



Case Report

When CAP turns catastrophic: Pediatric necrotizing pneumonia

Kiran Araballi^{1*}, Nishanth², Manish³, Yashaswini^{4*}

¹Junior Consultant – Pediatric Intensive Care Unit (PICU), Electronic City, Kauvery Hospital, Karnataka

²Consultant Urologist and Renal Transplant Surgeon, Electronic City, Kauvery Hospital, Karnataka

³Radiology Resident, Electronic City, Kauvery Hospital, Karnataka

⁴Lead Consultant – Department of Pediatric Critical Care, Electronic City, Kauvery Hospital, Karnataka

*Correspondence

Abstract

Background: Necrotizing pneumonia (NP) with advanced empyema is a severe complication of pediatric community-acquired pneumonia, increasingly reported even in pneumococcal conjugate vaccine-immunized children. A 3-year-old girl presented with fever, cough, chest pain, and respiratory distress and was found to have CT-proven NP of the left lower lobe with stage IV empyema. She required high-flow nasal cannula, broad-spectrum intravenous antibiotics, Video-assisted thoracoscopic surgery (VATS) decortication, prolonged intercostal drainage, and a 4-week parenteral antibiotic course. Despite complete immunization and sterile pleural cultures, respiratory PCR detected *Streptococcus pneumoniae*. Recent evidence supports early CT imaging, molecular diagnostics, and early VATS for advanced empyema to hasten clinical and radiologic resolution. This case emphasizes guideline-concordant, multidisciplinary management achieving good short-term recovery in complex pediatric NP.

Keywords: Necrotizing pneumonia, Empyema, VATS, *Streptococcus pneumoniae*

Citation: Kiran Araballi, Nishanth, Manish, Yashaswini. When CAP Turns Catastrophic: Pediatric Necrotizing Pneumonia. *Kauverian Med J.* 2026;3(3):127-129.

Academic Editor: Dr. Venkita S. Suresh

ISSN: 2584-1572 (Online)



Copyright: © 2026 by the authors. Submitted for possible open access publication under the terms and conditions.

1. Introduction

Necrotizing pneumonia is an uncommon but increasingly recognized severe complication of pediatric CAP, characterized by parenchymal liquefaction, cavitation and a high rate of associated empyema. The introduction of PCV13 has decreased overall rates of pneumococcal CAP and parapneumonic effusions, but recent series report a disproportionate burden of NP from serotype 3 and other non-vaccine serotypes, with breakthrough infections in fully vaccinated children. Management of complicated effusion or empyema ranges from chest drainage with intrapleural fibrinolytics to early VATS decortication and recent meta-analyses suggest that VATS may offer shorter hospital stay and faster clinical recovery in advanced disease stages.¹

2. Case Presentation

A 3-year-old previously healthy, PCV-immunised girl presented with 5 days of high-grade fever, 2 weeks of cough and cold, 2 days of left-sided chest pain and reduced activity; she was tachycardic, tachypneic, drowsy, and hypoxic (SpO₂ 89% on room air)

with decreased air entry over the left hemithorax. Initial investigations showed neutrophilic leukocytosis with markedly elevated CRP and procalcitonin, chest radiograph and ultrasound revealed extensive left-sided consolidation with pleural effusion, and CT demonstrated necrotizing pneumonia of the left upper and lower lobes with mild effusion. She was started on HFNC and empiric Ceftriaxone plus Azithromycin, rapidly escalated to Meropenem and Teicoplanin for severe hypoxia and CT-proven NP, child was on frequent hospital visits with already 5 days on Cephalosporins. Pulmonology and pediatric surgery were involved early, and VATS decortication on day 3 revealed thick pus, near-complete necrosis of the left lower lobe, and stage IV empyema with a major air leak. She required 24 hours of postoperative ventilation due to major air leaks and developed subcutaneous emphysema that resolved over two weeks; pleural fluid was exudative but culture-negative, while respiratory multiplex PCR detected *Streptococcus pneumoniae*, consistent with culture-negative pneumococcal NP after prior antibiotics. Persistent postoperative fever prompted evaluation for lung abscess, catheter-related infection, and thrombosis, all of which were excluded; antibiotics were then de-escalated to Ceftriaxone and Linezolid as inflammatory markers declined. Histopathology confirmed necrotizing suppurative pleuritis and acute pneumonia, and an extended immunodeficiency workup and sickling screen were normal. She gradually improved with HFNC weaning over 6 days, intensive chest physiotherapy, incentive spirometry, nutritional optimization, and ICD drainage that became minimal by POD 12, allowing removal on POD 18 after radiographic lung re-expansion. On POD 25 she developed a brief rhinovirus-positive URTI, repeat USG showed a small, stable residual loculated pleural collection, managed conservatively in line with recommendations to observe asymptomatic residual collections; she completed 4 weeks of IV antibiotics and was discharged hemodynamically stable, on room air, with planned follow-up for imaging.

3. Discussion

Recent data indicate that NP now accounts for a growing fraction of complicated pediatric CAP, with an increasing proportion of cases occurring in PCV-vaccinated children, often due to serotype 3 or non-PCV serotypes, and with a high rate of culture-negative pleural fluid.¹⁻⁵ This case fits that pattern, with severe NP and empyema in a fully immunized child, negative conventional cultures, and pneumococcal DNA detected only by PCR, underscoring the value of molecular diagnostics in complicated pneumonia.⁴ Elevated CRP and procalcitonin at presentation, as in this child, have been associated with more severe disease and complications in NP cohorts. Choice and duration of antimicrobial therapy in NP remain largely based on expert consensus and observational data, with guidelines recommending extended courses (often 3–4 weeks) tailored to clinical and radiologic response.^{2,3,6} Stepped care in this child – initial broad-spectrum coverage for severe disease followed by de-escalation once pneumococcal etiology and downward trends in inflammatory markers were documented – is concordant with antimicrobial stewardship principles in Pediatric NP and Empyema.¹⁻³ The prolonged but eventually resolving course, including late viral URTI and small residual loculated effusion, mirrors longitudinal studies where children with NP often show slow radiologic resolution but generally favorable long-term functional outcomes with appropriate treatment.³ The optimal timing and modality of pleural intervention in empyema are debated, with older guidelines suggesting initial tube drainage with fibrinolytics and reserving VATS for failures or advanced loculations.⁶⁻⁸ However, more recent systematic reviews and randomized data suggest that in advanced empyema, VATS is associated with shorter hospital stay, faster fever resolution, and earlier chest drain removal than tube thoracostomy plus fibrinolytics, with similar complication rates.^{8,9} In this child,

early VATS was chosen due to CT-proven NP, stage IV Empyema, and significant respiratory compromise, aligning with evidence favoring early definitive surgical clearance in complex disease.⁶⁻⁹

4. Conclusion

Finally, current literature suggests that most children with NP have favourable long-term outcomes, although radiographic resolution can be delayed for months and mild residual changes may persist. Immunodeficiency evaluation is generally reserved for children with recurrent, unusually severe, or atypical infections, but may be considered in particularly severe NP cases as a precaution.

Reference

- [1] Bradley JS, Byington CL, Shah SS, Alverson B, Carter ER, Harrison C, et al. The management of community-acquired pneumonia in infants and children older than 3 months of age: clinical practice guidelines by the Pediatric Infectious Diseases Society and the Infectious Diseases Society of America. *Clin Infect Dis*. 2011;53(7):e25-76.
- [2] Kuo W-C, Huang Y-C. Necrotizing pneumonia in children: early recognition and management. *Pediatr Neonatol*. 2023;64(3):247-57.
- [3] Zhang L, Chen X, Wang Y, Li Y. A comprehensive review of pediatric necrotizing pneumonia. *Pediatr Pulmonol*. 2025;60(9):e1-e15.
- [4] Bender JM, Ampofo K, Byington CL, Korgenski K, Daly J, Pavia AT, et al. Childhood necrotising pneumonia, empyema and parapneumonic effusion in the era of pneumococcal conjugate vaccines. *Pediatr Infect Dis J*. 2024;43(5):e150-7.
- [5] Midulla F, et al. Severe necrotizing pneumonia in children: a challenge to clinicians. *J Trop Pediatr*. 2020;66(6):637-45.
- [6] Canadian Paediatric Society, Paediatric Infectious Diseases and Immunization Committee. Paediatric complicated pneumonia: diagnosis and management of empyema. *Paediatr Child Health*. 2018;23(5):339-43.
- [7] Basu S, Bhatnagar V. Management of empyema thoracis in children. *Indian Pediatr*. 2002;39(2):145-57.
- [8] Ahmed S, Hanif M, Kumar R, et al. Management strategies and outcomes of pediatric empyema: a multicentre experience. *Arch Pediatr Infect Dis*. 2022;10(3):e147997.
- [9] Abdelrahman H, et al. Video-assisted thoracoscopic surgery versus tube thoracostomy with fibrinolytics in pediatric empyema: a systematic review and meta-analysis. *J Pediatr Surg*. 2025;60(4):712-20.