

# Mixed anaerobic thoracic empyema: the first report of *Filifactor alocis* causing extra-oral disease

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## Abstract

We report on a case of bilateral lung consolidation and thoracic empyema caused by the periodontal pathogens *Filifactor alocis* and *Campylobacter rectus* in a patient with chronic dysphagia. This is the first report of *Filifactor alocis* causing infection at an extra-oral site.

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## Case report

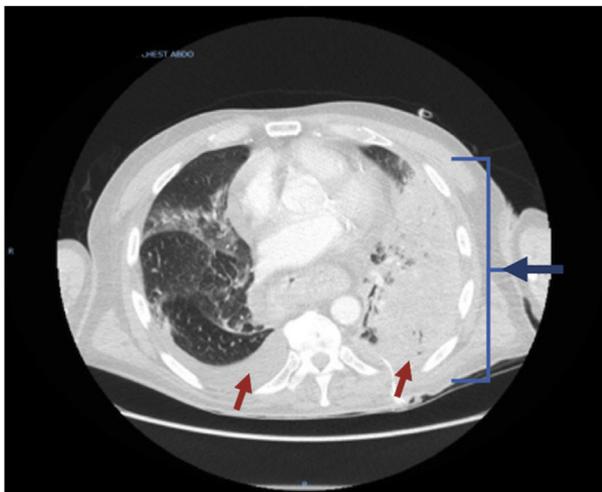
A 65-year-old man with a significant past medical history of cerebrovascular disease and chronic excessive alcohol consumption presented to hospital with acute shortness of breath. Auscultation of the chest revealed decreased air entry at the left base with a corresponding stony dull percussion note. Chest x-ray confirmed the presence of left-sided pleural effusion. Examination of the mouth revealed poor dentition but no overt periodontal abscess. The patient reported that he had not visited a dentist for many years, in keeping with self-neglect. Examinations of the limbs, joints, abdomen, and nervous system revealed no additional sites of infection. Admission blood tests revealed a white cell count of  $34.9 \times 10^9/L$ , C-reactive protein 299 mg/L, lactate 1.5 mmol/L, and creatinine 166  $\mu\text{mol/L}$  (baseline 70). Therapy commenced immediately with intravenous tazobactam/piperacillin (4.5 g three times daily) and oral clarithromycin (500 mg twice daily).

The patient remained persistently febrile, and on day 3 an intrathoracic drain was inserted and antibiotic chemotherapy escalated to meropenem 1 g three times a day; 800 mL frank

pus was drained with a pH of 6.83, and a sample was sent for microscopy and culture.

Gram staining of the initial pleural fluid sample showed Gram-variable rods, and after 48 h anaerobic culture on Columbia blood agar (Oxoid) a colony was transferred to matrix-assisted laser desorption/ionization time of flight (MALDI-ToF) mass spectrometry (Bruker) which identified *Campylobacter rectus* with an excellent confidence score; 16S rDNA analysis performed on the same fluid detected *Filifactor alocis*. In total four blood cultures were drawn on days 0, 1, 2 and 3 of admission, but none of these grew any bacteria. Urine culture was also negative for bacteria and yeasts and contained no white cells on microscopy; respiratory viral PCR for common respiratory viruses (BIO-FIRE® FILMARRAY® Respiratory Panel 2 plus) was also negative, as were urinary pneumococcal and *Legionella* antigens see (Fig. 1).

After reviewing the literature for these two organisms, antibiotics were switched to amoxicillin/clavulanate, 1.2 g i.v. three times daily. On day 10 this was switched to oral amoxicillin/clavulanate, 500/125 mg three times daily. The patient completed 28 days on antibiotics with good clinical improvement. Creatinine returned to baseline on day 7 of treatment, and the patient began mobilizing. X-ray on day 10 (Fig. 2) showed resolving pleural effusion post drainage. No further pleural fluid sampling was performed. At discharge, the patient had made a good functional recovery and returned to independent living.

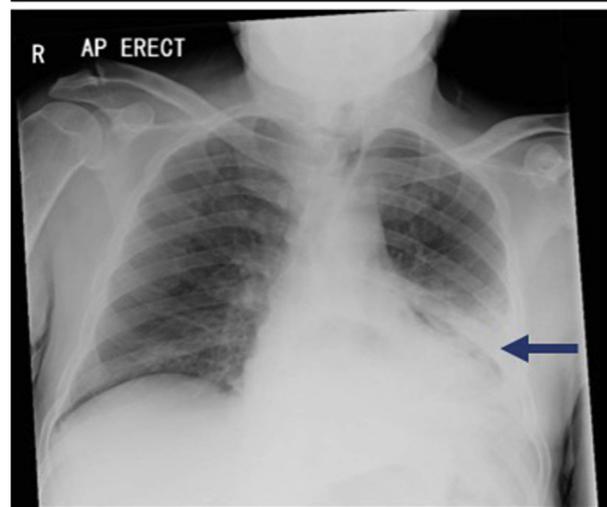
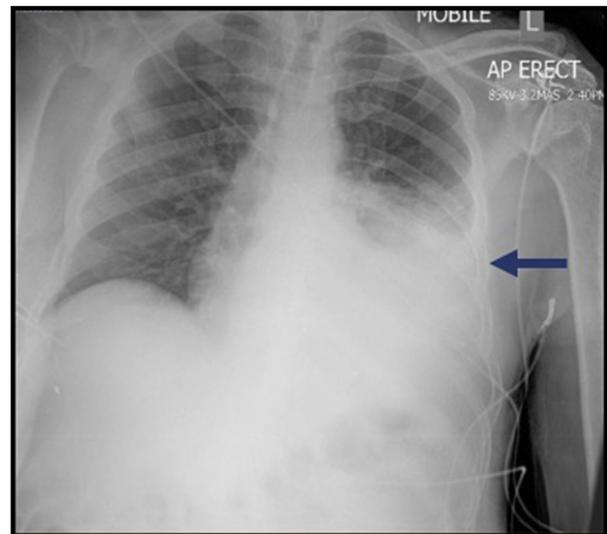


**FIG. 1.** Chest computed tomography (axial slice) showing bilateral pleural effusions and extensive left-sided consolidation (blue arrow) and bilateral pleural effusions (red arrows).

## Discussion

Anaerobic empyema is often seen in the aspiration-prone patient. Anaerobes have been cultured in 36–76% of human empyema cases. Animal models of thoracic empyema demonstrate that infection with mixed flora, including aerobic and anaerobic bacteria, occur more frequently than infections with a single organism. Several centres now routinely consider molecular diagnostic techniques with pleural fluid/pus for rapid diagnosis.

*Campylobacter rectus* is a small, unbranched, straight, motile, Gram-negative organism. It was first described in 1981 as *Wolinella recta* [1], then reassigned in 1991 to the genus *Campylobacter* [2]. It forms part of the human oral flora, part of the orange complex of periodontal pathogens [3]. It grows only anaerobically on blood agar and not on selective *Campylobacter* media. It is known to be motile, oxidase-positive, urease-negative and catalase-variable. Though known as an established pathogen in periodontal disease, it has rarely been isolated in extra-oral invasive disease; to date 15 cases of extra-oral invasive disease have been described, four of which have been thoracic empyemas [4–12]. In most cases, extra-oral *Campylobacter rectus* infections have been polymicrobial, and the associated pathogens included *Actinomyces* spp., *Streptococcus intermedius*, *Eubacterium* spp., *Porphyromonas* spp. and *Fusobacterium nucleatum*, amongst others. In our case, *Filifactor alocis* was identified as a co-pathogen. Similarly to the case presented here, a recent case series [11] identified poor oral hygiene as a risk factor in nine out of 15 patients presenting with *Campylobacter rectus* suppurative infections, and chronic alcohol



**FIG. 2.** Chest radiographs showing partial resolution of the pleural effusion with treatment. *Upper panel:* plain film radiograph on the day of admission showing large left-sided pleural effusion (blue arrow). *Lower panel:* repeat plain film taken on day of admission +10. Blue arrow indicates the now smaller pleural effusion. (Note that the intrathoracic drain has been removed and is not present in either radiograph.)

dependence was identified in 2/15 patients. Four of these 15 cases were managed similarly to ours, with amoxicillin/clavulanate as the definitive agent. After the thorax, the cranium is the next most frequent extra-oral site of infection seen to date with *Campylobacter rectus*, and mastoiditis, acute otitis media and subdural abscess of the brain have all been described. These conditions reflect contiguous spread of the organism out of the oral cavity, with thoracic empyema likely reflecting aspiration of oral content. Our patient was assessed as having mild dysphagia, probably resulting from his cerebrovascular disease, and this may have led to aspiration. *Campylobacter rectus* has been documented in infections of patients aged 15–75 years of age.

*Filifactor alocis* is a non-spore-forming gram-positive rod which is considered a newly emerging pathogen in periodontal disease [13]. It was first isolated in 1985 when it was named *Fusobacterium alocis* but was reclassified in 1999 as *Filifactor alocis* [14] and has been reported multiple times in both the oral flora and as a causative agent in periodontitis. Although in our case study the patient had no prior documented history of periodontitis, he did have poor dentition, and a meta-analysis [15] has demonstrated a link between periodontitis and cerebrovascular disease, which the patient did suffer from.

The discrepancy between the organism cultured from the pleural fluid and the 16S rDNA result is difficult to explain. However, *Filifactor alocis* is difficult to culture, with a long generation time [16], which may explain why it did not grow on bacterial culture. By contrast, *Campylobacter rectus*, which did grow in culture, may not have been detected in the 16S rDNA, performed at the reference laboratory, as the technique tends to detect only the most abundant organism in the sample; this may have been *Filifactor alocis*, which was thus the more abundant of the two organisms but the more challenging to culture.

To our knowledge this is the first time that *Filifactor alocis* has been identified at an extra-oral site. The isolation of *Campylobacter rectus* from the same purulent sample supports a conclusion of aspiration of oral contents as the cause of this mixed, anaerobic empyema.

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