LETTER TO THE EDITOR

Shuttleworthia satelles endocarditis: Evidence of non-dental human disease

KEYWORDS
Endocarditis; Shuttleworthia satelles; Prosthetic valve

A 65-year-old man with rheumatic carditis and a mitral valve mechanical prosthesis presented with weakness and expressive aphasia which prompted hospital admission at another institution. For four months prior to admission, he had nightly symptoms of muscle aches and sweats. Six months prior to admission, he recalled a “boil” and bleeding from the mandibular gingiva. Magnetic resonance imaging showed two small acute infarctions in the distribution of the left middle cerebral artery. An echocardiogram showed two distinct mobile thrombi on the prosthetic mitral valve. Three sets of blood cultures were obtained, but no antimicrobial therapy was administered and the patient was transferred to our institution for further management three days later. On arrival, two sets of blood cultures were collected. Therapy with ampicillin/sulbactam was started when three of the five blood culture sets grew an anaerobic Gram-positive bacillus after 72 h of incubation. Gram stain showed short Gram-positive bacilli in diphtheroidal arrangements. Small satellite colonies grew within and from the margins of the primary colony after 10–14 days of incubation. The isolate was resistant to colistin (10 μg disc) and susceptible to vancomycin (5 μg disc), bile and indole positive, and catalase negative. Esculin was hydrolyzed, but arginine and urea were not. Arabinose, glucose, lactose, maltose, melezitose, sucrose, trehalose, fructose and rhamnose were fermented, but cellobiose, melibiose, mannitol, salicin, and sorbitol were not. Gelatin was not liquefied and H2S was not produced. The organism was N-acetyl-glucosidase and α-fucosidase negative, and β-D-galactosidase, α-D-galactosidase, and α-glucosidase positive. Acetic acid, formic acid, butyric acid, and lactic acid were detected by gas liquid chromatography.

In vitro susceptibility testing performed by E test methodology demonstrated MIC values of ≤0.5 μg/mL for penicillin, clindamycin, metronidazole, piperacillin/tazobactam, and ertapenem, and 1 μg/mL for vancomycin. Ampicillin and ceftriaxone were examined by agar dilution methodology and both had a MIC ≤ 0.5 μg/mL.

16S rDNA sequencing resulted in a mixed DNA chromatogram that was further analyzed using the RipSeq™ Mixed DNA interpretation software. Based on the scoring pattern of the chromatogram, the RipSeq algorithm flagged the mixed appearance due to an indel copy variant phenomenon, not a mixed culture, and gave a 100% match with Shuttleworthia satelles only (GenBank accession number AF399956, based on 431 bases). A BLAST search performed after manually assembling the non-ambiguous parts of the forward and reverse chromatogram reproduced the RipSeq result and gave a perfect match with the same reference (position 24–454). GenBank accession AF399956 is a type strain reference for S. satelles and was submitted in relation to the publication of the original description of that species.2 The distance to the next cultured reference in GenBank was >10%. Following the general criteria used for sequence-based identification of bacteria by the Clinical and Laboratory Standards Institute,1 this finding allowed for unequivocal identification to the species level.

The patient again developed transient expressive aphasia and EEG demonstrated seizure activity that was thought to account for this. Repeat MRI showed subacute infarctive changes with a lesion in the right occipital lobe that was not seen previously.

Due to concern for continued embolic events, redo sternotomy and mechanical mitral valve replacement was again performed. Intraoperatively, prosthetic valve vegetations were...
noted both on the atrial and ventricular aspects of the explanted prosthesis (see Fig. 1). Histopathologic examination of these vegetations showed active infective endocarditis, with focal purulent inflammation without identifiable organisms by either Gram or Gomori methenamine silver staining. Anaerobic and aerobic bacterial cultures of the resected valvular vegetations were negative. He completed a six-week course of intravenous ampicillin-sulbactam and underwent cardioversion to normal sinus rhythm due to intermittent atrial fibrillation, with no evidence of relapsing infection.

*S. satelles* is a slow growing, non-spore forming, Gram-positive anaerobic bacillus that is part of the normal oral flora in humans. This organism was previously classified in the genus *Eubacterium*. However, phenotypic evaluation and phylogenetic analyses of 16S rRNA gene sequences performed in 2002 demonstrated a new genus within the *Firmicutes* phylum and the *Clostridium-Bacillus* subphylum. These strains were saccharolytic, produced lactate, butyrate and acetate, hydrolyzed esculin and produced indole.

Although Gram and Gomori methenamine silver stains of the resected valvular vegetations did not reveal microorganisms, there was evidence of active endocarditis demonstrated on histopathologic examination. The patient’s recent use of antibiotic therapy before valve surgery could have accounted for the lack of demonstrable organisms seen on staining of tissue and negative tissue culture results. The presence of sustained bacteremia over 4 days due to *S. satelles* provides strong evidence that this organism was the cause of prosthetic valve infection.

The occurrence of a recurrent embolic brain lesion despite therapy prompted valve replacement. Many experts advocate valve replacement when embolic events to major organs occur despite appropriate antimicrobial therapy. Timing of surgery is often a difficult decision when weighing the benefits of surgery with the risks associated with cerebral hemorrhage in the setting of brain infarction, and the anticoagulation that is required for cardiac bypass during the valve surgery.

It is conceivable that prior to 2002, there were endocarditis cases ascribed to organisms not fully identified or organisms designated within the *Eubacterium* genus. There have only been a scant number of *Eubacterium* endocarditis cases described in the literature. If other cases due to *S. satelles* have occurred, they have not been published; or more likely, isolates were designated as an incompletely identified species.

*S. satelles* has been isolated from infected root canals of teeth associated with endodontic abscesses, and only a limited number of reports have described an association with this organism and periodontal disease. This case represents the only description of a non-dental infection in humans due to *S. satelles*.

References


Accepted 11 February 2010

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**Figure 1** Resected prosthetic mitral valve with vegetations involving the sewing ring.