Capnocytophaga sputigena Empyema

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Empyema is a problem faced by clinicians worldwide. Most cases are caused by Gram-positive organisms, such as streptococci and staphylococci. Empyema caused by Capnocytophaga spp. is extremely uncommon (H. Bonatti et al., Clin. Microbiol. Infect. 9:380–387, 2003). We present a unique case of a polymicrobial empyema, with a predominance of Capnocytophaga sputigena, in an older patient with no history of animal bite or splenectomy.

CASE REPORT

Our patient was a 68-year-old male who had a significant past medical history only of hypertensive intracranial hemorrhages managed conservatively, vascular dementia, and a left parotid pleomorphic adenoma, also managed conservatively.

He presented with 3 days of fever, cough, and dysphagia. The chest radiograph showed right-sided consolidation and effusion. He was treated initially with amoxicillin-clavulanate and then meropenem in view of the limited response. A computed tomography scan of the thorax then revealed a large loculated right pleural effusion with pleural enhancement (Fig. 1). Hence, a chest drain was inserted, and the pleural fluid investigation revealed an acute neutrophilic inflammatory yield with scanty amounts of coagulase-negative staphylococci. The patient was subsequently discharged, continued on 6 weeks of cloxacillin, and appeared to respond well initially. He was also started on nasogastric tube feeding in view of his dysphagia.

He was readmitted 1 month later after being noted to be hypoxic during a clinic follow-up. His chest radiograph showed worsening of the right-sided empyema (Fig. 2). He was empirically started on meropenem and vancomycin. A chest drain was inserted, and purulent, foul-smelling pleural fluid was obtained.

Pleural fluid investigations revealed the pleural fluid pH to be 6.4. The pleural fluid cultures grew heavy amounts of Capnocytophaga spp. and scanty amounts of Pseudomonas aeruginosa. Capnocytophaga was confirmed by the heavy growth of small, slightly yellowish colonies on anaerobic plates. The organism appeared as Gram-negative fusiform rods on Gram stain and was oxidase, catalase, and indole negative but esculin and o-nitrophenol-positive.

FIG 1 Loculated right pleural effusion with pleural enhancement.
nyl-β-D-galactopyranoside (ONPG) positive. The organism was subjected to matrix-assisted laser desorption–ionization time of flight mass spectrometry (MALDI-TOF MS), using the Bruker Biotyper system with version 3.1 software and database, which gave a score of 1.922 for Capnocytophaga sputigena. No oropharyngeal culture was performed on the patient.

A consult with the infectious disease specialist was sought, and the antibiotic regimen was adjusted to intravenous ceftazidime and oral amoxicillin.

In view of the presence of Capnocytophaga sputigena, a computed tomography scan of the neck and thorax was done, which revealed no gross collections or any suggestion of esophageal perforation. The patient had been bed bound due to his recurrent strokes and had been cared for solely by his wife and maid. His wife confirmed that the patient had no history of animal contact apart from their pet hamsters. An oral swab and stool culture from the patient’s hamsters did not reveal the presence of Capnocytophaga spp.

The patient responded clinically and remained afebrile. Inflammatory markers were on the downward trend, and the repeated chest radiograph showed significant interval improvement of the empyema. The chest tube was subsequently removed after minimal drainage was noted. The antibiotics were de-escalated to amoxicillin and ciprofloxacin, and the patient was discharged well on day 14. He was seen in the outpatient clinic within a month and completed 6 weeks of antibiotics.

Empyema is a serious complication of pneumonia with high morbidity and mortality rates (1, 2). Treatment of empyema includes appropriate antibiotic coverage based on the suspected bacteriology and the resistance patterns and drainage of the empyema.

In the past, Streptococcus pneumoniae, Streptococcus pyogenes, and Staphylococcus aureus were the traditional pathogens that were associated with empyema. However, in recent years, there has been a noted change in empyema microbiology for unclear reasons, with a shift toward the Streptococcus milleri group, a part of normal oral flora, being noted (2, 3).

As far we are aware, there have been only two prior case reports of Capnocytophaga empyema reported. One was secondary to a laparoscopic Nissen fundoplication (4), in which the Capnocytophaga species was not described, but the patient responded well to clindamycin, penicillin G, and fosfomycin. The other was a spontaneous empyema in a patient who suffered from hepatitis...
C-induced liver cirrhosis (5), from which the pleural fluid grew *Capnocytophaga ochracea*, and the patient responded to imipenem-cilastatin. *Capnocytophaga* is a fastidious Gram-negative bacillus that is more commonly found in the oropharynx of dogs and cats, although it is known to have been found in the oropharyngeal flora of humans. *Capnocytophaga* infections usually occur following animal bites or in patients postsplenectomy. In a case series of *Capnocytophaga* infections from Austria (6), the patients were either immunocompromised or developed the infection as a result of iatrogenic causes. If not treated, the pathogen can result in septicemia, multiorgan failure, and death, especially in immunocompromised patients. In this case series, *Capnocytophaga* infections resulted in a 50% mortality rate. Our patient was eventually noted to have *Capnocytophaga sputigena*, which is a commensal usually found in the oropharynx.

The recent introduction of MALDI-TOF MS has been able to provide rapid identification of bacteria and thus theoretically allow earlier intervention. Fedorko et al. (7) compared the use of MALDI-TOF MS with 16S rRNA sequencing for identification of 152 bacterial isolates and found it adequate in the identification of *Capnocytophaga sputigena*, with scores of >2.0, which was higher than the determined cutoff of 1.8 used for accurate identification of the bacterial species and genus. In our case, additional biochemical testing was performed, and these results were consistent with the final identification of *Capnocytophaga sputigena* given by the MALDI-TOF MS.

There has been no consensus on the first-line empirical treatment of *Capnocytophaga* infections, given its rare incidence, although most *Capnocytophaga* spp. have been known to be susceptible to clindamycin, imipenem-cilastatin, and β-lactamase inhibitors, while there is variable susceptibility to penicillins and cephalosporins (8). Our patient’s *Capnocytophaga sputigena* isolate was found to be susceptible to ampicillin and ceftriaxone, with no antibiotic resistance noted. We treated him with cefazidime and amoxicillin for 1 week and subsequently de-escalated to ciprofloxacin and amoxicillin. *Capnocytophaga* spp. have been reported to produce β-lactamase (6), which may result in resistance to penicillins. Fortunately, this was not the case in our patient, and he responded well.

**Conclusion.** *Capnocytophaga* empyema is a rare entity that has the potential to result in high mortality rates. With an aging population, availability of better diagnostic investigations, and increasingly diverse companion animals, clinicians should be alert for unusual organisms causing empyemas. Close collaboration between microbiologists and clinicians is essential to ensure good outcomes for our patients.

**REFERENCES**


