Case Report

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Native valve endocarditis caused by *Streptococcus oligofermentans*: a case report

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Introduction: Viridans group streptococci (VGS), which are commensal flora in the oral cavity, can act as opportunistic pathogens causing serious infections such as infective endocarditis (IE). Species identification of these organisms is difficult because of variability in phenotypic traits among strains of the same species.

Case presentation: We report a case of endocarditis in a 64-year-old male patient caused by *Streptococcus oligofermentans*, which was identified by 16S rRNA gene sequencing. *S. oligofermentans* is a commensal of the oral cavity and rarely causes disease. This is the second report of IE caused by *S. oligofermentans*.

Conclusion: Molecular methods are necessary to ascertain the identity of VGS strains, particularly those that rarely cause human disease.

Keywords: 16S rRNA gene PCR; infective endocarditis; *Streptococcus oligofermentans*.

Introduction

Viridans group streptococci (VGS) are part of the normal microbial flora of the oral cavity and are an important cause of bacterial endocarditis. They are difficult to identify by phenotypic characteristics and molecular methods are often used to speciate them. Here, we report a case of endocarditis caused by *Streptococcus oligofermentans*, a rare species of VGS.

Case report

A 64-year-old male with a history of rheumatic heart disease was admitted to the Department of Cardiology at Rajiv Gandhi General Hospital, Chennai, India, with complaints of intermittent fever for 1 month. On admission, he showed signs of pallor and had an elevated jugular venous pulse but was conscious and oriented. His blood pressure and heart rate were normal. Transoesophageal echocardiography was performed, which showed mild mitral regurgitation, mild aortic regurgitation and a vegetation attached to the anterior mitral leaflet. Three consecutive blood samples were collected at hourly intervals and inoculated into brain–heart infusion broth with 0.05 % sodium

polyanethol sulfonate (SPS) and incubated at 37 °C in an atmosphere of 5–10 % CO₂.

After 48 h, turbidity was observed in all blood cultures, and Gram staining of the broth showed Gram-positive cocci in chains. Colonies on blood agar were opaque and yellowish in colour and were α -haemolytic (Fig. 1). An antibiotic susceptibility test was performed by the Kirby–Bauer method and the isolate was found to be sensitive to penicillin, vancomycin, erythromycin, ceftriaxone, cefotaxime, ofloxacin and amoxicillin-clavulanic acid. The isolate fermented sucrose but did not ferment glucose, mannitol, arabinose or lactose. It was negative for a Voges–Proskauer test and did not hydrolyse hippurate, arginine or aesculin. It grew as small flat, blue colonies on Mitis Salivarius agar. DNA was extracted from the isolate by the alkaline lysis method (Hartas *et al.*, 1998) and analysed by 16S rRNA gene PCR as described previously (Weisburg *et al.*, 1991) using primers fd1 (5'-AGAGTTTGATCCTGGCTCAG-3') and rp2 (5'-ACGGCTACCTTGTTACGACTT-3') in a 50 µl reaction with an initial denaturation at 95 °C for 3 min, followed by 37 cycles of denaturation at 95 °C for 30 s, annealing at 55 °C for 30 s and extension at 72 °C for 1 min, with a final extension at 72 °C for 7 min. The PCR amplicon was subjected to electrophoresis and analysed in a gel documentation system. A BLAST search (<http://www.ncbi.nlm.nih.gov/BLAST>) of the amplified 16S rRNA gene sequence was performed, which showed 100 % nucleotide

Abbreviations: IE, infective endocarditis; VGS, viridans group streptococci.

Fig. 1. α -Haemolytic, opaque yellowish colonies of *S. oligofermentans*.

identity with *S. oligofermentans* (GenBank accession no. KP119845). The patient recovered after treatment with intravenous vancomycin and ceftriaxone for 4 weeks, and was discharged from the hospital.

S. oligofermentans was first described as a new *Streptococcus* sp. of the *mitis* group of VGS by Tong *et al.* (2003) during a survey of oral acid-producing bacteria in dental plaque and saliva of caries-free patients with nasopharyngeal carcinoma. The organism derives its name from the fact that it ferments few sugars, typically only glucose and sucrose. Our isolate appeared to be different because it did not hydrolyse hippurate or ferment sucrose but was similar in all other phenotypic characters to the isolate described by Tong *et al.* (2003). The organism has been isolated from healthy tooth surfaces, has a weaker ability to produce acid and demineralize hydroxyapatite, and is not considered to be a pathogen. To the best of our knowledge, only one case of endocarditis caused by *S. oligofermentans* has been reported so far (Matta *et al.*, 2009). This case was reported in 2009 in a 43-year-old female who presented with fever, arthralgia, a systolic murmur and a forearm abscess. The excised mitral vegetation as well as pus from the abscess were culture negative; however, direct 16S rRNA gene PCR from the clinical specimens and gene sequencing confirmed the presence of *S. oligofermentans*. In the present case, the organism was isolated from multiple blood cultures, phenotypically characterized and its identity confirmed by 16S rRNA gene amplicon sequencing. The patient recovered with intravenous antibiotic therapy. Recent phylogenetic studies have shown that *S. oligofermentans* is closely related to *Streptococcus sinensis* and a new phylogenetic clade, the 'sinensis group' has been proposed which includes *Streptococcus sinensis*, *Streptococcus oligofermentans* and *Streptococcus cristatus* (Teng *et al.*, 2014). 16S rRNA gene PCR, although useful for identification of VGS is considered

less accurate than other molecular methods such as multilocus sequence analysis (Naveen Kumar *et al.*, 2014)

Identifying VGS by biochemical methods may be difficult, especially in the case of rare species, and hence molecular methods should be used to ascertain the identity of strains isolated from serious infections.

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