

From soil to blood: first human case of *Sphingobacterium hotanense* bacteraemia

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SUMMARY

This report describes a case of *Sphingobacterium hotanense* bacteraemia in a patient scratched by a rooster on the right arm. Diagnostic, clinical and therapeutic features are discussed. To the best of our knowledge, this

is the first case of *Sphingobacterium hotanense* bacteraemia reported in the medical literature.

Keywords: *Sphingobacterium hotanense*, human infection.

INTRODUCTION

Sphingobacterium hotanense is an aerobic Gram-negative rod belonging to the genus of *Sphingobacterium*, usually isolated from soil and rarely found in human specimens from immunocompromised hosts. Isolations of such rare microorganisms in humans rise concern about their pathogenicity and reliability of diagnostic techniques. In this report, we describe a case of *Sphingobacterium hotanense* bacteraemia diagnosed by MALDI-TOF and sequencing pointing out strengths and weaknesses of these microbiological techniques.

CASE REPORT

An 86-year-old patient, with a pacemaker placed in 2006 for second degree atrioventricular block and a biological aortic valve prosthesis from 2008, was hospitalized for fever and soft tissues infection of the right upper limb. He reported to

be scratched by a rooster on the right arm two days before the admission; subsequently continuous high fever above 39°C occurred together with signs of inflammation and lymphangitis in the injured limb. At admission, Reactive C Protein (RCP) was equal to 7.88 mg/dl, white blood cells (WBC) 12.420/mm³. Blood samples for cultures were collected and the following day intravenous empiric antibiotic treatment was started with amoxicillin-clavulanate (2.2 g three times a day, having the patient a glomerular filtration rate lower than 50 mL/min). Quickly the fever disappeared and after few days of treatment WBC and RCP normalized. One out of two blood cultures resulted positive for *Sphingobacterium mizutaii*. A transthoracic echocardiogram excluded the presence of endocarditis. Blood cultures vials were incubated in Bactec (Becton Dickinson, BD). After turning positive, 10 µL of blood were sown on Columbia Blood Agar plates (BD) and Chocolate Agar plates (BD) to identify aerobic microorganisms and Columbia Blood Agar plates (BD), Chocolate Agar plates (BD) and Schaedler Agar plates (BD) for anaerobic microorganisms. Plates were placed in an incubator at 37°C for 24 hours under aerobic and anaerobic conditions. A Gram stained slide was also set up, which resulted positive for Gram-negative bacilli. The plates incubated in

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aerobic conditions, showed the growth of small colonies, non-haemolytic, smooth, with a very clear yellow pigment. Microbiological identification of *Sphingobacterium mizutaii* was made with MALDI-TOF Biotyper (Bruker) with a score >2. The 16S rRNA gene sequencing identified *Sphingobacterium hotanense* instead of *Sphingobacterium mizutaii* obtained by MALDI-TOF. Susceptibility tests showed susceptibility to all beta-lactams, fluoroquinolones, and cotrimoxazole, but resistance to aminoglycosides.

■ DISCUSSION

The genus *Sphingobacterium* belongs to the family of Sphingobacteriaceae, phylum Bacteroidetes; it has been isolated from Antarctic soil, clinical specimens, roots, compost from cow dung, rice straw, farm and forest soil. Very rare cases of microorganisms belonging to this genus have been reported from blood and urine in immunocompromised patients [1]. To date *Sphingobacterium hotanense* has never been found in human hosts. Sphingobacteriaceae family is characterized by the presence of sphingolipids in the cell wall. The genus *Sphingobacterium* consists of aerobic, Gram-negative rods. Genetic analysis and concentration of sphingolipids in the cell wall is used to distinguish *Sphingobacterium* from *Flavobacterium* genus [2]. *Sphingobacterium mizutae* is a Gram-negative rod, oxidase and catalase positive, gelatinase negative and, like others from the same genus, was isolated from the soil, while *Sphingobacterium hotanense*, was first isolated from soil of a *Populus euphratica* forest in the Hotan River valley in China and has never been previously found in human beings [3]. MALDI-TOF allows to distinguish very similar microorganisms between them through the comparison of the protein spectra produced by the microorganism and those present in a database. Despite the score >2 obtained by MALDI-TOF, which represents a high probability of correct identification, we performed confirmation tests, since the comparison of the protein spectra of rare microorganisms with those present in MALDI-TOF database, still has a certain level of uncertainty. The different results obtained from MALDI-TOF and sequencing, come from the lack of *Sphingobacterium hotanense* in the instrument database. The database is open

and can be updated with new sequenced species. In our case, MALDI-TOF identified *Sphingobacterium mizutaii* which, probably is close to *Sphingobacterium hotanense* as proteomic profile. Thus, even from the genetic point of view *Sphingobacterium mizutae* was found to be the closest strain to *Sphingobacterium hotanense* [3]. In the case we described, clinical significance of *Sphingobacterium hotanense* isolation has been supposed considering that the skin wound has been contaminated with soil conveyed by the animal scratch. This caused soft tissue infection which lead to bacteraemia. Prompt antibiotic therapy prevented from infectious valvular complications. However, it must be considered that *Sphingobacterium hotanense* has never been recognized as a human pathogen, so it is not possible to assume neither potential clinical impact nor the onset of a bacteraemia in the absence of antibiotic therapy. However, if we look at the old age of the patient, the presence of valvular prosthesis and pacemaker, we considered appropriate prolonging intravenous antibiotic therapy for 14 days and following the patient after discharge to rule out persistent infection. Finally, our antibiotic susceptibility data are consistent with those reported in the literature. The only isolation of *Sphingobacterium hotanense* from an inorganic material resulted resistant to aminoglycosides and susceptible to ceftazidime, but not to ampicillin [3]. In accordance with microbiological data, indeed, the patient improved with high dose of empirical treatment with protected beta-lactam (amoxicillin-clavulanate).

Conflict of interest. The authors have no conflicts of interest to disclose.

■ REFERENCES

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