Case report

Shewanella putrefaciens infective endocarditis

Jonathan Constant, Ivan Cherney, Eric Gomez

West Virginia School of Osteopathic Medicine, Lewisburg, WV, USA
Department of Medicine, Appalachian Regional Healthcare, Beckley, WV, USA

Introduction

Shewanella spp. encompass a group of saprophytic Gram-negative oxidative bacilli generally present in warm climates as part of marine microflora. Other possible sources include aquatic reservoirs, oil and gas reserves, as well as soil, snake bites, fish, poultry, dairy and beef products. Although apparently abundant in the environment, human infection with these pathogens is relatively rare. When identified in human isolates, it usually presents as a mixed bacterial flora. Of the Shewanella spp., human clinical infections are caused by Shewanella algae and Shewanella putrefaciens, the greater share of which being the more pathogenic S. algae, possibly due to its ability to carry out beta-hemolytic type reactions and exotoxin production. The most common clinical manifestations are skin and soft tissue infection, bacteremia and otitis. Shewanella spp. have also been associated with abdominal, joint and bone, pulmonary, urinary, ophthalmic, and cerebral infection. Bacteremia is often present but the course is usually benign. There is only one known case of polymicrobial infective endocarditis related to S. putrefaciens. The following report outlines the first known case of infective endocarditis due to an apparently monomicrobial S. putrefaciens infection, and the second known case of S. putrefaciens-related infective endocarditis worldwide.

Case report

A 40-year-old immunocompetent man presented to his vascular surgeon with complaints of right hand swelling, calor, numbness, and pain. An upper extremity venous doppler showed thrombosis of the right radial vein. He was admitted to the hospital and started on anticoagulation therapy with heparin. Two weeks prior to admission the patient presented with a burn at the medial region of his right thigh, which was evaluated by his primary care physician and topical antibiotics were prescribed. He had also been complaining of shaking chills for several days prior to admission. Past medical his-
Two reported tested In initially patient leaflet sets (40 updated areas use, S. nonhemolytic algae). Despite the utility of the production of acid from carbohydrate oxidation for the correct identification of S. algae, S. putrefaciens can produce varied results which have led to the recommendations of performing 16S rRNA sequencing for the correct speciation of Shewanella spp. In our case, the identification of the microorganism was performed through VITEK 2 system. The new VITEK 2 system has now included in its database S. algae and theoretically it could be detected on clinical samples. As the accuracy of the identification of S. algae on the VITEK 2 system, to our knowledge, has not been reported, it is possible that this strain could have been misidentified as S. putrefaciens instead of S. algae.

S. putrefaciens, when detected, is often a component of polymicrobial infections. This type of presentation has made it difficult to determine the significance of S. putrefaciens as an isolated pathogen. However, S. putrefaciens monomicrobial infections have been reported, confirming the pathogenicity of this microorganism. Vignier et al.\(^5\) reported that half of their cases of Shewanella infection were monomicrobial. In their review of the literature, they determined that a skin or mucosal portal of entry was found in 53% of the reported Shewanella infection cases. These were often preceded by chronic ulceration of the lower limb, trauma, burn wound, or seawater exposure. In our patient, the source of S. putrefaciens was not identified. Nonetheless, it is reasonable to assume that the patient’s burn wound was the port of entry. Unfortunately, no cultures of the burn wound on the patient’s right lower limb were obtained.

Dhawan et al.\(^5\) described a case of S. putrefaciens and viridans group streptococci polymicrobial mitral valve endocarditis in a patient with known rheumatic heart disease. Compared to our case, only one microorganism was isolated validating the pathogenic role of S. putrefaciens. Six sets of blood cultures, in a period of 9 days, turned out positive for S. putrefaciens resulting in the confirmation of monomicrobial infection due to S. putrefaciens. This rare case of monomicrobial infective endocarditis by S. putrefaciens in an immunocompetent host adds to the current literature of the increased numbers of human infection associated with the organism and highlights the pathogenic role of Shewanella spp.

Discussion

Despite the vast prevalence of Shewanella spp. in the environment, they are rarely implicated in clinical scenarios as a source of pathogenicity. Two species of Shewanella (S. algae and S. putrefaciens) are known to occasionally cause infection in humans. Khashe et al.\(^2\) reported that certain phenotypic characteristics could be useful to differentiate S. putrefaciens from S. algae. Compared to S. algae, S. putrefaciens is nonhemolytic on sheep blood agar, unable to grow at 42 °C or on high salt media (6.5%), but able to produce acid from arabinose, maltose, and sucrose.\(^2\) Automated identification systems have been reported as not being able to distinguish S. algae from S. putrefaciens reliably, as S. algae has not been updated in the databases.\(^1\) Khashe and Janda\(^2\) tested five strains of S. algae and five strains of S. putrefaciens on different bacterial identification systems that included API 20E, API NFT, RapID NF Plus and the automated VITEK system. All of these identification systems misidentified S. algae as S. putrefaciens. However, manual reading of arabinose and maltose reaction permitted the distinction between S. algae and S. putrefaciens.

Conflicts of interest

The authors declare no conflicts of interest.

References