
CASE REPORT**From abdominal discomfort to lung gangrene: A pediatric case of necrotizing pneumonia***Ján Hrubovčák^{1,2}, Lubomír Tulinsky^{1,2*}, Petr Jelínek^{1,2}, Ivana Slívová^{1,2}**¹ Department of Surgery, ² Department of Surgical Studies, Faculty of Medicine, University of Ostrava, Ostrava, Czech Republic*

Abstract

Acute abdominal pain is a common symptom encountered by most doctors in acute care settings. However, not all patients exhibiting a peritoneal response necessarily have an abdominal pathology. In some instances, the underlying issue may be entirely extraperitoneal. Pneumonia is one such diagnosis. While pediatric pneumonia is not uncommon, it can lead to unexpected complications and present a surprisingly broad spectrum of symptoms. This case report describes an unusual progression of necrotizing pneumonia that, despite aggressive treatment, advanced to lung gangrene, ultimately necessitating a lobectomy.

Keywords: Abdominal Pain, Necrotizing Pneumonia, Lobectomy

Introduction

Pneumonia, a condition often associated with a variety of symptoms, can present with manifestations that extend beyond the respiratory system. One of such extra-thoracic symptoms is parapneumonic abdominal pain, which, despite its common appearance, is rarely the primary indicator. A less common and more severe form of this condition is necrotising pneumonia, which deviates significantly from the typical course of pneumonia. The concurrent presentation of abdominal pain and necrotising pneumonia is an infrequent occurrence, presenting unique challenges in both diagnosis and treatment. This case report aims to highlight an intriguing case in which a young child's life-threatening pneumonia was initially misdiagnosed as mere abdominal pain.

Case report

A 5-year-old girl was brought to Department of Accident and Emergency due to a progressive decline in her overall health. Her parents had

consistently reported abdominal pain, which had started six days prior following a minor altercation with another girl at kindergarten. Accompanying the abdominal pain were symptoms of diarrhea, loss of appetite, and fever. The child's general health had been on a downward trajectory over the six days since the incident.

In addition to her current condition, the girl had a history of asthma, managed with low doses of salbutamol and a beclometasone spray. In addition to this, she was in good health and had received all her vaccinations according to the immunisation schedule, including those for tick-borne encephalitis, hepatitis A, rotaviruses, and *Streptococcus pneumoniae*.

The initial clinical examination revealed a peritoneal response in the abdomen, among other alarming findings. The child was lethargic, tachypneic (30 breaths/minute), and had a high fever of 39.8°C, hypotension (60/40 mmHg), and tachycardia (180/min). Auscultation revealed diminished

breath sounds on the left side of the chest and heart sounds displaced to the right hemithorax. The severity of the patient's condition and the significant symptoms being inconsistent with a single low-energy blunt abdominal trauma required further diagnostic investigations.

An abdominal ultrasound examination did not yield significant findings. However, a subsequent chest X-ray revealed left-sided alar pneumonia. A prompt CT scan demonstrated consolidation of nearly the entire left lung lobe, accompanied by a large pleural effusion in the left hemithorax, causing a shift of the mediastinum to the right (Figure 1). Blood tests indicated an elevated C-reactive protein (CRP) level of 407 mg/l and a procalcitonin level of 10 ug/l.



Figure 1: CT on admission

It was accurately deduced that the peritoneal response in the abdomen was secondary to a systemic septic shock, resulting from an undiagnosed but advanced pneumonia in the left lung lobe. The child was immediately transferred to a paediatric Intensive Care Unit (ICU), where an aggressive antibiotic regimen of intravenous amikacin and cefotaxime was started, together with comprehensive supportive therapy. Although the condition initially stabilised, a follow-up chest X-ray on the

second day revealed increased pleural effusion (Figure 2). Consequently, a thoracoscopic revision of the left hemithorax was performed on the third day, draining 450 ml of putrid effusion. However, the patient's condition did not improve. The persistence of high fever, elevated CRP levels, and the detection of *Streptococcus pneumoniae* in the effusion (confirmed by polymerase chain reaction) led to switching of antibiotics to high doses of crystalline penicillin. Despite these efforts, the expected improvement did not materialise. The chest tubes continued to drain putrid fluid and a subsequent CT scan on the 10th day showed progressive pyothorax and cavities in the lung parenchyma, raising strong suspicions of lung gangrene (Figure 3).

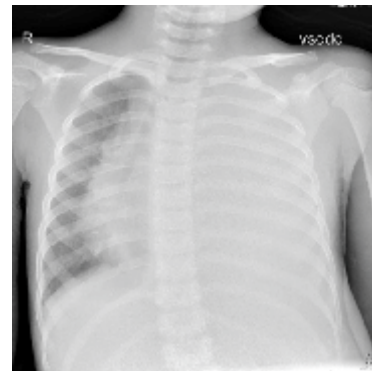


Figure 2: Follow-up chest X-ray on the second day

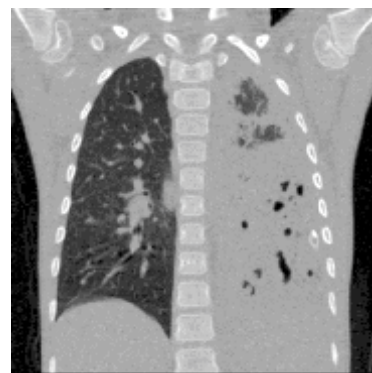


Figure 3: Follow-up CT on the 10th day

Consequently, a left thoracotomy was performed on the 11th day after admission. Surgery revealed abscessing pneumonia with gangrene in the left inferior lung lobe, necessitating its resection. After lobectomy of the left lower lung, the patient's condition improved significantly, leading to an uneventful recovery and discharge on the 21st day. A histopathological examination confirmed abscessing confluent bronchopneumonia and, identified the presence of unidentified foreign bodies within the lung parenchyma.

The final diagnosis was necrotising pneumonia by aspiration accompanied by lung gangrene. Regular spirometric follow-up indicated only a slight decrease in vital capacity, which remained stable even five years after surgery. The child currently does not experience limitations in her daily life.

Discussion

It is crucial to remember that abdominal pain is only a symptom, not a diagnosis in itself. It can be attributed to a wide range of diagnoses, many of which are extra-abdominal, including pneumonias. The easiest path to the correct pathology is by a comprehensive physical examination. As demonstrated, even pain confined to the abdomen, seemingly corroborated by a plausible history, can originate from an extra-abdominal pathology. In particular, pneumonia is the most common extra-abdominal source of abdominal pain in children [1], with abdominal discomfort occurring in approximately 12% of all paediatric pneumonias [2].

Necrotizing pneumonia, one of the most severe complications of pneumonia, is relatively rare, although its incidence is on the rise [3]. Characterized by progressive lung inflammation that is resistant to treatment, necrotizing pneumonia results in

the destruction of lung parenchyma, leading to lung necrosis or even gangrene. It is often associated with pulmonary abscesses, empyema, pleural effusion, bronchopleural fistulas, or pneumothorax [4, 5]. *Streptococcus pneumoniae* is among the most common pathogens involved. Given the vast number of *S. pneumoniae* serotypes present in the environment, which far exceed those included in vaccines, it is possible, though rare, to contract this infection despite vaccination.

The possibility of necrotising pneumonia should be considered when the patient's condition does not improve despite receiving appropriate antibiotic therapy for 72 hours or more. This diagnosis becomes particularly relevant when drainage of thoracic effusion, empyema, or pyopneumothorax does not produce the expected clinical improvement [6]. In such scenarios, surgical intervention is often necessary. Procedures may range from simple chest drainage to thoracoscopic or open debridement of early-stage empyema. If the disease progresses to lung gangrene, lung resection may be inevitable [7]. On the other hand, the mortality rate of necrotising pneumonia, when correctly treated, is remarkably low. Most children experience minimal to no long-term sequelae, even after surgery [4].

Conclusion

In conclusion, this case underscores that acute abdominal pain does not necessarily originate from an intra-abdominal pathology. It is essential to maintain a broad perspective, particularly when symptoms are atypical or inconclusive. On the contrary, when dealing with necrotising pneumonia, there is no room for hesitation in treatment. This life-threatening disease requires a comprehensive and aggressive therapeutic approach from

the moment of suspicion. However, there are still patients whose conditions deteriorate despite all efforts. When faced with intractable pneumonia in

children that has progressed to lung gangrene, the decision can be made between surgery or death.

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