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ERECTOR SPINAE PLANE VS. ANTERIOR CHEST WALL BLOCKS IN CARDIAC SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RCTS

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INTRODUCTION

Erector Spinae Plane Block (ESPB) and **Anterior Chest Wall Blocks (ACWB)** are increasingly used for regional analgesia in cardiac surgery via median sternotomy.

Evidence comparing their analgesic efficacy, opioid requirements, and side-effect profiles is highly variable, largely confounded by disparate control-group interventions across published trials.

This meta-analysis compared **ESPB** versus **ACWB**, investigating how control-arm design drives heterogeneity in cardiac surgery analgesia.

MATERIALS AND METHODS

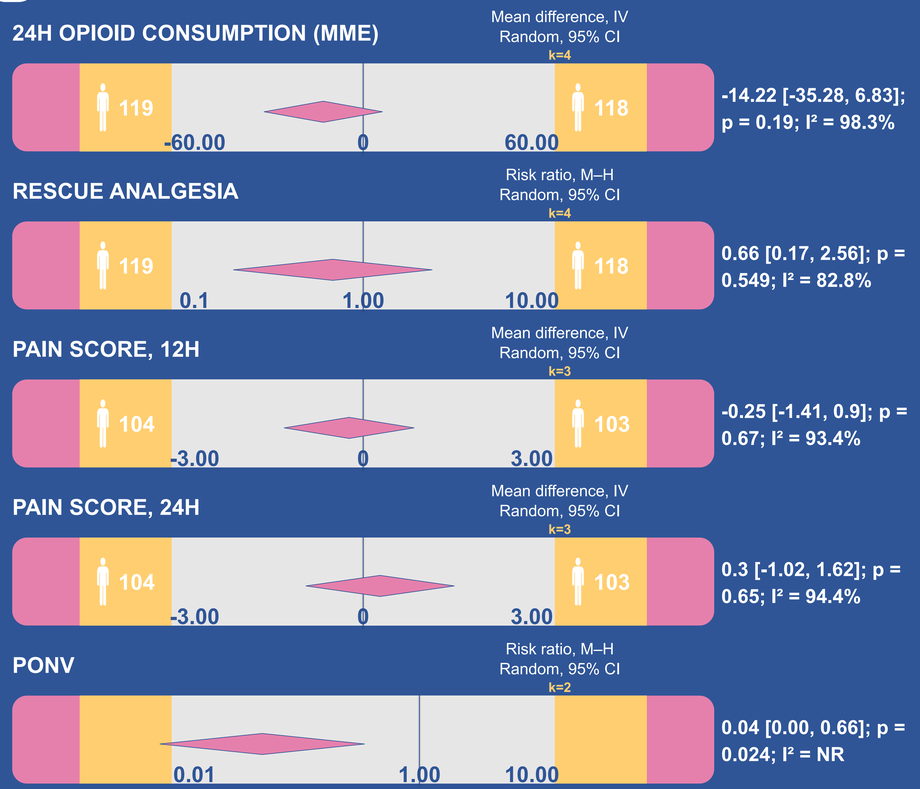
- Searched **PubMed, Cochrane Library, and Embase** through August 2026
- **RCTs only**
- **Inclusion:** ESPB vs. ACWB in adults undergoing cardiac surgery via median sternotomy
- **Primary outcomes:** 24h opioid consumption (IV morphine MME) and rescue analgesia requirements
- **Secondary outcomes:** pain scores at 12 and 24 hours and PONV
- **Subgroup analysis by control strategy** (head-to-head vs. additive designs); random-effects (REML); MD/RR with 95% CI; leave-one-out sensitivity analysis; analysis in R v4.6.1.
- **Publicly available, de-identified aggregate data**; met institutional criteria for IRB exemption.

Control-arm design — not the block itself — drives most of the heterogeneity between ESPB and ACWB in cardiac surgery.

396 records identified
42 full-text reports after deduplication and screening
4 studies included

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237 patients
119 **ESPB** / 118 ACWB



RESULTS

- **Study Selection:**
- **396 records identified** (PubMed 63, Embase 151, Cochrane 182); 178 duplicates removed; 176 excluded by title/abstract, leaving 42 full-text reports assessed for eligibility.
- Of these, 11 were excluded for population overlap, 8 for no control group, 5 for no outcomes of interest, and 2 for other reasons, leaving **4 RCTs** (237 patients; 119 ESPB, 118 ACWB).
- **Outcomes:**
- Overall opioid consumption and rescue analgesia did not differ significantly (both $p > 0.19$).
- **Control-strategy subgroup analysis** explained trial heterogeneity for both primary outcomes ($P_{subgroup} < 0.0001$ and 0.0036): **ESPB cut opioid use vs. combined ACWB** (MD −36.01 [−47.15, −24.87]) and rescue risk vs. isolated ACWB (RR 0.20 [0.02, 1.65]), while additive designs (ESPB vs. ESPB+ACWB) favored control.
- Pain scores at 12h and 24h did not differ; omitting Elbardan et al. cut 12h heterogeneity from 93.4% to 31.4%.
- **ESPB significantly reduced PONV** (RR 0.04 [0.00, 0.66], $p = 0.024$).

DISCUSSION

ESPB and ACWB provide comparable overall analgesia in median sternotomy, but control-arm design strongly drives trial heterogeneity: **ESPB is opioid-sparing versus isolated ACWB**, while additive designs favor combined controls. Leave-one-out analyses confirm overall stability, and ESPB significantly reduces PONV risk. Control-strategy heterogeneity must be systematically addressed in future regional anesthesia meta-analyses.

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