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Comparison of concomitant hysterectomy and uterine preservation for pelvic floor reconstruction using transvaginal mesh in the treatment of POP: a systematic review and meta-analysis

Jicheng Lou[1,2] and Feng Guo[3*]

Abstract

Objectives This study aimed to summarize the evidence available in the published literature on concomitant hysterectomy versus uterine preservation in the treatment of pelvic organ prolapse (POP) and to clarify whether uterine removal should be performed during pelvic floor reconstructive surgery using transvaginal mesh (TVM).

Methods The literature search strategy was specifically designed to identify articles investigating the comparison of concomitant hysterectomy and uterine preservation in pelvic floor reconstruction using TVM. The database search spanned from their inception until March 2024. The literature selection and data collection processes were guided by predetermined inclusion and exclusion criteria. The included studies were independently evaluated by two reviewers, and a meta-analysis was conducted utilizing RevMan 5.4.

Results Eleven retrospective studies involving 1341 patients were selected for meta-analysis. The results showed no statistically significant differences in the objective cure rate or the risk of recurrence between concomitant hysterectomy and uterine preservation. Compared to uterine preservation, concomitant hysterectomy surgery was associated with extended operative duration (MD 31.59, 95% CI 19.49 – 43.68, $p < 0.00001$), longer hospital stay (MD 1.29, 95% CI 0.67 – 1.92, $p < 0.0001$), increased intraoperative blood loss (MD 62.52, 95% CI 30.18 – 94.86, $p = 0.0002$), reduced PISQ-12 scores (MD -5.99, 95% CI -9.70 to -2.28, $p = 0.002$), decreased postoperative total vaginal length (MD -0.66, 95% CI -1.14 to -0.18, $p = 0.007$), and higher risk of mesh exposure (RR 1.95, 95% CI 1.18–3.23, $p = 0.009$).

Conclusions Uterine sparing surgery using TVM compared to concomitant hysterectomy surgery using TVM showed equally effective in the treatment of POP at short and medium term follow-up. But uterine preservation could reduce intraoperative blood loss, operative duration, and duration of hospitalization. In addition, uterine sparing surgery is beneficial for decreasing the risk of mesh exposure, increasing the vaginal length and improving sexual satisfaction.

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Keywords Hysterectomy, Uterine preservation, Pelvic floor reconstruction, Pelvic organ prolapse, Transvaginal mesh, Meta-analysis

Introduction

Pelvic organ prolapse (POP) is the herniation of pelvic organs to the vaginal wall and is a common condition that results in the protrusion of the vagina, uterus, or both. Nearly 43% of pelvic organ prolapse occurs in women aged 50–79 years and consists of cystocele, rectocele, and uterine prolapse [1]. Traditional colporrhaphy for POP, which involves the use of the patient's own tissue, has a high failure rate, with 29% of patients requiring a second surgical intervention [2]. Consequently, new surgical approaches and pelvic floor support materials (synthetic mesh) have been developed to decrease anatomical recurrence [3]. Pelvic floor reconstruction using transvaginal mesh has been proven to be an efficient method that can significantly reduce objective prolapse recurrence rates compared to operations involving native tissues [4]. At the meanwhile, complications related to the mesh have been reported in many studies, including mesh exposure, pelvic pain, dyspareunia, infection, haematoma, or fistula. In 2011, the FDA issued a safety update alerting the public that serious complications associated with transvaginal repair of pelvic organ prolapse (POP) using synthetic mesh were common. Furthermore, following multiple safety warnings, the FDA reclassified transvaginal mesh as a Class III medical device. In 2019, the ban on transvaginal mesh kits in the United States significantly impacted treatment options for POP. However, some clinical trial believed that highly trained urogynecologists and well designed meshes could remarkably decrease the complications of TVM [5]. With advances in surgical skills and meshes, we have reason to believe that pelvic floor reconstruction using TVM could play an important role in the treatment of POP.

Hysterectomy was commonly used in the treatment of POP, even though descent of the uterus is a consequence and not the cause of prolapse [1, 6]. Its application is not evidence-based, and it is unclear whether it is better to remove or preserve the uterus [7]. Some specialists advocated that concomitant hysterectomy could reduce the risk of prolapse recurrence and prevent future uterine cancer in the past. However, compared with vaginal hysterectomy, uterine preservation is less invasive yet equally effective with fewer complications [8]. Furthermore, higher demands regarding quality of life, self-esteem and sexuality by patients in modern societies have turned the tide, favoring uterine preservation [9]. With the application of TVM, which can provide additional pelvic floor strength, the need for concomitant hysterectomy has become even more 'dubious' [10]. Up to now, there are no clear indications for uterine preservation or removal during pelvic floor reconstruction using TVM. Therefore, we conducted this systematic review and meta-analysis to compare the efficacy and complications of concomitant hysterectomy and uterine preservation for pelvic floor reconstruction using TVM in the treatment of POP.

Methods

The current study was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis guidelines issued in 2020 (PRISMA Checklist). This study was registered with the PROSPERO database (CRD42023477390).

Search strategy

The electronic databases Embase, the Cochrane Library, Web of Science, PubMed, China National Knowledge Infrastructure (CNKI), Wanfang Data, and Chinese BioMedical Literature Database (CBM) were systematically searched for eligible studies from their inception until March 2024. The core search terms included uterine prolapse, uterovaginal prolapse, vaginal prolapse, uterine descent, pelvic organ prolapse, surgical mesh, transvaginal mesh, transvaginal pelvic reconstruction, hysterectomy, uterine preservation, uterine removal and uterine sparing. The search strategy, exemplified using PubMed, was detailed in Supplementary Appendix 1. On the basis of whether concomitant hysterectomy was conducted during the pelvic floor reconstructive surgery using TVM or not, the study was divided into concomitant hysterectomy group (experimental group) and uterine preservation group (control group).

Selection criteria

Studies reported the following were included: (1) Patients diagnosed with symptomatic uterine prolapse and Pelvic Organ Prolapse Quantification (POP-Q) stage II or more; (2) Patients undergoing pelvic floor reconstructive surgery using TVM; (3) Hysterectomy, including vaginal or abdominal hysterectomy; (4) Full-text articles with complete data; and (5) Cohort studies or randomized controlled trials.

The exclusion criteria were as follows: (1) Patients with previous POP surgery or hysterectomy; (2) Duplicate publications; (3) Studies in which the full-text articles could not be obtained; (4) Studies with unclear outcome indicators; (5) Abstracts, case reports, reviews, or meeting minutes; or (6) Studies that provided incomplete or inaccurate clinical data.

Data extraction and assessment of study quality

Two authors selected the articles and further extracted the data using a standardized form, independently. The standardized form included the following information: authors, publication date, journal of publication, research title, BMI, history of prolapse surgery, mean age, study design, criteria of inclusion and exclusion, outcome measurements and their results. Any different opinion in study selection and/or extraction of data was resolved by consensus between the two authors. Only studies met the criteria of inclusion were assessed further. The quality of the included publications was evaluated using the Methodological Index for Non-Randomized Studies (MINORS) by two independent reviewers. According to the evaluation items, the total MINORS score ranges from 0 to 24. A score of 0–8 indicates low quality, 9–16 indicates medium quality, while 17–24 indicates high quality, and differences were resolved through discussion and consultation.

Statistical analysis

The recurrence rate of prolapse was defined as symptomatic prolapse of stage II or more according to the Pelvic Organ Prolapse Quantification System (POP-Q) [1]. The objective cure rate was defined as a POP-Q stage I or less. The meta-analysis was performed using RevMan5.4 software. For dichotomous variables, The relative risk (RR) and 95% confidence interval (CI) were calculated using the Mantel-Haenszel test (M-H). For continuous variables, the weighted mean difference (MD) and 95% CI were calculated using the inverse-variance test (IV). The heterogeneity of each included study was tested using x^2 test. The random-effects model was used for meta-analysis when $I^2 > 50\%$, otherwise, the fixed-effects model was used. $P < 0.05$ indicated statistical significance. $I^2 > 50.0\%$ or $P < 0.10$ was considered to be significant heterogeneity. Sensitivity analyses were conducted to assess the robustness of the pooled conclusions by sequentially removing individual studies.

Results

Search results and studies selection

A total of 2363 articles were identified from the electronic searches. After removal duplicate items, 1650 articles were retained. A total of 160 records were excluded because they were case reports, meeting abstracts, systematic reviews or review articles. Moreover, 1383 articles were excluded because of irrelevant subjects or abstracts. A total of 107 studies were retrieved for further full-text evaluation, and 96 studies were excluded. Finally, 11 cohort studies were selected for the meta-analysis [11–21] (Fig. 1).

Basic characteristics

The meta-analysis included 11 articles published between 2012 and 2022, with a total of 1341 patients (623 in the hysterectomy group and 718 in the uterine preservation group). The basic traits and quality assessment of the studies are shown in Table 1. The mean age of the included women ranged from 59.3 to 74.3 years old, the BMI was 23.1 to 27.7. All patients underwent pelvic floor reconstruction using ttransvaginal mesh. The types of TVM included Apogee, Perigee, Elevate, Uphold and Prolift. The MINORS scores ranged from 15 to 19, which represents that all the included studies are medium and high quality.

Meta-analysis

The eleven included studies consistently reported six key meta-analysis outcomes: perioperative outcomes, postoperative total vaginal length, mesh exposure rates, objective cure rates, recurrence rates, and quality of life (QoL) assessments. Among these, intraoperative complications included bladder or bowel injuries and hematoma, whereas postoperative complications comprised urinary retention and mesh exposure. The perioperative outcomes included operative time, blood loss volume, duration of hospital stay, intraoperative bladder or bowel injuries, hematoma and urinary retention. QoL was evaluated by patient-reported outcome measures, which consisted of the Pelvic Floor Distress Inventory-20 (PFDI-20) and Pelvic Floor Impact Questionnaire-7 (PFIQ-7) and Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire-12 score (PISQ-12).

Meta-analysis result of perioperative outcomes

The number of studies available for operative time, blood loss volume, and duration of hospital stay was five, six and five, respectively (Fig. 2). The results showed that compared to uterine preservation, concomitant hysterectomy was associated with more operative time (MD 31.59, 95% CI 19.49 – 43.68, $p < 0.00001$; $I^2 = 82\%$), more blood loss (MD 62.52, 95% CI 30.18 – 94.86, $p = 0.0002$; $I^2 = 88\%$), and longer hospital stay (MD 1.29, 95% CI 0.67 – 1.92, $p < 0.0001$; $I^2 = 76\%$). There were eight, four and six studies available for intraoperative bladder or bowel injuries, hematoma and urine retention, respectively (Fig. 3). Compared with uterine preservation, concomitant hysterectomy had no statistically significant effects on the risk of intraoperative bladder or bowel injuries (RR 0.66, 95% CI, 0.17–2.61, $p = 0.55$; $I^2 = 0$), hematoma (RR 2.16, 95% CI, 0.75–6.27, $p = 0.16$; $I^2 = 0$) and urine retention (RR 0.62, 95% CI 0.33–1.15, $p = 0.13$; $I^2 = 0$).

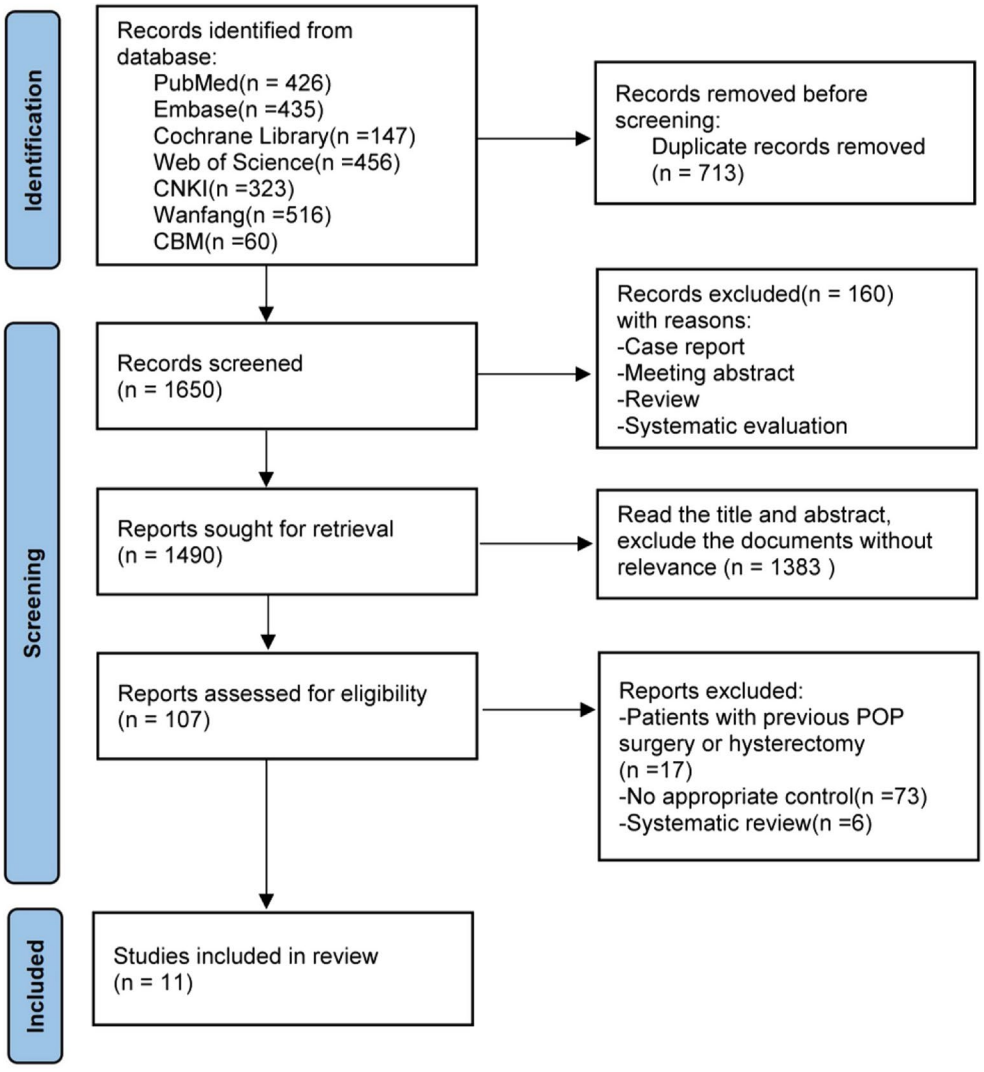

Fig. 1 Flow diagram of study selection following the PRISMA guidelines

Table 1 The detailed baseline characteristics and of all included studies

Study	Country or region	Experimental	Control	Type of TVM	Sample size	Mean age	Mean BMI	Inclusion criteria	Follow-up (months)	MINORS score
Chu 2012 [11]	Taiwan	Con. hysterectomy	Uterine preservation	Perigee and Apogee	39/52	59.3/65.5	25.3/24.9	III–IV	9(mean)	15
Xia 2012 [12]	China	Con. hysterectomy	Uterine preservation	Prolift	65/46	74.3/73.9	24.8/24.5	III–IV	12(mean)	17
Zhang 2012 [13]	China	Con. hysterectomy	Uterine preservation	Prolift	22/26	65.7/69.8	23.1/23.8	II–IV	12(mean)	16
McLennan 2013 [14]	USA	Con. hysterectomy	Uterine preservation	Prolift and Elevate	46/86	67.0/68.0	27.7/26.7	II–IV	30(median)	18
Sirls 2013 [15]	USA	Con. hysterectomy	Uterine preservation	Elevate and Prolift	89/45	66.7/65.1	27.2	II–IV	54(median)	19
Yang 2014 [16]	China	Con. hysterectomy	Uterine preservation	Prolift	30/33	64.1/60.0	NA	III–IV	27(mean)	18
Stanford 2015 [17]	USA	Con. hysterectomy	Uterine preservation	Elevate	29/51	60.3/62.8	26.8/25.9	II–IV	24(mean)	19
Huang 2015 [18]	Taiwan	Con. hysterectomy	Uterine preservation	Prolift	24/78	62.0/67.1	24.9/24.2	III–IV	26(mean)	19
Ker 2018 [19]	Taiwan	Con. hysterectomy	Uterine preservation	Uphold	30/66	66.1/66.6	25.2/24.3	II–IV	16(mean)	17
Li 2020 [20]	Taiwan	Con. hysterectomy	Uterine preservation	Elevate and Uphold	211/197	65.9/67.4	24.6/25.1	III–IV	24(mean)	17
Li 2022 [21]	China	Con. hysterectomy	Uterine preservation	Prolift	38/38	63.3/60.1	23.7/24.5	III–IV	60(mean)	18

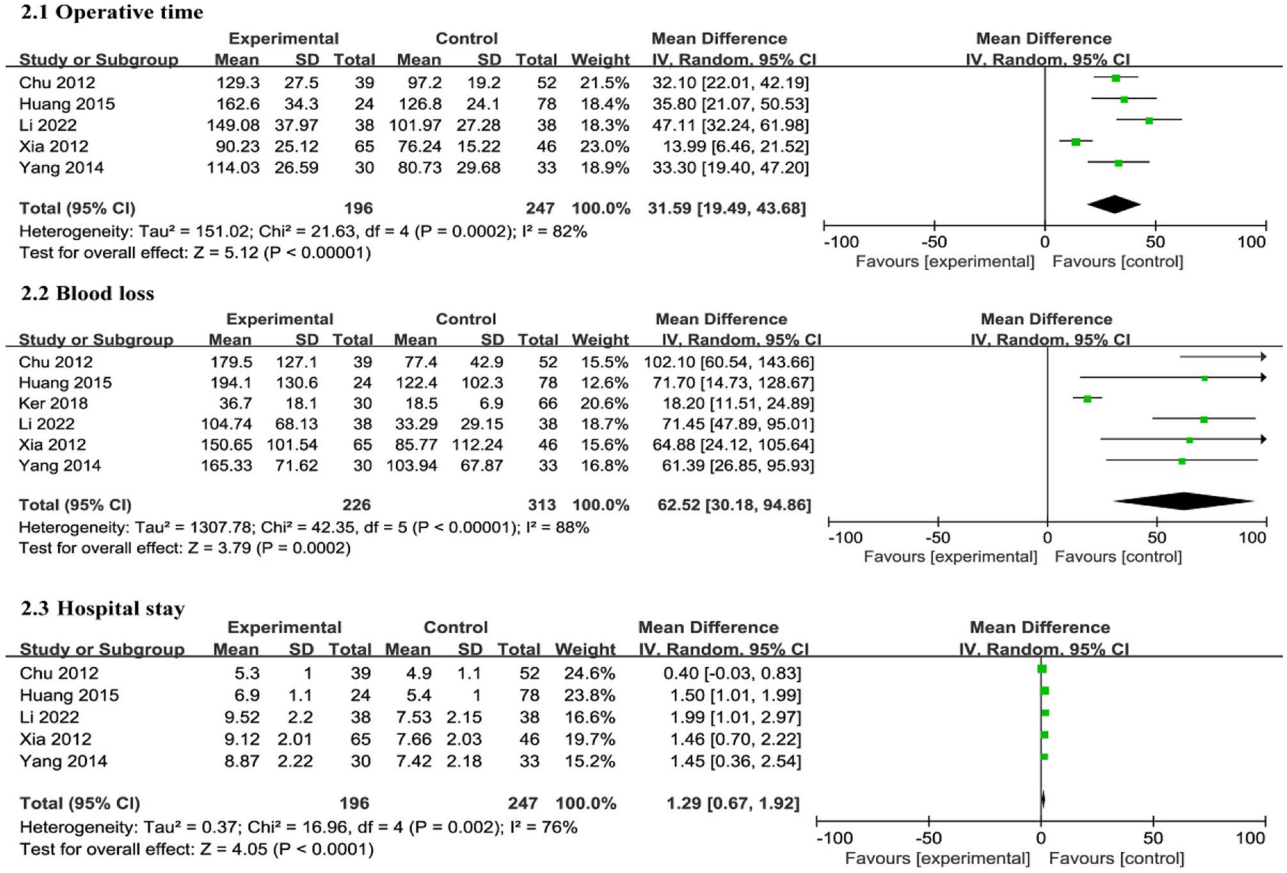

Fig. 2 Perioperative outcomes 1

Meta-analysis result of postoperative total vaginal length

Five studies compared the postoperative total vaginal length in 415 patients (Fig. 4). Four studies assessed total vaginal length immediately after the surgery, while one study reported evaluations at 6 months postoperatively. Concomitant hysterectomy was associated with reduced total vaginal length after surgery (MD -0.66, 95% CI -1.14 to -0.18, $p = 0.007$; $I^2 = 82\%$).

Meta-analysis result of objective cure rates

Three studies evaluated the objective cure rates in 304 patients, with a mean follow-up duration of 15.7 months (Fig. 5). The results showed that there was no statistically significant difference in the objective cure rates between concomitant hysterectomy and uterine preservation (RR 1.01, 95% CI 0.98–1.05, $p = 0.45$; $I^2 = 0$). The objective cure rates were 99.2% (127 of 128 patients) and 96.5% (170 of 176 patients) in the concomitant hysterectomy group and uterine preservation group, respectively.

Meta-analysis result of recurrence rates

Six studies evaluated the recurrence rates in 511 patients, with a mean follow-up duration of 17 months. There was no statistically significant difference in the risk of recurrence between concomitant hysterectomy and uterine preservation (RR 1.07, 95% CI, 0.43–2.67, $P = 0.88$; $I^2 = 0$) (Fig. 6). The recurrence rates were 3.3% (7 of 210 patients) and 3.6% (11 of 301 patients) in the concomitant hysterectomy group and uterine preservation group in the pelvic floor reconstructive surgery using TVM, respectively.

Meta-analysis result of mesh exposure rates

Eight studies reported mesh exposure in 1085 patients, with a mean follow-up duration of 19 months. Concomitant hysterectomy was associated with increased risk of mesh exposure than uterine preservation (RR 1.95, 95% CI 1.18–3.23, $p = 0.009$; $I^2 = 1$) (Fig. 7). The overall mesh exposure rates was 7.1% (37 of 517 patients) in the concomitant hysterectomy group and 3.7% (21 of 568 patients) in the uterine preservation group.

Meta-analysis result of quality of life

There were three studies available for each of the PFDI-20, PFIQ-7 and PISQ-12 (Fig. 8). Concomitant hysterectomy was associated with reduced PISQ-12

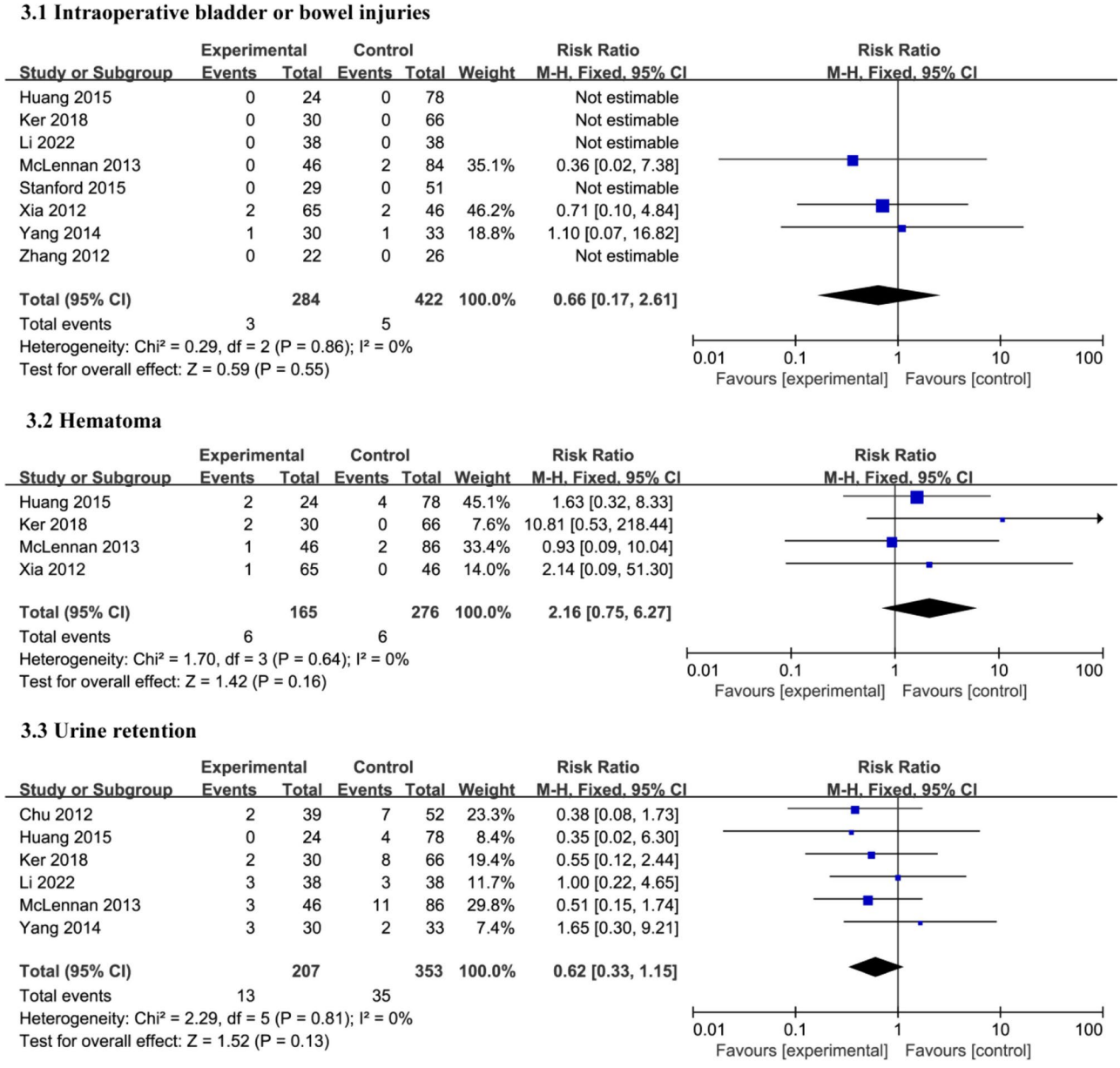

Fig. 3 Perioperative outcomes 2

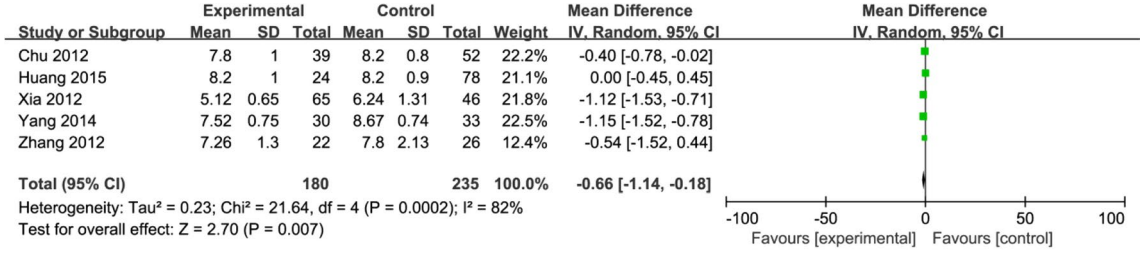

Fig. 4 Postoperative total vaginal length

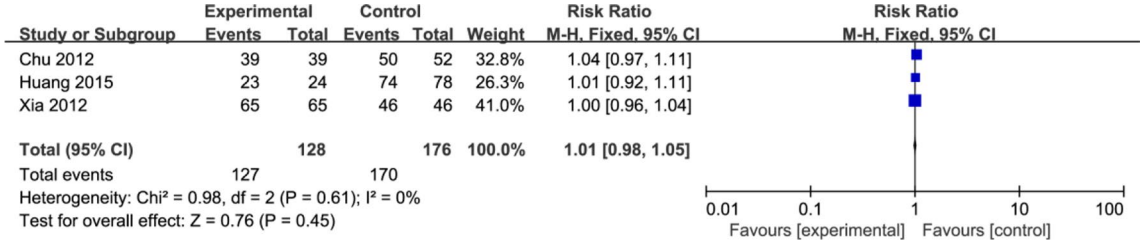

Fig. 5 Objective cure rates

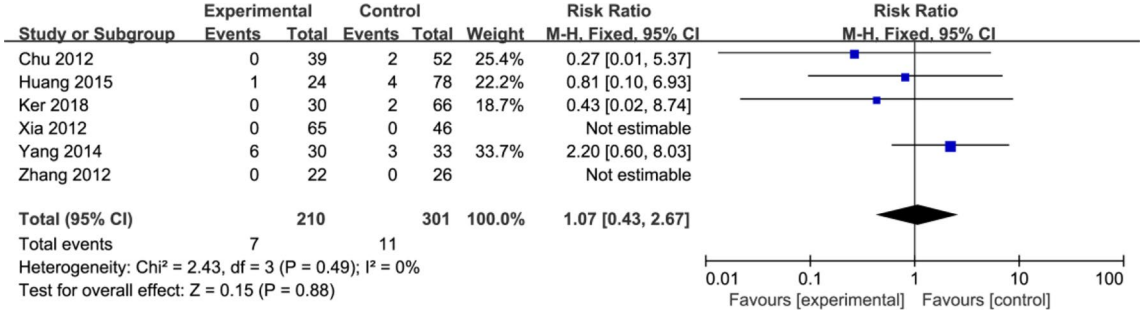

Fig. 6 Recurrence rates

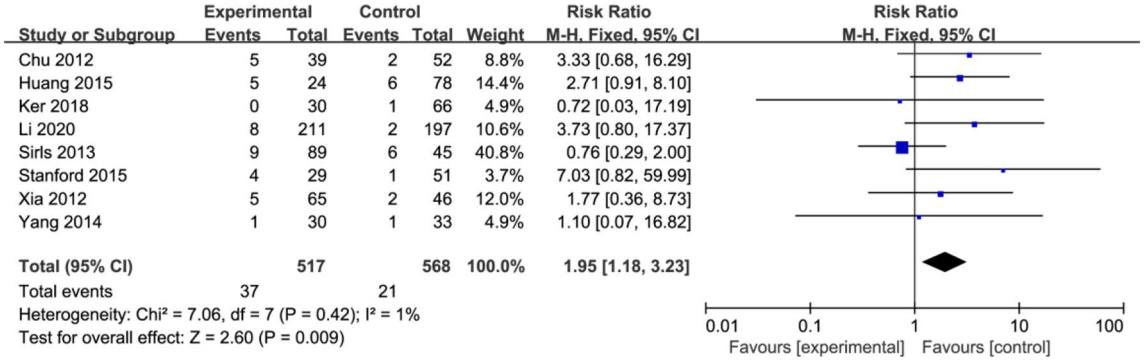

Fig. 7 Mesh exposure rates

score (MD -5.99, 95% CI -9.70 to -2.28, $p = 0.002$; I^2 = 57) than uterine preservation among the relevant studies. There were no statistically significant differences in the PFDI-20 score (MD -0.09, 95% CI -2.01 to 1.83, $p = 0.93$; I^2 = 0) or PFIQ-7 score (MD -0.64, 95% CI -4.30 to 3.03, $p = 0.73$; I^2 = 0) between concomitant hysterectomy group and uterine preservation group.

Sensitivity analysis

High heterogeneity was observed in several meta-analyses, and sensitivity analysis was conducted to assess the reliability of the results. After excluding the study with the largest weight of heterogeneity, I^2 equal to zero and the pooled effect size in operative time, blood loss, hospital stay, total vaginal length, and PISQ-12 score did not change the effects observed in the primary analysis (MD 35.88, 95% CI 29.44–42.31, $P < 0.00001$; MD 72.77, 95% CI 57.20–88.30, $P < 0.00001$; MD 1.55, 95% CI 1.19–1.91, $P < 0.00001$; MD 1.09, 95% CI 0.83–1.36, $P < 0.00001$; MD 7.58, 95% CI 5.79–9.36, $P < 0.00001$) (Supplementary Appendix 2, 3, 4). The results of sensitivity analysis indicated the relative stability of our results.

Discussion

Our study determined that there was no statistically significant difference in the objective cure rate between concomitant hysterectomy and uterine preservation in pelvic reconstruction utilizing transvaginal mesh (TVM). The recurrence rates were also comparable between the two groups. The concurrent performance of hysterectomy surgery did not elevate the risk of intraoperative injuries to the bladder or bowel, nor did it increase the incidence of hematoma or urinary retention. However, compared to uterine preservation, concomitant hysterectomy surgery was associated with increased intraoperative blood loss,

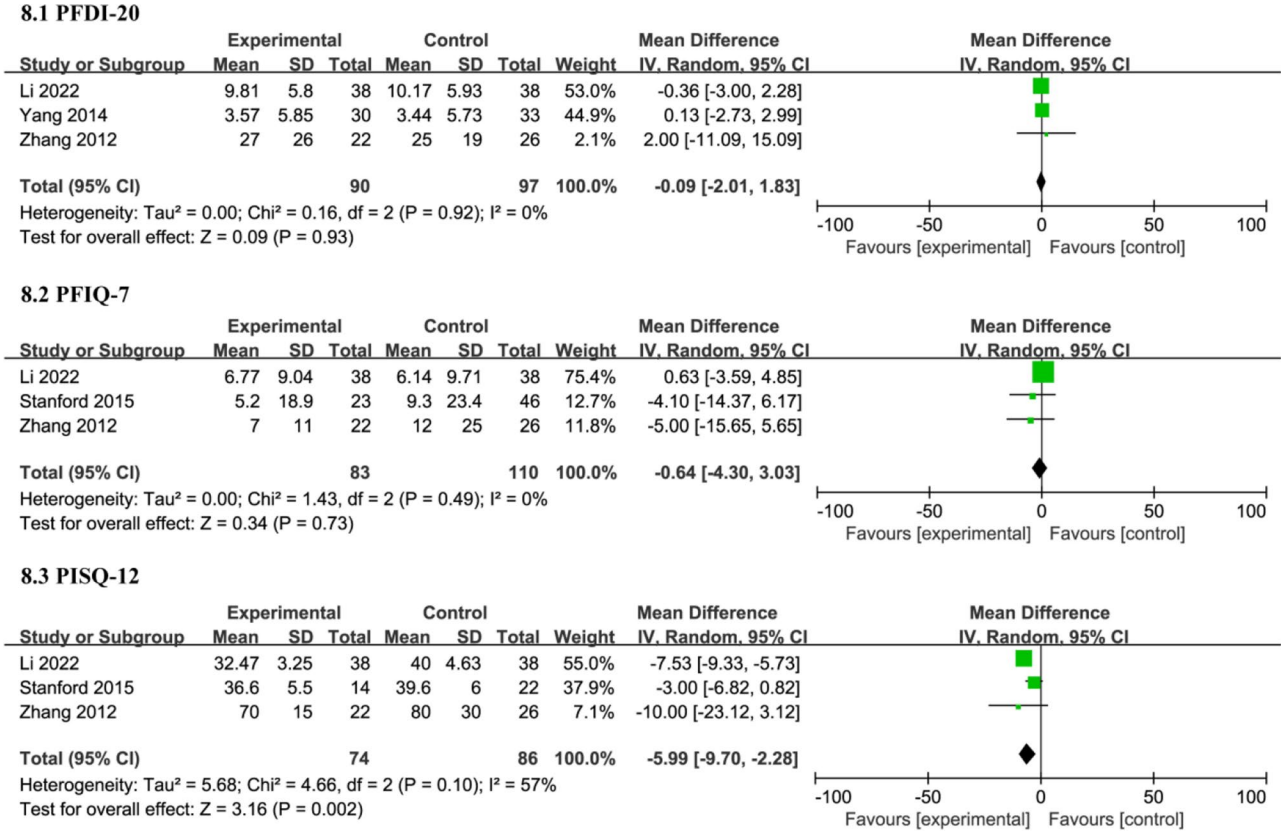

Fig. 8 Quality of life

extended operative duration, reduced PISQ-12 scores, decreased postoperative total vaginal length, and an elevated risk of mesh exposure.

Concomitant hysterectomy was often the priority in the pelvic floor reconstruction using TVM in the past [22]. With the increasing understanding of pelvic anatomical structure and the improvements in surgical techniques, uterine preservation has become an alternative option in the pelvic floor reconstruction using TVM [23]. In recent years, patients have tended to choose uterine preservation if uterine removal is unnecessary [24]. However, there were few data on the comparison of concomitant hysterectomy and uterine preservation in the pelvic floor reconstructive surgery using TVM. To the best of our knowledge, this is the first meta-analysis to clarify whether the uterus should be preserved or removed during pelvic floor reconstructive surgery using TVM.

In this study, the results showed no statistically significant differences in the objective cure rates or the risk of recurrence between concomitant hysterectomy and uterine preservation. The objective cure rates were 99.2% and 96.5% in the concomitant hysterectomy group and uterine preservation group, respectively, during the follow-up. The hysterectomy procedure tended to have a higher objective cure rate. The recurrence rates were 3.3% and 3.6% in the hysterectomy group and uterine preservation group, respectively. Both procedures proved pelvic floor reconstruction using TVM to be a highly efficient method for treating POP without previous POP surgery, and the therapeutic effect of these procedures did not seem to be significantly different.

We noticed that concomitant hysterectomy was significantly associated with more intraoperative blood loss, longer operative duration, and increased duration of hospitalization in this meta-analysis. However, the results showed no statistically significant differences in the risk of intraoperative bladder or bowel injuries, hematoma, or urinary retention. This evidence showed that concomitant hysterectomy did not increase the difficulty or risk of pelvic floor reconstructive surgery, except for the additional anesthesia duration and surgical risk caused by the hysterectomy procedure itself, which would not be as good for aged patients or women without good physical condition. He et al. reported that both hysteropreservation and hysterectomy have similar effects on recurrence and reoperation rates, while hysteropreservation is superior to hysterectomy in reducing intraoperative blood loss and shortening the duration of surgery and hospitalization [25]. Consequently, preserving the uterus may reduce complications and enhance the recovery process for elderly patients following pelvic floor reconstructive surgery.

Complications related to the use of transvaginal mesh, especially mesh exposure, have been reported [26]. Collinet et al. proposed that uterine preservation is a protective factor against mesh extrusion [27]. In the present study, we found that concomitant hysterectomy was associated with a higher risk of mesh exposure than uterine preservation. The rate of mesh exposure was 7.1% in the hysterectomy group, while it was 3.7% in the uterine preservation group. Uterine preservation showed to have an advantage over concomitant hysterectomy regarding mesh exposure during the follow-up. Mesh exposure had been reported to be associated with a combination of bacterial infection and devascularization of the vaginal cuff [28]. Concomitant hysterectomy involves a wider tissue incision and dissection, and the opening of the vaginal cuff with exposure to vaginal flora may lead to subsequent mesh erosion. Su et al. also reported that the relatively low mesh exposure rate might be attributed to the use of a softer and less dense mesh [29]. Uterine preservation benefits from the avoiding of vaginal full-thickness dissection, which is conducive to better healing and reducing the risk of mesh exposure. Furthermore, pelvic pain is the main complication which is associated with mesh exposure. Rates of pain after the mesh repair are variable. A Cochrane review reported that the rate was relatively low, with only 0.5% of women requiring mesh removal for this reason [30]. Another major concern regarding mesh exposure was the possibility that it may increase the occurrence of dyspareunia [31]. Huang et al. reported that dyspareunia was relatively low and showed no significant difference between the two TVM groups with or without the concomitant hysterectomy [18]. This was possibly owing to lower sexual activity of elderly women.

Quality of life (QoL) was also assessed in some of the included studies. We observed that all of the QoL indicators improved from baseline and showed continued improvement during the follow-up period. There were no statistically significant differences in the improvements in the PFDI-20 or PFIQ-7 scores between the two groups. In addition, we observed that uterine preservation was associated with increased total vaginal length after surgery and higher PISQ-12 scores. The higher PISQ-12 scores indicate better sexual function. However, a statistically significant difference does not always correlate with a clinically meaningful outcome. From a physiological functional perspective, a statistically difference in vaginal length may not directly lead to significant functional impairments. In other words, the observed better sexual function in the uterine preservation group cannot be definitively attributed to vaginal elongation, which requires further validation through prospective clinical studies with controlled variables. De Vita et al. reported an increase in sexual activity of only 12.5% in the concomitant hysterectomy patients compared to 95% in the uterine preservation patients [32]. Similarly satisfactory responses in sexual functions after hysteropexy were also reported by Jeng et al. and Dietz et al., although no comparison to hysterectomy cases was conducted [33, 34]. This information might be helpful when offering preoperation counseling.

Although the safety of transvaginal mesh usage has been questioned by the FDA and the procedure has even been banned in some countries, it has shown promising outcomes in East Asian countries [5, 35]. Thus, the use of mesh is likely to be actively promoted based on favorable outcomes in East Asian countries. The current practices involving the use of vaginal mesh vary greatly across the world, and different experiences may result in different outcomes in different regions [36]. Therefore, it is advisable that TVM should be used prudently by a well-trained surgeon, with the appropriate selection of patients and adequate counseling before surgery for those with complicated POP, including severe prolapse of the anterior compartment, recurrent prolapse, and compromised connective tissue [37]. Similarly, TVM is recommended only for patients with advanced complicated prolapse, such as more than POP-Q stage III or recurrence cases, as they may benefit from the advantages of fewer recurrences and a balance of acceptable complications.

Several limitations of this study should be acknowledged: (1) Potential biases might have arisen since all the included papers were retrospective studies; (2) The quality of the included articles was variable, which might impact the results of this meta-analysis; (3) Heterogeneity among the included studies was not fully explained by sensitivity analyses; (4) The inclusion of Chinese journals might include publication bias; (5) These are short-mid term outcomes, long-term prognostic outcomes are more convincing; and (6) The exclusion of obese patients from our study may constrain the generalizability of our findings. The unique physiological characteristics of obese individuals, including variations in pelvic floor anatomy, obesity-related comorbidities (such as diabetes mellitus and cardiovascular diseases), and altered biomechanical stress distribution, could substantially impact surgical risk stratification, postoperative recovery trajectories, and therapeutic efficacy metrics. As our current study did not include this demographic, key surgical outcome parameters should not be directly extrapolated to obese populations with POP.

Conclusions

Uterine sparing surgery using TVM compared to concomitant hysterectomy surgery using TVM appears equally effective in the treatment of POP at short and medium term follow-up. But there are also some differences, compared with concomitant hysterectomy, uterine

sparing surgery could reduce intraoperative blood loss, operation time, and duration of hospitalization. In addition, uterine sparing surgery is beneficial for decreasing the risk of mesh exposure, increasing the vaginal length and improving sexual satisfaction. Therefore, uterine sparing surgery seems to be a superior alternative to concomitant hysterectomy in pelvic floor reconstructive surgery using TVM for the treatment of POP without a history of POP surgery. This information is useful in preoperative counseling. When pathological or potentially pathological cervix or uterine specimens are excluded, patients can make an informed choice as to whether or not to accept concomitant hysterectomy.

Abbreviations

POP	Pelvic organ prolapse
TVM	Transvaginal mesh
QoL	Quality of life
PISQ-12	Pelvic Organ Prolapse/Urinary Incontinence Sexual Questionnaire-12 score
PFDI-20	Pelvic Floor Distress Inventory-20
PFIQ-7	Pelvic Floor Impact Questionnaire-7
RCT	Randomized controlled trial
MD	Weighted Mean Difference
Cis	Confidence intervals
RR	Relative risk

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12905-025-03643-0.

Supplementary Material 1

Supplementary Material 2

Supplementary Material 3

Supplementary Material 4

Author contributions

JL: data collection, manuscript writing, research design; FG: data collection, statistical data processing, manuscript writing.

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Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

Not applicable because this study is a review article and a meta-analysis.

Consent for publication

All authors have read and approved the final manuscript.

Competing interests

The authors declare no competing interests.

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