

Background/Introduction

- Postoperative pain management remains a challenge
- Opioid-based anesthesia (OBA) linked to adverse effects¹ such as:
 - Postoperative nausea and vomiting (PONV)
 - Respiratory depression
 - Risk of long-term use
- Opioid-free anesthesia (OFA) combines non-opioid agents with regional techniques.
- Peripheral nerve blocks may further enhance OFA’s benefits by minimizing systemic analgesic needs.
- Randomized trials suggest that OFA with nerve blocks may^{2,3}:
 - Lower pain
 - Decrease opioid use
 - Reduce adverse side effects
- Evidence on their combined efficacy is limited and inconsistent.
- Objective: evaluate the impact of OFA with nerve blocks on postoperative pain and PONV
- Hypothesis: OFA with nerve blocks offers superior pain control and reduces the incidence of PONV than OBA with nerve blocks.

Methods

- PubMed, CENTRAL, and CINAHL searched for RCTs: OFA + nerve block vs OBA + nerve block
- Used keywords and MeSH terms related to OFA, OBA, and nerve block
 - 426 studies found
 - 309 studies screened
 - 6 studies reviewed
- Screening: 2 reviewers; 3rd resolved discrepancies
- Outcomes:
 - Post-operative pain at 24 hours (NRS, VAS, or the QoR pain domain)
 - PONV rates
- Analysis: Random-effects (ML); heterogeneity = I²
- Effect sizes: Hedges’ g (pain), OR (PONV)
- Risk of bias: Cochrane RoB 2

Results

a. Search results:

- 6 randomized controlled trials met inclusion criteria and were included in the meta-analysis; all were assessed as having low risk of bias.

Table 1. Characteristics of included RCTs

Study ID	Year of Publication	Intervention	Control	Total Sample Size	Type of Surgery	Risk of Bias
Luo	2025	Esketamine combined with iliac fascia block	Sufentanil and remifentanil combined with iliac fascia block	72	Surgery for hip fractures	Low
Chen	2025	Dexmedetomidine combined with pectoral nerve block	Sufentanil combined with pectoral nerve block	136	Mastectomy	Low
Gao	2024	Dexmedetomidine and esketamine combined with quadratus lumborum block	Sufentanil combined with quadratus lumborum block	60	Retroperitoneiscopic renal surgery	Low
Xue	2024	Dexmedetomidine and esketamine combined with interscalene brachial plexus block	Fentanyl combined with interscalene brachial plexus block	69	Shoulder arthroscopy	Low
Dai	2023	Esketamine combined with unilateral/bilateral quadratus lumborum block	Sufentanil combined with unilateral/bilateral quadratus lumborum block	122	Lower abdominal or pelvic surgery	Low
Ibrahim	2022	Dexmedetomidine, ketamine, and lidocaine combined with bilateral oblique subcostal transverse abdominis plane block	Fentanyl combined with bilateral oblique subcostal transverse abdominis plane block	103	Sleeve gastrectomy	Low

b. Post-operative pain at 24 h

- OFA with nerve blocks was associated with lower postoperative pain (Hedges' g = −0.59; 95% CI: −1.19 to 0.00; p = 0.05) compared to OBA.
- Substantial heterogeneity was observed (I² = 91.2%, p < 0.01)

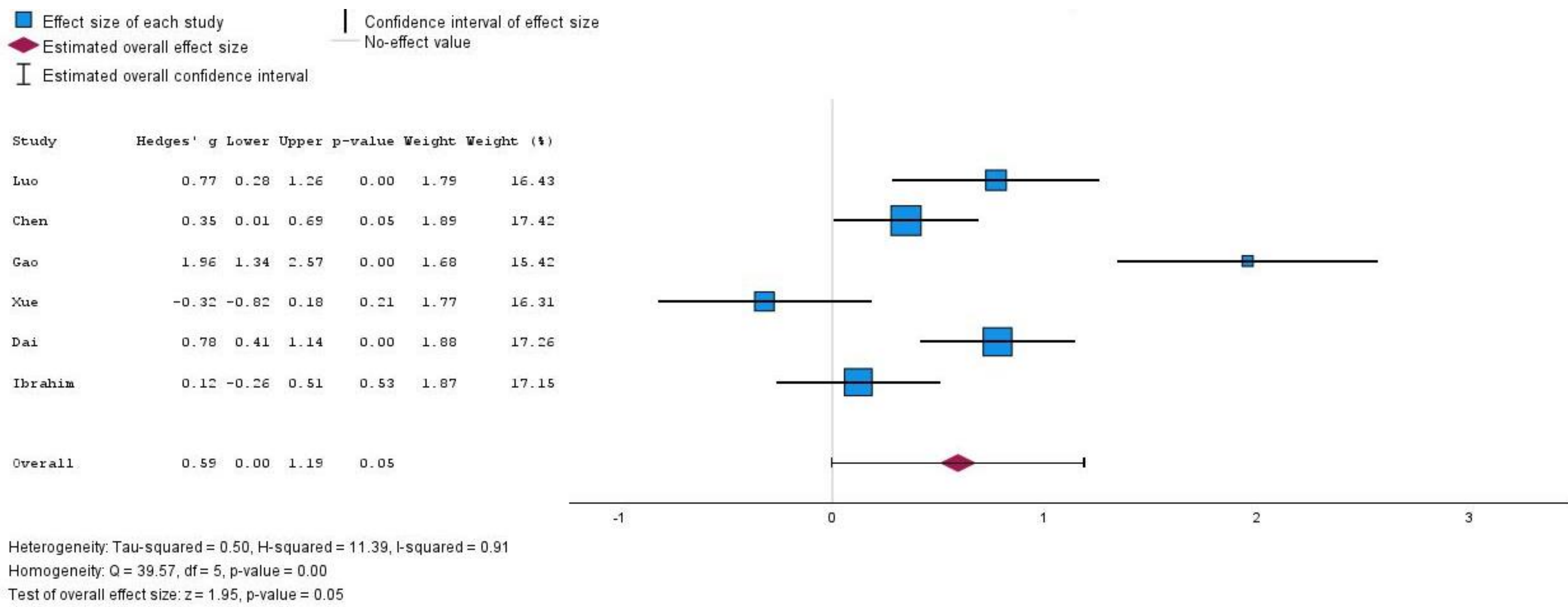


Figure 1. Forest plot of post-operative pain at 24 h

c. PONV

- OFA with nerve blocks associated with lower rates of PONV (OR=0.43; 95% CI, 0.20 to 0.89; p = 0.02) compared to OBA
- Moderate heterogeneity was observed I² = 55.5%, p = 0.06)

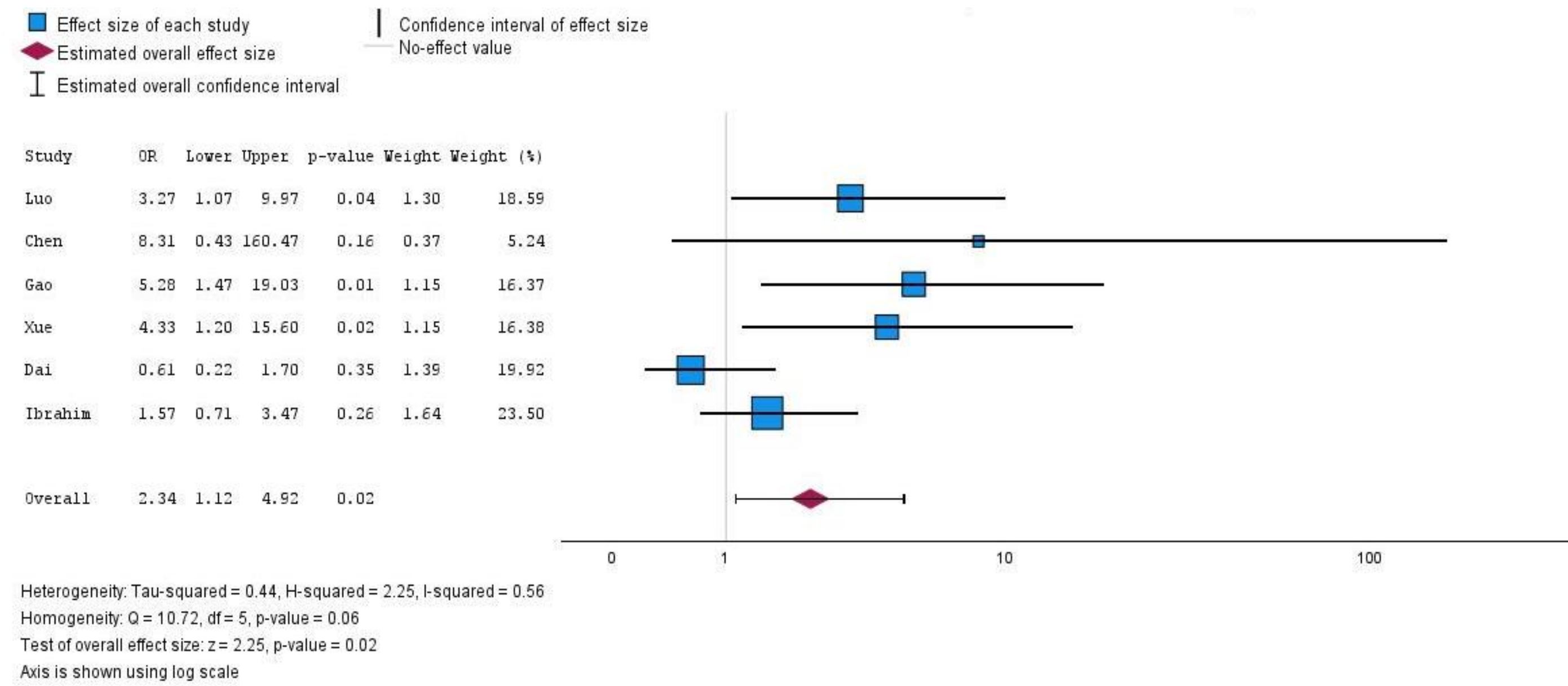


Figure 2. Forest plot of post-operative nausea and vomiting

Conclusion

- OFA with nerve blocks may reduce postoperative pain and PONV compared to OBA in surgical patients.
- Supports previous findings that OFA, particularly with regional techniques, provides effective analgesia with fewer opioid-related side effects.
- Heterogeneity in pain likely reflects variation in study populations, non-opioid regimens, surgeries, nerve block techniques, and pain assessment methods
- Highlights the need for standardized protocols in future research into other opioid-related complications such as respiratory depression, sedation, and long-term opioid dependence.
- Strengths: rigorous methodology and low risk of bias
- Limitations: limited number of studies and protocol variability may affect the generalizability.

References

- Benyamin R, Trescot AM, Datta S, et al. Opioid complications and side effects. Pain Physician. 2008;11(2 Suppl):S105-S120.
- Accurso G, Rampulla D, Cusenza M, et al. A blended opioid-free anesthesia protocol and regional parietal blocks in laparoscopic abdominal surgery- a randomized controlled trial [published correction appears in Sci Rep. 2025 Jun 13;15(1):20062. doi: 10.1038/s41598-025-02624-5.]. Sci Rep. 2025;15(1):14097. Published 2025 Apr 23. doi:10.1038/s41598-025-97116-x
- Zhang Q, Wu Y, An H, Feng Y. Postoperative recovery after breast cancer surgery: A randomised controlled trial of opioid-based versus opioid-free anaesthesia with thoracic paravertebral block. Eur J Anaesthesiol. 2023;40(8):552-559. doi:10.1097/EJA.0000000000001856