Case Report

Bacteraemia caused by *Sciscionella marina* in a lymphoma patient: phenotypically mimicking *Nocardia*

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A 55-year-old female patient with malignant lymphoma after induction chemotherapy developed fever. Blood culture yielded an organism biochemically identified as representing *Nocardia* spp., but molecular identification (16S rRNA gene sequencing) later identified it as representing *Sciscionella marina*. This is the first report, to the best of our knowledge, of *Sciscionella* being isolated from a human sample.

**Introduction**

*Sciscionella* are Gram-positive, aerobic, marine actinomycetes, phenotypically resembling *Nocardia*. The genus belongs to the family *Pseudonocardiaceae* and has been described only recently (Tian *et al.*., 2009). The type species is *Sciscionella marina*, which was isolated from marine sand sediments from the South China Sea. However, *Sciscionella* spp. have not previously been reported to cause human infections. In the present report, we describe the isolation of *S. marina* from the blood culture of a patient with malignant lymphoma who developed fever after induction chemotherapy.

**Case report**

A 55-year-old female patient from the suburbs of Bangalore, India, was referred to the Kidwai Memorial Institute of Oncology, a regional cancer centre in south India, with a provisional diagnosis of malignant lymphoma.

On admission (day 0), she had breathlessness with tachypnoea and coarse, bilateral crepitations. Clinical examination revealed hepato-splenomegaly and generalized lymphadenopathy with firm, non-tender, non-matted lymph nodes that were not fixed to adjacent soft tissues. Lymph node biopsy at the centre confirmed the diagnosis as malignant lymphoma. A chest radiograph revealed mediastinal widening, small homogeneous opacity in the right lower zone and pulmonary congestion. She was treated with parenteral amoxicillin–clavulanate (1.25 g day−1) and dexamethasone (16 mg day−1) for 1 week to which she responded favourably and was discharged with advice to continue oral prednisolone (40 mg day−1) and oral cephalaxin (1.5 g day−1) for 7 days and review for initiation of chemotherapy after 10 days.

She was readmitted on day 20 with fever and a cough. In view of subnormal absolute neutrophil counts (ANCs) and the possibility of infection, cefotaxime (2 g three times daily) and amikacin (750 mg day−1) were administered. She responded favourably. On day 30, the first cycle of induction chemotherapy was administered (parenteral cyclophosphamide and vincristine on day 1, and oral prednisolone continued at 100 mg day−1) with a plan to repeat this cycle every 2 weeks for six to eight cycles. Two days after the first cycle of chemotherapy, she had an episode of fever and oral thrush. Blood was collected and cultured in biphasic brain heart infusion medium (sterility controlled for each batch). After collection of blood for culture she was empirically treated with amoxicillin–clavulanate (1.25 g day−1) and oral fluconazole (400 mg day−1). A current haemogram showed an ANC of 1500 cells μl−1 (lymphocyte count 1000 μl−1). Microbiological investigation of the respiratory sample did not reveal any significant pathogen. On day 37, after 1 week of induction chemotherapy, she developed deep vein thrombosis and became drowsy, and developed features of pulmonary hypertension and congestive cardiac failure. The patient left the hospital against medical advice and could not be followed further.
Blood for culture, collected after induction chemotherapy, grew small, dry and pitted colonies after 6 days of incubation at 37 °C in a candle jar. Staining of these colonies showed thin filamentous and branched Gram-positive bacilli. Subculture on sheep blood agar revealed off-white, wrinkled, heaped colonies which grew within 3 days of incubation at 37 °C in ambient air. Similar colony characteristics were observed when the isolate was grown on Sabouraud’s dextrose agar (Fig. 1). The modified acid-fast staining (without heating, and decolorization with 1 % sulfuric acid) showed very faintly stained acid-fast bacilli. The isolate hydrolysed casein, hypoxanthine, tyrosine and gelatin, but not xanthine or urea. It utilized citrate, grew at 35 °C but not at 45 °C and was resistant to lysozyme (50 μg ml⁻¹). The isolate was phenotypically identified as representing *Nocardioides brasilienis* as per the identification schemes of Kiska et al. (2002) and Shivaprakash et al. (2007). Antibiotic sensitivity testing by the standard Kirby–Bauer disc diffusion method on Mueller–Hinton agar showed susceptibility to gentamicin (10 μg), tobramycin (10 μg) and amikacin (30 μg), but resistance to erythromycin (15 μg) and ciprofloxacin (5 μg). The isolate was sent to the National Culture Collection of Pathogenic Fungi (NCCPF), at the Postgraduate Institute of Medical Education and Research (PGIMER), Chandigarh, India, for confirmation of its identification.

**Molecular diagnosis**

At the NCCPF, molecular identification was performed by amplifying the 16S rRNA gene (La Scola et al., 1998; Weisburg et al., 1991) by using the universal primer pair 16s F (5′-GCTTAAACATGCAAAGTCG-3′) and 16s R (5′-GAAATTCAGTCTCCCTG-3′). Sequencing reactions were performed with a Big Dye Terminator Cycle Sequencing kit, version 3.1 (Applied Biosystems), for both strands. The sequencing reaction products were purified and analysed on an ABI 3130 Genetic Analyzer (Applied Biosystems). The consensus sequences were prepared from the sequence obtained by forward and reverse primers with the help of Bionumerics software, version 6.6 (Applied Maths). The consensus sequences were compared with those in the GenBank DNA database. The 16S rRNA gene sequence of the isolate showed 99 % similarity to that of *S. marina* SCSIO 00231T (GenBank accession no. NR044512.1). The next closest match was to the type strain of *Pseudonocardia petroleophila* (93 % similarity). The new isolate was thus identified as representing *S. marina* and its sequence was deposited in the GenBank database under accession number HM244406.1.

**Discussion**

*Sciscionella* are marine actinomycetes, phenotypically resembling *Nocardia*, which belong to the family *Pseudonocardiaceae* and have been isolated from sediments collected from the northern South China Sea (Tian et al., 2009). Actinomycetes containing mycolic acids are classified into several genera (*Corynebacterium*, *Gordonia*, *Mycobacterium*, *Nocardia*, *Rhodococcus*, *Skeermania*, *Tsukamurella* and *Williamsia*) and their counterparts lacking mycolic acids include genera belonging to the family *Pseudonocardiaceae* (Goodfellow & Maldonado, 2006). Reports of *Sciscionella* causing human infections were previously unknown. This report of *Sciscionella* bacteraemia is the first report, to the best of our knowledge, of *Sciscionella* being isolated from a human sample. The isolate was identified by molecular techniques. Although a repeat sample could not be obtained, the possibility of environmental or skin contamination was remote. Moreover, the isolate grew as a pure culture from a patient who was immunosuppressed and clinically diagnosed with sepsis. The patient had been on steroids on and off for a month and had received induction chemotherapy 12 days earlier, as a result of which her neutrophil counts were subnormal. Corticosteroids and cancer chemotherapy are known to lower immune status and increase susceptibility to opportunistic pathogens. Previous use of corticosteroids is known to be an important risk factor in the development of *Nocardia* infections (Minero et al., 2009). The source of this infection and its mode of entry into the patient remain unknown, as the organism was not isolated from a respiratory or any other clinical sample obtained from the patient.

The identification of actinomycetes by phenotypic methods is time consuming and requires expertise (Muñoz et al., 2007). Molecular identification helps in accurate identification in certain situations, as in the present case. The present isolate showed *in vitro* sensitivity to trimethoprim–sulfamethoxazole and amoxicillin–clavulanate. The patient was empirically treated with amoxicillin–clavulanate, but the therapeutic response could not be ascertained as the patient was lost to follow-up.

In tertiary care hospitals treating cancer patients, the likelihood of isolating rare pathogens and hitherto unknown pathogens is not unlikely. *Sciscionella* were not known previously to cause human infections, although with growing numbers of immunocompromised patients in cancer hospitals, the likelihood of infections caused by rare or novel human pathogens should be borne in mind. Every blood isolate should be treated as a potential pathogen, unless proven otherwise. Furthermore, genotypic characterization of uncommon isolates helps to identify rare and novel pathogens causing infection in immunocompromised patients. This report highlights the
need for awareness among microbiologists and clinicians for \textit{Nocardia} and other actinomycete infections, especially in cancer patients, transplant recipients or other immunosuppressed patients. It also emphasizes the utility of molecular tools to correctly identify rare bacteria.

\textbf{Acknowledgements}

We acknowledge the Indian Council of Medical Research, New Delhi, for providing DNA sequencing facilities under the project National Culture Collection of Pathogenic Fungi (NCCPF) at PGIMER, Chandigarh, India.

\textbf{References}


