

Disseminated Infection Caused by *Staphylococcus schleiferi*: A Dangerous Wolf in Coagulase-Negative *Staphylococcus* Clothing

Seioh Ezaki¹, Hiroshi Ito², Yasuhiro Ogawa², Nobutake Shimojo², Satoru Kawano²

1. Orthopaedics, University of Tsukuba Hospital, Tsukuba, JPN 2. Division of Hospital Medicine, University of Tsukuba Hospital, Tsukuba, JPN

Corresponding author: Hiroshi Ito, itohirokan@yahoo.co.jp

Abstract

Staphylococcus schleiferi is a coagulase-negative staphylococcus known to cause canine external otitis but has rarely been reported in human infections. However, unlike other coagulase-negative staphylococci, *S. schleiferi* can cause disseminated infection in immunocompetent patients. Here, we present a case of *S. schleiferi* bacteremia, accompanied by infective endocarditis, brain abscesses, acute focal bacterial nephritis, and possible epididymitis, in which an *S. aureus* bacteremia treatment strategy was useful for resolution. Further reports should be accumulated to determine if *S. schleiferi* is a virulent pathogen that frequently causes the disseminated infection type seen in our patient.

Categories: Cardiology, Internal Medicine, Infectious Disease

Keywords: staphylococcus schleiferi, infective endocarditis, brain abscesses, bacteremia

Introduction

Staphylococcus schleiferi is a coagulase-negative staphylococcus that has rarely been reported in human infections [1]. Described reports of infection are mainly limited to canine external otitis [2] and little is known about its pathogenicity and presentation in human infections. Here, we report a patient with brain abscesses caused by *S. schleiferi* that presented as a disseminated infection and a treatment strategy for *S. aureus* bacteremia [3] was useful in managing this condition.

Case Presentation

A 45-year-old Japanese man was admitted to the emergency department after seven days of persistent fever, nausea, and right scrotal pain. His medical history included aortic valve regurgitation due to a bicuspid aortic valve (native valve) and a dental extraction without antibiotic prophylaxis one week before the onset of symptoms. He had owned a dog until two years before. He denied recent sexual history. His heart rate was 115 beats per minute, blood pressure 141/83 mmHg, axillary temperature 37.8 °C and respiratory rate 25. Physical examination was unremarkable except for right scrotal tenderness. Laboratory data were as follows: white blood cell count 11,900/μL (reference value, 4,000-9,000/μL), hemoglobin 15.3 g/dL (reference value, 14.0-18.0 g/dL), platelet count 246,000/μL (reference value, 150,000-350,000/μL), aspartate transaminase 114 U/L (reference value, 8-38 U/L), alanine aminotransferase 193 U/L (reference value, 4-44 U/L), lactate dehydrogenase 318 U/L (reference value, 124-222 U/L), serum creatinine 0.69 mg/dL (reference value, 0.61-1.04 mg/dL), and C-reactive protein 10.9 mg/dL (reference value, 0.0-0.2 mg/dL). Contrast-enhanced computed tomography images of the chest and abdomen revealed a wedge-shaped area in the right kidney (Figure 1) while magnetic resonance (MR) images of the brain showed scattered abnormal signal intensities in the left parietal and frontal lobes (Figure 2). Native-valve infective endocarditis was suspected; however, transthoracic and transesophageal echocardiography revealed no remarkable abnormalities except for the previously known aortic valve regurgitation (Figure 3). As antistaphylococcal penicillins are not available in Japan, high-dose ceftriaxone (2 g, every 12 hours) was administered for presumed disseminated bacterial infection by the dental extraction and blood cultures revealed gram-positive cocci in clusters which were identified as methicillin-susceptible *S. schleiferi* (Table 1).

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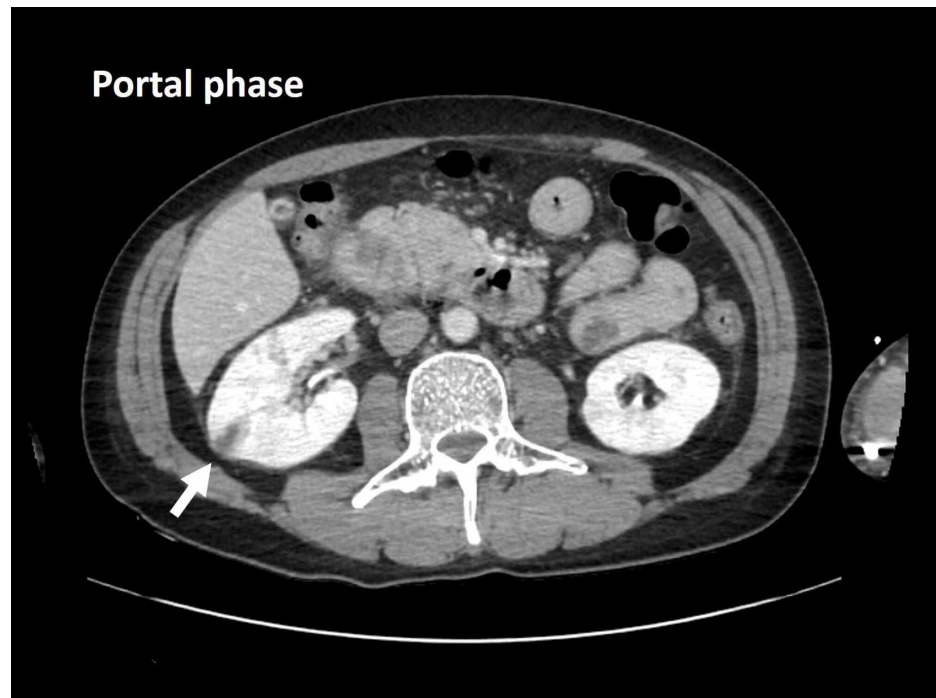


FIGURE 1: Initial contrast-enhanced computed tomography images of the chest and abdomen

The computed tomography images showing a wedge-shaped area in the right kidney (white arrow).

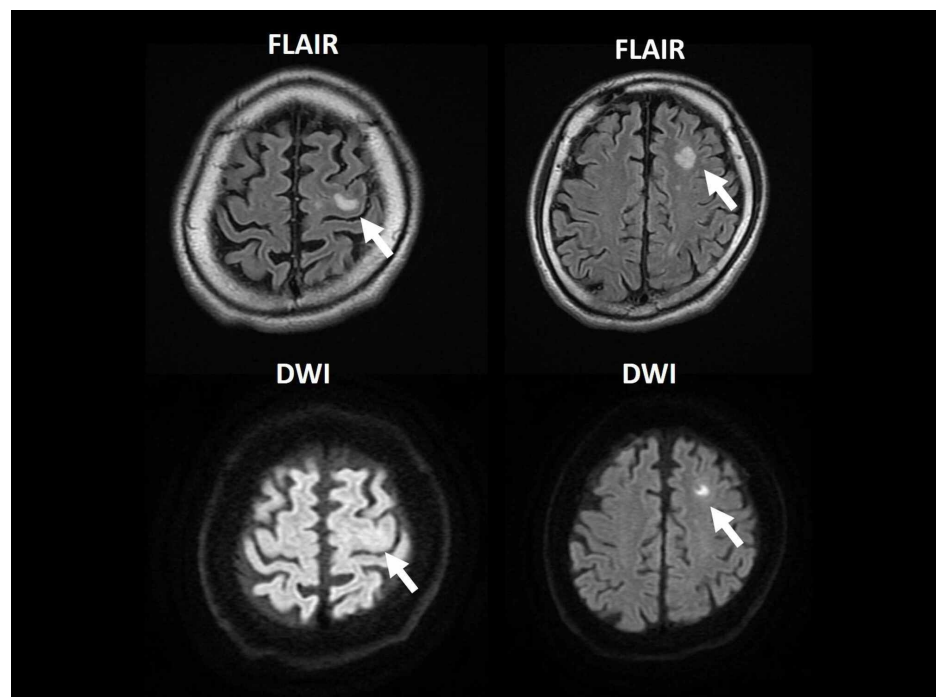


FIGURE 2: Initial magnetic resonance images of the brain

The magnetic resonance images showing scattered abnormal signal intensities in the left parietal and frontal lobes (white arrows).

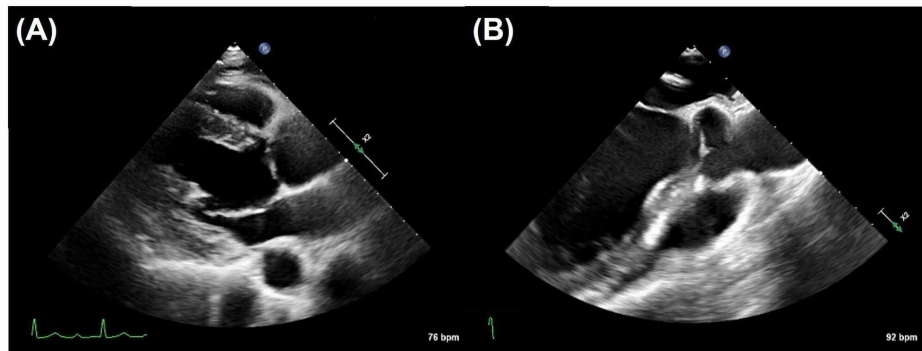


FIGURE 3: Transthoracic and transesophageal echocardiography

Transthoracic (A) and transesophageal echocardiography (B) revealed no remarkable abnormalities suggesting infective endocarditis.

Antibiotics	MIC (µg/mL)	Sensitivity
Benzylpenicillin	>8	Resistant
Methicillin	≤0.25	Sensitive
Cefazolin	≤8	Sensitive
Cefotiam	≤8	Sensitive
Cefepime	≤8	Sensitive
Cefmetazole	≤16	Sensitive
Meropenem	≤4	Sensitive
Minocycline	≤4	Sensitive
Gentamicin	>8	Resistant
Clindamycin	≤0.5	Sensitive
Levofloxacin	>4	Resistant
Vancomycin	≤2	Sensitive
Linezolid	4	Sensitive
ST	≤2	Sensitive
Rifampicin	≤1	Sensitive

TABLE 1: Antimicrobial susceptibility of *S. schleiferi* isolated from blood cultures

MIC: minimum inhibitory concentration, ST: sulfamethoxazole-trimethoprim

His symptoms resolved within several days using high-dose ceftriaxone and two sets of repeated blood cultures were negative. On the eighth hospital day, tender nodules developed on his left sole, which were thought to be Osler's nodules (Figure 4), and a subsequent diagnosis of infective endocarditis was made according to the modified Duke criteria [4]. The abnormal signal intensity on the brain MR images improved on day 39 and he was discharged after a 42-day course of ceftriaxone therapy. At his most recent visit, 30 days after discharge, he was asymptomatic and doing well.



FIGURE 4: Osler's nodules on his left sole

Tender nodules on the left sole as seen on the eighth hospital day (white arrows).

Discussion

We presented a case of disseminated infection caused by *S. schleiferi*, a relatively rare coagulase-negative staphylococcus. Coagulase-negative staphylococci are considered less virulent than *S. aureus* [5]; however, there have been reports of *S. schleiferi* causing severe disease in cases of infective endocarditis [6,7], pericarditis [8], prostate abscess [9], meningitis [10], and vertebral osteomyelitis [11] (Table 2). Our patient presented with not only bacteremia but also brain abscesses and acute focal bacterial nephritis in the right kidney. He was additionally diagnosed with infective endocarditis according to the modified Duke criteria for which he met five minor clinical criteria: bicuspid aortic valve, fever, intracranial hemorrhage, Osler's nodes, and positive blood cultures which did not meet a major criterion. Physicians should bear in mind *S. schleiferi* bacteremia can cause disseminated infection.

Case	Author	Age (years)	Gender	Underlying disease	Focus	Antibiotics	Prognosis
1	Latorre M, et al. [1]	66	Male	Cirrhosis	Unknown	CTR, TOB	Survived
2	Leung MJ, et al. [6]	78	Male	Myxomatous mitral valve (post prosthetic valve replacement), atrial fibrillation	Infective endocarditis	PCG, RFP, GM	Survived
3	Kumar D, et al. [7]	58	Male	Chronic hepatitis C (post liver transplantation)	Infective endocarditis	VCM, GM	Survived
4	Thawabi M, et al. [8]	55	Male	None	Infective pericarditis	VCM, AZT	Survived
5	Merchant C, et al. [9]	49	Male	Diabetes mellitus, prostatic hyperplasia	Prostate abscess	CEZ, VCM	Survived
6	Jin D, et al. [10]	0	Male	None	Meningitis	VCM, MEPM, CTR	Survived
7	Yarbrough ML, et al. [11]	60	Female	None	Vertebral osteomyelitis	VCM, CTR	Survived
8	Our case	45	Male	Bicuspid aortic valve (native valve)	Brain abscess, focal nephritis, epididymitis	CTR	Survived

TABLE 2: Previous reports on *S. schleiferi* bacteremia

CTR: ceftriaxone, TOB: tobramycin, PCG: benzylpenicillin, RFP: rifampicin, GM: gentamicin, VCM: vancomycin, AZT: aztreonam, CEZ: ceftazidime, MEPM: meropenem

An *S. aureus* bacteremia treatment strategy, including follow-up blood cultures, early source control, echocardiography, early use of appropriate antibiotics (although antistaphylococcal penicillins are unavailable in Japan), and optimal treatment duration, was useful in resolving this condition [12]. As our patient had brain abscesses complicated by infective endocarditis, we used a 42-day course of intravenous antibiotic therapy in line with a previous report [13]. Surgical intervention was deemed unnecessary in our case since the brain abscesses were relatively small and transthoracic/transesophageal echocardiography revealed no remarkable findings suggestive of verrucous endocarditis.

The occurrence of severe infections caused by coagulase-negative staphylococci is not limited to *S. schleiferi* bacteremia as *S. lugdunensis* is well known to cause severe diseases, such as infective endocarditis [14]. Bacteremia caused by these pathogens should thus be treated as *S. aureus* bacteremia instead of as other coagulase-negative staphylococci [15].

Conclusions

We presented a case of *S. schleiferi* bacteremia accompanied by infective endocarditis, brain abscesses, acute focal bacterial nephritis, and possible epididymitis. *S. schleiferi* may present as a disseminated infection, as seen in our case, but can be effectively managed according to *S. aureus* bacteremia guidelines. Further reports should be accumulated to determine if *S. schleiferi* is a highly virulent pathogen that frequently causes disseminated infection types as seen in our case.

Additional Information

Disclosures

Human subjects: Consent was obtained by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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