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25th Annual Pain Medicine Meeting
November 5-7, 2026 | Tampa, Florida
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Continuous Serratus Anterior Plane Block for Pain Management in Minimally Invasive Cardiothoracic Surgery: A Systematic Review and Meta-Analysis

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INTRODUCTION

Minimally invasive cardiothoracic surgery reduces surgical trauma, but postoperative pain remains a major challenge that can impair respiratory function and delay recovery. Continuous serratus anterior plane block (cSAPB) may improve analgesia while limiting opioid exposure, yet its efficacy in this setting is uncertain.

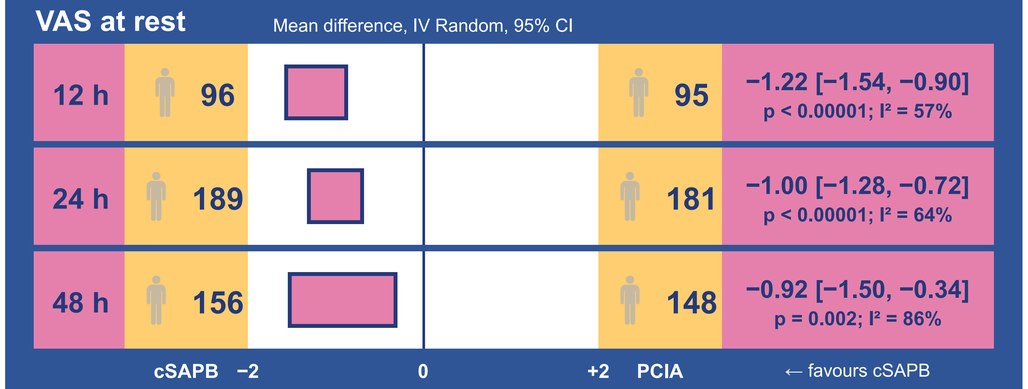
Objective: evaluate the efficacy of cSAPB versus standard-of-care analgesia or placebo in adults after minimally invasive cardiothoracic surgery.

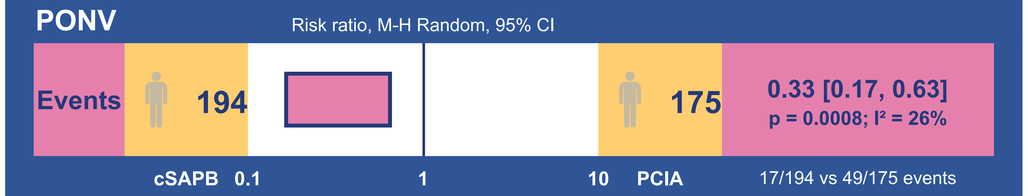
MATERIALS AND METHODS

- **Search:** PubMed, Embase, and Cochrane.
- **Design:** RCTs and prospective or retrospective comparative cohorts of adults; cSAPB vs standard-of-care analgesia or placebo.
- **Primary outcomes:** VAS at rest at 12, 24, and 48 h; PONV; ICU length of stay.
- **Secondary outcomes:** VAS on cough at 12 and 48 h; hospital length of stay.
- **Statistics:** Mantel–Haenszel RR (binary) and inverse-variance MD (continuous), 95% CI; heterogeneity by Cochran's Q, I^2, and Tau^2. Continuous outcomes in RevMan (DerSimonian–Laird); PONV in R 4.2.1 (REML).

Continuous SAPB lowered rest pain for 48 h, cut PONV by two-thirds, and shortened ICU and hospital stay.

11 studies included · **673** adult patients





RESULTS

Study selection: 11 studies (673 participants) met inclusion criteria and were pooled.

Outcome	Effect [95% CI]	p	I^2
PRIMARY			
VAS rest 12 h	MD −1.22 [−1.54, −0.90]	< 0.00001	57%
VAS rest 24 h	MD −1.00 [−1.28, −0.72]	< 0.00001	64%
VAS rest 48 h	MD −0.92 [−1.50, −0.34]	0.002	86%
PONV	RR 0.33 [0.17, 0.63]	0.0008	26%
ICU stay (d)	MD −1.05 [−1.52, −0.58]	< 0.0001	59%
SECONDARY			
VAS cough 12 h	MD −1.15 [−2.72, 0.41]	0.15	92%
VAS cough 48 h	MD −0.74 [−1.40, −0.07]	0.03	56%
Hospital LOS (d)*	MD −1.19 [−1.52, −0.86]	< 0.00001	90%
VAS rest 48 h†	MD −1.12 [−1.68, −0.55]	0.0001	87%

*IV, fixed effect. †Sensitivity analysis including Bansal 2024.

DISCUSSION

- cSAPB improved rest analgesia through 48 h and shortened ICU and hospital stay.
- Supports cSAPB within multimodal analgesia, with lower PONV incidence.
- **Limitations:** substantial heterogeneity in several outcomes; few studies per outcome; mixed RCT and cohort designs.
- Adequately powered RCTs are needed to confirm these findings and define optimal protocols.

REFERENCES

Included studies: Bansal 2024; Bussche 2023; Er 2021; Gao 2022; Gao 2024; Gautam 2020; Sakait 2023; Sato 2025; Toscano 2020; Xiaohua 2018; Yang 2020. Analyses in Review Manager (RevMan; The Cochrane Collaboration) and R 4.2.1 (R Foundation for Statistical Computing).