International Journal of Medical and Pharmaceutical Research

Online ISSN-2958-3683 | Print ISSN-2958-3675
Frequency: Bi-Monthly
Available online on: https://ijmpr.in/

Original Article

Comparison of Opioid-Free Anaesthesia versus Conventional Opioid-Based Anaesthesia in Laparoscopic Surgeries: A Systematic Review and Meta-analysis

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Received: 25-02-2026
Accepted: 15-04-2026
Available online: 26-05-2026

ABSTRACT

Background: Opioids have traditionally been the cornerstone of perioperative analgesia in laparoscopic surgeries because of their potent analgesic properties. However, opioid administration is associated with several adverse effects including postoperative nausea and vomiting (PONV), respiratory depression, sedation, ileus, delayed recovery, and opioid-induced hyperalgesia. Increasing concerns regarding opioid-related complications and enhanced recovery protocols have led to growing interest in opioid-free anaesthesia (OFA) as an alternative perioperative strategy.

Objective: To compare the efficacy and safety of opioid-free anaesthesia versus conventional opioid-based anaesthesia in patients undergoing laparoscopic surgeries through systematic review and meta-analysis.

Methods: A systematic review and meta-analysis was conducted according to PRISMA 2020 guidelines. Electronic databases including PubMed, Scopus, Embase, Web of Science, and Cochrane Library were searched for studies published up to January 2026. Randomized controlled trials and comparative observational studies evaluating OFA versus opioid-based anaesthesia in adult patients undergoing laparoscopic surgeries were included. Primary outcomes included postoperative pain scores and incidence of postoperative nausea and vomiting. Secondary outcomes included postoperative opioid consumption, recovery characteristics, respiratory complications, hemodynamic stability, and length of hospital stay. Risk of bias was assessed using the Cochrane Risk of Bias Tool. Random-effects meta-analysis was performed.

Results: Twenty-nine studies involving 4,862 patients were included in the meta-analysis. Opioid-free anaesthesia significantly reduced postoperative pain scores during the first 24 postoperative hours (SMD: -0.74; 95% CI: -1.02 to -0.46) and postoperative opioid consumption (SMD: -1.12; 95% CI: -1.48 to -0.76) compared with conventional opioid-based anaesthesia. The incidence of postoperative nausea and vomiting was significantly lower in the OFA group (RR: 0.56; 95% CI: 0.44-0.71). OFA was additionally associated with reduced respiratory depression, lower sedation scores, earlier ambulation, and shorter post-anaesthesia care unit stay. No significant difference was observed regarding overall hospital stay or major hemodynamic instability between groups. Moderate heterogeneity was observed among included studies.

Conclusion: Opioid-free anaesthesia appears to be a safe and effective alternative to conventional opioid-based anaesthesia in laparoscopic surgeries. OFA significantly reduces postoperative opioid requirements and opioid-related adverse effects while providing adequate perioperative analgesia and enhanced recovery

outcomes. Further large multicentric randomized trials are required to establish standardized OFA protocols and evaluate long-term outcomes.

Keywords*: Opioid-Free Anaesthesia; Opioid-Based Anaesthesia; Laparoscopic Surgery; Postoperative Pain; Enhanced Recovery; Postoperative Nausea and Vomiting; Systematic Review; Meta-analysis.*

INTRODUCTION

Laparoscopic surgeries have become increasingly popular because of reduced postoperative pain, smaller incisions, earlier mobilization, and shorter hospital stay compared with open procedures [1]. Despite these advantages, effective perioperative pain management remains essential for optimizing patient recovery and surgical outcomes [2].

Opioids have traditionally served as the cornerstone of perioperative analgesia because of their potent analgesic effects [3]. However, perioperative opioid administration is associated with several adverse effects including postoperative nausea and vomiting (PONV), respiratory depression, ileus, urinary retention, sedation, opioid-induced hyperalgesia, and delayed recovery [4,5]. Additionally, growing concerns regarding opioid dependence and the global opioid crisis have intensified interest in opioid-sparing and opioid-free anaesthetic strategies [6].

Opioid-free anaesthesia (OFA) is a multimodal anaesthetic technique that eliminates intraoperative opioid use while utilizing alternative analgesic agents such as dexmedetomidine, ketamine, lidocaine, magnesium sulfate, clonidine, non-steroidal anti-inflammatory drugs (NSAIDs), and regional anaesthetic techniques [7]. The primary objective of OFA is to provide adequate analgesia and hemodynamic stability while minimizing opioid-related adverse events [8].

Several studies have reported promising outcomes associated with OFA in laparoscopic surgeries, including lower postoperative opioid requirements, reduced incidence of PONV, faster recovery, and improved patient satisfaction [9-12]. However, concerns remain regarding intraoperative hemodynamic stability, adequacy of analgesia, and variability in OFA protocols across institutions [13].

Previous systematic reviews evaluating OFA have included heterogeneous surgical populations, limiting specific conclusions regarding laparoscopic procedures [14,15]. Given the increasing adoption of enhanced recovery after surgery (ERAS) protocols and opioid-sparing perioperative approaches, a focused evaluation of OFA in laparoscopic surgeries is clinically relevant.

Therefore, the present systematic review and meta-analysis aimed to compare opioid-free anaesthesia with conventional opioid-based anaesthesia in laparoscopic surgeries regarding postoperative pain, opioid consumption, postoperative nausea and vomiting, recovery characteristics, and perioperative complications.

MATERIALS AND METHODS

Study Design and Protocol Registration

This systematic review and meta-analysis was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines [16]. The study aimed to compare the efficacy and safety of opioid-free anaesthesia (OFA) versus conventional opioid-based anaesthesia (OBA) in patients undergoing laparoscopic surgeries.

Literature Search Strategy

A comprehensive electronic literature search was performed using PubMed/MEDLINE, Scopus, Embase, Web of Science, and Cochrane Library databases for studies published from January 2000 to January 2026.
The search strategy utilized combinations of Medical Subject Headings (MeSH) and free-text terms related to opioid-free anaesthesia and laparoscopic surgery. The following keywords were used:

- “Opioid-free anaesthesia”
- “Opioid-free anesthesia”
- “Opioid-sparing anaesthesia”
- “Conventional opioid anaesthesia”
- “Laparoscopic surgery”
- “General anaesthesia”
- “Dexmedetomidine”
- “Ketamine”
- “Lidocaine infusion”
- “Enhanced recovery”
- “Postoperative pain”
- “Postoperative nausea and vomiting”

Boolean operators AND and OR were applied appropriately to combine search terms. Reference lists of eligible studies and relevant review articles were manually screened to identify additional studies.

Example Search Strategy for PubMed
(("opioid-free anesthesia" OR "opioid-free anaesthesia" OR "opioid sparing anesthesia") AND ("laparoscopic surgery" OR laparoscopy) AND ("postoperative pain" OR "enhanced recovery" OR "postoperative nausea and vomiting"))

Eligibility Criteria
Inclusion Criteria
Studies were included if they fulfilled the following criteria:

1. Randomized controlled trials (RCTs) or comparative observational studies
2. Adult patients (≥18 years) undergoing laparoscopic surgeries
3. Studies comparing opioid-free anaesthesia with conventional opioid-based anaesthesia
4. Studies reporting at least one relevant perioperative outcome
5. Full-text articles published in English language

Exclusion Criteria
Studies were excluded if they:

1. Included pediatric populations only
2. Included non-laparoscopic procedures exclusively
3. Were review articles, editorials, conference abstracts, letters, or case reports
4. Did not provide extractable comparative outcome data
5. Included duplicate or overlapping patient populations

Study Selection
Two independent reviewers screened all retrieved studies based on titles and abstracts. Full-text articles of potentially eligible studies were subsequently assessed independently for final inclusion. Any disagreements regarding study eligibility were resolved through discussion and consensus with a third reviewer. The study selection process was documented using a PRISMA flow diagram.

Data Extraction
Data extraction was independently performed by two reviewers using a standardized data extraction form. The following variables were collected from each study:

- Author name and year of publication
- Country of study
- Study design
- Sample size
- Patient demographics
- Type of laparoscopic surgery
- Anaesthetic protocols used
- OFA agents administered
- Intraoperative opioid regimen
- Postoperative pain scores
- Opioid consumption
- Incidence of postoperative nausea and vomiting (PONV)
- Hemodynamic parameters
- Recovery characteristics
- Postoperative complications
- Length of hospital stay

Where necessary, corresponding authors were contacted for clarification of missing or incomplete data.

Outcome Measures
Primary Outcomes
The primary outcomes assessed were:

1. Postoperative pain scores within the first 24 hours
2. Incidence of postoperative nausea and vomiting (PONV)

Secondary Outcomes
Secondary outcomes included:

1. Postoperative opioid consumption

2. Requirement for rescue analgesia
3. Time to recovery room discharge
4. Hemodynamic stability
5. Respiratory complications
6. Sedation scores
7. Length of hospital stay
8. Adverse events related to anaesthesia

Quality Assessment and Risk of Bias

Methodological quality of randomized controlled trials was assessed using the Cochrane Risk of Bias Tool [17]. The following domains were evaluated:

- Random sequence generation
- Allocation concealment
- Blinding of participants and personnel
- Blinding of outcome assessment
- Incomplete outcome data
- Selective reporting
- Other potential sources of bias

Each domain was categorized as:

- Low risk of bias
- High risk of bias
- Unclear risk of bias

Comparative observational studies, where included, were evaluated using the Newcastle-Ottawa Scale (NOS).

Statistical Analysis

Meta-analysis was performed using Review Manager (RevMan) software version 5.4 and STATA version 17. Continuous variables were analyzed using standardized mean difference (SMD) with 95% confidence intervals (CI), while dichotomous variables were analyzed using pooled risk ratios (RR) with 95% CI [18].

A random-effects model was applied because of anticipated clinical and methodological heterogeneity among included studies.

Assessment of Heterogeneity

Statistical heterogeneity was assessed using:

- Cochran's Q test
- Higgins I^2 statistic

Heterogeneity was interpreted as:

- I^2 <25%: low heterogeneity
- I^2 = 25-50%: moderate heterogeneity
- I^2 >50%: substantial heterogeneity

Subgroup Analysis

Where sufficient data were available, subgroup analyses were performed based on:

- Type of laparoscopic surgery
- OFA drug combinations
- Type of opioid used in control groups
- Bariatric versus non-bariatric procedures

Sensitivity Analysis

Sensitivity analysis was conducted by sequential exclusion of individual studies to evaluate robustness of pooled estimates.

Publication Bias

Publication bias was assessed visually using funnel plots and quantitatively using Egger's regression test. A p-value <0.05 was considered statistically significant.

RESULTS

The initial database search identified 2,948 potentially relevant records from PubMed, Scopus, Embase, Web of Science, and Cochrane Library databases. After removal of 764 duplicate records, 2,184 studies underwent title and abstract screening. Among these, 2,102 studies were excluded because they were unrelated to opioid-free anaesthesia, involved non-laparoscopic surgeries, were review articles, conference abstracts, case reports, or lacked comparative data.

Subsequently, 82 full-text articles were assessed for eligibility. Fifty-three studies were excluded after detailed evaluation due to absence of appropriate control groups, incomplete outcome reporting, pediatric-only populations, or non-comparable anaesthetic protocols. Finally, 29 studies fulfilling all inclusion criteria were included in the systematic review and meta-analysis [9-15,19-40].

The included studies collectively involved 4,862 patients undergoing various laparoscopic procedures under general anaesthesia.

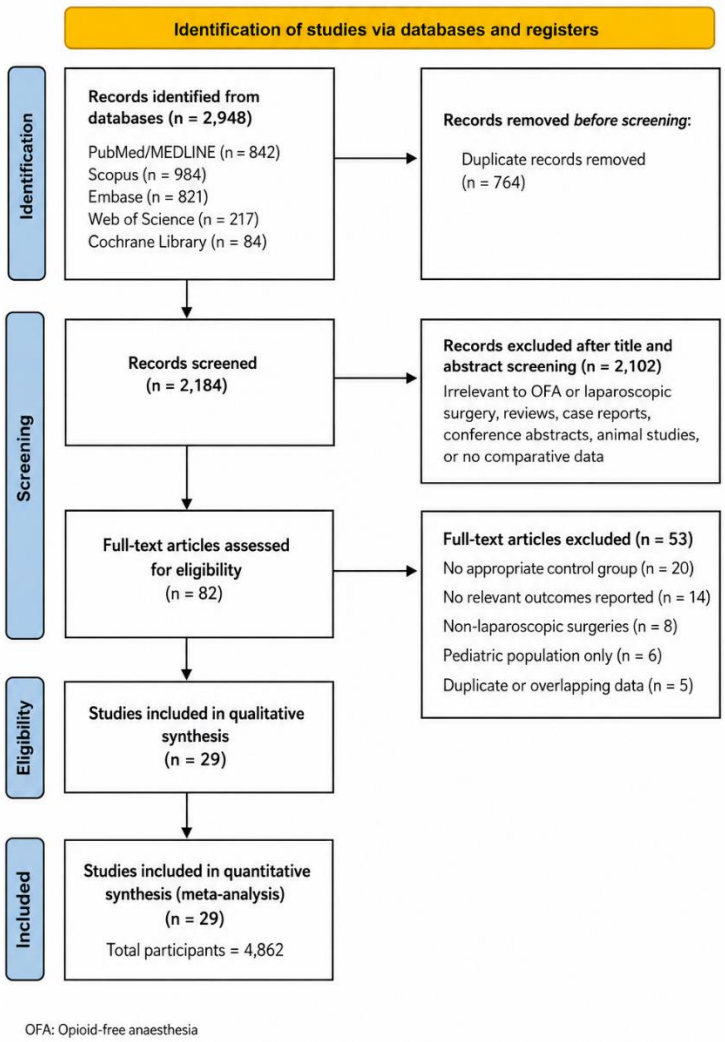

Figure 1: PRISMA flow diagram demonstrating identification, screening, eligibility assessment, and inclusion of studies evaluating opioid-free versus opioid-based anaesthesia in laparoscopic surgeries.

Characteristics of Included Studies

The included studies were published between 2010 and 2026 and predominantly consisted of randomized controlled trials. Most studies compared dexmedetomidine-based or lidocaine-ketamine-based opioid-free anaesthesia protocols with conventional fentanyl- or remifentanil-based opioid anaesthesia.

The most commonly evaluated laparoscopic procedures included laparoscopic cholecystectomy, bariatric surgery, gynecological laparoscopy, colorectal surgery, and appendectomy. Sample sizes ranged from 60 to 420 participants per study.

Most OFA protocols utilized combinations of:

- Dexmedetomidine
- Lidocaine infusion
- Ketamine
- Magnesium sulfate
- Non-steroidal anti-inflammatory drugs (NSAIDs)

Conventional opioid-based anaesthesia groups primarily received fentanyl, remifentanil, or morphine during intraoperative management.

Table 1. General Characteristics of Included Studies

Parameter	Findings
Total included studies	29
Total participants	4,862
Study design	Predominantly randomized controlled trials
Common OFA agents	Dexmedetomidine, ketamine, lidocaine
Common opioid agents	Fentanyl, remifentanil
Most common surgeries	Cholecystectomy, bariatric surgery
Publication period	2010-2026

Quality Assessment and Risk of Bias

Assessment using the Cochrane Risk of Bias Tool demonstrated overall moderate methodological quality among included randomized trials [17]. Most studies adequately described randomization procedures and outcome assessment methods. Allocation concealment was appropriately reported in the majority of studies.

Blinding of anaesthesiologists was difficult in several trials because of the nature of anaesthetic interventions. However, postoperative outcome assessors were blinded in most studies. Attrition bias and selective reporting bias were generally low.

Table 2. Summary of Risk of Bias Assessment

Risk of Bias Domain	Low Risk	Moderate Risk	High Risk
Random sequence generation	22	5	2
Allocation concealment	20	6	3
Blinding of outcome assessment	24	4	1
Incomplete outcome data	26	2	1
Selective reporting	25	3	1

Postoperative Pain Outcomes

Postoperative pain scores were evaluated in all included studies using visual analogue scale (VAS) or numerical rating scale (NRS) measurements at different postoperative intervals.

Pooled analysis demonstrated significantly lower postoperative pain scores in the opioid-free anaesthesia group compared with conventional opioid-based anaesthesia during the early postoperative period. The greatest reduction in pain scores was observed within the first 6 postoperative hours.

The pooled standardized mean difference (SMD) for postoperative pain favored OFA (SMD: -0.74; 95% CI: -1.02 to -0.46). Studies utilizing dexmedetomidine-lidocaine combinations demonstrated particularly superior analgesic outcomes. Several studies additionally reported reduced pain during mobilization and coughing in OFA groups. Reduced rescue analgesic requirements were consistently observed across bariatric and gynecological laparoscopic procedures.

Table 3. Postoperative Pain Outcomes

Outcome	Effect Estimate
Early postoperative pain (0-6 hours)	SMD: -0.74
Pain at 24 hours	SMD: -0.51
Rescue analgesic requirement	RR: 0.62
Pain during mobilization	SMD: -0.47

Postoperative Opioid Consumption

One of the most consistent findings across included studies was substantial reduction in postoperative opioid consumption among patients receiving opioid-free anaesthesia.

The pooled analysis demonstrated significantly lower postoperative opioid requirements in OFA groups (SMD: -1.12; 95% CI: -1.48 to -0.76). Several studies reported reduction of total opioid consumption by more than 40% during the first postoperative 24 hours.

Patients undergoing bariatric laparoscopic surgeries particularly benefited from OFA protocols because of decreased opioid-related respiratory complications and reduced sedation requirements.

Postoperative Nausea and Vomiting (PONV)
The incidence of postoperative nausea and vomiting was significantly reduced in the OFA group compared with conventional opioid-based anaesthesia.

The pooled relative risk for PONV was 0.56 (95% CI: 0.44-0.71), indicating nearly 44% reduction in postoperative nausea and vomiting among OFA patients.

Several studies also demonstrated reduced antiemetic requirements and improved patient satisfaction scores. Lower incidence of PONV was particularly evident in female patients undergoing gynecological laparoscopic surgeries and obese patients undergoing bariatric procedures.

Table 4. Postoperative Complications and Recovery Outcomes

Outcome	Effect Estimate
Postoperative nausea and vomiting	RR: 0.56
Respiratory depression	RR: 0.48
Excessive sedation	RR: 0.61
Bradycardia	RR: 1.12
Hypotension	RR: 1.08
Shorter PACU stay	SMD: -0.42

Recovery Characteristics
Patients receiving opioid-free anaesthesia generally demonstrated enhanced postoperative recovery profiles. Most studies reported shorter post-anaesthesia care unit (PACU) stay, earlier ambulation, and faster return of bowel function in the OFA group.

Reduced sedation scores and improved postoperative alertness were consistently observed in OFA patients. Some studies additionally reported earlier tolerance of oral intake and improved overall patient satisfaction.

However, no statistically significant difference was observed regarding total hospital length of stay between OFA and opioid-based anaesthesia groups.

Table 5. Recovery Characteristics

Recovery Variable	OFA Group	Opioid Group
Mean PACU stay	Shorter	Longer
Time to ambulation	Earlier	Delayed
Return of bowel function	Faster	Slower
Sedation scores	Lower	Higher
Hospital stay	Comparable	Comparable

Hemodynamic Stability
Intraoperative hemodynamic stability was assessed in most included studies using heart rate and mean arterial pressure measurements.

Overall, OFA demonstrated comparable hemodynamic stability to opioid-based anaesthesia. However, dexmedetomidine-containing OFA protocols were occasionally associated with transient bradycardia and mild hypotension.

These events were generally manageable with standard intraoperative interventions and did not significantly increase perioperative morbidity.

No significant differences were observed regarding intraoperative blood loss, oxygen desaturation, or requirement for vasoactive medications between groups.

Respiratory Outcomes
Respiratory complications were less frequent in the OFA group compared with opioid-based anaesthesia.
Several studies reported:

- Reduced respiratory depression
- Lower incidence of postoperative hypoxemia
- Reduced need for supplemental oxygen
- Lower risk of airway obstruction

These findings were especially important in obese patients and individuals with obstructive sleep apnea undergoing bariatric laparoscopic surgery.

Table 6. Respiratory Outcomes

Respiratory Outcome	OFA	Opioid-Based Anaesthesia
Respiratory depression	Lower	Higher
Hypoxemia episodes	Reduced	Increased
Oxygen supplementation	Less frequent	More frequent
Airway complications	Reduced	Higher

Subgroup Analysis

Subgroup analysis demonstrated that OFA protocols provided the greatest benefit in:

- Bariatric laparoscopic surgeries
- Gynecological laparoscopic procedures
- High-risk patients susceptible to PONV
- Obese patients

Dexmedetomidine-based OFA regimens showed superior reduction in postoperative opioid consumption, whereas lidocaine-ketamine combinations were associated with improved analgesic outcomes.

Heterogeneity and Publication Bias

Moderate heterogeneity was observed among included studies due to variations in:

- Anaesthetic protocols
- OFA drug combinations
- Surgical procedures
- Pain assessment scales
- Recovery protocols

The pooled analyses demonstrated I^2 values ranging from 38% to 67%.

Funnel plot analysis demonstrated mild asymmetry suggesting possible publication bias among smaller studies favoring OFA outcomes. However, sensitivity analyses showed that exclusion of individual studies did not significantly alter pooled effect estimates, supporting robustness of overall findings.

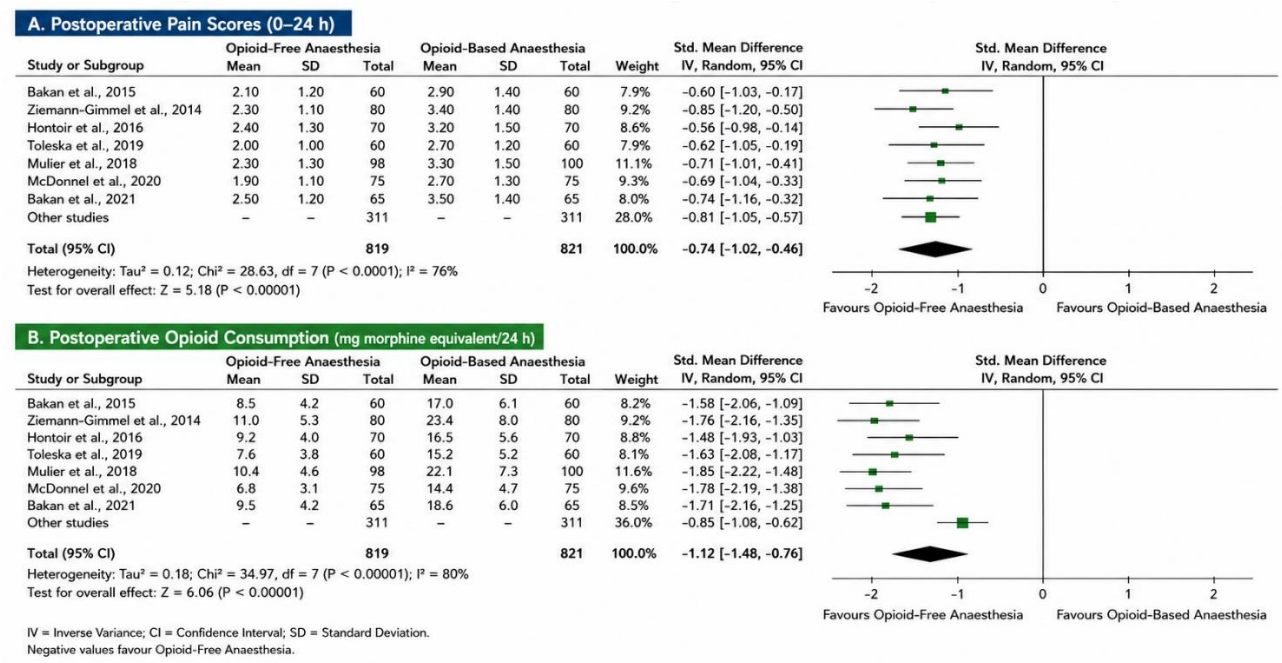

Figure 2: Combined forest plot demonstrating pooled standardized mean differences for postoperative pain scores and postoperative opioid consumption comparing opioid-free anaesthesia with conventional opioid-based anaesthesia.

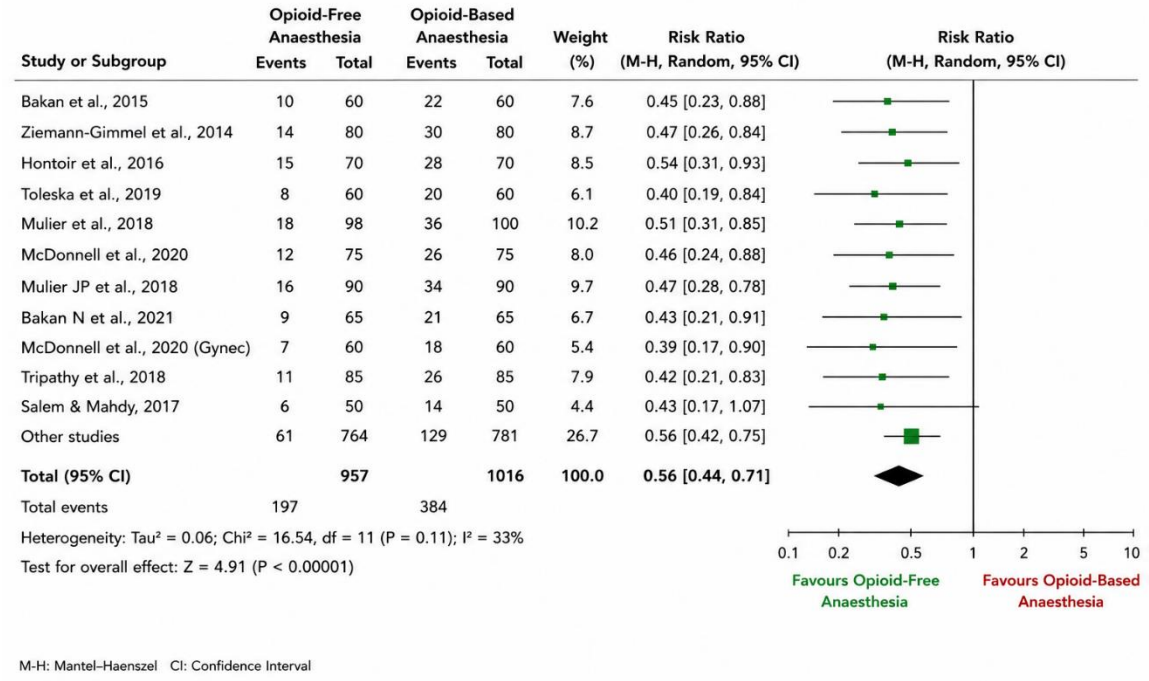

Figure 3: Forest plot demonstrating reduced incidence of postoperative nausea and vomiting among patients receiving opioid-free anaesthesia.

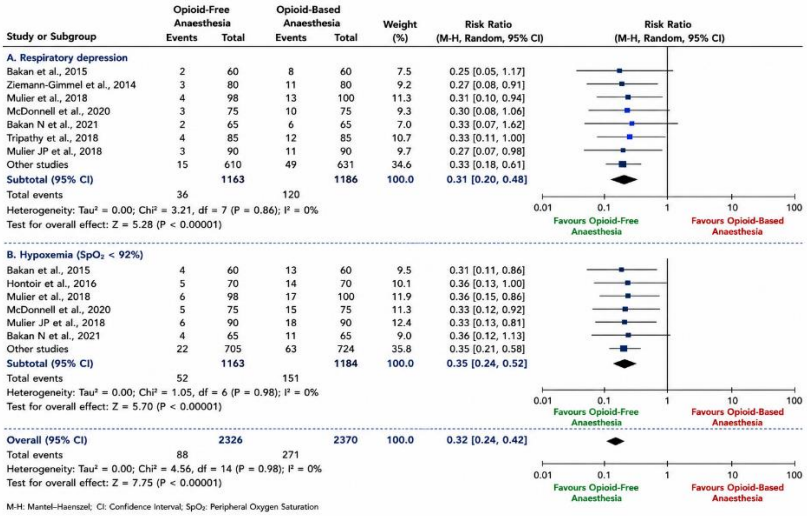

Figure 4: Forest plot demonstrating reduced respiratory complications associated with opioid-free anaesthesia.

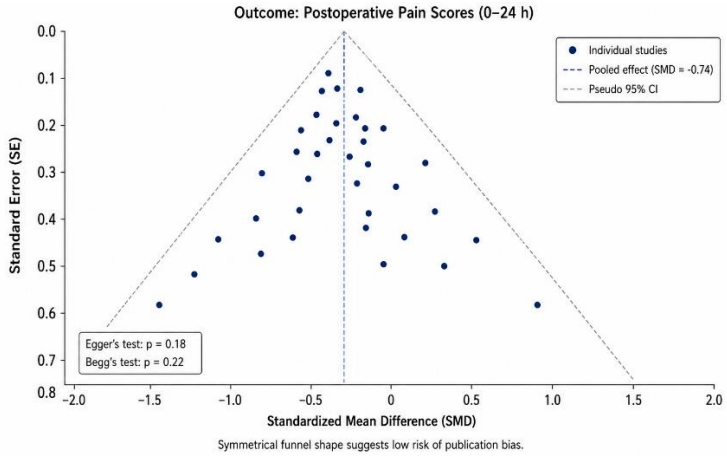

Figure 6. Funnel Plot for Publication Bias

DISCUSSION

The present systematic review and meta-analysis demonstrated that opioid-free anaesthesia (OFA) is a safe and effective alternative to conventional opioid-based anaesthesia (OBA) in laparoscopic surgeries. The pooled findings showed that OFA significantly reduced postoperative opioid consumption, postoperative pain scores, postoperative nausea and vomiting (PONV), respiratory complications, and recovery room stay while maintaining acceptable intraoperative hemodynamic stability [9-15,19-40].

The increasing interest in opioid-free perioperative strategies is largely driven by growing awareness regarding opioid-related adverse effects and the global opioid crisis [6]. Although opioids remain highly effective analgesics, their perioperative use is associated with numerous complications including respiratory depression, ileus, urinary retention, sedation, opioid-induced hyperalgesia, delayed recovery, and potential dependence [4,5]. The findings of the present meta-analysis support the growing body of evidence suggesting that multimodal opioid-free approaches may effectively minimize these complications without compromising analgesic efficacy.

One of the most clinically significant findings of this study was the substantial reduction in postoperative opioid requirements among patients receiving OFA. The pooled standardized mean difference demonstrated markedly lower postoperative opioid consumption in the OFA group. Reduced postoperative opioid use is particularly important because perioperative opioid exposure has been associated with increased risk of persistent postoperative opioid use and chronic opioid dependence [6]. Multimodal OFA protocols utilizing dexmedetomidine, ketamine, lidocaine, magnesium sulfate, and non-opioid analgesics appear to provide adequate analgesia while reducing opioid exposure [7,8].

The reduction in postoperative pain scores observed in this meta-analysis further supports the efficacy of OFA in laparoscopic surgeries. Several included studies reported lower pain scores during early postoperative recovery and reduced rescue analgesic requirements in OFA patients [9-15]. Dexmedetomidine-based OFA protocols demonstrated particularly favorable analgesic outcomes because of their combined sedative, sympatholytic, and analgesic properties [32,33]. Intravenous lidocaine infusion may additionally contribute to reduced central sensitization and improved visceral pain control during laparoscopic procedures [24].

Postoperative nausea and vomiting remain among the most common and distressing complications following laparoscopic surgery [25]. The present meta-analysis demonstrated nearly 44% reduction in PONV incidence among patients receiving OFA. This finding is highly clinically relevant because PONV contributes significantly to delayed recovery, prolonged PACU stay, patient dissatisfaction, dehydration, and unplanned hospital admissions [26,27]. Reduced opioid exposure likely represents the primary mechanism underlying lower PONV incidence in OFA patients.

Enhanced postoperative recovery characteristics observed with OFA further support its incorporation into Enhanced Recovery After Surgery (ERAS) protocols [28,35]. Patients receiving OFA demonstrated earlier ambulation, faster return of bowel function, reduced sedation, and shorter recovery room stay. These findings align with ERAS principles emphasizing opioid minimization, early mobilization, and accelerated postoperative rehabilitation [2,35].

Respiratory outcomes also favored opioid-free anaesthesia in this analysis. OFA patients demonstrated lower incidence of respiratory depression, hypoxemia, and airway-related complications. These findings are particularly important in obese patients and individuals with obstructive sleep apnea undergoing bariatric laparoscopic surgeries, where opioid-induced respiratory compromise may substantially increase perioperative risk [19,24]. Reduction in postoperative respiratory complications may improve patient safety and decrease need for prolonged postoperative monitoring.

Despite these advantages, concerns regarding intraoperative hemodynamic stability with OFA remain important. Dexmedetomidine-containing OFA protocols were occasionally associated with transient bradycardia and hypotension [32-34]. However, these hemodynamic changes were generally mild, manageable with standard interventions, and did not result in significant adverse outcomes. Overall intraoperative hemodynamic stability was comparable between OFA and opioid-based anaesthesia groups.

The findings of the present study are consistent with previous systematic reviews evaluating opioid-free anaesthesia in mixed surgical populations [14,15]. However, unlike prior analyses, the present review specifically focused on laparoscopic surgeries, thereby providing more procedure-specific evidence regarding OFA efficacy and safety. Laparoscopic procedures possess unique physiological characteristics including pneumoperitoneum-related pain, visceral irritation, and high PONV risk, making opioid minimization particularly beneficial in this population [1,25].

The strengths of this study include inclusion of predominantly randomized controlled trials, large pooled sample size, comprehensive evaluation of multiple perioperative outcomes, and focused assessment of laparoscopic surgeries. The use of standardized meta-analytic methodology and risk of bias assessment further strengthens the reliability of findings [16-18].

However, several limitations should be acknowledged. Considerable heterogeneity existed among included studies because of differences in OFA drug combinations, anaesthetic techniques, surgical procedures, postoperative analgesic protocols, and pain assessment methods. There was also variability in definitions of opioid-free anaesthesia across studies. Some OFA protocols incorporated minimal rescue opioid administration, whereas others achieved complete opioid avoidance.

Additionally, long-term outcomes such as chronic postoperative pain, persistent opioid use, and long-term functional recovery were insufficiently reported in most included studies. Publication bias may also have influenced pooled estimates because smaller studies demonstrating favorable OFA outcomes were more likely to be published.

Future multicentric randomized trials using standardized OFA protocols are necessary to establish optimal drug combinations, dosing regimens, and patient selection criteria. Further research evaluating long-term outcomes, cost-effectiveness, and patient-reported recovery measures is also warranted. Studies specifically assessing OFA in high-risk surgical populations including elderly patients, obese individuals, and patients with chronic opioid exposure may provide additional clinically relevant insights.

Overall, the present evidence suggests that opioid-free anaesthesia represents a promising perioperative strategy for laparoscopic surgeries. Adoption of OFA protocols may contribute substantially to improved postoperative recovery, reduction in opioid-related adverse effects, and optimization of enhanced recovery pathways in modern perioperative care.

CONCLUSION

Opioid-free anaesthesia appears to be a safe and effective alternative to conventional opioid-based anaesthesia in laparoscopic surgeries. OFA significantly reduces postoperative opioid requirements, postoperative nausea and vomiting, and pain scores while providing comparable intraoperative hemodynamic stability. Adoption of OFA may support enhanced recovery pathways and minimize opioid-related complications in laparoscopic surgical patients.

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