



## Case report

*Salmonella* empyema an unusual infection – A case report

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## ABSTRACT

Pleuropulmonary *Salmonella* infections are very rare and are associated with high mortality.

We present a case of empyema due to *Salmonella* in an 83-year-old male patient, with uncontrolled hematological disease. The patient presented with a one-week history of fever, productive cough with purulent sputum, dyspnea, and pleuritic pain localized to the right hemithorax. He denied having nausea, vomiting, and diarrhea. No history of smoking or respiratory diseases.

Chest imaging showed a right loculated pleural effusion with adjacent parenchymal consolidation. Blood test revealed anemia without leukocytosis with elevated C-reactive protein (36.2 mg/dL).

A chest tube was placed, with drainage of purulent fluid and empiric antibiotic therapy with ceftriaxone and clindamycin was started.

Pleural fluid and blood cultures were positive for *Salmonella* serotype Enteritidis. The stool cultures were negative.

Due to slow improvement, clindamycin was suspended and ciprofloxacin was initiated. The patient showed clinical and laboratory improvement. After seven weeks of antibiotic therapy, he presented with negative blood cultures and significant imaging improvement. The patient was discharged.

This case describes a positive outcome in an unusual infection with a high mortality caused by non-typhoid *Salmonella*.

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## Introduction

*Salmonella* is a pathogenic bacillus of the *Enterobacteriaceae* family. This enteric agent is responsible for gastrointestinal infections, which are usually self-limiting, as well as extra-intestinal infections, such as endocarditis, urinary tract infections, and septic arthritis [1–3].

Pleuropulmonary infections by this Gram-negative bacteria are rare and associated with high mortality, especially in immunocompromised hosts [3–7].

*Salmonella* may cause very severe infections, with bloodstream invasion and bacteremia. The serotype *Salmonella enterica* serovar Enteritidis has a high capacity for blood invasiveness capacity. The severity of the clinical presentation is often defined by the agent's virulence and the host immunity status [1,3,4,6].

Non-typhoid *Salmonella* infections are usually associated with contaminated foods or contact with reptiles or their habitats [1]. We present a rare and challenging case of extraintestinal infection by *Salmonella*.

## Case report

An 83-year-old male, retired farmworker, with a medical history of myelodysplastic syndrome with excess blasts, necessitating blood transfusion support every 15 days.

The patient came to the emergency department with a one-week history of fever (38.3 °C), productive cough with purulent sputum, dyspnea and pleuritic pain localized to the right hemithorax. He denied having nausea, vomiting, or diarrhea

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Fig. 1. Chest X-ray at admission.

and had no history of smoking or respiratory diseases. He also denied having any recent foreign travel, exposure to undercooked or contaminated food, and contact with reptiles or amphibians.

At the physical examination, the patient was pale and afebrile, with a blood pressure of 110/60 mmHg and pulse

of 90 bpm. He was eupneic with oxygen saturation of 96 % on room air. Pulmonary auscultation revealed a decrease in the breath sounds and dullness to percussion over the right base.

The laboratory tests revealed anemia (hemoglobin 6.8 g/dL; hematocrit 19.8 %) no leukocytosis (white blood count 5700 cells/

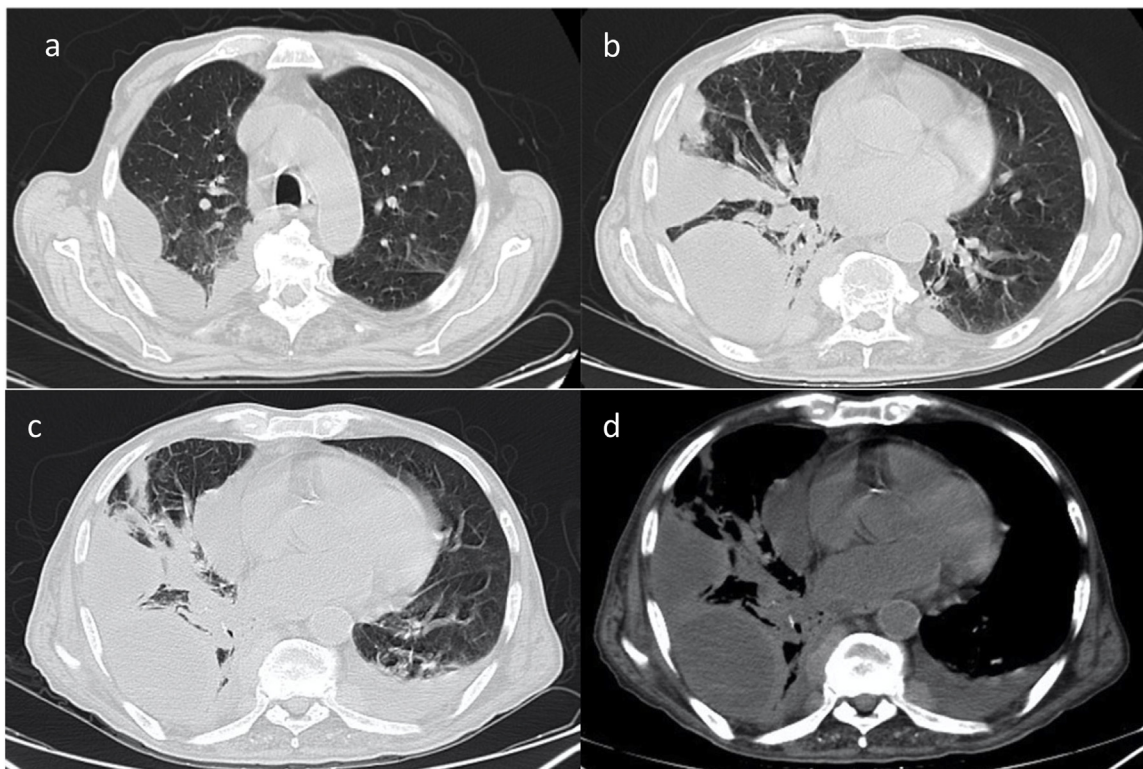


Fig. 2. Chest CT axial images: (a), (b), (c) lung window and (d) mediastinal window showing right loculated pleural effusion with adjacent parenchymal consolidation and mediastinal lymphadenopathy.



Fig. 3. Thoracic chest tube drainage with purulent pleural fluid.

$\mu\text{L}$ ;  $3.65 \times 10^3/\mu\text{L}$  (60 %) neutrophils), an erythrocyte sedimentation rate of 41 mm, and an elevated C-reactive protein (36.2 mg/dL). The HIV serology result was negative. Urinary antigen results for legionella and pneumococcus were negative. Blood and stool samples for cultures were obtained.

Chest radiography showed right hemithorax opacification (Fig. 1), and computed tomography (CT) of the chest revealed a right loculated pleural effusion with adjacent parenchymal consolidation and mediastinal lymphadenopathy (Fig. 2).

Thoracic ultrasound revealed a complex pleural effusion, which was anechoic, but there were septations visible within the effusion, loculated areas, and consolidation of the lung. A diagnostic ultrasound-guided thoracentesis revealed a purulent pleural fluid. Samples of fluid were collected and sent for culture and cytological analysis. A thoracic chest tube (8Fr) was inserted, with immediate drainage of 450 mL of purulent fluid (Fig. 3).

Pleural fluid analysis revealed an exudate with the following parameters: pH 6.24, glucose <5 mg/dL, lactate dehydrogenase 6743 U/L, and proteins 3.8 g/dL. Cytology revealed 97600 cells/ $\text{mm}^3$  with 99 % neutrophils.

The case was discussed with the thoracic surgery department, and it was concluded that the patient had no clinical condition for a surgical approach. A diagnosis of pneumonia

with empyema in an immunocompromised patient was assumed, and empirical antibiotic therapy was initiated with intravenous ceftriaxone at 1 g twice a day associated with clindamycin at 600 mg four times a day. The patient began respiratory physiotherapy.

On hospital day 5, pleural fluid and blood cultures were positive for *Salmonella enterica* serotype Enteritidis. Antimicrobial susceptibility testing showed sensitivity to cotrimoxazole, ceftriaxone, ciprofloxacin, and ampicillin. Stool cultures were negative. Based on these findings, we assumed a diagnosis of *Salmonella* non-typhoid pneumonia complicated by empyema and bacteremia. Clindamycin was suspended and intravenous ciprofloxacin at 200 mg twice a day was added to ceftriaxone, which resulted in clinical and laboratory improvement.

Two weeks after treatment, new blood cultures were negative for pathogens.

The patient was discharged, after seven weeks of antibiotic therapy, with negative blood cultures and significant imaging improvement (Fig. 4). One year later, the patient had not relapsed.

## Discussion

*Salmonella enterica* serotype Enteritidis is one of the most common serotypes, and it seems that impaired cell-mediated immunity is an important factor in the pathogenesis of extra-intestinal salmonellosis [1,2,4]. This case emphasizes a complicated and extremely rare case of pleuropulmonary disease due to non-typhoid *Salmonella*. The results show that considering *Salmonella* infections in an immunocompromised patient is very important. In our patient, this condition was found as a risk factor. Pleuropulmonary infections by this microbiological agent have high mortality, but despite an uncontrolled hematological disorder, the patient was a successful case. A conservative approach, without the possibility of surgical intervention can have positive outcomes.

The diagnosis was also made challenging by the lack of gastrointestinal symptoms and no leukocytosis, but the literature does point out that primary bacteremia without gastroenteritis is more common in patients with severe immunosuppression [1,3,4]. In this atypical presentation, a high level of suspicion is crucial for an early diagnosis and prompt treatment, reducing the morbidity and mortality risk. Although non-typhoid *Salmonella* infections are usually associated with contaminated foods, in the present case, the source of the patient's *Salmonella* was not discovered.

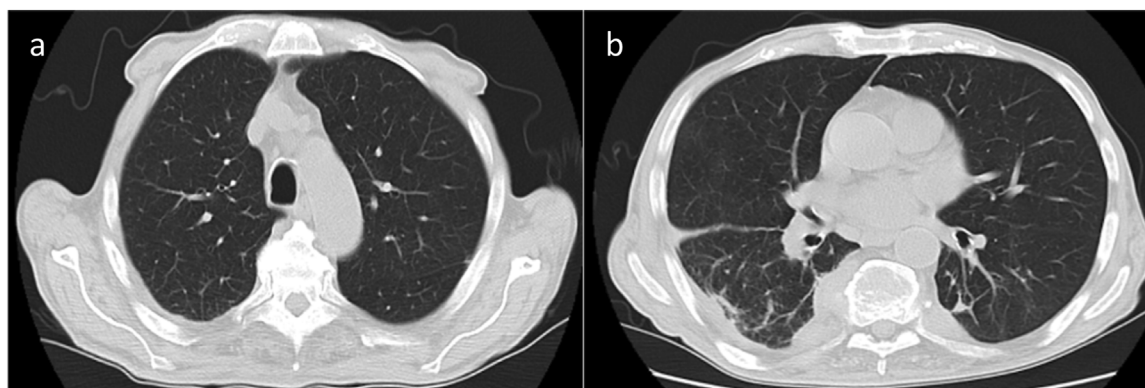


Fig. 4. Chest CT axial images (a, b) lung window after treatment.

### Author statement

All persons who meet authorship criteria are listed as authors, and all authors certify they have participated in the work to take public responsibility for the content.

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### Patient consent

Written informed consent was obtained from the patient for publication of this case report and any accompanying images. A copy of written consent is available for review by the Editor-in-Chief of this journal.

### CRediT authorship contribution statement

**André Nunes** and **Ricardo José Cordeiro** analyzed and interpreted patient data. **Natália André** took care of the patient and was a great contributor in the conception of the work. **Carina Maria Rôlo Ferreira Silvestre** took care of the patient and wrote the manuscript. **João Eusébio**, **Teresa Falcão** and **António Carlos Domingos** revised the manuscript. **Carina Maria Rôlo Ferreira Silvestre**, **André Nunes**, **Ricardo José Cordeiro**, **João Eusébio**, **Natália André**, **Teresa Falcão**, **António Carlos Domingos** read and approved the final manuscript.

### Declaration of Competing Interest

The authors report no declarations of interest.

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