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# Morphine Substitutes and Modulators for Pain Control in Scoliosis Surgery, Post-Operatively Study Type: Systematic Review (Without Meta-Analysis)

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## Key Points

**Question:**
What are the potential substitutes for morphine in post-scoliosis surgery pain management?
Can alternative analgesics improve pain relief while reducing opioid-related side effects?
How effective are ketamine, dexmedetomidine, and gabapentin in reducing postoperative morphine use?

**Findings:**
Esketamine-dexmedetomidine improves analgesia and sleep quality, making it a potential morphine substitute.
Ketamine is more effective than morphine, and ketamine-magnesium enhances sleep quality.
Prolonged low-dose ketamine does not significantly reduce morphine use.
Gabapentin lowers postoperative morphine intake without affecting opioid-related side effects.

**Meaning:**
Alternative analgesics can improve postoperative pain control and reduce morphine dependence.
Further research is needed to optimize dosage and combination strategies for effective pain management.
Identifying optimal replacements can improve recovery and overall patient outcomes.

## Abstract

**Importance:**
Severe pain is often experienced by patients after scoliosis correction surgery as it is regarded as one of the most painful elective procedures, therefore, it is important for spine surgeons to consider which opioid they'll use to improve analgesia (in-ability to feel pain) post-operatively. This is of vital importance as it impacts the patient's recovery, and time-needed to return to normal, daily activities, improving the patient's outcome. Morphine has been the primary substance used for pain management post-scoliosis surgery; however, it is often associated with severe side-effects such as obstruction of sleep, hypoventilation, and nausea.

**Objective:**
This study's aim is to examine potential morphine replacements and modulators to decrease and potentially replace postoperative morphine use in scoliosis correction surgery, whilst improving analgesia and reducing side-effects.

**Evidence Review:**
MeSH terms from the National Library of Medicine were used in PubMed, including: scoliosis, morphine and ketamine. Studies were filtered to only include Randomized Controlled Trials (RCTs), and excluded studies examining delivery methods of opioids, leaving seven studies to be included in the study.

**Findings:**
Combined esketamine-dexmedetomidine has an improved analgesia and quality of sleep, marking it as a potential replacement for morphine (Zhang et al., 2023). Ketamine has been proven to be more effective than morphine (Ricciardelli et al., 2020), and when combined with magnesium it has improved sleep quality (Jabbour et 2 al., 2014). However, prolonged-low-dose ketamine does not decrease postoperative morphine use (Engelhardt et al., 2008), (Perelló et al., 2017), and (Pestieau et al., 2014). Lastly, oral gabapentin reduced postoperative morphine intake, without the impacting the overall opioid side-effects (Rusy et al., 2010).

**Conclusion:**
Whilst potential replacements for post-operative morphine in scoliosis surgery are present such as combined esketamine-dexmedetomidine, ketamine, and combined ketamine-magnesium. However, further research is needed to determine methods to reduce postoperative morphine intake and its consequent side-effects.

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