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1 ***Capnocytophaga sputigena*: an unusual cause of community-acquired pneumonia**

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22 **Key words:** Community-acquired pneumonia; *Capnocytophaga sputigena*;

23 **Abstract:**

24 *Capnocytophaga sputigena* is an unusual cause of community-acquired pneumonia. A
25 22-year-old woman presented an amoxicillin-resistant pneumonia. Sputum examination
26 detected *C. sputigena* from 3 specimens with a significant bacterial load. The strain produced
27 beta lactamase. Evolution was favorable after introduction of amoxicillin-clavulanate acid.
28 Physicians might be aware of the presence of this unusual bacterium in cases of community-
29 acquired pneumonia.

30 **Introduction:**

31 *Capnocytophaga sputigena* is a capnophilic gram-negative fusiform bacillus
32 belonging to the family Flavobacteriaceae. This bacterium was first described in 1979 and
33 belongs to the normal flora of the subgingival throat (1). There is no national or international
34 epidemiological surveillance of this bacterium. As for pulmonary infections, they still seem
35 very little described. Here, we report a case of pneumonia with *C. sputigena*.

36 **Clinical case:**

37 In July 2018, a 22-year-old woman with a severe obesity, for which she underwent
38 sleeve gastrectomy, was hospitalized in our infectious diseases unit, in the IHU Méditerranée
39 Infection, Marseille, France. For 2 weeks she had rhinorrhoea associated with fever without
40 improvement under symptomatic treatment. Subsequently, symptoms worsened with
41 dyspnoea, coughing, fever and purulent sputum. Amoxicillin was introduced as acute
42 community pneumonia was suspected. After 8 days of antibiotic therapy, the symptoms
43 persisted and led the patient to consult again in the emergency department.

44 Clinically, she presented cough with sputum associated with crackles at the two
45 pulmonary bases. The rest of the clinical exam was normal. Chest radiograph showed a focal
46 infection of the left lower lung lobe associated with diffuse interstitial syndrome (Figure 1).
47 Standard blood test analysis found moderate inflammatory syndrome with CRP at 45mg/L
48 without hyperleucocytosis or any other abnormality. On the microbiological level, *Legionella*
49 *pneumophila* and *Streptococcus pneumoniae* urinary antigens were negative. We decided to
50 empirically change antibiotic therapy for levofloxacin in this atypical pneumonia resistant to
51 amoxicillin.

52 Three semi-quantitative cultures of sputum specimen were performed, for which *C.*
53 *sputigena* was found predominant. The isolate identified by MALDI-TOF MS grew at
54 10^7 CFU/mL in all specimens. Antibiotic susceptibility testing was performed according to

55 the EUCAST recommendations using *Haemophilus spp.* breakpoints and evinced a resistance
56 to amoxicillin and a susceptibility to amoxicillin-clavulanic acid.

57 According to these results, amoxicillin-clavulanic acid was introduced. In parallel, this
58 atypical case of pneumonia due to *C. sputigena* was documented. The patient entirely
59 recovered after 7 days of treatment.

60 **Discussion:**

61 *C. sputigena* is rarely implicated in pulmonary infection, most of the described cases
62 related its implication in bacteraemia or amniotic infections (2). To the best of our knowledge,
63 only five other cases of *C. sputigena* pulmonary infection have been described. Infection can
64 occur in immunocompetent hosts, and Lo et al. reported the case of a bilateral pneumonia
65 with pleural effusion in an 84-year-old man. *C. sputigena* was detected on blood cultures (3).
66 Li et al. presented a case of a 68-year-old immunocompetent man with persistent pleural
67 effusion for whom *C. sputigena* was detected on a pleural drain (4). *C. sputigena* has also
68 been involved in a respiratory infection following care; a 67-year-old old man, who
69 underwent fibroscopy for exploration of a suspicious pulmonary mass, presented fever 7 days
70 after the procedure, and a lung abscess was diagnosed. *C. sputigena* was isolated from the
71 latter and histological analysis detected a lung cancer (5). Furthermore, *C. sputigena* was
72 involved in a lung abscess in a 39-year-old immunocompromised host suffering from a
73 neuroendocrine tumor. Interestingly, the biochemical testing identified the isolate as *C.*
74 *ochracea* or *C. sputigena* (6). Finally, the pediatric population can be affected as Atmani et al.
75 related the case of a 12-year-old girl with pleural effusion involving *C. sputigena* (7).

76 Our case is the first in which *C. sputigena* is recovered from a sputum specimen.
77 Sputum might be a difficult sample for interpretation and diagnosis of this infection, as the
78 bacterium is a commensal of the oral flora. However, in our case, *C. sputigena* was detected
79 on three samples and with a significant bacterial load. Moreover, clinical response was

80 correlated with antibiotic susceptibility as the introduction of a beta-lactamase inhibitor
81 improved the clinical course. The bacterium was identified by MALDI-TOF mass
82 spectrometry, which is the technique that has been used in recent case reports (3–5).

83 Evolution was unfavourable following amoxicillin treatment. *Capnocytophaga* is now
84 often resistant to beta-lactam because of its beta-lactamase production. Adjunction of a beta-
85 lactam inhibitor is recommended when a treatment against *Capnocytophaga* is initiated (8).
86 As an example, in our lab, since 2013, among the 51 samples found positive for *C. sputigena*,
87 we found that 55% were sensitive to amoxicillin, while 100% were sensitive to amoxicillin-
88 clavulanic acid.

89 **Conclusion:**

90 We present here the first documented case of pneumonia caused by *C. sputigena* after
91 sputum examination, and the second case described in France. The repeated culture of this
92 bacterium from the sputum samples of the same patient should alert microbiologists and
93 infectious disease clinicians, as this bacterium can, **in rare occasion**, cause pneumonia.

94

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118 lactamase inhibitors. Antimicrob Agents Chemother. 2000 Nov;44(11):3186–8.

119

120 **Figure:**

121 Figure 1: Chest radiograph highlighting a pneumonia

Table:

| Cases report | Sex | Age | Past medical history | Immuno-suppression | Clinical presentation | Positive culture on Detection by | Treatment | Death |
|--|-----|-----|--|---|---|--|--------------------------------|-------|
| Atmani S, et al. <i>Arch Pediatr.</i> 2008 | F | 12 | None | No | Febrile pleural effusion | Pleural fluid 16S RNA sequencing | Amoxicillin Rifampicin | No |
| Li A, et al. <i>J Clin Microbiol.</i> 2013 | M | 64 | Hypertensive intracranial hemorrhage vascular dementia, parotid pleomorphic adenoma | No | Pleural empyema with unfavorable evolution (treated since one month) | Pleural fluid MALDI-TOF MS (Codetection of <i>P. aeruginosa</i>) | Amoxicillin Ciprofloxacin | No |
| Lo SH1, et al. <i>J Microbiol Immunol Infect.</i> 2017 | M | 84 | Stroke, diapletic seizure, high blood pressure, type 2 diabetic mellitus, benign prostatic hypertrophy, gastric cancer | Gastric cancer Diabetic mellitus | Relapsing bilateral pneumonia with pleural effusion | Blood culture MALDI-TOF MS 16S RNA sequencing | Piperacillin tazobactam | No |
| Migiyama Y, et al. <i>J Infect Chemother.</i> 2018 | M | 67 | Prostatic cancer | Lung cancer | Lung abscess seven days after fibroscopy for pulmonary mass exploration | Lung abscess fluid MALDI-TOF MS | Meropenem | No |
| Our case | F | 22 | Severe obesity, sleeve gastrectomy | No | Pneumonia | Sputum MALDI-TOF MS | Amoxicillin Clavulanic acid | No |

124 **Consent:** an informed consent was obtained from the patient

125 **Funding:** None

126 **Conflict of interest statement:** None

127 **Contributions:** LG, and SA: data collection, data analysis and writing; MM and GD: data
128 analysis and reviewing the manuscript; JCL: study design; writing

129 **Ethical Approval:** Not applicable

