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ELECTRICAL ACUPOINT STIMULATION FOR VIDEO-ASSISTED THORACOSCOPIC SURGERY: A META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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INTRODUCTION

Video-assisted thoracoscopic surgery has largely replaced open thoracotomy, yet acute postoperative pain, opioid-induced adverse events, and **postoperative nausea and vomiting** remain major clinical challenges.

Electrical acupoint stimulation (EAS) — transcutaneous stimulation and electroacupuncture — reduces intraoperative opioid consumption and acute postsurgical symptoms, motivating this synthesis of the randomized evidence.

This meta-analysis evaluated **perioperative electrical acupoint stimulation** versus **sham or placebo** in video-assisted thoracoscopic surgery, across pain, emetic, and gastrointestinal recovery outcomes.

MATERIALS AND METHODS

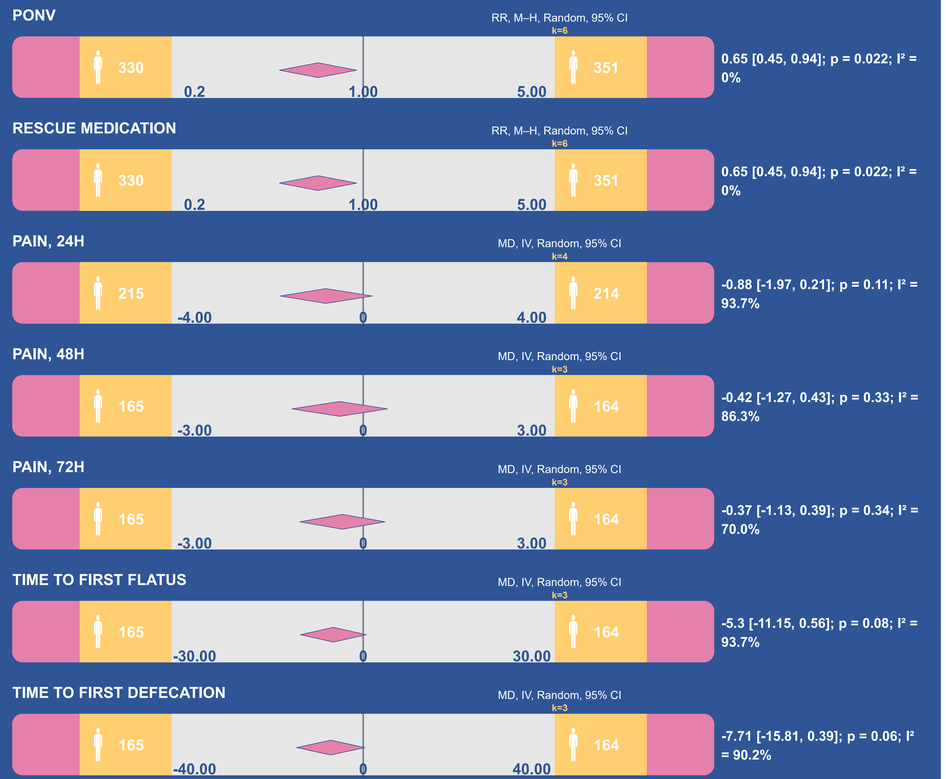
- Searched PubMed, Embase, and Cochrane CENTRAL through August 2026
- **RCTs only**
- **Inclusion:** electrical acupoint stimulation vs. sham or placebo in video-assisted thoracoscopic surgery
- **Primary outcome:** pain scores at 24 hours
- **Secondary outcomes:** pain at 48h/72h, PONV, rescue medication requirements, and time to first flatus and defecation
- **Random-effects models (REML)**; mean differences or risk ratios with 95% CI; **leave-one-out sensitivity analyses** performed across all outcomes; analysis in R v4.6.1.
- **Publicly available, de-identified aggregate data**; met institutional criteria for IRB exemption.

EAS cut PONV and rescue medication needs by 35% in video-assisted thoracoscopic surgery, with no significant difference in resting pain scores.

754 records identified
44 full-text reports after deduplication and screening
8 studies included

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835 patients
EAS vs. sham or placebo



RESULTS

- **Study Selection:**
- **754 records identified** (PubMed 237, Embase 133, Cochrane 384); 284 duplicates removed; 426 excluded by title/abstract, leaving 44 full-text reports assessed for eligibility.
- Of these, 9 were excluded for population overlap, 12 for no control group, 11 for no outcomes of interest, and 4 for other reasons, leaving **8 RCTs** (835 patients).
- **Outcomes:**
- **EAS cut PONV risk by 35%** (RR 0.65 [0.45, 0.94], p = 0.022, I^2 = 0%), stable on leave-one-out sensitivity analysis (RR range 0.53–0.72; all $I^2 \leq 17.1\%$).
- **EAS also cut rescue medication use by 35%** (RR 0.65 [0.45, 0.94], p = 0.022, I^2 = 0%).
- **No differences in resting pain** at 24h, 48h, or 72h (all p > 0.10); leave-one-out omitting Chen 2016 resolved pain-score heterogeneity to 0%.
- **Gastrointestinal recovery**: time to first flatus and defecation were significantly accelerated upon omitting Chen 2016 (MD −1.91h [−3.20, −0.62] and −3.74h [−5.67, −1.80]).

DISCUSSION

Electrical acupoint stimulation significantly reduces postoperative nausea and vomiting by 35% and decreases rescue medication requirements in video-assisted thoracoscopic surgery. Leave-one-out analyses confirm **robust estimate stability** for emetic and analgesic outcomes, and show that heterogeneity in pain trajectories and gastrointestinal recovery was heavily driven by a single trial (Chen 2016). EAS serves as an effective non-pharmacological adjunct within multimodal recovery pathways.

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