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Effectiveness of Biological versus Synthetic Meshes in Laparoscopic Inguinal Hernia Repair: A Systematic Review and Meta-Analysis

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ADMINISTRATIVE INFORMATION

Support - None.

Review Stage at time of this submission - Completed but not published.

Conflicts of interest - None declared.

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 28 January 2026 and was last updated on 28 January 2026.

INTRODUCTION

Review question / Objective This systematic review and meta-analysis aims to compare the clinical effectiveness and safety of biological meshes versus synthetic meshes in laparoscopic inguinal hernia repair, with particular focus on postoperative pain, foreign body sensation, seroma formation, and recurrence rate.

Condition being studied Inguinal hernia requiring laparoscopic repair, a common condition in general surgery where mesh selection may influence postoperative outcomes and long-term prognosis.

METHODS

Participant or population Adult patients diagnosed with inguinal hernia who underwent laparoscopic inguinal hernia repair, regardless of sex, body mass index, or comorbidities.

Intervention Laparoscopic inguinal hernia repair using biological mesh materials, including xenogeneic or biologic-derived meshes designed to promote tissue remodeling.

Comparator Laparoscopic inguinal hernia repair using synthetic mesh materials, such as polypropylene or polyester meshes, providing permanent mechanical reinforcement.

Study designs to be included Randomized controlled trials.

Eligibility criteria
(1) Randomized controlled trials (RCTs).
(2) Adult patients undergoing laparoscopic inguinal hernia repair.
(3) Direct comparison between biological mesh and synthetic mesh.
(4) Reporting at least one of the following outcomes: postoperative pain, foreign body sensation, seroma formation, or recurrence rate.

Information sources Electronic databases including PubMed, Embase, Cochrane Library, Web of Science, CNKI, Wanfang, and VIP were searched from inception to January 25, 2026. Reference lists of included studies were also manually screened.

Main outcome(s) Postoperative pain scores, Incidence of seroma formation, Incidence of foreign body sensation, Hernia recurrence rate.

Quality assessment / Risk of bias analysis Risk of bias was assessed using the Cochrane Risk of Bias Tool (RoB 1.0), covering random sequence generation, allocation concealment, blinding, incomplete outcome data, selective reporting, and other biases.

Strategy of data synthesis Meta-analysis was conducted using RevMan 5.4 software. Continuous outcomes were expressed as mean differences (MD) with 95% confidence intervals (CI), and dichotomous outcomes as relative risks (RR) with 95% CI. Heterogeneity was assessed using the I^2 statistic, and fixed- or random-effects models were applied accordingly.

Subgroup analysis Subgroup analyses were not performed due to the limited number of included studies and insufficient statistical power.

Sensitivity analysis Sensitivity analysis was not performed because of the limited number of included studies, which precluded meaningful assessment of the robustness of the pooled estimates.

Country(ies) involved China.

Keywords Biological mesh; Synthetic mesh; Laparoscopic inguinal hernia repair; Meta-analysis; Randomized controlled trial; GRADE.

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