

Real-Time Ultrasound-Guided Thoracic Epidural Blockade via the Caudal Approach for Postoperative Analgesia in an Awake Infant: A Case Report

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INTRODUCTION

- **Caudal epidural blockade** is widely used in pediatric anesthesia but requires high volumes for thoracic coverage, increasing the risk of unintended lumbar or sacral nerve blockade.
- **Advancing caudal catheters to the thoracic epidural space** enables targeted analgesia with lower anesthetic doses and fewer complications.
- **Ultrasound guidance** enhances procedural safety and precision by enabling real-time visualization of needle placement, catheter positioning, and anesthetic distribution.
- **Epidural blocks in awake infants are rare** due to cooperation challenges; this case highlights a successful awake thoracic epidural placement in a complex pediatric patient.

CASE PRESENTATION

- A 5-month-old ex-34-week female infant (6.2 kg) with **necrotizing enterocolitis** underwent redo exploratory laparotomy for bowel stricture resection and gastrostomy tube exchange following three prior abdominal surgeries.
- **Severe postoperative pain** (rFLACC 8/10), tachycardia (150–180 bpm), and hypertension (80–120/30–70 mmHg) occurred, refractory to acetaminophen and continuous morphine infusion and boluses.
- **Complicating factors** of respiratory distress, oxygen desaturation, and prolonged extubation period made general anesthesia high-risk.

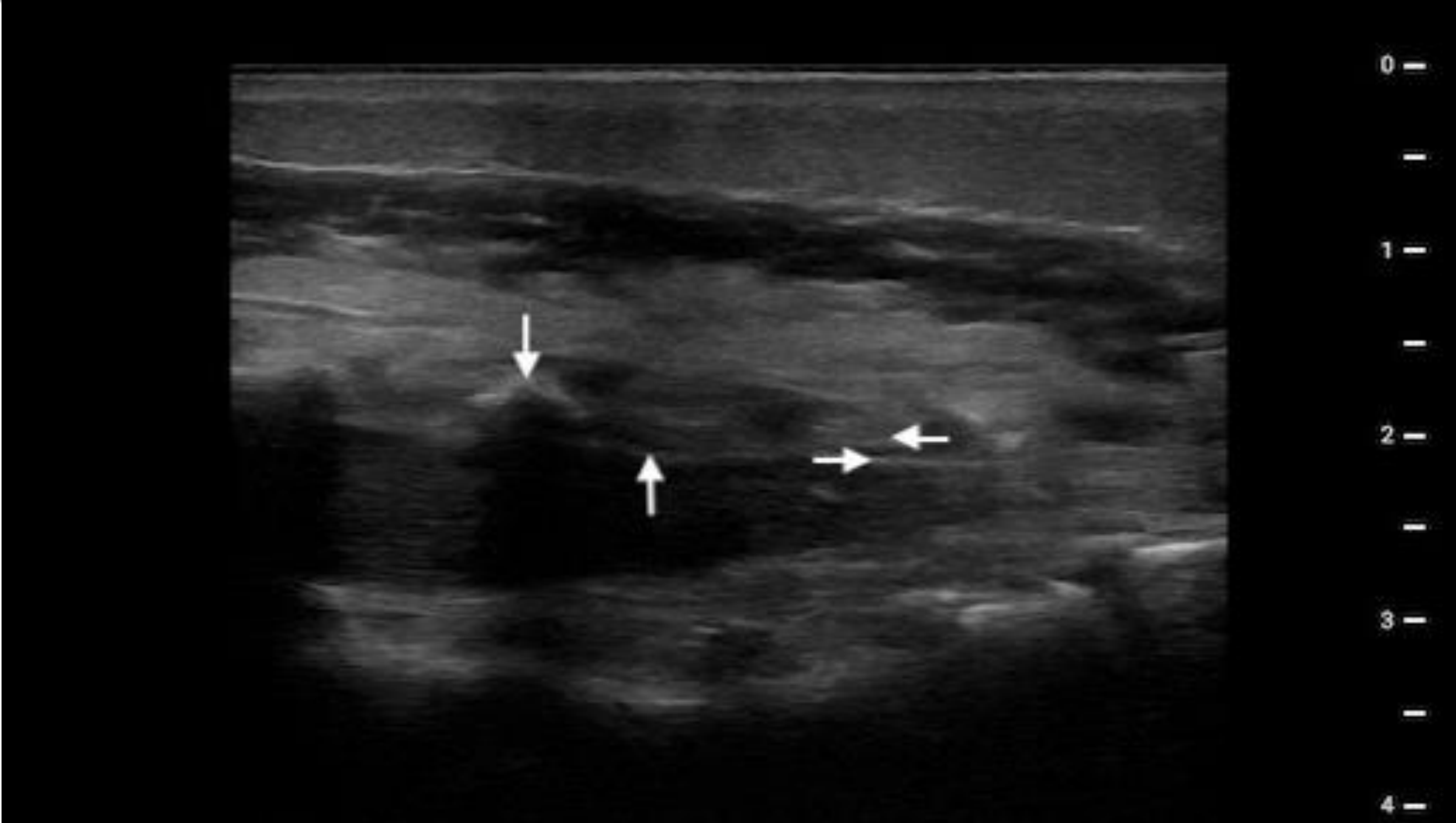


Figure 1. Ultrasound image of the epidural space in an infant weighing 6.2 kg. The upward arrow indicates the dura mater, the downward arrow the L5 lamina, and the horizontal arrows the posterior complex. (Left to right=cranial to caudal)

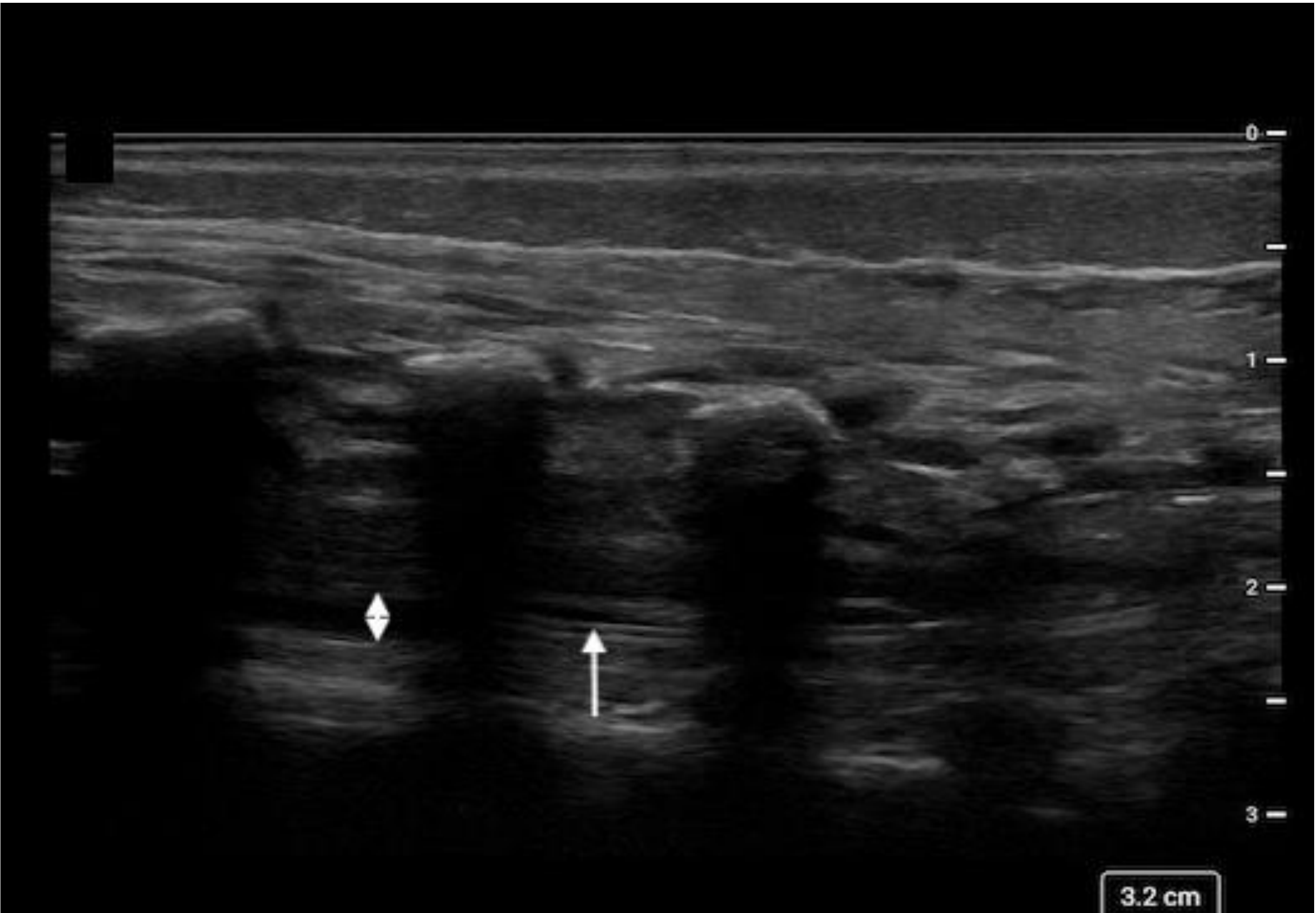
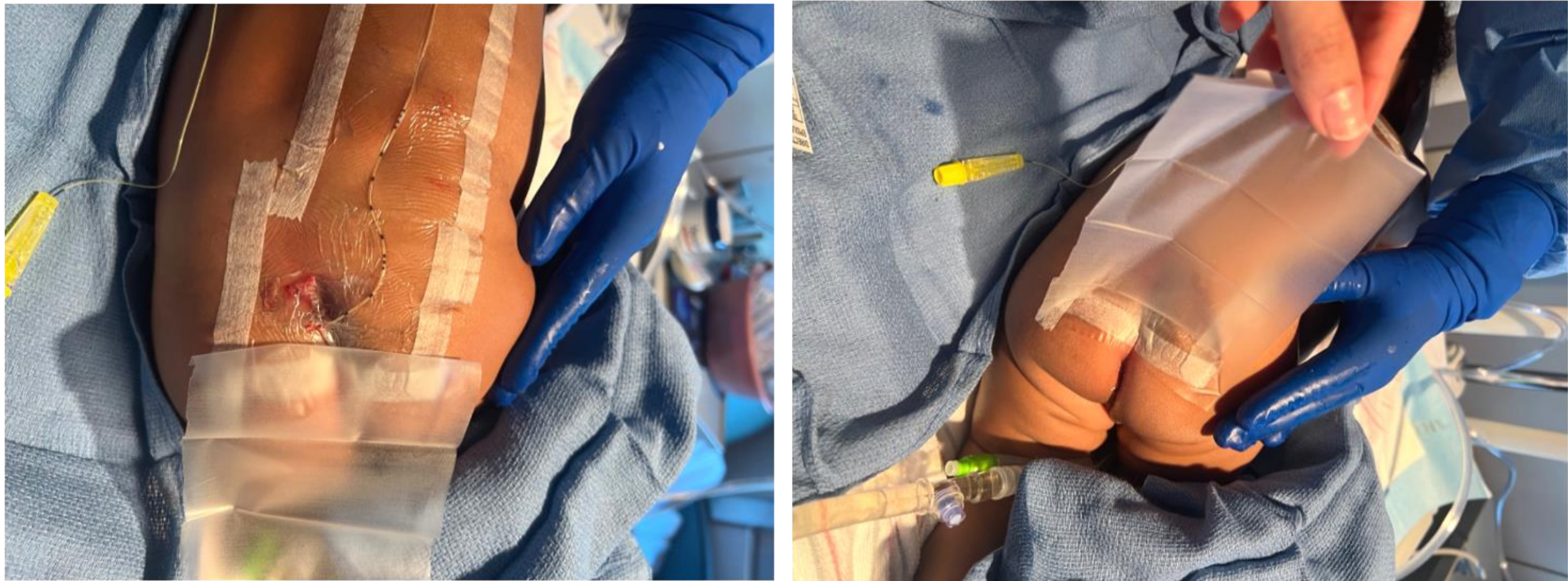


Figure 2. Ultrasound visualization of local anesthetic spreading inside the epidural space. The double-ended arrow indicates the dimensional increase of the anterior epidural space in the anteroposterior plane. The upward arrow indicates the epidural catheter within the expanded anterior epidural space. (Left to right=cranial to caudal)

- **Approach**
 - Awake **ultrasound-guided thoracic epidural placement via the caudal approach** was performed under topicalization with EMLA cream and IV morphine sedation.
 - Patient was positioned in **left lateral decubitus**, using a 15 MHz linear transducer, the sacral hiatus and sacrococcygeal ligament were identified, and a 20G angiocatheter was inserted.
 - **Catheter advanced to T7** under real-time ultrasound guidance; placement confirmed with saline bolus.
 - **2 mL of 0.2% ropivacaine with epinephrine** administered, resulting in **immediate pain relief and stabilization of vitals**.



DISCUSSION

- **Thoracic epidural anesthesia** is a well-established, safe, and effective modality for managing pediatric postoperative pain with reduced systemic side effects.
- **Ultrasound-guided neuraxial techniques** enhance block success and improve safety by enabling **real-time visualization** of needle and catheter placement, ensuring accurate targeting for surgical incisions, and optimizing local anesthetic distribution, particularly in high-risk patients.
- **This case highlights that awake thoracic epidural placement** is feasible and expands the scope of pediatric regional anesthesia in complex cases when general anesthesia is deemed high-risk.

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Table 1. The rFLACC pain scale assesses pain in preverbal children by scoring five categories—each from 0 to 2, for a total score of 0 to 10.

Categories	Scoring		
	0	1	2
F Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested; <i>appears sad or worried</i>	Frequent to constant frown, clenched jaw, quivering chin; <i>distressed-looking face: expression of fright or panic</i>
L Legs	Normal position or relaxed	Uneasy, restless, tense; <i>occasional tremors</i>	Kicking or legs drawn up; <i>marked increase in spasticity, constant tremors or jerking</i>
A Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense; <i>mildly agitated (eg, head back and forth, aggression); shallow and splinting respirations, intermittent sighs</i>	Arched, rigid, or jerking; <i>severe agitation, head banging; shivering (not rigors); breath-holding, gasping or sharp intake of breath; severe splinting</i>
C Cry	No cry (awake or asleep)	Moans or whimpers, occasional complaint; <i>occasional verbal outburst or grunt</i>	Crying steadily, screams or sobs, frequent complaints; <i>repeated outbursts, constant grunting</i>
C Consolability	Content, relaxed	Reassured by occasional touching, hugging, or being talked to, distractable	Difficult to console or comfort; <i>pushing away caregiver, resisting care or comfort measures</i>