

Erector Spinae Plane Block with Ultrasound- and CT-Based Double-Lumen Tube Selection for Thoracotomy in Giant Pulmonary Hydatid Cyst: A Case Report

Nazia Nazir¹, Bhumika Gautam¹, Shivi Mishra¹, Samiksha Khanuja¹, Savita Gupta¹

¹Department of Anesthesiology and Critical Care Government Institute of Medical Sciences, Greater Noida, UP, India.

Abstract

Background: Excision of giant pulmonary hydatid cysts carries high risks of cyst rupture, anaphylaxis, and respiratory compromise, necessitating precise lung isolation and robust regional analgesia.

Case Description: A 35-year-old female presented for posterolateral thoracotomy to excise a giant pulmonary hydatid cyst. The primary anesthetic goals were to ensure atraumatic lung isolation and minimize postoperative pulmonary complications.

Intervention A multimodal approach was utilized: airway ultrasound and CT imaging were combined to precisely select a left-sided double-lumen tube (DLT). For analgesia, an ultrasound-guided erector spinae plane (ESP) block was administered preoperatively to facilitate an opioid-sparing technique.

Outcome: The strategy resulted in effective lung isolation, excellent intraoperative stability, and superior postoperative pain control. The patient was extubated early, demonstrated improved respiratory mechanics, and achieved an uneventful recovery with minimal opioid requirements.

Key Message: Combining image-guided airway assessment with the ESP block provides a safe, effective, and comprehensive anesthetic strategy for high-risk thoracic procedures.

Keywords: Airway ultrasound, Double-lumen tube sizing, Erector spinae plane block, Thoracotomy analgesia, Pulmonary hydatid cyst, One-lung ventilation

Introduction

Pulmonary hydatid disease caused by *Echinococcus granulosus* often requires surgical excision. However, the management is challenging due to the risk of cyst rupture which can lead to anaphylaxis. [1] Impaired pulmonary reserve with the need for thoracotomy and one-lung ventilation (OLV) pose additional challenges. [2] Severe post-thoracotomy pain may further compromise respiratory function if inadequately managed. Although thoracic epidural analgesia has traditionally been used for pain management in thoracotomy, its limitations have increased interest in ultrasound-guided fascial plane blocks. [3] The erector spinae plane (ESP) block offers effective analgesia for thoracic procedures while avoiding the risks associated

with neuraxial techniques. It blocks the dorsal and ventral rami of thoracic spinal nerves through spread in the paravertebral space. [4] This surgery also required effective lung isolation. The conventional methods of double-lumen tube (DLT) sizing are based on gender and height which are unreliable. Preoperative airway ultrasound and computed tomography enable objective, patient-specific DLT selection, improving airway safety. [5,6]

By combining ultrasound-guided ESP block for regional analgesia with imaging-based airway assessment for DLT selection, a comprehensive perioperative strategy can be achieved. We report a case of giant pulmonary hydatid cyst excision in which this integrated ultrasound-guided approach contributed to effective

Address for Correspondence

Dr. Nazia Nazir,

Department of Anesthesiology and Critical Care Government Institute of Medical Sciences, Greater Noida, UP, India.

E-mail: nazunazir@gmail.com

Submitted: 20-07-2025; Reviewed: 15-08-2025; Accepted: 17-10-2024; Published: 10-12-2025

@Author 2025, DOI: <https://doi.org/10.13107/ijra.2025.v06.i01.138> | www.ijrajournal.com |

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial-Share Alike 4.0 License (<http://creativecommons.org/licenses/by-nc-sa/4.0>) which allows others to remix, tweak, and build upon the work non-commercially as long as appropriate credit is given and the new creation are licensed under the identical terms.

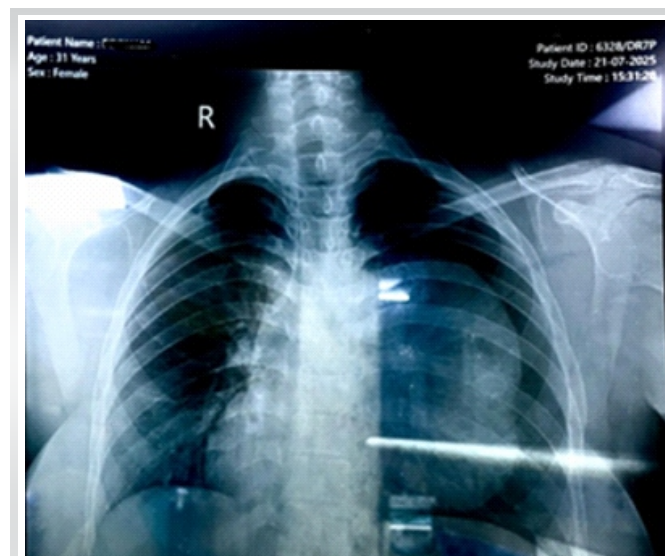


Figure 1: Preoperative chest radiograph showing a massive left-sided opacity with significant contralateral mediastinal shift, highlighting the risk of hemodynamic instability during induction.

analgesia, safe lung isolation, and favorable postoperative respiratory outcomes.

Case Report

A 35-year-old female (69 kg, 160 cm) presented with a six-month history of progressive left-sided chest pain and dyspnea. Imaging revealed a 172 × 119 mm giant pulmonary hydatid cyst in the left hemithorax with contralateral mediastinal shift (Fig. 1).

Analgesic Strategy

While thoracic epidural analgesia (TEA) is often considered the gold standard for thoracotomy, an Erector Spinae Plane (ESP) block was preferred in this case. This decision was based on its superior safety profile, lower risk of hemodynamic instability (hypotension) in a patient with potential mediastinal shift, and the absence of neuraxial complications.

A left-sided ultrasound-guided ESP block was performed at the T4 level using an in-plane technique. Following hydrodissection, 30 mL of 0.25% bupivacaine was injected, achieving multi-dermatomal spread. (Fig. 2) General anesthesia was induced following the establishment of the regional block.

Airway Management

To minimize the risk of cyst rupture from airway trauma or high ventilatory pressures, precise DLT sizing was critical. We utilized a dual-imaging approach:

- Ultrasound: Measured a transverse tracheal diameter of 16.1 mm at the cricoid level.
- CT Imaging: Confirmed an internal tracheal diameter of 16.7 mm.

This concordance allowed for the selection of a 35 Fr left-sided DLT (RUSCH, Teleflex™), which provided an optimal seal without excessive mucosal pressure. Video laryngoscopy (C-MAC, KARL STORZ Endoskope), and fiberoptic bronchoscopy (Ambu® aScope™ 4 Broncho, OD 3.8 mm). confirmed atraumatic placement. The DLT passed smoothly from the vocal cords and the left bronchial cuff was seen placed distally by check bronchoscopy. (Fig. 3) One-lung ventilation was verified by sequential clamping of the lumens. This precision-guided selection ensured effective lung isolation and complete lung collapse, which was vital for the safe surgical excision of the giant cyst using the puncture–aspiration–reaspiration technique.

Outcome

The patient remained hemodynamically stable throughout the surgery. Postoperatively, the ESP block provided excellent analgesia (VAS 2 at rest), facilitating early incentive spirometry and extubation. The patient was discharged on postoperative day 12 following an uneventful recovery.

Discussion

Effective perioperative analgesia is a cornerstone of anesthetic management in thoracic surgery, particularly for giant hydatid cysts where maintaining respiratory mechanics is vital to prevent post-obstructive complications. While Thoracic Epidural Analgesia (TEA) remains the traditional "gold standard," its associated risks—such as profound hypotension, dural puncture, and the potential for epidural hematoma—often complicate the management of high-risk thoracic patients. [4]

In this case, the Erector Spinae Plane (ESP) block served as a safer, technically simpler alternative. Recent comparative studies, such as those by Fang et al. [8], suggest that ESPB can offer comparable analgesia to TEA for thoracotomy while maintaining superior hemodynamic stability. Our patient

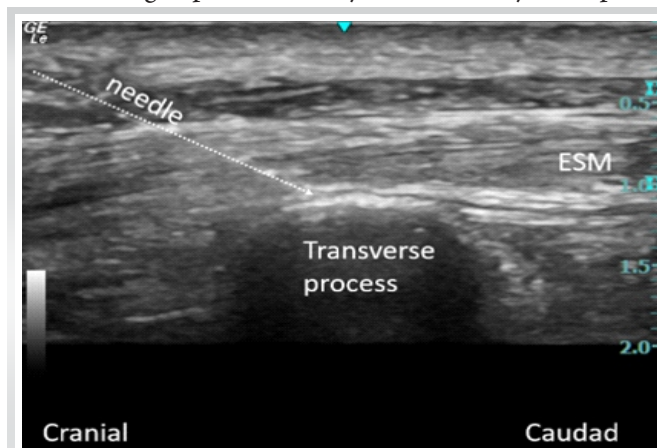


Figure 2: Ultrasound-guided ESP block at the T4 level. The needle is visualized in-plane, with local anesthetic spread confirmed between the erector spinae muscle and the transverse process.

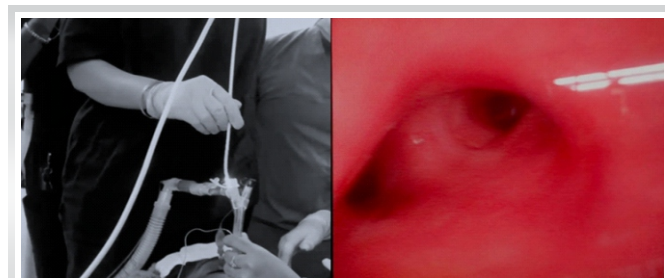


Figure 3: Fiberoptic confirmation of the 35 Fr DLT. Precision sizing based on USG/CT measurements ensured a perfect fit in the left main bronchus, facilitating complete lung collapse for surgical exposure.

demonstrated this advantage by requiring zero intraoperative vasopressors and reporting a VAS score of 2 in the PACU. However, a limitation of the ESPB is the potential for variable spread; unlike the paravertebral block, the ESPB relies on indirect diffusion into the paravertebral space, which may occasionally result in incomplete visceral pain coverage. In this case, the 30 mL volume was sufficient to achieve the multi-dermatomal spread necessary for a posterolateral incision.

Regarding airway management, the traditional reliance on height-based formulas for DLT selection has a documented failure rate of up to 40% in achieving an "ideal" bronchial fit.[5] In a giant hydatid cyst excision, a tube that is too large can cause traumatic rupture upon insertion, while a tube too small risks inadequate lung collapse and accidental cyst spillage into the dependent lung. [6, 7] By using a dual-

imaging approach (USG and CT), we achieved a measurement concordance (16.1 mm vs 16.7 mm). This objective data allowed us to confidently select a 35 Fr DLT, which provided immediate, complete lung isolation without the need for traumatic repositioning.

While CT is often considered the most accurate tool for airway sizing, it is a static, supine measurement. The addition of Point-of-Care Ultrasound (POCUS) adds a dynamic, bedside dimension that can be performed in the pre-induction area, bridging the gap between radiological data and real-time clinical application.

Conclusion

This case demonstrates that the management of giant pulmonary hydatid cysts can be optimized through a "Precision Anesthesia" framework. The integration of ultrasound-guided DLT sizing eliminates the guesswork of traditional formulas, ensuring safe lung isolation in high-risk pathologies. Furthermore, the ESP block provides a hemodynamically stable alternative to neuraxial techniques, facilitating early recovery and preserving pulmonary function. Clinicians should consider this dual-imaging and interfascial plane block strategy as a robust protocol for complex thoracic cases where both hemodynamic stability and respiratory preservation are paramount.

References

1. Al-Hurani M, Al-Hadrah Y, Ayoub KR, Al-Salhi A, Al-Sarsour HS, Kocher GJ. Thoracoscopic Approach for Treating a Primary Hydatid Cyst in the Thymus in a Teenager: A Case Report. *Am J Case Rep*. 2025; 22;26: e948600.
2. Sachar S, Goyal S, Goyal S, Sangwan S. Uncommon locations and presentations of hydatid cyst. *Ann Med Health Sci Res*. 2014;4(3):447-52.
3. Pokhriyal, Abhimanyu Singh; Tomar, Sonu; Saran, Vinayak. Anesthetic management of the patient with large pulmonary hydatid cyst: A case report. *Bali Journal of Anesthesiology* 2024;8(1): 53-6
4. Chin KJ, Adhikary S, Sarwani N, Forero M. The analgesic efficacy of pre-operative bilateral erector spinae plane blocks in thoracic surgery. *Anaesthesia*. 2017;72(4):452-460.
5. Mathew RM, Gautam S, Raman R, Rai A, Srivastava VK, Singh MK. Evaluating the precision of ultrasound versus computed tomography-guided measurement of cricoid cartilage diameter for double-lumen tube selection in thoracic surgery: A randomised comparative study. *Indian J Anaesth*. 2024; 68(10):896-901.
6. Brodsky JB, Lemmens HJ. Left double-lumen tube size selection: A practical method. *Anesth Analg*. 2005;100(3):853-856.
7. Pooja Chandran, Ankit Agarwal, Debendra K Tripathy, Nitish Thakur, Vikram Chandra. Anaesthetic Considerations in Simultaneous Management of Pulmonary and Hepatic Ruptured Hydatid Cyst: A Case Report. *Archives of Anesthesiology and Critical Care* 2023; 9(3): 265-267.
8. Fang B, Wang Z, Huang X. Ultrasound-guided preoperative single-dose erector spinae plane block provides comparable analgesia to thoracic paravertebral block following thoracotomy. *Ann Transl Med*. 2019;7(8):174.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his/her consent for his/her images and other clinical information to be reported in the Journal. The patient understands that his/her name and initials will not be published, and due efforts will be made to conceal his/her identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

How to cite this article: Nazir N, Gautam B, Mishra S, Khanuja S, Gupta S. Erector Spinae Plane Block with Ultrasound- and CT-Based Double-Lumen Tube Selection for Thoracotomy in Giant Pulmonary Hydatid Cyst: A Case Report. *International Journal of Regional Anaesthesia*. July-December 2025; 6(2): 20-22. DOI: <https://doi.org/10.13107/ijra.2025.v06.i02.138>