Spontaneous chylothorax is rare in adults. We present an unusual case that was complicated by *Prevotella bivia* empyema. Full recovery was achieved with chest tube drainage and prompt treatment with intravenous clindamycin.

**CASE REPORT**

A 78-year-old man was admitted to the hospital with a 1-month history of weight loss (10 kg), asthenia, dyspnea, dry cough, right chest pain, and low-grade fever (37.1°C on admission). He was an exsmoker (60 packs/year) with moderately severe chronic obstructive pulmonary disease that was not associated with chronic respiratory failure. He also suffered from chronic periodontitis, was known to harbor the factor V Leiden mutation, and had been treated 3 months earlier for an episode of pulmonary embolism. The physical examination revealed diminished chest expansion, tachypnea (24 breaths/min), reduced vesicular breathing on the right, and bilateral rales. The white blood cell (WBC) count was 14.8 × 10^9/liter with 94% neutrophils. Arterial blood gas analysis on room air revealed severe hypoxemia-compensated respiratory acidosis. A chest X-ray showed a right pleural effusion without clear evidence of consolidation (Fig. 1a). Ultrasound analysis disclosed two loculated pleural effusions in the right hemithorax. Computed tomography (CT) revealed two large right pleural effusions (anterior and lateral), a small posterior effusion, right middle lobe consolidation, and diffuse, bilateral “ground-glass” opacities (Fig. 1b). Empirical treatment with intravenous levofloxacin (750 mg every 24 h [q24h]) was started, and a chest tube was inserted on the right midaxillary line. A 50-ml sample of purulent fluid was characterized by a pH of 6.8, a lactate dehydrogenase (LDH) level of 1,320 IU/liter, a WBC count of 10,840 cells/μl, high triglyceride levels (270 mg/dl versus serum level of 67 mg/dl), a low cholesterol level (10 mg/dl), and no identifiable cholesterol crystals. Microscopic examination of the fluid showed numerous neutrophils but no parasites or ova (1–4). Gram staining revealed short rod-shaped bacteria, and cytology was negative for malignancy. Ziehl-Nielsen staining detected no acid alcohol-resistant bacteria. A diagnosis of chylothorax with pleural infection was made. Two other chest tubes were inserted, and drainage samples from each were sent to the microbiology laboratory. In accordance with our routine protocol, the pleural fluid specimens were subjected to aerobic cultures on MacConkey (35°C) and Sabourad (30°C) agars; microaerobic cultures (35°C in air with 5% CO_2); anaerobic cultures in an anaerobic growth chamber (Forma Scientific, Marietta, OH) containing 10% vol/vol hydrogen, 10% carbon dioxide, and 80% nitrogen on brucella blood, Columbia, and Schaedler agars (35°C); and aerobic and anaerobic cultures on enriched thioglycolate medium with vitamin K and hemin (plates and slants from Becton, Dickinson Diagnostic Systems, Sparks, MD, and bioMérieux, Marcy l’Etoile, France). Specimens were also inoculated onto Lowenstein-Jensen solid medium and in MGIT liquid medium (Becton, Dickinson). Three sets of blood cultures (Becton, Dickinson) were drawn. Lymphatic scintigraphy with technetium-99m (99mTc)-human albumin revealed no possible sources of chyle leakage. Aerobic and microaerobic cultures yielded no growth, but after 36 h of incubation, anaerobic cultures of all three samples produced small, circular, convex, translucent, shiny white colonies of Gram-negative rods. Matrix-assisted laser desorption ionization–time of flight (MALDI-TOF) mass spectrometry (Bruker Biotyper system, version 3.1 software and database; Bruker Daltonik GmbH, Bremen, Germany) identified the isolates as *Prevotella bivia* with log (scores) of 1.78 to 1.81 (5). The isolates exhibited no growth in the presence of bile and no evidence of esculin hydrolysis.

In light of these findings, the patient was switched to intravenous clindamycin treatment (600 mg/8 h), and the *in vitro* susceptibility of the isolates was assessed with the Etest (bioMérieux, Marcy l’Etoile, France), as previously described (6). Interpreted according to EUCAST breakpoints (7), the results revealed susceptibility to amoxicillin-clavulanate (MIC, 0.06 mg/liter), piperacillin-tazobactam (MIC, 0.12 mg/liter), meropenem (MIC, 0.002 mg/liter), clindamycin (MIC, 0.016 mg/liter), metronidazole (MIC, 0.06 mg/liter), and chloramphenicol (MIC, 2 mg/liter) and full resistance to penicillin (MIC, ≥0.5 mg/liter). Beta-lactamase positivity was documented by the cefinase disk method. All of the blood cultures were negative. Chest tube drainage cultures for *Mycobacterium tuberculosis* and fungi yielded no growth. Isolates were retested on the Vitek 2 system with ANC cards (both from bioMérieux, Marcy l’Etoile, France), which identified all as *P. bivia*. The species-level identification was confirmed by 16S rRNA gene sequencing (100% match with *P. bivia* strain SEQ227 isolates on November 12, 2017 by guest http://jcm.asm.org/ Downloaded from
FIG 1 Imaging findings. As performed at admission, a chest X-ray shows the right lateral pleural effusions with loculated features (a) and a CT scan shows the two loculated pleural effusions described in the text (b).

[GenBank accession no. JN867300]). On day 10, after 7 days of clindamycin treatment, the patient was transferred to a rehabilitation center with a prescription for oral clindamycin (300 mg every 6 h for 4 weeks). The 6-month follow-up assessment revealed full clinical and microbiological biological resolution of the empyema.

In 1990, 16 Bacteroides species were transferred to form the new genus Prevotella, which now includes 48 validated species of obligately anaerobic, pleomorphic, Gram-negative rods (8; http://www.bacterio.net/). Human infections ascribed to P. bivia (or “Bacteroides bivia,” as it was known then) had first been reported in 1987 (9). They frequently involve the female urogenital tract or, less commonly, the oral cavity, and they have been linked to an increased risk of preterm delivery (10, 11), an effect attributed to increased prostaglandin formation (12). Recovery of P. bivia, alone or with other pathogens, has also been sporadically reported in patients with other types of infection (9, 13–27), including one with pleural effusions (9) and two with empyema (14). Unfortunately, none of the latter reports described the clinical findings of the cases or specified whether the infections were monomicrobial or polymicrobial.

Chylothorax and chyloous pleural effusions are uncommon in adults (28, 29). They are diagnosed when the pleural drainage contains high levels of triglycerides (>110 mg/dl) and no cholesterol crystals and the supernatant appears milky and opaque (28). Causes vary widely (malignancy, natural or surgical trauma, deep-vein thrombosis, sarcoidosis, congestive heart failure, malformations of the lymphatic trunks, parasitic infections), and some cases are idiopathic (3, 28–30).

Our patient had no history of surgery or trauma, and lymphoscintigraphy showed no evidence of a chyle leak. Chest CT scans performed to identify possible neoplastic disease revealed only nonspecific findings in the retrocrural area suggestive of inflammation, and there were still no signs of malignancy at the 1-year follow-up visit. Hepatic disease was excluded, and there were no signs or symptoms of lymphatic disorders.

Pleural effusion can be provoked by any change in the pulmonary venous hydrostatic pressure, lymphatic pressure, or oncotic pressure, as well as by local tissue trauma or inflammation. Hydrostatic mechanisms seem to have been the most likely cause of our patient’s chylothorax. The cardiology work-up had revealed clear evidence of chronic cor pulmonale, with a left ventricular ejection fraction of 40% and a pulmonary arterial pressure of 54 mm Hg. In addition, the patient’s recent episode of pulmonary microembolism might also have caused additional transient increases in the hydrostatic pressure of the pulmonary circulation. Collectively, these increases could have resulted in the leakage of chyle into the pleural space.

Pleural infection is a significant and increasingly common cause of morbidity and mortality worldwide (31). Persistent infections can lead to empyema, which is manifested by pus in the pleural fluid, positive culture, or positive Gram’s stain (32). The infection is usually associated with pneumonia, but primary infections without evidence of parenchymal lung involvement have been reported (32). In the case described here, a simple chyloous pleural effusion evolved into multiloculated fibrinopurulent collections associated with clinical and biochemical features of sepsis. The original effusion impeded reexpansion of the lung, impairing pulmonary function and creating a persistent pleural space at risk for infection, but it seems likely that alterations of the microbiota ecosystem also contributed to the onset of infection (31). Anaerobic organisms are being recovered more and more frequently from patients with empyema, particularly those who, like our patient, are elderly with comorbidities and/or poor oral hygiene (31). Indeed, our patient had been suffering for years from chronic periodontitis.

Delayed diagnosis and treatment of empyema are common (31). The clinical presentation varies. As in this case, the course may be indolent with nonspecific constitutional symptoms such as weight loss and pleuritic chest pain. Prompt drainage and effective antimicrobial treatment are essential for successful management of empyema (31). Our patient was initially treated with levofloxacin, but as soon as the pleural isolates were identified with MALDI-TOF mass spectrometry (36 h after the culture was submitted), he was switched to clindamycin, which is characterized by good penetration of the pleural space (33). Twenty-four hours later, the appropriateness of this empirical decision was confirmed by in vitro susceptibility data. However, clindamycin resistance in Prevotella species is reportedly on the rise, so antibiogram guidance is imperative in severe infections caused by these organisms (6).

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