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# DEXMEDETOMIDINE-ESKETAMINE FOR SEDATION IN ORTHOPEDIC SURGERY: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED TRIALS

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## INTRODUCTION

**Dexmedetomidine** reduces preoperative agitation and emergence delirium, and **esketamine** adds sedation and analgesia with **minimal respiratory depression**, but evidence on their combination in orthopedic surgery remains limited.

**Evidence remains limited** on whether this combination improves **cooperation during anesthesia induction** and reduces **postoperative complications** in orthopedic surgical patients.

This meta-analysis evaluated **dexmedetomidine + esketamine** versus **dexmedetomidine-based or active comparators** in orthopedic surgery.

## MATERIALS AND METHODS

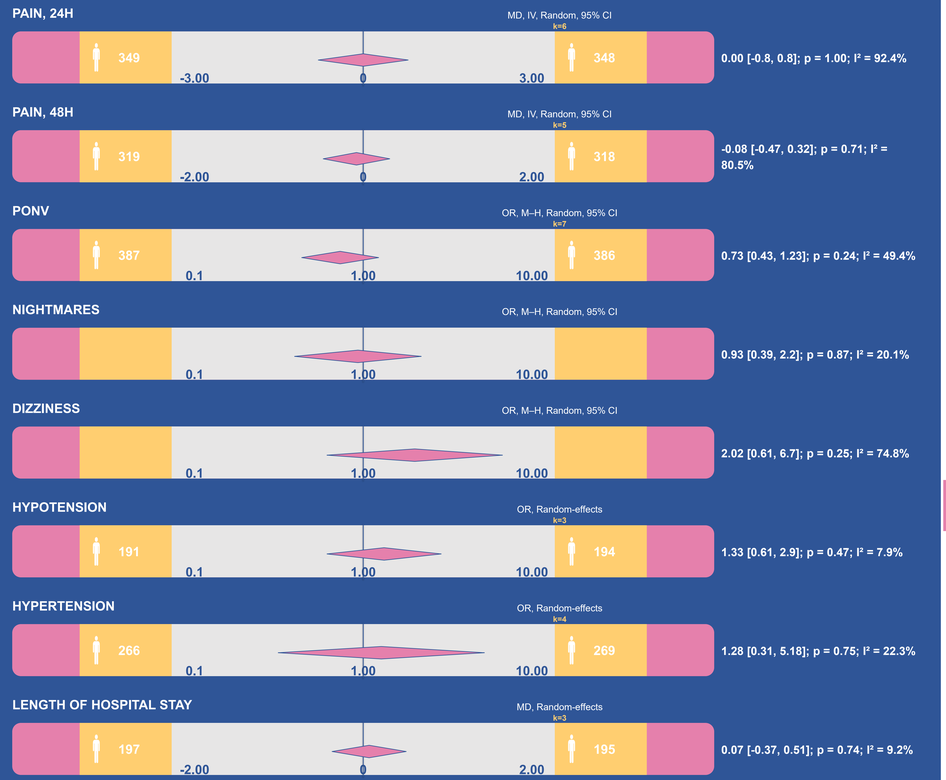
- Searched PubMed, Cochrane Library, and Embase
- **RCTs only**
- **Inclusion:** dexmedetomidine + esketamine vs. dexmedetomidine-based or active (opioid-/propofol-based) comparators in orthopedic surgery
- **Outcomes:** pain at 24h/48h, length of stay, PONV, nightmares, dizziness, hypertension, and hypotension
- **Random-effects models** used for data synthesis; heterogeneity explored through **subgroup analyses**; OR/MD with 95% CI computed in R (v4.5.1).
- **Leave-one-out sensitivity analyses** performed for every pooled estimate to test robustness to any single trial.
- Publicly available, de-identified aggregate data; met institutional criteria for IRB exemption.

**Dexmedetomidine + esketamine showed a favorable safety profile in orthopedic surgery, with no confirmed analgesic benefit over comparators.**

**7 RCTs included**
**773** patients

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**Dex + Esk** vs. dexmedetomidine-based / active comparators




## RESULTS

- **Study Selection:**
- **7 RCTs included**; 773 patients.
- **Outcomes:**
- **No significant difference in pain at 24h** (MD 0.00 [−0.80, 0.80]) or 48h (MD −0.07 [−0.47, 0.33]); leave-one-out showed the 24h estimate was unstable, with significance emerging after excluding individual studies — heterogeneity may mask a true effect. The 48h outcome remained robust.
- **Length of stay was similar** (MD 0.07 [−0.37, 0.51], $I^2 = 9.2\%$).
- **Safety outcomes:**
- **PONV** OR 0.73 [0.43, 1.23], $I^2 = 49.4\%$; **nightmares** OR 0.93 [0.39, 2.20], $I^2 = 20.1\%$; **dizziness** OR 2.02 [0.61, 6.70], $I^2 = 74.8\%$ — none reached significance, though the dizziness estimate lacked robustness on leave-one-out testing.
- **Hemodynamics: hypotension** OR 1.33 [0.61, 2.90], $I^2 = 7.9\%$; **hypertension** OR 1.28 [0.31, 5.18], $I^2 = 22.3\%$ — no significant increase in either direction.

## DISCUSSION

**Dexmedetomidine + esketamine** did not consistently improve postoperative pain in orthopedic surgery, though sensitivity analyses suggest a **possible 24-hour effect masked by heterogeneity**. Secondary outcomes were stable with no significant differences, and the combination showed a favorable safety profile — supporting its use as a safe strategy with a possible but unconfirmed analgesic benefit, warranting further high-quality trials.

## CONTACT INFORMATION

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