The Effect of Opioid-Free Anesthesia on Postoperative Pain Scores in Adult Thoracic Patients

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INTRODUCTION

- Opioid related deaths in the United States are increasing each year, with 79,770 opioid-related overdoses in 2022 alone.[1,2]
- A 2019 study noted persistent opioid use for up to 180 days after cardiothoracic surgery in previously opioid-naive patients.[3]
- Anesthesia practitioners routinely expose patients to opioids during anesthesia for procedures.[3]
- Opioids traditionally are the first-line agent for pain control, although they are associated with side effects like postoperative nausea and vomiting, pruritis, and respiratory depression.[4]
- Anesthesia professionals should use techniques that reduce exposure of patients to opioids yet provide adequate pain control.
- Opioid-free anesthesia could present a feasible alternative to appropriately control patient's pain postoperatively.[5]
- The purpose of this project is to determine if there are differences in patients' postoperative pain after an opioid-free anesthesia compared to a traditional, opioid-based plan.
- PICOT question: In thoracic surgical patients over the age of 18 years, what is the effect of opioid-free anesthesia using volatile anesthetic or total intravenous anesthesia with or without regional techniques, versus opioid-based anesthesia on postoperative pain scale scores and opioid consumption in morphine mg equivalents between 24 and 48 hours after surgery?

METHODS

- PubMed and Embase were searched using a date range from 2010 to 2024.
- Exclusion criteria: administration of opioids during induction and/or intraoperatively
- Inclusion criteria: ages 18 to 65 years old, thoracic surgery

Opioid-free anesthesia provides comparable pain control to opioid-based anesthesia in thoracic surgery patients

Study	Study design, LOE, Population (N)	OFA Technique, Postop Pain Management	OBA Technique, Postop Pain Management	Pain Scale Scores 24 h Post-surgery	Postoperative Opioid Consumption
Devine et al,[6] 2020	Case controlled, 4 N = 166	Regional block, lidocaine, magnesium, propofol, ± paracetamol, parecoxib Postop: PCA morphine ± paracetamol and ibuprofen	Fentanyl, remifentanil and /or morphine, regional block, propofol, ± paracetamol, parecoxib Postop: PCA morphine ± paracetamol and ibuprofen	VRS score 0-3 Median (IQR) OFA 0 (0-1) OBA 0 (0-1) *P* = .49	24 h MME consumption (mg) Mean (± SD) OFA 16.2 (± 18.1) OBA 21.1 (± 18.8) *P* = .16
Fan et al,[7] 2023	RCT 2 N = 60	Dexmedetomidine, propofol, midazolam, esketamine, cisatracurium, atropine, Postop: Imrecoxib, PRN tramadol	Dexmedetomidine, propofol, midazolam, sufentanil, cisatracurium, atropine, remifentanil, IC regional block Postop: Imrecoxib, PRN tramadol	NRS score Mean (± SD) OFA 1.4 ± 1.1 OBA 1.2 ± 0.7 *P* = NR [a]No statistical difference in pain scores between groups	Tramadol given for NRS > 3; n (%) OFA 5 (16.7) OBA 5 (16.7) *P* = 1
Yan et al,[8] 2023	RCT 2 N = 159	Propofol, esketamine, ropivacaine, rocuronium Epidural catheter used intraop and postop Postop: PCEA, esketamine, ropivacaine, parecoxib	Propofol, fentanyl, ropivacaine, rocuronium Epidural catheter used intraop and postop Postop: PCEA, ropivacaine, morphine, parecoxib	VAS score > 4/10 n/group (%) OFA 10/80 (17.5%) OBA 0/79 (0%) *P* = < .001 OR, 52.14; 95% CI	24 h MME not measured OFA: no postop opioid given OBA: morphine 10 mg added to PCEA infusion
Mathew et al,[9] 2023	SRMA 1 N = 729	n = 336	n = 393	Pooled data of 11-point NRS and VRS scores SMD −0.73 (95% CI −1.79; −0.33) *P* = .471 I^2 = 87%	48 h MME SMD −0.45 (95% CI −6.46; 5.57) *P* = .517 I^2 = 90%

Table 1. Opioid-free and Opioid-based Anesthesia Study Characteristics
Abbreviations: CI, confidence interval; IQR, interquartile range; MME, morphine milligram equivalents; NR, not reported; NRS, numeric rating scale; OBA, opioid-based anesthesia; OFA, opioid-free anesthesia; OR, odds ratio; PCA, patient-controlled analgesia; PCEA, patient-controlled epidural analgesia; PRN, pro re nata or as needed; RCT, randomized controlled trial; SMD, standard mean difference; SRMA, systematic review and meta-analysis; VAS, visual analog scale; VRS, verbal rating scale
[a]*P* value not reported in study; statement of no significant difference between groups in results section

TCU

METHODS (*cont.*)

- Search terms included *opioid-free anesthesia*, *opioid free anesthesia*, *opioid free anesthesia* AND *thoracic surgery*, *opioid free* AND *anesthesia*, *opioid free surgery*, *opioid-free* AND *surgery*
- PubMed yielded 178 results. Embase search resulted in 1037 citations.
- Best-evidence articles meeting criteria were identified from the search resulting in 2 randomized, controlled trials (RCT), 1 individual case-controlled study, and 1 systematic review and meta-analysis.
- IRB/IACUC approval does not apply to this evidence-based project.

REVIEW of LITERATURE/ CRITICAL APPRAISAL

- All studies utilized opioid-free anesthetics in a variety of thoracic surgery cases.[6-9]
- All 4 studies touted the feasibility of opioid-free anesthesia for thoracic surgery.[6-9]
- 3 of the 4 articles included regional anesthesia for both groups,[6-8] thus another control arm without regional nerve blocks could help determine if regional anesthesia is paramount to successful pain control with OFA.
- 3 of 4 studies reported no difference in postoperative pain scale scores at the 24-hour mark,[6,7,9] and there were no differences between groups in 24-48 h postoperative opioid consumption in the 3 studies reporting the outcome.[6,7,9]
- Many different medications and combinations of medications are still to be trialed, and an ideal OFA regimen has not yet been discovered,[9] highlighting a gap in knowledge and a need for more research.
- The synthesis of literature demonstrated multiple instances where opioid-free anesthesia had comparable effects on postoperative pain when compared to opioid-based anesthesia.[6,7,9]

RECOMMENDATIONS for PRACTICE / CONCLUSIONS

- Opioid-free anesthesia could lessen patient opioid exposure during this nationwide increase in opioid-related deaths.
- Studies should be completed to identify an ideal OFA regimen and to determine if any unknown side-effects of OFA exist.
- The findings of this integrative review project indicate that patients receiving opioid-free anesthesia for thoracic surgery have comparable pain scores and opioid consumption after surgery compared to patients who receive an opioid-based anesthetic.[6,7,9]

References