Liposomal Bupivacaine Versus Long-Acting Local Anesthetics in Thoracoscopic Surgery: A Systematic Review and Meta-Analysis

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Introduction

- Liposomal bupivacaine (LB) is used to prolong postoperative analgesia
- Clinical relevance of its benefit after thoracoscopic surgery unclear
- Objective: evaluate whether LB provides clinically meaningful improvement in pain and opioid use.

Methods

- Databases: PubMed, Embase, Cochrane Library, Web of Science (from inception to Jan 30, 2026)
- Population: adults undergoing thoracoscopic surgery
- Intervention: plain LB
- Comparator: plain long-acting local anesthetics
- Outcomes assessed using predefined MCIDs
  - Pain: ≥1 point on 0–10 scale
  - Opioid consumption: ≥5 mg IV morphine equivalents / 24 h
- Certainty of evidence evaluated with GRADE

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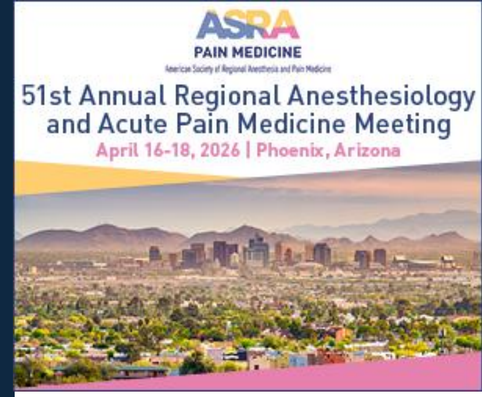
Liposomal Bupivacaine is not clinically superior to conventional long acting local anesthetics in thoracoscopic surgeries

Outcome	No of patients (RCTs)	Relative Effect (95% CI)	95% PI	GRADE	Comments:
Primary Outcomes					
Pain at Rest at 24h	541 (6)	MD -0.79 (-1.38 to -0.19)	-2.78 to 1.20	⊕◯◯◯abce* Very Low	Statistically significant but not clinically meaningful (MCID: 1). CI crosses MCID. Confirmed by TSA.
Opioid Consumption (0-24h)	350 (4)	MD -10.71 mg (-19.27 to -2.15)	-40.60 to 19.18	⊕⊕◯◯abc Low	Statistically significant but not clinically meaningful (MCID: 5). CI crosses MCID. Confirmed by TSA.
Cumulative Opioid Consumption (72h)	286 (3)	MD -25.18 mg (-58.07 to 7.70)	-167.47 to 117.1	⊕◯◯◯ab Very Low	Not statistically significant and not clinically significant (MCID: 10). Inconclusive TSA.
Secondary Outcomes					
Pain with Movement (24h)	399 (5)	MD -0.90 (-1.63 to -0.17)	-3.37 to 1.56	⊕◯◯◯abce* Very Low	Statistically significant but not clinically meaningful (MCID: 1). CI crosses MCID. Confirmed by TSA.
Hospital Length of Stay	543 (6)	MD -0.08 days (-0.39 to 0.24)	-0.77 to 0.62	⊕⊕⊕◯b** Moderate	Not statistically significant. No clinical relevance. Inconclusive TSA.
PONV	550 (6)	RR 0.52 (0.31 to 0.88)	0.26 to 1.04	⊕⊕⊕◯b** Moderate	Statistically significant. Inconclusive TSA.

95% PI reflects expected range in future studies, accounting for heterogeneity. PONV: Postoperative Nausea and Vomiting; LFK: Luis Furuya-Kanamori index for publication bias; MCID: Minimal Clinically Important Difference

a: Downgrading for inconsistency; *b*: Downgrading for imprecision; *c*: Trial sequential analysis; *d*: Downgrading for Risk of Bias; e: Downgrading for Publication Bias

*Major asymmetry on LFK index
**Minor asymmetry on LFK index



Results

- 8 RCTs (n = 953)
- LB reduced pain at 12–72 h
- Differences below MCID (≥1 point)
- Small opioid reduction in some 24-h intervals
- Effect below MCID (≥5 mg / 24 h)
- No difference in cumulative opioid use at 72 h
- No difference in length of stay
- No difference in adverse events

Conclusion

- Certainty of evidence very low for most primary outcomes
- No clinically meaningful benefit of LB vs LALA
- Statistically significant differences below MCID
- No improvement in recovery outcomes
- Higher cost without clinical advantage
- Routine use of LB not supported
- Further high-quality RCTs required