Anaerobe 49 (2018) 95–98

Contents lists available at ScienceDirect

Anaerobe

journal homepage: www.elsevier.com/locate/anaerobe

Case report

# Fatal thoracic empyema involving *Campylobacter rectus*: A case report

A. Noël [a, *], A. Verroken [a], L. Belkhir [b], H. Rodriguez-Villalobos [a]

[a] Department of Microbiology, Cliniques Universitaires Saint-Luc, Bruxelles, Belgium
[b] Department of Internal Medicine and Infectious Diseases, Cliniques Universitaires Saint-Luc, Bruxelles, Belgium

ARTICLE INFO

*Article history:*
Received 3 December 2017
Received in revised form
28 December 2017
Accepted 31 December 2017
Available online 8 January 2018

Handling Editor: Ellie JC Goldstein.

*Keywords:*
Campylobacter rectus
MALDI-TOF MS
Thoracic empyema
Periodontal disease

ABSTRACT

We report the case of a 69-year-old man admitted for septic shock secondary to necrotic pneumoniae complicated by thoracic empyema of fatal issue. Microbiological examination of pleural liquid revealed a mixed anaerobic flora involving Campylobacter rectus and Actinomyces meyeri.

Campylobacter rectus is an infrequent anaerobic pathogen of oral origin To our knowledge, this is the first case report of fatal C. rectus - associated thoracic empyema, and only the second reported case in which identification was successfully performed by MALDI-TOF MS.



## 1. Background

First described in 1981 as *Wolinella recta*, *Campylobacter rectus* is a straight, non-spore-forming and motile Gram-negative rod of fastidious culture and identification [1]. This occasional member of the human oral flora is well described as a periodontal pathogen, and has also been reported in few cases of invasive infections such as extra-oral abscesses, septic cavernous sinus thrombosis or sacroiliitis [2–15].

We describe here the first case of fatal *C. rectus* thoracic empyema in which identification was easily and successfully performed by Matrix-Assisted Laser Desorption/Ionization Time-Of-Flight Mass Spectrometry (MALDI-TOF MS), later confirmed by 16S rRNA sequencing.

## 2. Case report

A 69-year-old man previously known for alcoholism, chronic renal failure, atherosclerosis and chronic obstructive pulmonary disease was admitted in intensive care unit for septic shock. The patient complained of increasing back pain for a week, with majored shortness of breath for the past hours. He was afebrile on admission. Physical examination revealed poor dental hygiene, tachycardia, hypotension (96/50 mm Hg), marbled skin and bilateral crackles. Blood tests showed elevated C-reactive protein (58,3 mg/L; normal value < 5 mg/L)), leucocytosis with neutrophil predominance (white blood cell count 69,67 $\times$ $10^9$/L, with 94% neutrophils), and multiple organ failure with severe electrolytes imbalance and metabolic acidosis (GFR = 11 ml/min/1,73 $m^2$, K+ = 7,37 mmol/L).

A chest computed-tomography (CT) scan showed an empyema and a large broncho-pleural fistula complicating a necrotic pneumonia in the inferior lobe of the right lung (Fig. 1).

Hemodynamic and ventilatory support were provided. A right chest drain was inserted and immediately brought 300 ml of purulent fluid that was cultured. Three aerobic and three anaerobic bottles were also taken for blood culture (BACTEC System, BD diagnostics, Sparks, USA) but remained sterile after five days of

* Corresponding author.
*E-mail address:* audrey.noel@uclouvain.be (A. Noël).

https://doi.org/10.1016/j.anaerobe.2017.12.014
1075-9964/

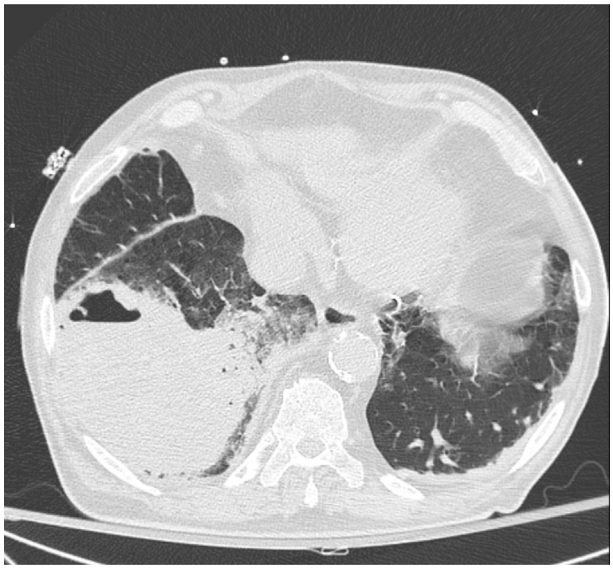

**Fig. 1.** Thoracic CT-scan showing a massive right necrotic pneumonia.

incubation. An empirical treatment with amoxicillin-clavulanate and amikacin was then initiated. Unfortunately, patient's condition worsened and he died 24 h after admission.

Pleural liquid was cultured on a Columbia agar plate with 5% sheep blood and a Chocolate agar plate with IsoVitalex™ and Bacitracin (Becton Dickinson GmbH, Heidelberg, Germany) at 35 °C under 5% $CO_2$, on a Mac Conkey II agar plate (Becton Dickinson GmbH) under aerobic conditions and on a Schaedler plate with and without kanamycin and vancomycin (Becton Dickinson GmbH) under anaerobic conditions (10% $H_2$, 10% $CO_2$ and 80% N). Only anaerobic cultures grew for one Gram-positive rod and one thin Gram-negative rod. The strains were identified as *Actinomyces meyeri* and *Campylobacter rectus* by MALDI-TOF MS using the Microflex LT with the Biotyper software package 3.0 (Bruker Daltonics, Bremen, Germany). Four identification spots were performed for each strain. It was easily identified in all of them with a log score varying from 2063 to 2177 (allowing species-level identification with an excellent probability following manufacturer's instructions). Identification was later confirmed by 16S ribosomal RNA gene sequencing (96GA3730XL, Applied Biosystem, USA) showing 99.83% of identity [16].

On blood agar, *Campylobacter rectus* grew as tiny (less than 0,1 mm wide) grey non-haemolytic colonies after two days of incubation. Direct examination after Gram staining revealed thin and straight Gram-negative rod of various length. The strain didn't grow under aerophilic nor micro-aerophilic conditions.

Antimicrobial susceptibility testing was performed by agar dilution method on Mueller-Hinton agar plate with 5% horse blood (MH-F, Becton Dickinson GmbH), using Etest® (bioMérieux, Marcy-l'Etoile, France) under anaerobic conditions and interpreted according to 2013 EUCAST breakpoints for Gram-negative anaerobes. The strain was sensitive to all evaluated antibiotics *i.e.* amoxicillin/clavulanate (MIC = 0,047 mg/L), meropenem (MIC < 0,002 mg/L), clindamycin (MIC = 0,016 mg/L) and metronidazole (MIC = 0,094 mg/L). *Actinomyces meyeri* susceptibility was assessed using disk diffusion method on MH-F agar plates (Becton Dickinson GmbH) under aerobic conditions with 5% $CO_2$, interpreted using 2013 EUCAST breakpoints for *Corynebacterium* spp. The strain was reported susceptible to β-lactamins but resistant to clindamycin.

## 3. Discussion

*C. rectus* is an anaerobic pathogen that only grows on blood agar (and not on selective *Campylobacter* agar) under anaerobic atmosphere. It is known to be oxidase positive, catalase variable, urease and $H_2S$ negative but classically does not yield a recognizable profile using identification systems such as RapID ANA II system (Thermo Fisher Scientific, Waltham, USA), API 20A (bioMérieux) or VITEK 2 ANC ID cards (bioMérieux) [5,9,12,14]. After Martiny et al., we describe, to our knowledge, the second case in which identification was successfully performed by MALDI-TOF MS, enhancing that the spread of this technique facilitates and improves identification performances of the microbiological laboratories [15].

*C. rectus* has been mainly reported in periodontal diseases and necrotizing infections, with poor oral hygiene and immunocompromising conditions (including alcoholism and diabetes mellitus) as major risk factors. To date, only three cases of *C. rectus* thoracic infections have been published, none of them resulting in the patient's death (Table 1). As documented in present case, infections were mainly polymicrobial (2/3) and classically associated with dental diseases (3/3), suggesting that false deglutition of this periodontal pathogen could be the source of infection. *C. rectus* has also been reported in several cerebral, vertebral, breast or thigh abscesses, septic cavernous sinus thrombosis, sacro-iliitis as well as acute median otitis [2–15,17]. As reported in the present case, patients were mainly male (12/15) and aged 50–70 years old (9/15). *C. rectus* was recovered from culture in 14/15 cases (and only by 16S rRNA gene sequencing directly performed on middle ear fluid in one case), with a mean time of isolation (reported in 11/15 cases) of 4.12 days (Range: 2–7 days). Isolates were associated with other members of the oral flora in 10/15 cases (including *Actinomyces* spp. in 4/15 cases), which enhance the assumed pathogenic role of *Actinomyces meyeri,* recovered in the same proportion as *C. rectus* in present case [2–15,17].

Treatment in previously described cases usually involved combination of long course of antibiotics combined with surgical drainage. Unfortunately, drainage and correct antibiotherapy were not sufficient in this present case, maybe because of patient's severe comorbidities (*i.e.* alcoholism, CRF, diffuse atherosclerosis and COPD). This case presented no clinical common characteristics with the only other lethal *C. rectus* infection published, a subdural empyema reported by Lam and al. in a 41-year old previously healthy woman [12]. The few published data on the *C. rectus* antibiotic resistance profile suggest its high susceptibility to most anaerobic-targeting antibiotics such as amoxicillin/clavulanate, cefoxitin, carbapenems, clindamycin, metronidazole (Table 1). This high susceptibility is corroborated by the present case. *C. rectus* has also been reported susceptible to chloramphenicol, levofloxacin or moxifloxacin [14,18,19]. Several studies failed to highlight the presence of β-lactamase among this species [20,21]. However, as *C. rectus* infections are mainly polymicrobial, and given the high prevalence of β-lactamase production in other oral anaerobes such as *Prevotella* spp. [22], it could be wise to avoid β-lactams that are not associated to a β-lactamase inhibitor in case of a severe, life-threatening, infection.