclusion:*** LMGU and BMGU are both effective and safe surgical methods for the treatment of long-segment ureteral stenosis. They have shown high effectiveness in treating mid- and upper-segment ureteral stenosis ≤8 cm.

Introduction

Ureteral stricture is characterized by a narrowing of the ureteral lumen, resulting in obstruction of urine outflow and subsequent upper urinary tract obstruction and hydronephrosis. This condition can be caused by congenital

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developmental abnormalities, iatrogenic injuries, and the presence of long-term embedded stones [1]. The incidence of iatrogenic ureteral injury is gradually increasing due to the development of endoscopic technology and the rise in radiotherapy to the pelvic ureteral area [2, 3]. This has been a significant challenge for urological surgeons over time. Ureteral reconstruction has traditionally been considered the preferred treatment for ureteral strictures. In cases where patients are not suitable for direct end-to-end anastomosis, autologous patch ureteral reconstruction has emerged as a standard procedure for repairing the ureter. Since Naude's [4] initial report on the use of buccal mucosa for ureteral stenosis repair in 1999, followed by Simonato et al.'s [5] report on lingual mucosa reconstruction for the same purpose in 2006, this procedure has become a common practice in numerous medical facilities [6–8]. While lingual mucosa and buccal mucosa have been identified as optimal tissues for repairing ureteral stricture [9, 10], there remains a lack of comprehensive review reports regarding the preferred surgical approach for patients with this condition. Recently, oral mucosal reconstruction for ureteral repair has garnered attention and shown promising outcomes, potentially influencing the management of ureteral stricture. As such, we undertook a systematic review and meta-analysis to evaluate the efficacy and safety of these two surgical methods in treating ureteral stricture.

Methods

This meta-analysis was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines [11], and the protocol was registered a priori in PROSPERO, an international prospective register of systematic reviews (CRD42024536265 PROSPERO [york.ac.uk]).

Search Strategy

A systematic database search was conducted in PubMed, Embase, and Web of Science to identify eligible studies from January 1, 2000, to March 1, 2024. The predefined search terms included "buccal mucosa," "lingual mucosa," "ureteral stricture," and "ureteroplasty." Additionally, a manual search of eligible references was performed without any language restrictions in the search strategy.

Study Selection

We employed specific inclusion criteria to encompass studies focusing on LMGU or BMGU in patients with ureteral stenosis. The exclusion criteria are as follows: (1) duplicate studies; (2) multiple publication from the same study population; (3) less than or equal to 6 patients participated in the experiment; (4) case report or review; (5) the literature lacks data reporting.

Two authors (X.Z. and L.X.) conducted an electronic database search and screened relevant studies by reviewing titles and abstracts. Full-text evaluation of the selected literature was then carried out to determine inclusion or exclusion. Any discrepancies between the two authors were resolved by the third author (H.X. and Y.Y.) through discussion to reach a consensus.

The criteria for measuring success are usually clinical success (no clinical symptoms, such as waist and abdominal pain) and imaging success (CT or B-ultrasound showing alleviate in the degree of hydronephrosis). In this study, we prespecified the following primary outcomes: (1) success rate as determined by the number of patients with clinical and radiographic success during follow-up; (2) intraoperative measurement of stenosis length; (3) surgical evaluation using the Clavien-Dindo classification Grade of postoperative complications; (4) bleeding amount.

Data Extraction and Management

Relevant information was extracted from the included studies by two authors independently (X.Z. and L.X.) and included: authors, publication year, study design, patient characteristics, surgical interventions, operative time to success, and other primary outcome measures were documented in Microsoft Excel 2021. The participants were divided into LMGU and BMGU groups based on different surgical interventions. Data merging and analysis were conducted using Stata/MP 14.0 with metan and metaprop. A random effects model was used due to heterogeneity among studies for result analysis.

Subgroup Analysis

Subgroup analysis was conducted to compare success rates, operative times, blood loss, stricture lengths, hospital stays, and postoperative complications among different surgical interventions (LMGU, BMGU). Median and range were used for continuous statistics to estimate the pooled mean value. Inter-study heterogeneity was categorized into three levels based on I^2: low (25%–50%), medium (50%–75%), and high (>75%).

Risk of Bias

Since all the studies included in this meta-analysis were single-group studies without a control group, two researchers (X.Z. and L.X.) independently performed quality assessment of each included study using the Methodological Index for Non-Randomised Studies tool [12].

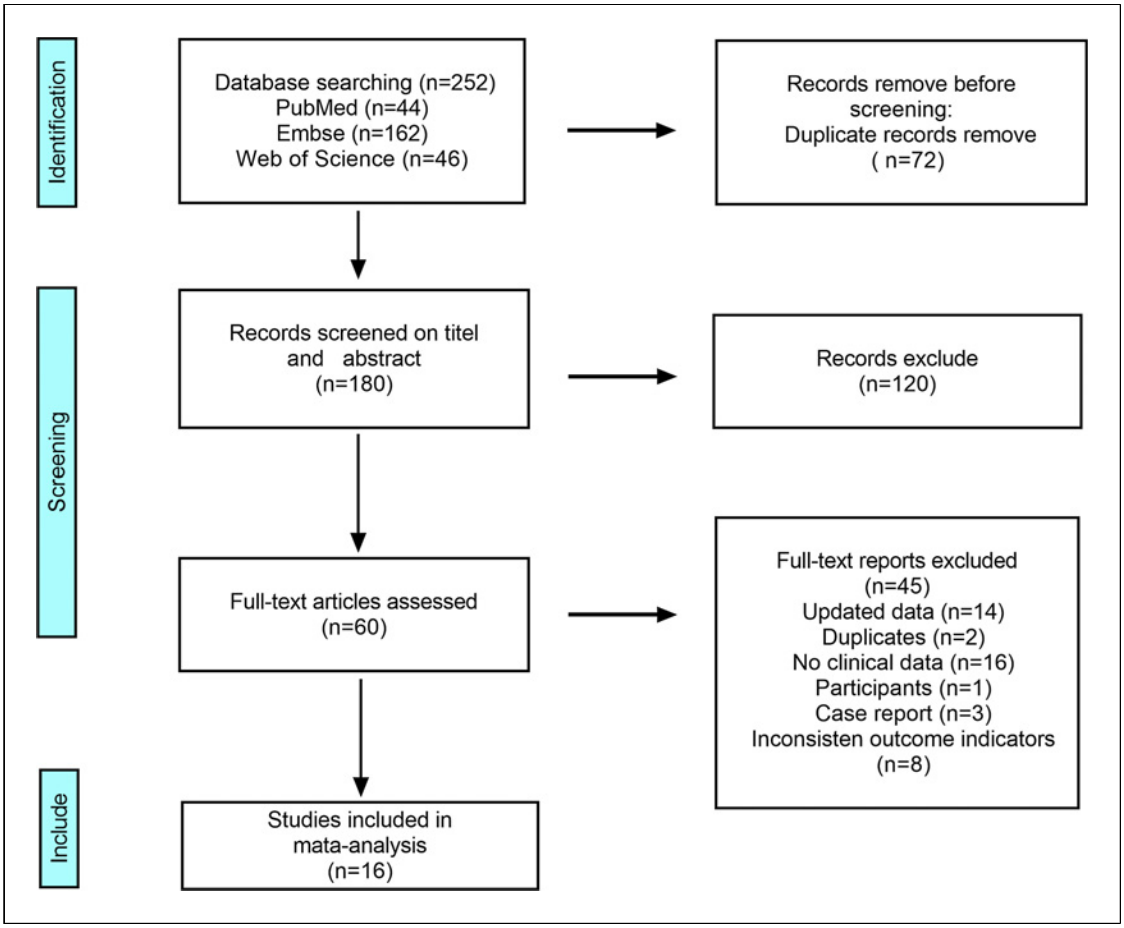

Fig. 1. Flowchart of the inclusion process of the study.

Results

Search Results

In the initial search, a total of 252 references were identified. After removing duplicates, 180 remained. Titles and abstracts were read, 120 were excluded, and the remaining 60 were read in full text. Forty-four of them were excluded due to: (1) Belongs to updated literature, $n = 14$; (2) duplicate literature, $n = 2$; (3) missing clinical data, $n = 16$; (4) less than or equal to 6 patients, $n = 1$; (5) case reports, $n = 3$; (6) inconsistent outcome indicators, $n = 8$ (see Fig. 1).

A total of 16 studies involving 348 patients met the eligibility criteria for our meta-analysis (Table 1) [13–28]. Out of these, 12 studies with 226 patients documented the BMGU treatment experience, while 4 studies with 122 patients reported on LMGU treatment for ureteral stricture. Fan et al.'s [26] study conducted a comparison between laparoscopy and robotic surgery, categorizing them into laparoscopic group L and robotic group R. The median sample size across the 16 studies was 17.5 cases (ranging from 7 to 54 cases). The overall median follow-up time was 21 months (ranging from 3 to 35 months), with the BMGU group having a median follow-up time of 12.5 months (ranging from 5 to 31 months) and the LMGU group with a median follow-up time of 29 months (ranging from 15 to 35 months). It is important to note that no randomized controlled trials were identified, and all eligible studies were single-arm studies.

Success Rate

Success rates or the number of patients without recurrent stenosis were reported in 16 included studies. A meta-analysis based on random effects resulted in a summary effect size of 96.0% (95% CI: 94%–99%, $I^2 = 0\%$, $n = 17$) with statistical significance ($z = 44.83$, $p = 0.00 < 0.05$), suggesting that both tongue mucosa and buccal mucosa are significantly effective in repairing ureteral stricture. Subgroup analysis showed a success rate of 95%

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Table 1. Characteristics of the included studies

Study	Intervention	Sample size	Design	Median age, years	Stricture length (cm), mean	Follow-up (months), median	Study quality
Villarreal et al. [13] (2020)	BMGU	9	Retrospective, single-arm	nr	4	5	8
Volkov [14] (2020)	BMGU	7	Prospective, single-arm	52.5 (range 36–67)	6.5 (range 5–8)	11 (range 4–18)	9
Lee et al. [15] (2021)	BMGU	54	Retrospective, single-arm	55.0 (IQR 42.0–65.8)	3 (range 1–8)	27.5 (IQR 21.3–38.0)	12
Nafie [16] (2021)	BMGU	7	Prospective, single-arm	nr	4.5 (range 4–7)	10 (range 4–23)	11
Proietti et al. [17] (2021)	BMGU	9	Prospective, single-arm	nr	2.7 (range 1.8–3.9)	11 (IQR 7–16)	12
Ogawa et al. [18] (2022)	BMGU	17	Retrospective, single-arm	58 (IQR 43–64)	4.7 (range 3–7)	13 (IQR 5–20.5)	11
Yang [27] (2022)	BMGU	29	Prospective, single-arm	49 nr	3.7 (range 2–7)	>12	12
Guliev et al. [19] (2023)	BMGU	24	Prospective, single-arm	44.8 (range 19–74)	3.6 (range 2.5–8)	22 (range 4–45)	12
Rai et al. [20] (2023)	BMGU	22	Retrospective, single-arm	32 nr	6.4 nr	34.31 nr	11
Wang [28] (2023)	BMGU	18	Retrospective, single-arm	47.5 nr	3 (range 2–7)	10.6 nr	11
Engelmann et al. [21] (2024)	BMGU	14	Retrospective, single-arm	51 (IQR 34–64)	1.9 (range 0.5–4.1)	15 (range 4–34)	12
Sahay et al. [22] (2024)	BMGU	16	Retrospective, single-arm	35.5 (range 28–45)	5.28 (range 3.5–7)	23 (range 4–38)	12
Liang et al. [23] (2022)	LMGU	41	Retrospective, single-arm	43 (range 23–64)	4.8 (range 2–8)	35 (range 13–80)	12
Xu et al. [24] (2023)	LMGU	8	Retrospective, single-arm	45.1 (range 34–64)	3.1 (range 2.2–4.5)	nr (range 3–9)	10
Wang et al. [25] (2024)	LMGU	41	Prospective, single-arm	33 (range 21–67)	3.5 (range 2–7)	29 (range 15–41)	11
Fan et al. [26] (2023)	LMGU	16	Prospective, single-arm	36 nr	4.8 (range 3–6.5)	21 nr	12
Fan et al. [26] (2023)	LMGU	16	Prospective, single-arm	37 nr	3.7 (range 1.5–6)	29 nr	12

IQR, interquartile range; nr, not reported.

(95% CI: 91%–98%, I^2 = 0, n = 12) for BMGU and a success rate of 99% (95% CI: 95%–100%, n = 5) for LMGU (see Fig. 2).

Sensitivity analysis was performed on all 16 documents included in this study, and none of the documents had a significant impact on the results of the meta-analysis. A funnel plot was constructed to assess the presence of publication bias in the study. The symmetry of the funnel plot indicates the absence of publication bias. Figure 3 displays the funnel plot for this study (see Fig. 3).

The symmetry test was conducted on the figure above p = 0.180 > 0.05. This indicates that the funnel plot is symmetrical, leading to the conclusion that there is no publication bias present in the literature of this study.

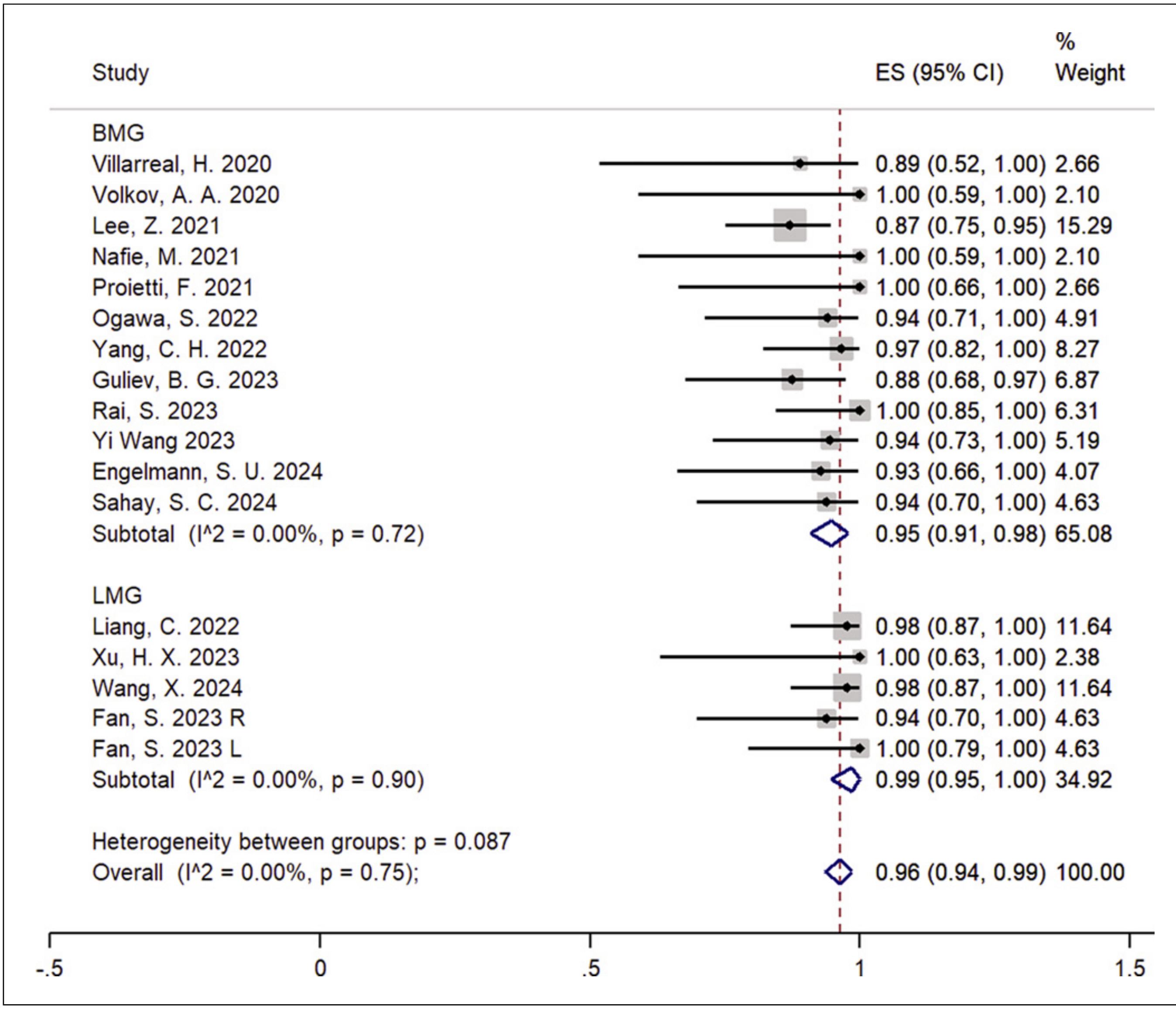

Fig. 2. Forest plots showing the pooled success rate and success rate for different interventions.

Operation Time

A total of 13 studies reported the operation time, with a combined average duration of 197.13 min (95% CI: 176.8–217.47 min) (I^2 = 94.7%, n = 14). We performed sensitivity analysis and excluded one document and the average operation time was 201.34 min (95% CI: 183.80–218.88 min) (I^2 = 90.5%, n = 13), the average operation time of the BMGU group increased from 190.65 min (95% CI: 164.38–216.93 min) (I^2 = 94.9, n = 9) to 196.77 min (95% CI: 172.30–221.25 min) (I^2 = 90.9%, n = 8), the unaffected average operation time in the LMGU group was 208.62 min (95% CI: 181.56–235.68 min) (I^2 = 91.2, n = 5) (see Fig. 4; online suppl. Fig. S1; for all online suppl. material, see https://doi.org/10.1159/000545041).

Amount of Blood Loss

A total of 9 studies reported intraoperative blood loss. Initially, we aimed to collect data on intraoperative blood loss specifically during the stage of oral mucosa acquisition. However, due to the lack of relevant reports in the article, we could only obtain information on the total blood loss during the operation. This total blood loss may be influenced by factors such as the surgeon's skill level

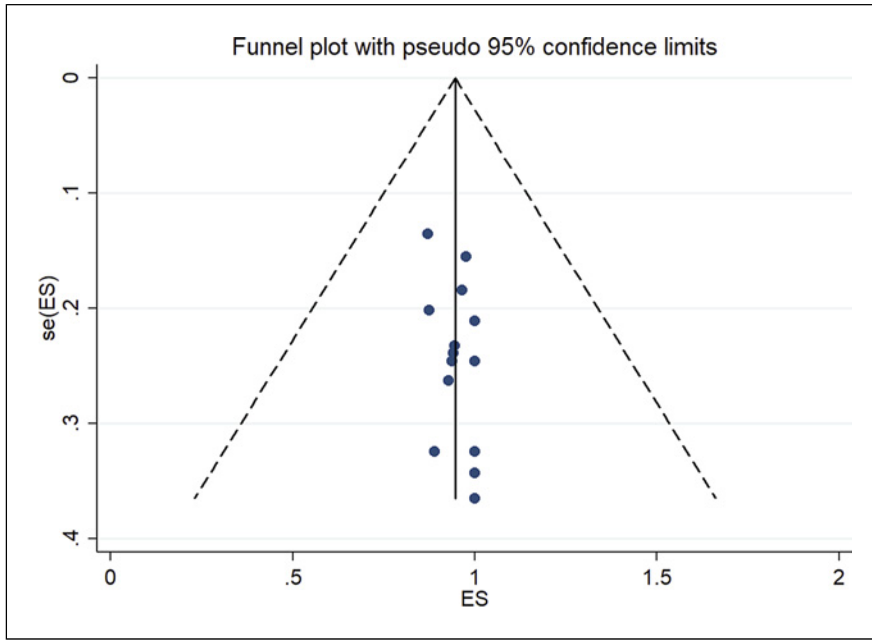

Fig. 3. Funnel plot was used to assess publication bias.

and surgical approach. The average intraoperative blood loss across the 9 studies was 76.96 mL (95% CI: 55.6–98.31 mL) (I^2 = 95.4%, n = 10). After sensitivity analysis, excluding one document, the average increased to 81.77 mL (95% CI: 63.61–99.92 mL) (I^2 = 90.7%, n = 9). In the BMGU group, the average intraoperative blood loss rose from 95.58 mL (95% CI: 56.88–134.27 mL) (I^2 = 97.6%, n = 5) to 113.44 mL (95% CI: 77.64–149.23 mL) (I^2 = 93.7%, n = 4). Conversely, the average intraoperative blood loss in the LMGU group remained stable at 62.33 mL (95% CI: 43.15–81.51 mL) (I^2 = 85.2%, n = 5) (see Fig. 5; online suppl. Fig. S2).

Length of Stenosis

Fourteen studies reported a mean stenosis length of 4.07 cm (95% CI: 3.48–4.66 cm) (I^2 = 94.1%, n = 15), and the mean stenosis length in the BMGU group was 4.12 cm (95% CI: 3.24~5 cm) (I^2 = 95.4%, n = 10), the average stenosis length of the LMGU group was 3.98 cm (95% CI: 3.27–4.69 cm) (I^2 = 89.7%, n = 5). Sensitivity analysis showed that the results were stable and the heterogeneity did not change much (see Fig. 6; online suppl. Fig. S3).

Postoperative Complications

A total of 8 documents reported the number of patients with postoperative complications. Postoperative complications were 20% (95% CI: 14%–27%) (I^2 = 0%, n = 9). The incidence of postoperative complications in BMGU patients were 25% (95% CI: 15%–36%) (I^2 = 0%, n = 5), and the postoperative complications in LMGU patients were 18% (95% CI: 11%–26%) (I^2 = 0%, n = 4) (see Fig. 7; online suppl. Fig. S4). For specific complication, see Table 2.

Discussion

Ureteral strictures greater than 3 cm are often challenging to directly anastomose using simple end-to-end ureteral anastomosis, increasing the risk of postoperative restenosis [29, 30]. Historically, intestinal ureteral replacement or renal autotransplantation were common approaches for cases where the stenotic segment was too long or difficult to anastomose directly due to excessive tension [31]. Intestinal replacement of the ureter and autologous kidney transplantation are infrequently utilized in clinical settings due to the extensive trauma, complex nature of the procedure, and numerous postoperative complications [32]. However, the advent and utilization of autologous tissue transplantation for ureteral reconstruction in recent years have introduced new treatment options for patients with ureteral stricture. The fundamental principle of this procedure involves longitudinally incising the ventral wall of the narrowed ureter segment, or directly resecting the diseased portion of the ureter and reconstructing the posterior wall, followed by inserting a mucosal patch into the narrowed segment to maintain the integrity of the "ureter bed." Subsequently,

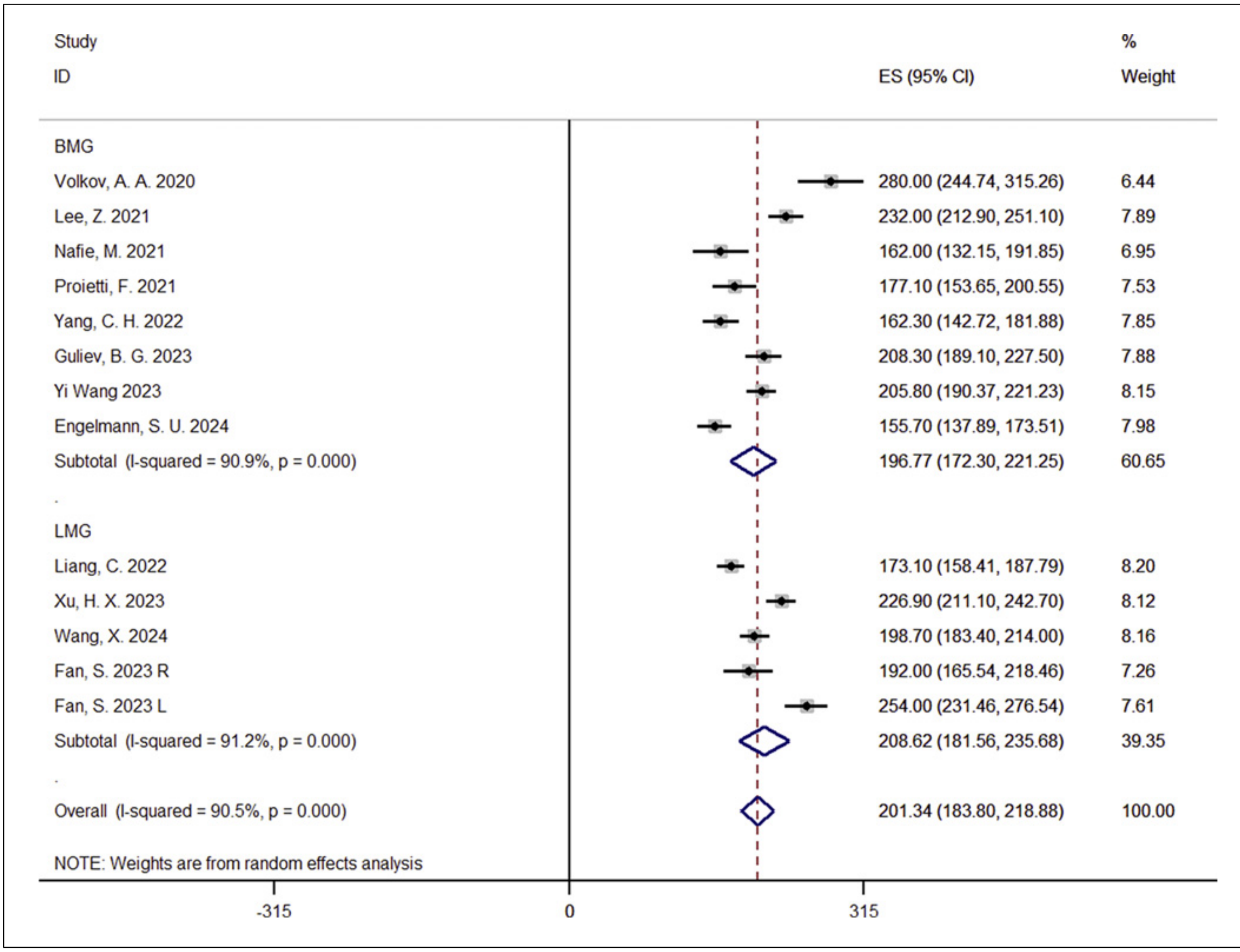

Fig. 4. The forest plots show the combined operation time and the operation time of different interventions.

the transplanted ureter is wrapped with omentum to enhance its chances of survival by utilizing the rich blood supply present in the omentum tissue. The selection between these two surgical methods primarily hinges on the complexity of the ureteral stricture. In instances of localized strictures with healthy surrounding tissues, the ventral aspect of the narrowed ureter can be directly incised, and ONLAY technology may be employed to restore ureteral patency. Conversely, in cases characterized by extensive stenosis, structural abnormalities, and poor local tissue conditions, it becomes essential to reconstruct the posterior wall to enhance support for functional restoration, followed by anastomosing the graft to the ureter to minimize the risk of restenosis.

When confronted with multi-segment complex ureteral stenosis, some researchers have employed oral mucosal transplantation in conjunction with ureteral bladder reimplantation techniques [33]. Lee et al. [34] reported a case involving the use of two buccal mucosa grafts (BMGs) to address multifocal ureteral stenosis. Additionally, Nafie [16] included a study in this article that also utilized double buccal mucosa to repair ureteral strictures. Although these treatments have been implemented in only a limited number of centers and are supported by a lack of large sample sizes and sufficiently long follow-up reports, it is reasonable to hypothesize that the combination of oral mucosal transplantation technology with other methods, or the increased application of oral mucosal grafts, may enhance the repair of more complex ureteral strictures.

The study included repaired ureteral strictures ranging from 0.5 to 8 cm, with the maximum length being 8 cm.

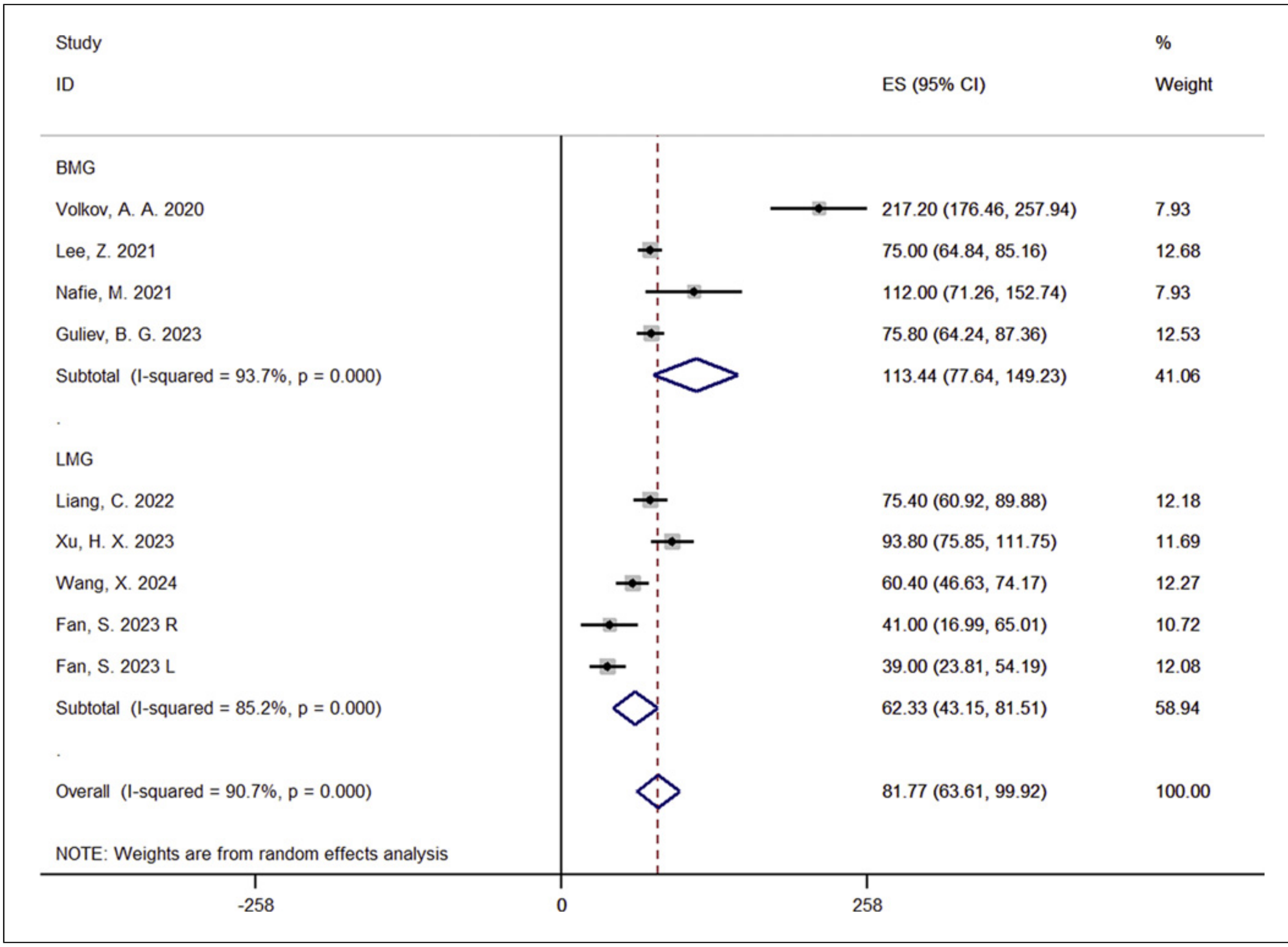

Fig. 5. The forest plot shows the amount of blood loss in comprehensive surgery and different interventions.

While lingual or buccal mucosa can reach lengths of 11–14 cm [7, 35], using excessively long oral mucosa for strictures may lead to misjudgment by the surgeon, affecting tongue movement and function as well as causing numbness at the donor site [35]. Hence, utilizing oral mucosa for treating ureteral strictures larger than 8 cm may not be suitable.

In this study, the combined success rate of LMGU and BMGU in treating ureteral stricture was very high, reaching over 95%. The surgical success rate of the LMGU group was as high as 99%. The possibilities for the high success rate of the two groups are as follows. First, preservation of the ureteral bed during surgery facilitates the reconstruction and repair of anastomotic vessels and reduces the possibility of restenosis [31]. Second, the patch inlay technology of longitudinal ureteral incision can effectively expand the lumen. In terms of postoperative complications, the combined average incidence rate of the LMGU group was 18%, which was lower than that of the BMGU group, which was 25%. Most of the reported postoperative complications in the two groups were low-grade postoperative complications. The main postoperative complications reported were numbness at the oral site and postoperative infection. The tongue mucosa and buccal mucosa are close to the urothelium. They have been in a moist oral environment for a long time and lack secretion and absorption functions. They will not reabsorb urine metabolites, let alone cause environmental disorders in the body. And both have similar macroscopic appearance, with local Iga activity, good immunogenicity, abundant blood vessels, and thin lamina propria. The difference is that LMG is slightly thinner than BMG [36]. However, some literature suggests that

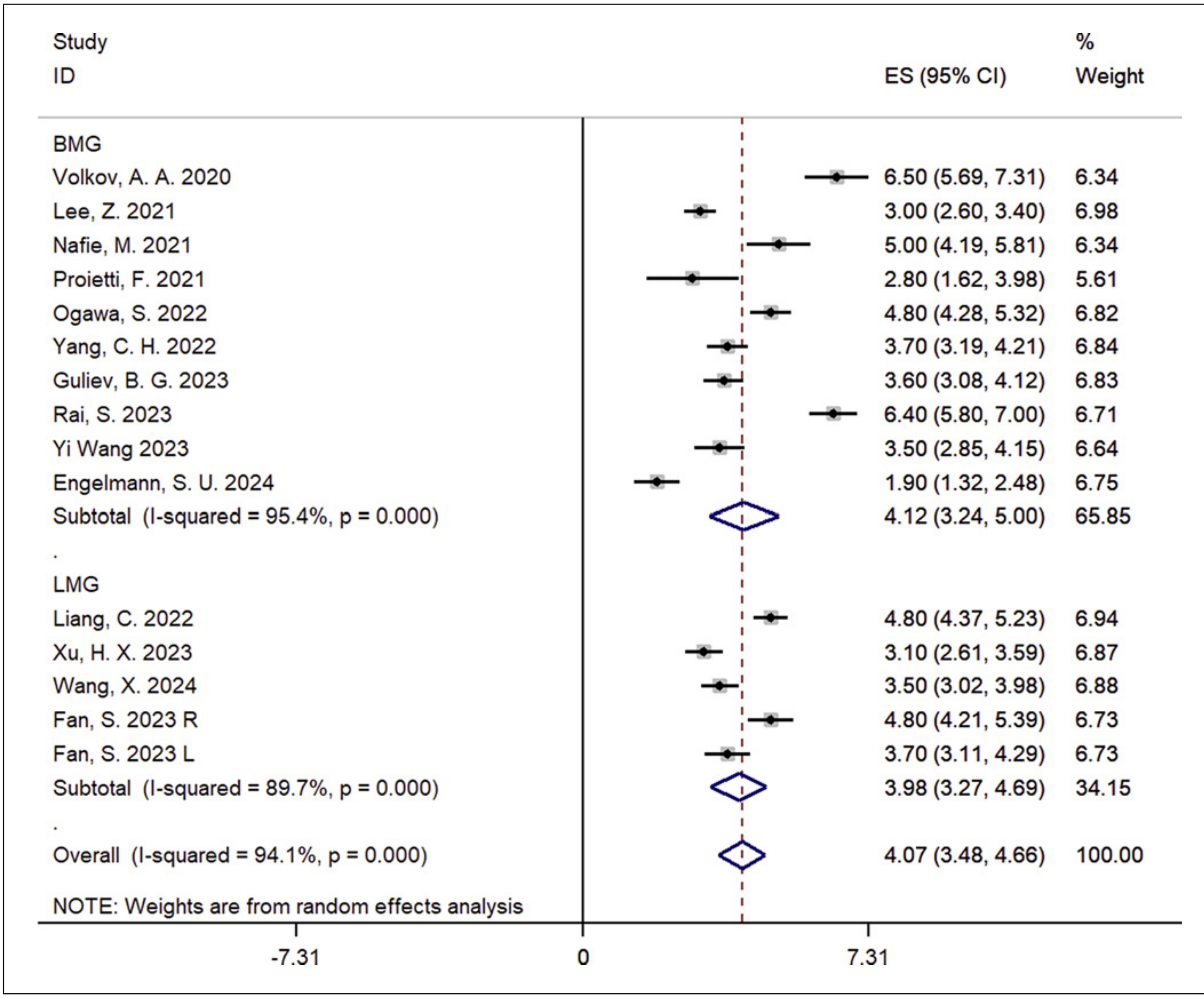

Fig. 6. The forest plot shows the combined stenosis length and the stenosis length of different interventions.

in patients with oral mucosal transplantation, the incidence of complications in the oral cavity after surgery is lower in the tongue mucosa than in the buccal mucosa [37]. The outer surface of the tongue mucosa has no special functions, and there is a possibility of numbness, changes in saliva, and difficulty in opening the mouth. It is low, and the tongue mucosa is easier to obtain (the entire tongue can be taken out of the mouth), which fully exposes the field of view and also reduces the time required for acquisition. However, the operation time of the LMGU group in this study was slightly higher than that of the BMGU group, which may be related to the complexity of ureteral stricture and the surgical habits of each operator.

In the retrospective study conducted by Wood et al. [38], 110 male patients who underwent buccal mucosal transplantation for urethral stricture were analyzed. Among the 57 returned questionnaires, long-term complications were observed. Notably, 26% of cases experienced persistent perioral numbness, 11% had changes in salivation, and 9% faced difficulty opening their mouths. Our study found a higher incidence of long-term complications and high-grade complications (Clavien-Dindo grade III or above) in the BMGU group compared to the LMGU group. These complications tended to occur after more extensive harvesting of oral mucosa. In Wang et al.'s [39] study on the morbidity of donor sites following lingual mucosa grafting (LMG)

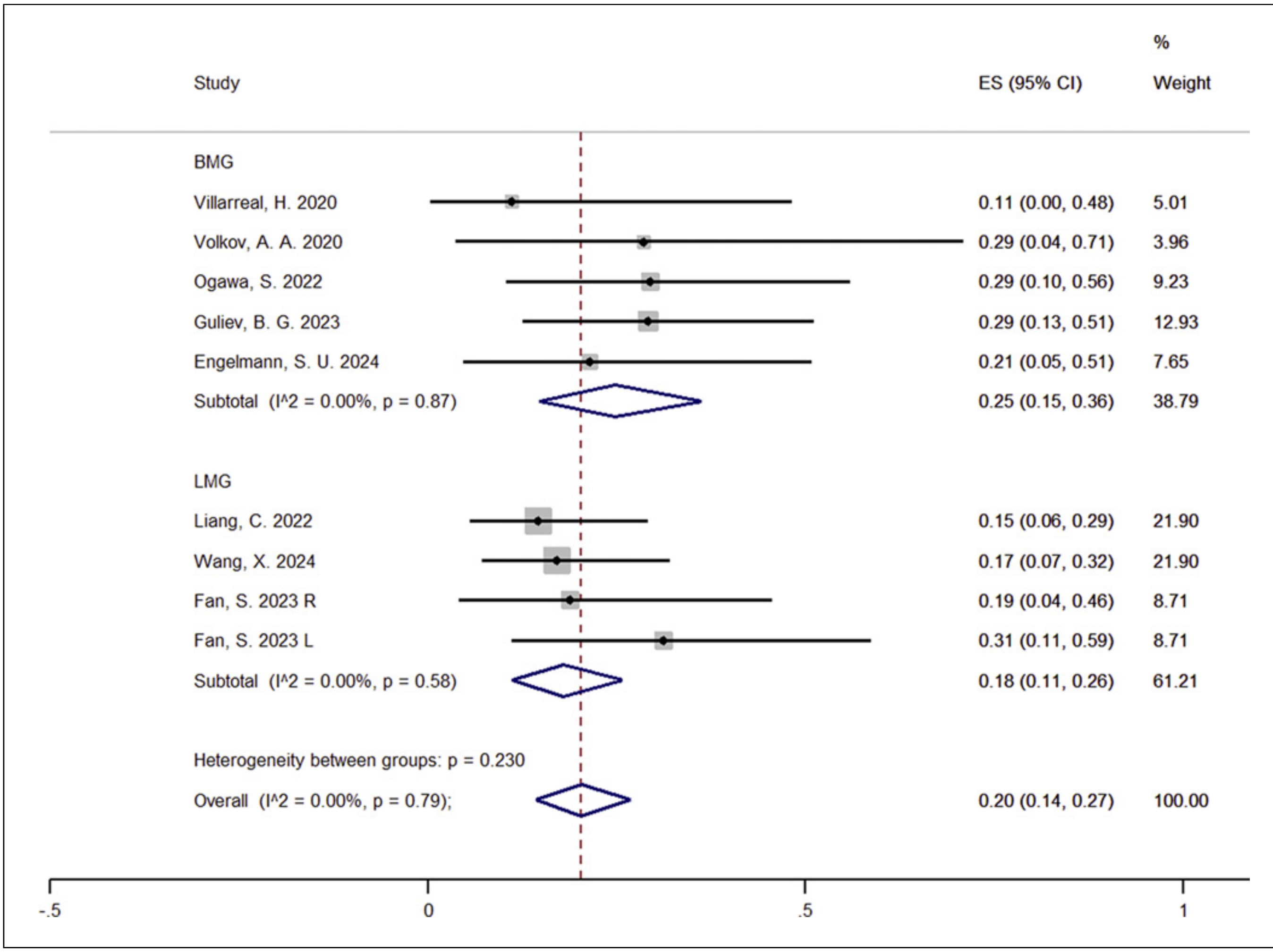

Fig. 7. The forest plot shows the incidence of comprehensive postoperative complications and the incidence of postoperative complications with different interventions.

and buccal mucosa grafting (BMG), it was suggested that patients receiving LMG have a higher likelihood of experiencing speech difficulties and protrusion difficulties of the tongue within 30 days postoperatively, while the BMG group is more likely to encounter early donor site swelling and opening difficulties at 30 days post-surgery, with some patients experiencing perioral numbness lasting up to 6 months. However, due to the low level of evidence, no definitive recommendations can be made. This article includes only 8 references that describe complications and provide specific data, which present certain limitations. Our study also highlighted the benefits of the LMGU group in terms of intraoperative blood loss. Nevertheless, it would be premature to assert the superiority of LMGU over BMGU without data from a larger sample size and longer follow-up. Overall, both BMGU and LMGU have demonstrated significant efficacy in the reconstruction and repair of urethral stricture.

Limitations of the Current Literature

Our meta-analysis has several limitations. First, there is heterogeneity across studies in terms of single-arm design, patient baseline characteristics, and preoperative preparation, despite establishing inclusion criteria. Second, the lack of an internationally recognized guideline for the treatment of complex ureteral stricture led to the inclusion of single-arm studies with potential methodological flaws in our study design. Retrospective studies in our analysis were prone to bias, and variability in outcome measures across

Table 2. Specific complication

Study	Group	Year	Total	Events	Clavien-Dindo <3	Clavien-Dindo ≥3	Specific complication
Villarreal et al. [13]	BMG	2020	9	1	nr	1	Postoperative cryptogenic ischemic stroke (Clavien-Dindo ≥3)
Volkov [14]	BMG	2020	7	2	1	1	Two patients received postoperative blood transfusion (Clavien-Dindo <3); postoperative intestinal obstruction occurred in 1 patient (Clavien-Dindo 3B)
Ogawa et al. [18]	BMG	2022	17	5	4	1	Postoperative intestinal obstruction occurred in 1 patient, postoperative urinary tract infection occurred in 2 patients, 1 patient was readmitted to hospital for pain control (Clavien-Dindo <3); postoperative restenosis occurred in 1 patient (Clavien-Dindo ≥3)
Guliev et al. [19]	BMG	2023	24	7	5	2	Postoperative urinary tract infection occurred in 5 patients (Clavien-Dindo 2); 2 patients developed grade IIIa complications, one of which had anastomotic leakage
Engelmann et al. [21]	BMG	2024	14	3	2	1	Postoperative urinary tract infection occurred in 2 patients (Clavien-Dindo <3); postoperative incisional hernia was reported in 1 patient (Clavien-Dindo ≥3)
Liang et al. [23]	LMG	2022	41	6	5	1	Low-grade complications occurred in 5 patients (Clavien-Dindo <3); Prolonged hospital stay due to lymphatic hemorrhage in 1 patient (12 days) (Clavien-Dindo ≥3)
Wang et al. [25]	LMG	2024	41	7	7	nr	No major complications occurred after operation (Clavien-Dindo <3) 7 patients
Fan et al. [26]	LMG	2023	16	3	3	nr	Donor numbness or taste disturbance occurred in 2 patients (Clavien-Dindo 1); postoperative urinary tract infection occurred in 1 patient (Clavien-Dindo 2)
Fan et al. [26]	LMG	2023	16	5	5	nr	Donor numbness or taste disturbance occurred in 2 patients (Clavien-Dindo 1); 1 patient developed kidney stones1 (Clavien-Dindo 1); postoperative urinary tract infection occurred in 1 patient (Clavien-Dindo 2); deep vein thrombosis occurred in 1 patient (Clavien-Dindo 2)

studies resulted in some studies lacking statistical data for analyses. Additionally, smaller within-group sample sizes may reduce statistical power, requiring caution when interpreting subgroup analysis results.

Conclusion

Our results demonstrate that both LMGU and BMGU are viable options for treating ureteral strictures due to their effectiveness and safety profile. These techniques offer benefits such as reduced trauma, shorter hospitalization, decreased risk of complications, and lower rates of restenosis. Therefore, we suggest considering LMGU and BMGU for managing ureteral strictures of varying lengths. Specifically, these surgical approaches should be prioritized for patients with middle and upper ureteral strictures measuring ≤8 cm. The selection of specific grafts should be guided by personalized recommendations derived from patient-physician communication. For example, the surgeon's surgical habits, whether there is potential buccal submucosal fibrosis (patients who chew betel nut), whether there is a history of surgery at the donor site, etc. Even when facing complex ureteral stricture, we can consider using more oral mucosa or combining it with other surgical methods to restore ureteral patency.

Statement of Ethics

An ethics statement is not applicable because this study is based exclusively on published literature. All authors approved the final manuscript and the submission to this journal.

Conflict of Interest Statement

The authors declare that they have no conflicts of interest.

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Author Contributions

Hui Xu and Xin Zeng designed the thesis and outline for the review. Xin Zeng, Lingyu Xie, and Zhicheng Zeng conducted the literature search. Xin Zeng drafted the manuscript. Yuanhu Yuan reviewed the manuscript and polished the grammar. Yuanhu Yuan and Hui Xu reviewed the final completion of the manuscript and provided important feedback, correcting some errors in the article. All authors contributed to the manuscript revision and approved the submitted version.

Data Availability Statement

The original contributions presented in the study are included in the article/online supplementary material. Further inquiries can be directed to the corresponding author.

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