

Erector Spinae Plane Block Utilizing Liposomal Bupivacaine in Pediatric Cardiac Surgery: A Case Report

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Abstract

Erector spinae plane blocks (ESPBs) have become more popular in cardiothoracic surgeries due to their safety, execution simplicity and efficient pain relief.¹ ESPBs utilizing the long-acting liposomal form of bupivacaine have shown promise in the reduction of prolonged pain and opioid use both during and after surgery.² Nonetheless, the use of liposomal bupivacaine in ESPBs in pediatric cardiothoracic surgeries remains minimally explored.³ In this case, an ESPB with liposomal bupivacaine was used on a pediatric patient undergoing coronary artery unroofing on cardiopulmonary bypass with the goal to reduce postoperative opioid requirements and pain scores.

Methods

A seven-year-old male with a history of an anomalous left coronary artery arising from the right sinus of Valsalva underwent coronary artery unroofing on cardiopulmonary bypass. Before surgery, bilateral ESPBs utilizing 1.3% liposomal bupivacaine (3 mg/kg or 108 mg) and 0.25% plain bupivacaine (2 mg/kg or 73 mg) were performed at the 5th thoracic vertebrae with the guidance of ultrasound (Figure 1). After the operation was completed, a field block, using a combination of 0.25% plain bupivacaine (0.25 mg/kg or 9 mg) and 1.3% liposomal bupivacaine (1 mg/kg or 36 mg), was performed at the chest tube site. Post-operative pain scores, along with intraoperative and postoperative opioid consumption, were recorded within the first 48 hours.

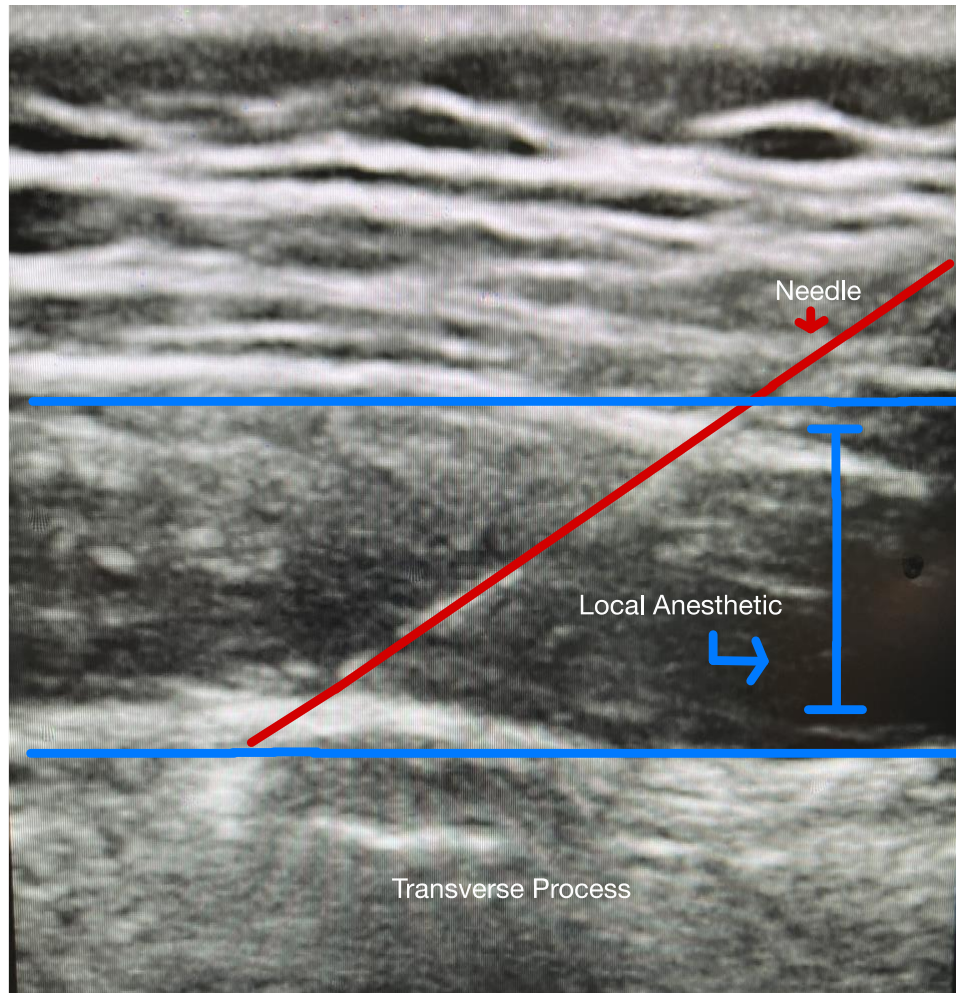


Figure 1. ultrasound-guided ESPB block.

Results

A total of 175 μg fentanyl ($4.9 \mu\text{g}/\text{kg}$) was administered throughout the operation. Additionally, the patient received a rescue dose from the Nursing Controlled Analgesia (NCA) pump at the 3rd postoperative hour and a total of 5 doses until the 20th postoperative hour. After discontinuing the NCA pump, the patient required a single 1.82 mg dose of morphine at the 23rd postoperative hour. No other opioids were required thereafter. Post-operative pain scores ranged from 0 to 5, with an average of 1.0/10 (maximum pain score of 5) on day 1 and 0.7/10 (maximum pain score of 4) on day 2, as shown in Figure 2. In general, NCA doses were administered whenever pain scores showed an increase.

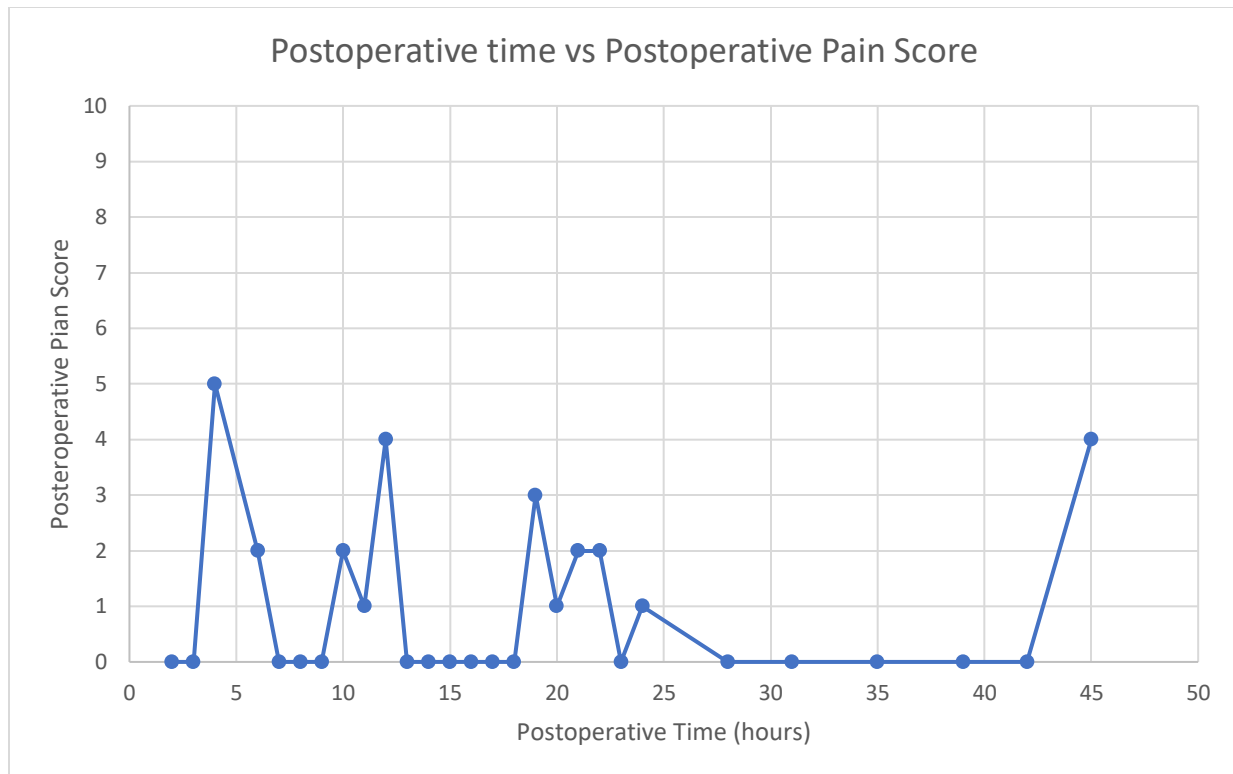


Figure 2. postoperative time vs. postoperative pain score chart for our patient.

Conclusion

In the realm of pediatric heart surgeries, ESPBs are a relatively new form of regional anesthesia, especially when using liposomal bupivacaine. Historically, many patients have required high intraoperative opioid doses, often within the range of 10-30 $\mu\text{g/kg}$ of fentanyl.⁴ However, in this case study, the patient required less than 5 $\mu\text{g/kg}$. Postoperatively, the patient experienced consistently low pain scores during the first two postoperative days, with minimal need for rescue opioids. The case study also demonstrated the potential of ESPBs to enhance postoperative recovery and reduce opioid-related side effects in pediatric heart surgery patients. Furthermore, as we learn more about this unique strategy it becomes clear that additional outcomes need to be evaluated. One aspect that could use unique investigation is measuring length of stay (LOS). Understanding how ESPBs with liposomal bupivacaine impact LOS compared to traditional opioid-based pain management could provide insight into potential economical and logistical advantages. Additional research is needed to gain a comprehensive understanding of the benefits and potential side effects of these blocks in this unique patient population.

References

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