

Role of Opioids Administered During Anesthesia in Acute Pain and Opioid Consumption: A Meta-Analysis

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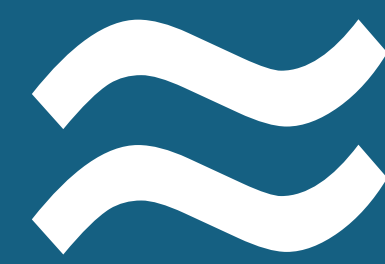
Background: The use of opioids in surgical patients has been reported as a risk factor for increasing postoperative pain and opioid use.¹ Recent studies have investigated the role of opioids during anesthesia by comparing **opioid-based anesthesia (OBA)** to **opioid-free anesthesia (OFA)** on postoperative outcomes.^{1, 2} This resulted in advocating OFA as a way to reduce pain and prevent postoperative complications including opioid-related side effects, such as worsened postoperative pain and increased opioid requirements.³ However, the validity of such claims has been questioned by those who favor OBA. This study aims to compare OFA and OBA in their relative effects on postoperative acute pain and opioid consumption using a meta-analysis.

Methods: PubMed, Cochrane and Embase libraries were used to search up to June 12, 2025, for studies that included opioid-free anesthesia. Studies that included randomized controlled trials (RCTs) conducted in adult humans were selected, while observational studies, studies including epidural and spinal anesthesia, and RCTs currently awaiting approval were excluded. Included RCTs conducted over a period of June 2000 and September 2024.

Discussion: Our meta-analysis concludes that OFA results in statistically significant lower postoperative pain scores and opioid consumption in incidence of postoperative nausea and vomiting, faster recovery times, enhanced patient satisfaction, and improved safety profiles. ^{2,4} Based on this meta-analysis and other supporting literature, **OFA is a viable alternative to OBA** in post-operative pain reduction, in decreasing opioid requirements, for reducing PONV, antiemetic and non-opioid analgesics use. However, variability across the studies, and the heterogeneity between studies and central role played by dexmedetomidine highlight that, at most, this analysis suggests a non-inferiority between OFA and OBA. A prospective randomized OFA versus opioid sparing OBA is required to establish the role that OFA may have in modern anesthesia.



Opioid free anesthesia



Opioid based anesthesia

OFA is a viable alternative for OBA.

However, there are important limitations:

1. Relative limited number of studies
2. High statistical heterogeneity ($I^2 = 84.09\%$) amongst the analyzed studies
3. High variability in non-opioid analgesics use as alternatives to opioids (saline, dexmedetomidine, ketamine, and magnesium, alone or in combination)
4. Limited sample sizes in individual trials
5. Lack of long-term outcome data

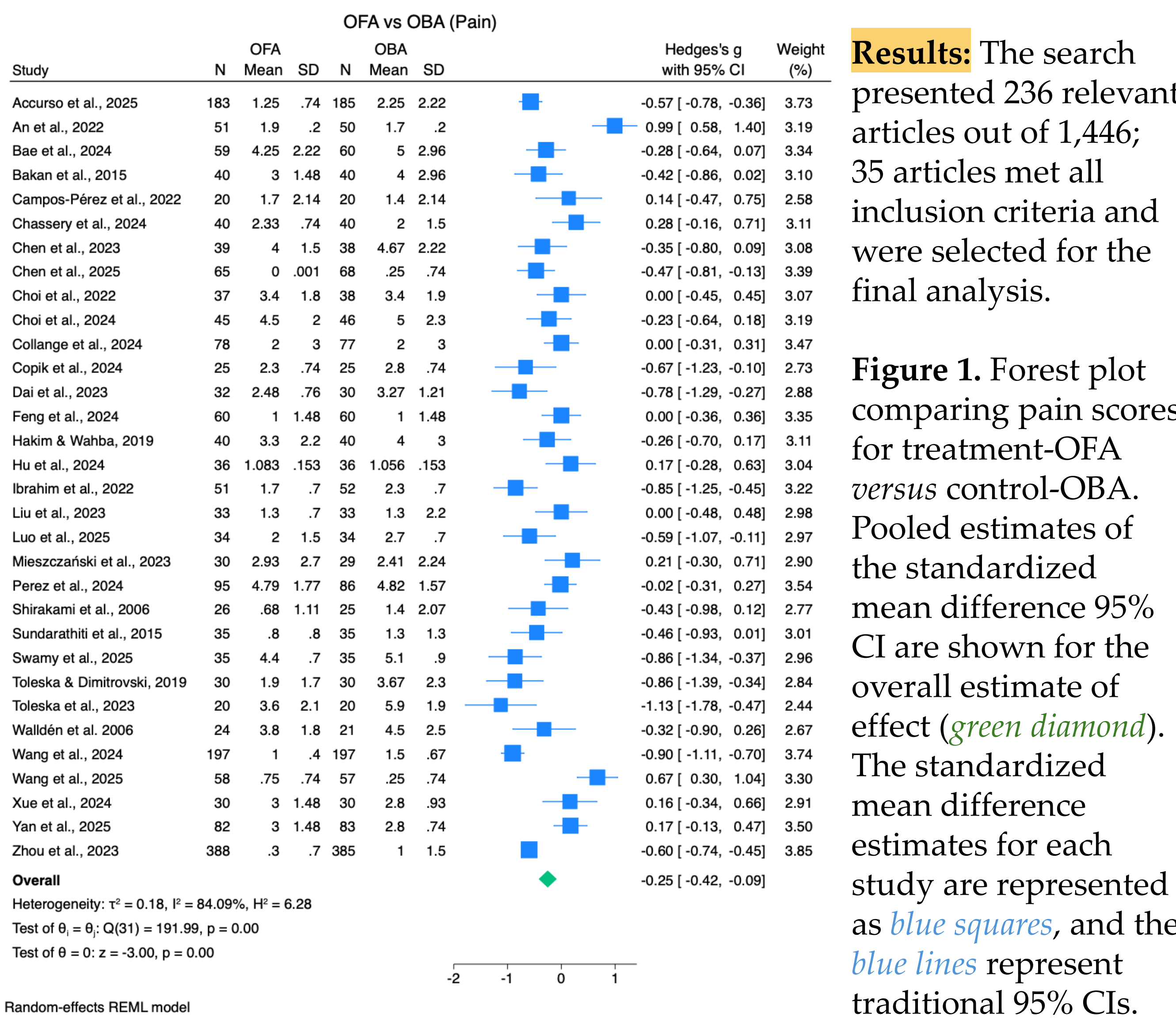


Table 1. Primary and secondary outcome results

Outcome	<i>n</i> of studies	Overall	<i>p</i> -value	<i>I</i> ² , %
Primary outcomes				
Pain	32	Hedges’ g: −0.25 [−0.42 - −0.09]	<0.001	84.09
OME	19	Hedges’ g: −0.37 [−0.60 - −0.14]	<0.001	85.70
Secondary outcomes				
PONV	21	RR: 0.49 [0.36 – 0.66]	<0.001	66.99
Nausea	11	RR: 0.50 [0.36 - 0.71]	<0.001	57.19
Vomiting	12	RR: 0.47 [0.33 - 0.67]	<0.001	18.81
Antiemetic	9	RR: 0.36 [0.20 - 0.66]	<0.001	75.65
Analgesic	10	RR: 0.71 [0.55 – 0.91]	0.01	46.50
Time to flatus, h	8	Hedges’ g: −0.18 [−0.56 - 0.20]	0.36	87.09
Pruritus	7	RR: 0.49 [0.16 - 1.49]	0.21	55.92
QoR-40	6	Hedges’ g: 0.42 [0.16 - 0.67]	<0.001	65.76
Length of stay, days	11	Hedges’ g: −0.21 [−0.60 - 0.17]	0.27	94.47
Hypotension	8	RR: 0.73 [0.52 – 1.03]	0.07	71.12
Hypertension	7	RR: 1.14 [0.97 – 1.34]	0.11	8.46
Bradycardia	15	RR: 0.84 [0.51 – 1.37]	0.47	60.37
Tachycardia	7	RR: 1.35 [0.83 – 2.18]	0.23	13.23

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