

First case of *Desulfovibrio desulfuricans* bacteraemia successfully identified using MALDI-TOF MS

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Abstract

Desulfovibrio species are anaerobic Gram-negative bacilli that make up part of the human gastrointestinal and vaginal flora. Infection with these bacteria is usually secondary to an intra-abdominal source. Identification of these bacteria is possible using available contemporary methods. We report the first case of *Desulfovibrio desulfuricans* bacteraemia identified using matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS).

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Case presentation

A 53-year-old man presented to the emergency department at our institution with fever, abdominal pain, and obstipation. The patient had undergone, in his home country, surgical resection of a colorectal adenocarcinoma and underwent restoration of bowel continuity 2 months prior to presentation. The patient reported taking multiple doses of laxative in the preceding few days. Computed tomography scan of the abdomen revealed an intraluminal irregularity proximal to the anastomotic site resulting in complete bowel obstruction without signs of perforation. Two sets of aerobic and anaerobic peripheral blood cultures were performed (Bactec FX; Becton Dickinson, Franklin Lakes, NJ, USA) and piperacillin–tazobactam was started empirically. In the emergency department, the patient spontaneously evacuated a surgical compress followed by stool and intestinal gas. After 78 h of incubation, one anaerobic blood culture bottle signalled

positive and was subcultured on Columbia and Schaedler agar. Gram staining showed curved gram-negative bacilli. Under anaerobic conditions, growth was observed after 48 h of incubation at 35°C. Employing matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) and using the direct smear procedure without protein extraction (Biotyper IVD 4.2.80; Bruker Daltonics, Bremen, Germany), the colonies were identified as *Desulfovibrio desulfuricans* (best-match score: 2.25). The isolate was subjected to 16S rRNA gene sequencing using universal primers. A BLAST search in the GenBank database using the sequence obtained (Accession No. MN306006.1) showed a 99.46% concordance with *Desulfovibrio desulfuricans* reference strain Essex 6 (Accession No. NR_104990.1). Antibiotic susceptibilities were determined using MIC gradient tests (Etest® bioMérieux, Marcy-l'Etoile, France) on Brucella HK agar. According to the EUCAST 2019 guidelines (v 9.0), the isolate was sensitive to metronidazole (MIC 0.016 mg/L), amoxicillin–clavulanic acid (MIC 0.094 mg/L), imipenem (MIC 0.25 mg/L), and clindamycin (MIC 0.5 mg/L), while it was found to be resistant to piperacillin–tazobactam (MIC 64 mg/L). Antibiotic therapy was switched to amoxicillin–clavulanic acid and the patient was ultimately discharged with complete recovery.

Desulfovibrio species are non-fermenting, anaerobic Gram-negative bacilli found in the environment, such as in soil and sewage [1]. These bacteria are also part of human

gastrointestinal and vaginal flora [2,3]. Cases of bacteraemia due to *D. desulfuricans* have been reported previously [1,4–7]. All patients were aged >60, the source of infection was always intra-abdominal (with the majority due to appendicitis or intra-abdominal abscess), and *D. desulfuricans* bacteraemia was most often monomicrobial. To the best of our knowledge, this is the first case of *D. desulfuricans* identified by MALDI-TOF MS. In the aforementioned reports, identification was always performed using either 16S rRNA gene sequencing alone or in combination with phenotypic testing, which is costly and time-consuming. This case serves as a reminder of the improved efficacy in microbiological diagnosis provided by MALDI-TOF MS [8].

Effective treatment options for *Desulfovibrio desulfuricans* infection include clindamycin, carbapenem, and metronidazole [2,9]. The antibiotic susceptibility profile of the isolate in this case (sensitive to amoxicillin–clavulanic acid and resistant to piperacillin–tazobactam) has been reported previously [1,2,4–7,9]. Indeed, certain *D. desulfuricans* strains can produce an Ambler class A extended-spectrum β -lactamase [10]. However, it seems that this bacterium may have other mechanisms of β -lactam resistance which have yet to be determined [10].

Conflict of interest

None to declare.

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