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Case Report
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Empyema Superimposed on Pseudochylothorax: A Report of a Rare Case

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Abstract

Background: Pseudochylothorax is an uncommon chronic pleural effusion characterized by elevated pleural cholesterol levels and typically associated with long-standing pleural inflammation, most commonly Rheumatoid Arthritis (RA) and tuberculosis. Although usually sterile, secondary infection may rarely complicate the condition, particularly in immunocompromised patients, posing diagnostic and therapeutic challenges.

Case: A 54-year-old man with seropositive RA presented with progressive dyspnea and bilateral pleural effusions. Right-sided thoracentesis showed purulent fluid with very high LDH and low glucose, consistent with empyema. Left-sided fluid was milky with high cholesterol (634 mg/dL) and low triglycerides (74 mg/dL), confirming pseudochylothorax. Ether testing supported the diagnosis. The patient received antibiotics and right-sided chest drainage, while the left effusion was managed conservatively, resulting in clinical improvement.

Conclusion: Empyema superimposed on pseudochylothorax is extremely rare. Chronic lipid-rich effusions may predispose to secondary infection, particularly in immunosuppressed hosts. Comprehensive pleural fluid analysis from both sides in bilateral effusions is essential for accurate diagnosis and timely management.

Keywords: Pseudochylothorax; Empyema; Rheumatoid Arthritis; Pleural Effusion

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Background

Pseudochylothorax is an uncommon manifestation of chronic pleural disease, characterized by the accumulation of cholesterol-rich fluid within the pleural cavity. It typically develops in the setting of long-standing pleural inflammation, particularly Rheumatoid Arthritis (RA) and tuberculosis [1].

In RA, chronic immune-mediated pleuritis may lead to progressive pleural thickening, impaired lymphatic drainage, and accumulation of the cellular breakdown products, particularly cholesterol crystals and lipid-laden macrophages [2]. Although pseudochylothorax is usually sterile and slowly progressive, however, due to high lipid content of the effusion, it can be predisposed to bacterial, mycobacterial and fungal infection especially under immunosuppressive conditions [3-5].

The coexistence of empyema and pseudochylothorax is extremely rare, and presents a diagnostic and therapeutic challenge due to overlapping clinical and biochemical features. To our knowledge, a few cases have been reported in the literature [6,7]. We present a rare case of bilateral pseudochylothorax in a patient with RA, complicated by superimposed empyema on one side.

Case Presentation

A 54-year-old man with a known history of seropositive rheumatoid arthritis, presented to the clinic with a one-month history of progressive exertional dyspnea without active arthritis. Over the few days prior to admission, he also reported mild fever and general fatigue. The patient was under treatment with 5 mg of daily prednisolone and 200 mg hydroxychloroquine and received a short course of antibiotic in outpatient management.

On physical examination, bilateral decreased breath sounds were noted in the lower lung zones. Chest radiography demonstrated bilateral pleural effusions, more obvious on the right side.

The patient was admitted to the hospital for further evaluation, in laboratory evaluation WBC count:11400/mm3, ESR: 45 mm/hr, CRP:64 μ/L, RF:244.3 IU/ml, Anticcp:>300. A chest CT scan confirmed bilateral pleural effusions without evidence of pleural thickening, parenchymal

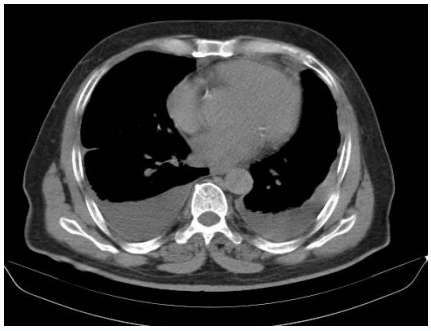

Figure 1: Chest computed tomography with bilateral pleural effusion more prominent in right side.

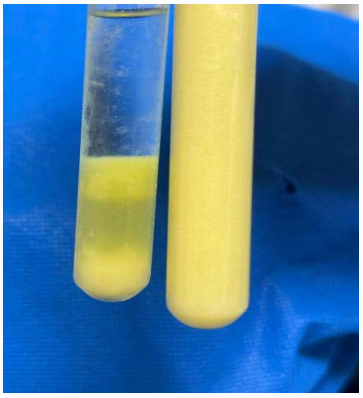

Figure 2: Ethyl ether clearance test to distinguish pseudochylothorax.

consolidation or lymphadenopathy (Figure 1). Echocardiography and Pro-BNP were in normal ranges. Antibiotic therapy was started at the emergency department.

A diagnostic thoracentesis of right side was performed under ultrasound guidance, and pleural fluid analysis yielded the following results. The appearance of the fluid was turbid, and purulent, white blood cell count: 12000 cells/μL with 90% neutrophils, LDH: 18,700 IU/L, Protein: 5.81 g/dL, Glucose: 3.5 mg/dL, PH: 7.1, ADA: 79.33 U/L, cholesterol: 634 mg/dL, Triglycerides: 74 mg/dL. These findings were in favor of empyema; right pleural space was drained by chest tube. Since there was no obvious etiology for accumulation of pleural effusion in left side, thoracentesis was performed and interestingly, yielded milky fluid and non-purulent. Left-side pleural fluid analysis showed milky appearance, WBC: 500 cells/μL with 70% segmented neutrophils, LDH: 2,061 IU/L (serum LDH: 390 IU/L), Protein: 3.5 g/dL (serum protein: 6.8 g/dL), Glucose: 36 mg/dL, ADA: 67.6 U/L, culture: no growth and cytology was negative for malignancy.

Rheumatoid Factor (RF) in right side pleural fluid was 17.8 IU/mL and 40 IU/ml in left side (normal range less than 15 IU/ml). The Ziehl-Nelsen stain and culture of the pleural fluid was negative for Mycobacterium tuberculosis.

These findings confirmed bilateral pseudochylothorax, with superimposed empyema exclusively on the right side, as evidenced by the markedly elevated LDH, low glucose, purulent fluid, and neutrophilic predominance. The presence of rheumatoid factor in pleural fluid and the history of longstanding RA further supported the diagnosis of RA-associated pseudochylothorax.

To further support the diagnosis, a sample of the left-sided pleural fluid was placed in a test tube, and ethyl ether was added. Within minutes, the milky fluid separated into two layers: a clear supernatant and a floating oily layer, indicating the presence of cholesterol crystals and confirming the diagnosis of cholesterol-rich pseudochylothorax (Figure 2).

Based on the combined clinical, biochemical, and visual findings, a final diagnosis of bilateral pseudochylothorax, complicated by right -sided empyema, was established.

Treatment was continued by intravenous broad-spectrum antibiotics and right-sided chest tube drainage. The left-sided effusion, being non-infected and stable, was managed conservatively after two times aspiration. The patient responded well to therapy and was discharged in improved condition with a scheduled follow-up and referred to rheumatologist.

Discussion

Pseudochylothorax is a rare form of chronic pleural effusion characterized by its milky appearance, high cholesterol concentration, and low triglyceride levels. It most commonly develops in association with long-standing pleural inflammation, particularly in patients with Rheumatoid Arthritis (RA) and tuberculosis. In RA, chronic immune-mediated pleural inflammation and pleural thickening leads to impaired lymphatic drainage, and cellular degradation, resulting in the accumulation of cholesterol crystals in the pleural space over time [2] but in 20% of patients with pseudochylothorax, there is not pleural thickening implying other pathogenic mechanisms [1].

In distinguishing pseudochylothorax from true chylothorax, pleural fluid analysis is essential. Chylothorax is typically associated with elevated triglycerides and the presence of chylomicrons, whereas pseudochylothorax is defined by cholesterol levels exceeding 200 mg/dL and triglyceride levels usually below 110 mg/dL [8]. In our patient, the pleural cholesterol was markedly elevated (634 mg/dL) while the triglyceride levels remained low (74 mg/dL), in favor of pseudochylothorax. Furthermore, the ether test by separation the fluid into a clear and oily layer, supported the cholesterol-rich nature of the effusion [9].

A systematic review of 104 patients with pseudochylothorax showed that the condition most often affects middle aged to older males and is predominantly associated with tuberculosis or rheumatoid arthritis. Effusions were typically unilateral (88%), milky, and exudative, with cholesterol crystals and a high cholesterol/triglyceride ratio as key diagnostic features. Notably, pseudochylothorax can occur without significant pleural thickening, and management of the underlying disease usually leads to favorable outcomes [1].

Interestingly, the presence of bilateral pseudochylothorax in our case was confirmed by cholesterol, triglyceride and RF levels.

Although pseudochylothorax is generally non-infectious, secondary infection can occur, particularly in immunocompromised individuals or in the presence of chronic pleural pathology.

Differentiation of pseudochylothorax from empyema is important because each of these conditions are managed in a different way [10]. In pseudochylous effusions, the mainstay of treatment is management of the underlying cause, whereas empyema requires both drainage and antibiotic therapy [11].

In our case, the superimposed empyema was suggested

by markedly elevated LDH, severely reduced glucose and p^H, neutrophilic predominance, and the purulent appearance of the right-sided pleural fluid. Interestingly, the clinical presentation was relatively mild, likely due to prior antibiotic use or ongoing low-dose corticosteroid therapy. Notably, a negative pleural fluid culture does not exclude empyema, as cultures are positive in only about 60% of cases [8], even when the fluid appears purulent. Given these findings, we proceeded with continued antibiotic therapy and right-sided chest tube drainage.

This case highlights the importance of bilateral thoracentesis and side-by-side fluid analysis in patients with asymmetrical or complex pleural effusions. Clinicians should be conscious that even chronic effusions like pseudochylothorax can become secondarily infected, particularly in immunocompromised hosts. Early identification and appropriate management are crucial to prevent morbidity.

Conclusion

This case illustrates an unusual coexistence of pseudochylothorax and empyema in a patient with longstanding rheumatoid arthritis. While pseudochylothorax is typically a chronic and non-infectious process, secondary infection may occur, particularly in immunosuppressed patients, and can significantly alter clinical management. Comprehensive pleural fluid analysis, including biochemical, cytologic, and microbiologic assessment from both hemithoraces when indicated, is essential for accurate diagnosis. Awareness of this rare but clinically relevant overlap may facilitate timely recognition and appropriate treatment in patients presenting with complex or bilateral pleural effusions.

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