

Case Report

Thoracic empyema caused by *Campylobacter rectus*Tomoyuki Ogata^a, Teruo Urata^b, Daisuke Nemoto^c, Shigemi Hitomi^{d,*}^a Department of Respiratory Medicine, JA Toride Medical Center, Japan^b Department of Clinical Laboratories, JA Toride Medical Center, Japan^c Department of Clinical Laboratories, University of Tsukuba Hospital, Japan^d Department of Infectious Diseases, University of Tsukuba Hospital, Japan

ARTICLE INFO

Article history:

Received 8 June 2016

Received in revised form

19 August 2016

Accepted 21 August 2016

Available online 25 September 2016

Keywords:

Campylobacter rectus

Thoracic empyema

Sulbactam-ampicillin

Garenoxacin

ABSTRACT

We report a case of thoracic empyema caused by *Campylobacter rectus*, an organism considered as a periodontal pathogen but rarely recovered from extraoral specimens. The patient fully recovered through drainage of purulent pleural fluid and administration of antibiotics. The present case illustrates that *C. rectus* can be a cause of not only periodontal disease but also pulmonary infection.

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1. Introduction

The genus *Campylobacter* is a group of spiral, curved, or straight rod-shaped Gram-negative bacteria. They require microaerobic and/or anaerobic conditions for their growth and typically demonstrate a characteristic corkscrew-like motion using a flagellum attached at one or both ends of cells [1].

To date, more than 15 *Campylobacter* species have been established or suspected as human pathogens. Gastroenteritis and extraintestinal infections, commonly due to *Campylobacter jejuni* and *Campylobacter fetus*, respectively, are major manifestations of human campylobacteriosis. These pathogens are generally reserved in domestic animals and transmitted to patients through consumption of contaminated food and water. In contrast, certain *Campylobacter* species reside in the human oral cavities, some of which are putatively associated with periodontal diseases [2].

Campylobacter rectus, formerly named as *Wolinella recta* [3], is one of the campylobacteria considered as periodontal pathogens [4]. The organism has commonly been found in various intraoral materials of both periodontically healthy and morbid individuals [5,6]. However, *C. rectus* has rarely been recovered from extraoral

specimens [7]. Here, we describe a case of thoracic empyema, in which *C. rectus* was solely recovered from purulent pleural effusion.

2. Case report

A 75-year-old Japanese man was referred because of fever and respiratory discomfort lasting for a week. He had regularly received medications for hypertension, hyperlipidemia, and diabetes mellitus with slightly impaired renal function. At the referral, the patient was alert and complained of left-sided chest pain. He had axillary temperature of 38.1 °C, a heart rate of 100/min, blood pressure of 139/52, and arterial oxygen saturation at room air of 92%. Blood tests showed leukocytosis (14,320/mm³), slight hepatic injury (aspartate aminotransferase: 33 IU/L, alanine aminotransferase: 58 IU/L), renal impairment (urea nitrogen: 30 mg/dL, creatinine: 1.64 mg/dL), an elevation of the C-reactive protein level (19.44 mg/dL), and hyperglycemia (glucose: 254 mg/dL, hemoglobin A1C: 6.7%). Chest X-ray and computed tomography revealed the presence of pleural effusion in the left thoracic cavity but no apparent infiltration in the lung field (Fig. 1). Blood culture was not performed.

After hospitalization, a chest tube was inserted into the left thoracic cavity, through which purulent effusion was drained. Gram staining of the effusion exhibited many polymorphonucleocytes but no apparent microorganism. Intravenous administration of sulbactam-ampicillin (6 g/day, a dose reduced according to an

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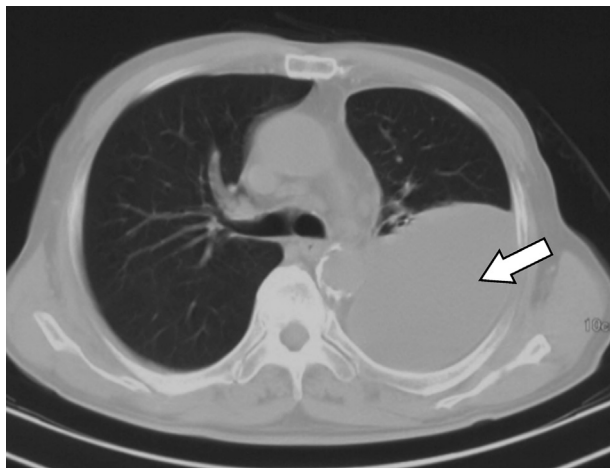


Fig. 1. Computed tomography of the chest taken on the day before hospitalization at the referring facility. An open arrow indicates pleural effusion in the left thoracic cavity.

estimated creatinine clearance of 30 ml/min) and intrathoracic irrigation with normal saline through the chest tube were initiated. The patient became afebrile on the next day. The chest tube was removed on day 17 and the intravenous antibiotic was switched to oral garenoxacin (400 mg/day) on day 2. The patient was discharged on day 25 with taking the antibiotic. On day 45, the patient visited an outpatient clinic because subcutaneous abscess, having emerged at the site where the chest tube had been inserted, ruptured spontaneously. The oral antibiotic was changed to levofloxacin (500 mg/day) according to the decision of a physician in the clinic and given until day 55. Dental consultation five months after the reference revealed that the patient had periodontitis with massive dental plaque, for which only dental cleansing was given. On a follow-up after one year, the patient was well and abnormal shadows on chest X-ray disappeared almost completely.

The purulent pleural effusion obtained on admission was centrifuged and the sediment was inoculated into HK Semisolid Medium (Kyokuto Pharmaceutical Industrial Co. Ltd., Tokyo, Japan). After incubation at 37 °C for 48 h, the lower layer of the broth became turbid, indicating growth of motile anaerobes. The turbid portion was inoculated onto Brucella HK (RS) agar broth (Kyokuto) and incubated anaerobically. Translucent, rough, flat, non-hemolytic colonies emerged after a few days (Fig. 2a). The organism was Gram-negative, straight rod-shaped (Fig. 2b), both catalase and oxidase tests-negative, and unculturable on sheep blood agar broth under 5% CO₂. Assays with API 20A (bioMérieux, Marcy-l'Etoile, France) and VITEK[®] 2 ANC ID Card (bioMérieux) failed to identify the organism. Hence, a part of the 16S ribosomal RNA gene of the organism was amplified with polymerase chain reaction

using the primers 27F and 1492R [8] and sequenced directly. A homology search using the Basic Local Alignment Search Tool showed that the sequence of 1517 base pairs was most closely related to that of *C. rectus* JCM 6301^T (GenBank accession number: AB595133.1) and contained an extra 189-base-pair portion identical to the intervening sequence of *C. rectus* strains described by Lam et al. (GenBank accession numbers: HQ890330 and HQ890331) [7]. With exclusion of the intervening portion, the sequence was 99.5% identical to that of *C. rectus* JCM 6301^T. Minimum inhibitory concentrations against the recovered organism, measured with the Epsilometer test (bioMérieux) on Brucella HK (RS) agar broth incubated anaerobically at 37 °C for 72 h, were as follows; penicillin: 0.047 µg/ml, amoxicillin: 0.094 µg/ml, levofloxacin: 0.032 µg/ml, and metronidazole: 0.75 µg/ml. No organism was cultured from the discharged material obtained from the spontaneously ruptured subcutaneous abscess on day 45.

3. Discussion

In the present case, the drained pleural effusion appeared purulent and contained many polymorphonucleocytes, confirming the diagnosis of thoracic empyema. Although Gram staining did not reveal any apparent microorganisms, recovery of *C. rectus* solely from the material, which was obtained without previous administration of antibiotics, indicates the recovered organism to be the causative agent. The present case illustrates that *C. rectus*, an organism generally considered as a periodontal pathogen, can be a cause of lower respiratory tract infection.

C. rectus is a small, unbranched, straight Gram-negative organism. Other typical characteristics include growth in an anaerobic condition, motility, formation of translucent colonies on blood agar plates, and negative reaction to both catalase and oxidase tests [9], all of which the organism recovered in the present case exhibited. Our attempt to identify the recovered organism using commercial identification kits for anaerobes failed because *C. rectus* was not included in their lists of identifiable organisms. Instead, we utilized a phylogenetic analysis of the 16S ribosomal RNA gene, through which *C. rectus* strains recovered in recent cases of extraoral infection were also identified [7,10–13].

To our knowledge, ten cases of extraoral *C. rectus* infection have been reported in the literature (Table 1) [7,10–16]. Normally sterile organs were involved without preceding injury in approximately two thirds of the cases [7,11–13,15,16], indicating hematogenous dissemination of causative organisms. In the present case, we speculate that the causative organism was also transmitted to the pleural space via the bloodstream, albeit a less common mode of transmission in cases of empyema [17], because the patient had neither apparent risk nor history of both aspiration and thoracic trauma and radiological abnormality in the left lung field was minimal at the referral. The indication of periodontitis with

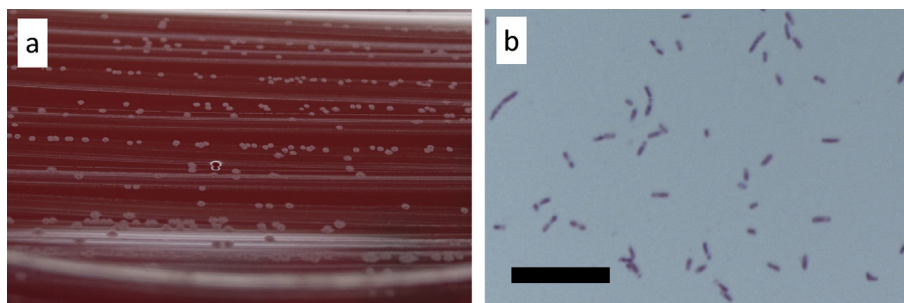


Fig. 2. Colonies (a) and Gram staining (b) of organisms after anaerobic incubation on Brucella HK (RS) agar broth for 3 days. A bar indicates 10 µm.

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