Chapter 12
A Randomized Double-Blind Clinical Trial of Dexmedetomidine vs. Ketamine Postoperative Epidural Analgesia in Lower Limb Orthopedic Surgeries

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ABSTRACT

Improving patient outcomes after lower limb orthopaedic procedures requires effective postsurgical pain management. This study compared the safety and analgesic effectiveness of dexmedetomidine and ketamine, two potentially effective treatments for postoperative pain management when given epidurally. A randomised controlled trial comprised one hundred patients aged eighteen to twenty undergoing lower limb orthopaedic treatments. Patients were divided into two groups, with Group 1 receiving epidural dexmedetomidine and Group 2 receiving epidural ketamine. The primary outcome was the amount of time until rescue analgesia was needed. Secondary outcomes included hemodynamic indicators, sedation levels, side effects, and the number of requests for rescue analgesia.

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INTRODUCTION

In the perioperative period, pain management is a complex issue that affects patients and healthcare professionals alike, especially when it comes to lower limb orthopaedic surgery. In addition to improving patient comfort, efficient postoperative pain management is essential for hastening recuperation, lowering complications, and improving overall surgical results (Sinatra et al., 2002). As such, the search for novel and sophisticated pain management techniques continues to be a primary goal of perioperative care (Bijur et al., 2001).

Lower limb orthopaedic surgeries are among the most common procedures performed globally and include a broad range of interventions, such as fracture fixations and joint replacements (Ramsay et al., 1974). The goals of these procedures are to improve the quality of life, reduce pain, and restore mobility for patients with musculoskeletal conditions (Shaikh & Mahesh, 2016). Nevertheless, these advantages frequently come at the expense of postoperative pain, which might impede the accomplishment of the intended surgical objectives if it is not appropriately managed (Pihlajamaki et al., 1991).

The conventional approach to managing pain after orthopaedic procedures on the lower limbs has primarily involved the use of systemic opioid analgesia, which is usually injected orally (Gujral et al., 2022). Opioids undoubtedly have a strong ability to relieve pain, but they also have a lot of negative side effects, including constipation, emesis, respiratory suppression, sleepiness, and a higher risk of opioid addiction (Radbin et al., 2021). In the field of perioperative pain management, this has led to a paradigm change in favour of the creation of mitigation measures for these opioid-related problems (Sonawane et al., 2016).

The development of epidural analgesia has been one of the most revolutionary methods of pain control in lower limb orthopaedic surgery (Swathi & Chandrudu, 2021). Targeted and sustained pain relief is provided by epidural analgesia, a procedure that includes injecting analgesic drugs directly into the epidural area around the spinal cord. It successfully lessens the need for systemic opioids, providing a substitute for obtaining the best possible pain management with the fewest possible side effects (Xue et al., 2018).

With the introduction of epidural analgesia, perioperative treatment entered a new era that marked a substantial shift from conventional opioid-based pain control techniques (Singh et al., 2016). With this strategy, analgesics can be precisely delivered to the site of pain, resulting in effective alleviation at a lower dosage of the drug and less systemic adverse effects. Additionally, because epidural analgesia offers a localised pain management approach that is frequently more beneficial than systemic drugs, it is especially helpful in lower limb orthopaedic procedures (Soliman & Eltaweel, 2016).

A wide variety of analgesic drugs have been used in epidural analgesia regimens over time. These consist of adjuvant drugs, local anaesthetics, and opioids, each with a distinct mode of action (Bloor et al., 1992). However, the search for substitute drugs has been prompted by the drawbacks of using opioids for epidural analgesia, such as the risk of respiratory depression. In order to facilitate epidural procedures for lower limb orthopaedic surgery, researchers and physicians have worked to find safer and more efficient analgesics (Hall et al., 2000).

Two pharmacological drugs, ketamine, and dexmedetomidine, have come to light as viable candidates for postoperative pain management in this changing field of epidural analgesia (Peden et al., 2001). Both medications have distinct modes of action that set them apart from both local anaesthetics and conventional opioids. This study compares the safety and effectiveness of dexmedetomidine and ketamine given epidurally in the setting of lower limb orthopaedic procedures (Taittonen et al., 1998).