

Is Dexamethasone-Enhanced Bupivacaine a Cost-Effective Alternative to Liposomal Bupivacaine for Postoperative Pain Control in Thoracic Surgery?

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Description

Postoperative pain management is an ongoing struggle in medicine. One must weigh the risks and benefits of finding the delicate balance between pain relief and overmedicating. The role of opioid analgesics as well as adjuvant medications have become the standard of practice in healthcare and although effective, the use of these medications does not come without adverse events.

The opioid epidemic has been well documented and numerous patients developed an addiction following their use in postoperative pain control. Additional adverse outcomes associated with the use of chronic opioid analgesia include constipation, sleep-disordered breathing, fractures, hypothalamic-pituitary-adrenal dysregulation and fatal overdoses [1]. The use of perioperative prophylactic medications to mitigate postoperative pain have become a center of attention as a potential solution to mitigating opioid use in this patient population. Methods of perioperative pain management include systemic pharmacotherapy, local anesthetics, regional anesthesia and neuraxial anesthesia [2].

Our study focused on the utilization of regional anesthesia, specifically intercostal nerve blocks. Current pharmacologic agents include the use of a sodium channel blocker such as a Liposomal Bupivacaine (LB) solution mixed with plain bupivacaine which is administered around the targeted nerve. This regimen provides a slow release of the medication, allowing for a longer duration of analgesia. It has proven to be extremely effective in reducing postoperative pain, especially in its use in thoracic surgery for Intercostal Nerve Blocks (INB) [3,4]. However, this therapy is expensive and the cost of healthcare is important to address. Our study assessed the use of affordable alternative to determine if it is noninferior to the current standard of LB. The use of dexamethasone as an adjunct to plain bupivacaine has proven to be effective at providing a faster onset of anesthesia, a longer duration of anesthesia/analgesia, decreased postoperative pain intensity and decreased postoperative analgesia requirements compared with local anesthesia alone [5].

After a clinical trial of our patients undergoing thoracic surgery, the use of Bupivacaine with Dexamethasone (BD) in intercostal nerve blocks proved to be noninferior to the current standard of LB mixed with plain bupivacaine. These conclusions were based on the analysis of various postoperative pain criteria, including primary outcomes of mean postoperative numerical pain ratings and mean postoperative opioid analgesic requirements. Secondary outcomes included adjuvant pain medication consumption, hospital length of stay and total opioid

use in oral morphine equivalents. Interestingly, the BD group saw a markedly reduced use of opioid analgesia on postoperative day 2. Though not statistically significant, patients in the BD group consumed, on average, half the total amount of opioids in the 72-hour postoperative period compared to those in the LB group.

These conclusions challenge the current standard of care for INB in thoracic surgery and present a potential alternative that provides a more cost-effective analgesia. The average cost of one standard dose of LB is about \$378 for a 266 mg/20 mL vial, compared to approximately \$13 for a similar dose of plain bupivacaine [6].

Horn et al., in July 2024 revealed that, when used independently, LB produced surgical blockade in only 32% of patients compared to 100% who received plain bupivacaine alone [2]. Further, LB sensory blockade started later after administration and had a shorter, less predictable duration of action compared to plain bupivacaine alone [7]. These novel findings suggest that the use of LB may not be as efficacious as we previously thought, suggesting a potential superiority for the use of plain bupivacaine for nerve blocks.

It is unclear whether the effects of LB versus BD can be extrapolated to the majority of nerve blocks, as nerves in various regions may respond differently to these medications. Further research should be directed to assessing the effects of LB *versus* BD in different anatomical locations conducted on larger patient populations.

In summary, we conclude that BD poses as a noninferior alternative to LB in providing patients undergoing thoracic surgery with adequate postoperative pain control in a more cost-effective manner.

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