

First case of *Campylobacter rectus* and *Solobacterium moorei* mixed bacteraemia successfully identified by MALDI TOF-MS

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Abstract

Campylobacter rectus and *Solobacterium moorei* are anaerobic Gram-negative and Gram-positive rods, respectively, that are occasionally members of the human oral flora. Bacteraemia has rarely been reported. We present the first case of mixed *C. rectus*–*S. moorei* bacteraemia in an individual with diabetes and human immunodeficiency virus infection. Both bacteria were successfully identified by MALDI-TOF MS.

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Keywords: 16S rRNA gene sequencing, bacteraemia, *Campylobacter rectus*, herpes simplex virus type 1, MALDI TOF-MS, oesophagitis, *Solobacterium moorei*

Original Submission: 15 May 2019; **Revised Submission:** 21 June 2019; **Accepted:** 26 June 2019

Article published online: 3 July 2019

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Case report

A 70-year-old man was admitted to our institution for a progressive decay of his general conditions: important weight loss and fatigue, and dysphagia associated with fever, cough and dyspnoea. The patient had human immunodeficiency virus type 1 infection and was being treated: viral load was <50 copies/mL and CD4⁺ T-cell count was 890/μL. After the collection of two sets of blood cultures, empirical treatment with amoxicillin/clavulanic acid was started. After 72 hours of incubation in a BD

Bactec FX blood culture system, one out of the two anaerobic blood culture bottles became positive (Becton Dickinson, Franklin Lakes, NJ, USA). Gram-staining achieved from the positive blood culture showed the presence of both Gram-negative and Gram-positive rods. Rapid matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) identification was performed on the positive blood culture, but provided no reliable identification. The blood was inoculated onto both aerobic and anaerobic media (respectively Columbia agar and Schaedler agar; Becton Dickinson). After 2 days, only anaerobic cultures became positive. Identifications were performed by MALDI-TOF MS, according to the manufacturer's instructions, using the direct smear procedure without protein extraction (Biotype IVD 4.2.80; Bruker Daltonics, Bremen, Germany). *Campylobacter rectus* and *Solobacterium moorei* were identified with best-match score values of 1.96 and 2.3, respectively. Considering that a score value of minimum 2 is required for acceptance, the *C. rectus*

TABLE 1. Summary of the cases of *Solobacterium moorei* bacteraemia reported in the literature

Authors	Case: age; sex	Concomitant infection and possible source	Co-pathogen isolated	Co-morbidities/risk factors	Treatment	Identification
Detry et al., 2006 [5]	1) 67 y; M	Sepsis Dental abscess	—	Multiple myeloma	Cefepime 15 days	PCR 16s rRNA
Lau et al., 2006 [10]	1) 43 y; F	Acute proctitis	—	Carcinoma of the cervix stage III-B	Piperacillin/tazobactam 15 days	PCR 16s rRNA
Martin et al., 2007 [11]	1) 37 y; M	Septic pulmonary embolism Femoral vein thrombophlebitis and abscess	<i>Fusobacterium nucleatum</i> ; <i>Bacteroides ureolyticus</i>	Intravenous drug abuse	Benzylpenicillin ? days metronidazole ? days	PCR 16s rRNA
Pedersen et al., 2011 [3]	1) 43 y; M	Tooth abscess	—	Lymphoma, kidney transplantation	Benzylpenicillin 14 days metronidazole 14 days	PCR 16s rRNA
	2) 66 y; F	Pulmonary abscess	<i>Eikenella corrodens</i>	Non-small-cell lung carcinoma with meningeal carcinomatosis	Meropenem → ciprofloxacin 21 days metronidazole 21 days	PCR 16s rRNA
	3) 64 y; M	Sepsis	—	Colon cancer	Cefuroxime 28 days metronidazole 28 days	PCR 16s rRNA
	4) 33 y; F	Femoral vein thrombosis and abscess	<i>Actinomyces meyeri</i>	Intravenous drug abuse Chronic HBV infection	Cefuroxime → benzylpenicillin + metronidazole 35 days	PCR 16s rRNA
	5) 77 y; M	Pneumonia	<i>Porphyromonas uenonis</i>	Prostate cancer History of heart disease	Benzylpenicillin → phenoxymethyl-penicillin 10 days	PCR 16s rRNA
Genderini et al., 2019 [current]	1) 70 y; M	Pneumonia HSV-1 oesophagitis	<i>Campylobacter rectus</i>	HIV infection Diabetes	Amoxicillin/clavulanic acid 14 days	MALDI-TOF MS

Abbreviations: F, female; HBV, hepatitis B virus; HIV, human immunodeficiency virus; HSV-1, herpes simplex virus-1; M, male; y, years.

identification was confirmed by the partial sequencing (1249 bp) of the 16S rRNA gene using universal primers (27F: 5'-AGAGTTTGATCMTGGCTCAG-3' and 1492R: 5'-TACGGY-TACCTTGTACGACTT-3'). The yielded sequence (GenBank Accession no.: MK063870.1) had 99.60% homology with *C. rectus* strain RM3267 (GenBank Accession no.: ACFU01000050) by using EZBioCLOUD (www.ezbiocloud.net/) and 99% homology with *C. rectus* strain JCM 6301 (GenBank Accession no.: NR_113247.1) by using the NCBI database (www.ncbi.nlm.nih.gov/). The antimicrobial susceptibility testing performed using E-test gradient strips (bioMérieux, Marcy l'Etoile, France) and following EUCAST v8.0 clinical breakpoints showed full susceptibility to amoxicillin/clavulanic acid (*C. rectus* MIC 0.047 µg/mL; *S. moorei* MIC 0.016 µg/mL). An oesophagogastroduodenoscopy showed an erosive oesophagitis and pathological examination of the biopsies indicated the presence of viral inclusions in epithelial cells. The immunostaining was positive for herpes simplex virus type 1 (HSV-1 Polyclonal antibody, Biocare Medical, Pacheco, CA, USA). Dental examination did not reveal any source of infection, only focal signs of periodontitis. ¹⁸F-Fluorodeoxyglucose positron emission tomography-CT was performed and demonstrated abnormal diffuse oesophageal hypermetabolism, suggesting an inflammatory origin but without evidence of malignancy.

This is the first case of a concomitant bacteraemia with *C. rectus* and *S. moorei*. *Campylobacter rectus*, an anaerobic Gram-negative rod, and *S. moorei*, a Gram-positive anaerobic rod, are both occasional members of the human oral flora and were found in individuals with refractory periodontitis [1]. Invasive infections such as empyema and brain abscess have been mainly reported in individuals with poor oral hygiene [2–4].

Solobacterium moorei bacteraemia is reported especially in individuals with malignancies [3,5]. In Table 1 a review of cases of *S. moorei* bacteraemia is presented. In all infections, identification was performed using 16s rRNA sequencing. We identified only two cases of bacteraemia caused by *C. rectus*; in one identification was performed using 16s rRNA sequencing [4,6]. The present case is the first in which both *S. moorei* and *C. rectus* were identified using MALDI-TOF MS. This case illustrates the added value of MALDI-TOF MS, not only in clinical microbiology [7] but also as a fast and reliable alternative to expensive molecular techniques such as 16s rRNA sequencing [8]. The probable source of the mixed bacteraemia was the translocation caused by the HSV-1 oesophagitis. Disruptions of the mucosal barrier along with host immunodeficiency are associated with higher risk of bacterial translocation from the gastrointestinal tract [9].

Conflict of interest

None to declare.

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