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The Effect of Opioid-Free Anaesthesia on Pain and Prognosis in Gynaecological Laparoscopic Surgery: A Systematic Review and Meta-analysis

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Amendments - This protocol was registered with the International Platform of Registered Systematic Review and Meta-Analysis Protocols (INPLASY) on 21 August 2025 and was last updated on 21 August 2025.

INTRODUCTION

Review question / Objective To evaluate the effect of opioid-free anaesthesia on postoperative pain and prognosis in gynaecological laparoscopic surgery.

Condition being studied This study systematically evaluated the effect of opioid-free anaesthesia (OFA) on pain and prognosis in patients who undergo gynaecological laparoscopic surgery.

METHODS

Participant or population A systematic search of four English and four Chinese databases was conducted up to 31 January 2024. Ten randomised controlled trials involving 861 patients were included.

Intervention N/A.

Comparator N/A.

Study designs to be included Randomised controlled trials.

Eligibility criteria Inclusion and exclusion criteria
The inclusion criteria are as follows: (1) study design: randomised controlled trials; (2) study participants: adult patients (≥18 years) undergoing gynaecological laparoscopic surgery under general or local anaesthesia; (3) study groups: an intervention group receiving OFA and a control group receiving opioid-based anaesthesia (OA) or any inert intervention (e.g. placebo, sham treatment, blank control), with no restrictions on dosage, route, timing, form or frequency of drug administration; and (4) outcome measures: primary outcomes including the occurrence of PONV, total quality of recovery (QoR-40), Visual Analog Scale (VAS) and numeric rating scale (NRS) and a secondary outcome of LOS. The exclusion criteria are as follows: (1) studies focusing on patients who were morbidly obese; (2) studies in which both groups received non-opioid interventions; (3) studies that did not report the specified outcome measures or had incomplete result reporting; and

(4) non-RCT literature, including cohort studies, descriptive studies, reviews and case reports.

Information sources PubMed, Web of Science, the National Library of Medicine and Embase. Additionally, four Chinese databases were searched, including the China National Knowledge Infrastructure, Wanfang Database, China Biology Medicine and the VIP Chinese Science and Technology Periodical Database.

Main outcome(s) 1. The incidence of postoperative nausea and vomiting (PONV) was significantly reduced in patients undergoing gynecological laparoscopic surgery after receiving opioid-free anaesthesia (OFA).
2.Opioid-free anaesthesia (OFA) can reduce postoperative pain intensity in patients undergoing gynecological laparoscopic surgery.

Quality assessment / Risk of bias analysis The results were cross-checked by two researchers who independently assessed the risk of bias. The risk of bias in the included RCTs was evaluated using the risk assessment tool recommended in the Cochrane Handbook version 5.1.0 (Michaelis et al. 2018). The evaluation criteria included: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting and other potential sources of bias. Each item was graded as 'low risk', 'high risk' or 'unclear risk' of bias. The overall quality of the literature was categorised into three levels: A (fully meets the standard), B (partially meets the standard) and C (does not meet the standard). In cases of disagreement over the evaluation, a third researcher was consulted.Publication bias analysis was conducted for the five outcome measures. Funnel plots for all outcomes (PONV, NRS, VAS, QoR-40 and LOS) are presented in Supplementary Figures S5–S9. The funnel plot for LOS appeared noticeably asymmetrical, indicating potential publication bias.

Strategy of data synthesis Meta-analysis was conducted using Review Manager version 5.4.1. For continuous data, the mean difference (MD) was used as the effect measure; for categorical data, the odds ratio (OR) was applied. Point estimates and 95% confidence intervals (CIs) were reported for each effect size. Heterogeneity was assessed using the I^2 statistic, with I^2 0.1 indicating low heterogeneity; in such cases, a fixed-effects model (Mantel-Haenszel method) was used. If $I^2 > 50\%$ or $P \leq 0.1$, suggesting significant heterogeneity, a random-effects model (DerSimonian-Laird method) was adopted. Publication bias was assessed using funnel plots. Sensitivity analysis was conducted by sequentially excluding each study. The significance level for all analyses was set at $\alpha = 0.05$.

Subgroup analysis In this analysis, we did not perform subgroup analyses.

Sensitivity analysis Sensitivity analysis was conducted by sequentially excluding each study.

Country(ies) involved China.

Keywords Anaesthesia opioid-free; Gynaecology; Laparoscopy; Meta-analysis; Postoperative painAnaesthesia opioid-free.

Contributions of each author
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Author 2 - Zhuangwen Hu.
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