

Post-induction allergic reaction in a child with empyema, pulmonary tuberculosis, and a positive direct antiglobulin test: A case report

Pulkit Johar¹, A S Arun Jagath²

From ¹Junior Resident, ²Senior Resident, Department of Anaesthesiology and Critical Care, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

ABSTRACT

This case study explores the anesthetic approach for a 3-year-old child diagnosed with left-sided empyema, pulmonary tuberculosis (PTB), and pleural effusion, who also had a positive Direct Antiglobulin Test (DAT). The child was scheduled for thoracotomy with decortication. During the anesthesia induction with fentanyl and propofol, the child developed a widespread maculopapular rash. This reaction was promptly managed with intravenous hydrocortisone and pheniramine. The positive DAT status posed a significant challenge, particularly concerning the planned blood transfusion, leading to the decision to avoid transfusion.

Key words: Allergic reaction, Direct antiglobulin test, Pediatric anesthesia, Pulmonary tuberculosis, Thoracotomy

Pediatric empyema complicated by pulmonary tuberculosis (PTB) and pleural effusion presents notable challenges in anesthesia management. Current recommendations advise therapeutic thoracentesis for patients with pneumonia and effusion exceeding minimal size, with the possibility of chest tube insertion and intrapleural fibrinolytic as needed. Persistence of loculated effusion may necessitate video-assisted thoracoscopic surgery, while inadequate lung expansion could lead to full thoracotomy with decortication [1]. The treatment algorithm for pediatric empyema is shown in Fig. 1 [2].

An allergic reaction to drugs and, less commonly, hemolytic anemia can occur in patients with a positive direct antiglobulin test (DAT). Various medications, notably antibiotics such as penicillin and cephalosporins, have been linked to drug-induced hemolysis or a positive DAT test [3]. However, there is limited literature on the likelihood of anesthetic drugs causing such reactions.

This case report aims to provide insights into managing such cases, specifically focusing on the level of caution to be maintained and prompt management of such reactions.

CASE PRESENTATION


A 3-year-old female weighing 10 kg presented with abdominal pain, fever, and cough persisting for 1 month.

Abdominal pain, initially in the epigastric region, worsened with positional changes and associated with vomiting. Fever,

documented at 103°F, accompanied by chills and rigor, responded to medication. A dry cough persisted, with Contrast-Enhanced Computed Tomography thorax revealing a left-sided pleural effusion measuring 6.5 × 2.9 × 6.7 cm, leading to the diagnosis of left-sided empyema, PTB, and pleural effusion, necessitating thoracotomy with decortication due to worsening respiratory distress and failure of medical management. The patient had no history of allergic reactions in the past.

Pre-medication was administered using intravenous ketamine (5 mg) and glycopyrrolate (0.1 mg), after which standard monitors were applied. Anesthesia was induced with fentanyl (15 mcg) and propofol (20 mg) given intravenously. Soon after induction, the patient developed a generalized maculopapular rash involving the trunk and extremities, raising concern for a hypersensitivity reaction. Atracurium (5 mg IV) was then used to facilitate intubation, and the airway was secured with a 4.5 mm cuffed PVC endotracheal tube. Anesthesia was maintained with sevoflurane, and additional atracurium (1 mg IV) was administered intermittently to maintain muscle relaxation. The child remained stable throughout the surgical procedure with no hemodynamic compromise. Prompt management with intravenous hydrocortisone (20 mg) and pheniramine (3 mg) resolved the rash.

In light of significant blood loss during surgery necessitating a transfusion, the presence of a positive DAT indicated the need to avoid transfusion. Instead, alternative methods for optimizing hemostasis were employed, including prompt fluid resuscitation using a balanced salt solution and the slow administration of 150 mg of intravenous tranexamic acid over 10 min.

Access this article online	
Received - 01 April 2025 Initial Review - 14 April 2025 Accepted - 31 May 2025	Quick Response code 
DOI: 10.32677/ijcr.v11i7.5154	

Correspondence to: Pulkit Johar, Department of Anaesthesiology, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India. E-mail: pulkitjohar23@gmail.com

© 2025 Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC-ND 4.0).

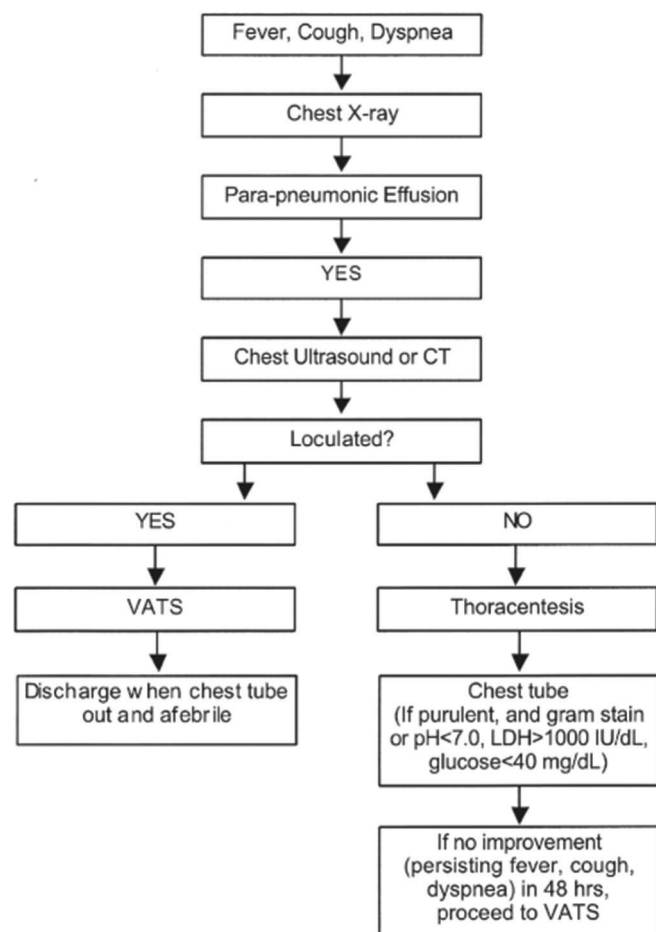


Figure 1: Treatment algorithm for pediatric empyema [2]

The patient tolerated the procedure well, was extubated in the operating room, and received post-operative analgesia with intravenous paracetamol (80 mg). Subsequent monitoring in the post-anesthesia care unit preceded transfer to the pediatric intensive care unit for further management, including hematology consultation.

DISCUSSION

When a young child presents with prolonged fever, breathing difficulty, and signs of pleural effusion on imaging, it is important to think broadly and consider various possibilities. The differential diagnoses in such scenarios include: (a) Parapneumonic Effusion or Empyema: This is a common complication of bacterial pneumonia in children. The clinical history, along with supportive imaging, usually helps in making this diagnosis; (b) Tubercular Pleural Effusion: Especially relevant in countries such as India where tuberculosis is endemic. It often presents with a longer course, constitutional symptoms, and characteristic findings on fluid analysis; (c) Bronchiectasis with Superimposed Infection: Although less frequent in very young children, chronic cough and recurrent infections may raise suspicion, particularly if there is an underlying structural lung abnormality; (d) Malignancy (such as lymphoma or leukemia): These can occasionally present with unexplained fever and pleural effusion. Clues such as lymph node

enlargement, hepatosplenomegaly, or abnormal blood counts may point in this direction; (e) Congestive Heart Failure: While rare in this age group unless there is a known heart condition, it can still be a cause of pleural effusions – typically on both sides – and should be ruled out; (f) Autoimmune Conditions (e.g., Systemic Lupus Erythematosus): Although uncommon in very young children, collagen vascular diseases can involve the pleura. Look for accompanying features such as rash, joint pain, or kidney involvement. In this case, the chronic nature of the illness, specific imaging findings, and the clinical context pointed toward tubercular empyema as the most likely diagnosis.

The successful anesthetic management of pediatric empyema complicated by PTB and pleural effusion requires an in-depth understanding of the underlying pathology and challenges posed during the perioperative period, with vigilant monitoring and timely intervention being essential to address potential complications [1,2].

Management of a positive DAT in our patient added complexity to perioperative care, necessitating a reassessment of the transfusion strategy to minimize the risk of hemolytic transfusion reactions. Alternative measures such as meticulous surgical hemostasis, intraoperative cell salvage, and hemostatic agents were implemented to optimize hemostasis and reduce transfusion requirements [4-6]. Serial hematological assessments were performed to monitor for signs of hemolysis or transfusion-related complications. Early recognition and intervention were crucial in managing a diffuse maculopapular rash following anesthesia induction to prevent progression to a severe allergic reaction, with immediate measures including airway protection, intravenous hydrocortisone, and pheniramine administration [4,5]. Vigilant monitoring for recurrence of allergic symptoms and signs of anaphylaxis, coupled with rapid access to resuscitative measures, was maintained. Positive DAT suggests an immune-mediated process, whereas the allergic reaction indicates a hypersensitivity reaction involving the release of inflammatory mediators. Despite their seemingly distinct nature, both phenomena share a common immunological basis. Drug-induced hypersensitivity reactions can trigger an immune response characterized by the activation of mast cells and basophils, potentially exacerbating existing immune-mediated processes such as the antibodies bound to red blood cells in a positive DAT [7].

Many medications have been linked to producing a positive DAT and hemolytic anemia [3].

Notably, research regarding anesthetic drugs and their impact on DAT is scarce, indicating a gap in the existing literature. This necessitates close monitoring and follow-up with relevant specialists to ensure timely intervention and management of potential complications during the perioperative period and beyond, highlighting the importance of a holistic, multidisciplinary approach to patient care.

CONCLUSION

Customized anesthesia care is essential for children with intricate thoracic issues such as empyema combined with pleural effusion

and PTB. Identifying and promptly addressing perioperative complications, such as allergic responses and positive DAT, are critical for ensuring the best possible outcomes for these patients.

REFERENCES

1. Light RW. Parapneumonic effusions and empyema. *Proc Am Thorac Soc* 2006;3:75-80.
2. Knudtson J, Grewal H. Pediatric empyema--an algorithm for early thoracoscopic intervention. *JSLs* 2004;8:31-4.
3. Sarkar RS, Philip J, Mallhi RS, Jain N. Drug-induced immune hemolytic anemia (direct antiglobulin test positive). *Med J Armed Forces India* 2013;69:190-2.
4. Stepanovic B, Sommerfield D, Lucas M, Von Ungern-Sternberg BS. An update on allergy and anaphylaxis in pediatric anesthesia. *Paediatr Anaesth* 2019;29:892-900.
5. Harper N, Cook TM, Garcez T, Lucas DN, Thomas M, Kemp H, *et al.* Anaesthesia, Surgery, and Life-Threatening Allergic Reactions: Report and Findings of the Royal College of Anaesthetists' 6th National Audit Project: Perioperative anaphylaxis (NAP6). United Kingdom: Royal College of Anaesthetists; 2018.
6. Spahn DR, Goodnough LT. Alternatives to blood transfusion. *Lancet* 2013;381:1855-65.
7. Jaime-Pérez JC, Almaguer-Gaona C. Rediscovering the coombs test. *Med Univ* 2016;30:447-54.

Funding: Nil; Conflicts of interest: Nil.

How to cite this article: Johar P, Jagath AS. Post-induction allergic reaction in a child with empyema, pulmonary tuberculosis, and a positive direct antiglobulin test: A case report. *Indian J Case Reports*. 2025; 11(7):298-300.