Annals of Clinical Microbiology www.acm.or.kr

Letter to the editor

Identification of *Cardiobacterium valvarum*: shedding light on infective endocarditis diagnosis

Junghyeon Yun[1], Jung-Hyun Byun[1], Yonggeun Cho[2]

[1]Department of Laboratory Medicine, Gyeongsang National University Hospital, Gyeongsang National University College of Medicine, Jinju, Korea

[2]Department of Laboratory Medicine, Hallym University Sacred Heart Hospital, Anyang, Korea

Dear Editor,

The genus *Cardiobacterium* is a fastidious, Gram-negative rod belonging to the HACEK group (*Haemophilus* species excluding *H. influenzae*, *Aggregatibacter*, *Cardiobacterium*, *Eikenella*, and *Kingella*). A total of 399 cases of infective endocarditis caused by HACEK species have been reported, accounting for approximately 3% of all endocarditis cases [1]. *Cardiobacterium valvarum* was first identified in a patient with infective endocarditis [2]. Although *C. valvarum* can cause infections in other anatomical sites [3], it is predominantly associated with infective endocarditis [2,4]. Here, we present how a preconceived notion of this bacterial species contributed to the diagnosis of a hidden, potentially fatal condition.

A 63-year-old woman was admitted with back pain, gait disturbance, and dysuria that began seven days before presentation. She had a history of mitral valve replacement in 2001 and was receiving warfarin as anticoagulation therapy. Physical examination revealed intact lower limb sensory function and normal deep tendon reflexes. Her vital signs were as follows: blood pressure, 110/50 mmHg; heart rate, 50 bpm; respiratory rate, 20 breaths per minute; and body temperature, 36.2°C. She did not report a febrile sensation or chest discomfort. Laboratory tests showed an elevated C-reactive protein level (32.4 mg/L; reference range, < 5 mg/L) and erythrocyte sedimentation rate (104 mm/h; reference range, ≤ 20 mm/h). Other laboratory results, including those for complete blood count, calcium, phosphorus, glucose, blood urea nitrogen, uric acid, cholesterol, protein, albumin, total bilirubin, alkaline phosphatase, aspartate aminotransferase, alanine aminotransferase, creatinine, sodium, potassium, and chloride, were within the reference ranges.

Her electrocardiogram (ECG) showed sinus bradycardia. Imaging studies were performed to assess potential spinal nerve compression and nerve root injury, as manual muscle testing revealed weakness in hip and knee flexion and extension. Magnetic resonance imaging revealed a bulging disc with bilateral foraminal narrowing at L3–4 and findings suggestive of spondylitis with small paraspinal abscess formation.

Bone specimens for culture and pathological analysis were obtained from the affected areas of the paraspinal abscesses and spondylitis via spinal bone biopsy. Two sets of blood samples were collected for culture. Empirical antibiotic therapy with oral levofloxacin (500 mg once daily) and rifampin (300 mg twice daily) was initiated. Microscopic examination revealed no bacteria, 10–20 white blood cells per high-power field (HPF), and 0–5 epithelial cells per HPF on Gram staining. Three days later, Gram-positive cocci were isolated from thioglycolate broth. Biochemical testing using the VITEK 2 system (bioMérieux) and matrix-

pISSN : 2288-0585
eISSN : 2288-6850

Ann Clin Microbiol 2025 March, 28(1):4
https://doi.org/10.5145/ACM.2025.28.1.4

Correspondence to
Jung-Hyun Byun
E-mail: microbyun@gmail.com

Received: January 16, 2025
Revised: February 24, 2025
Accepted: March 10, 2025

assisted laser desorption ionization–time-of-flight mass spectrometry (bioMérieux) did not yield a reliable identification of the cocci. To determine the bacterial species, 16S ribosomal RNA (rRNA) gene sequencing was performed. The 16S rRNA gene was amplified by polymerase chain reaction using the universal primers 785F and 907R and subsequently sequenced. The results were compared with 16S rRNA gene sequences of related taxa obtained from the EzBioCloud database (http://www.ezbiocloud.net/identify) and showed the highest sequence similarity to *C. valvarum* (AF506987; 98.96%) and *Cardiobacterium hominis* (ACKY01000036; 96.74%). For improved accuracy in species-level identification compared to 16S rRNA sequencing, whole-genome sequencing was conducted using the Illumina MiSeq platform (Illumina). The sequencing results were subsequently analyzed with the TrueBac ID-Genome software (www.truebacid.com; CJ Bioscience) [5]. Through average nucleotide identity comparisons, the isolate was confirmed as closely related to *C. valvarum* (96.70%) and more distantly related to *C. hominis* (85.53%). The bacterium was identified as *C. valvarum*. Antimicrobial susceptibility testing was performed and interpreted according to the Clinical and Laboratory Standards Institute M45 3rd edition guidelines using Etest strips (bioMérieux) [6]. The results indicated susceptibility to levofloxacin. The patient did not report any cardiac-related symptoms, and the initial ECG showed sinus bradycardia without other abnormalities. However, *C. valvarum* is a known cause of infective endocarditis [7], with prosthetic valves carrying a higher risk of infection. Given the patient's medical history, further evaluation was warranted.

Although no bacterial growth was detected in the blood cultures, further evaluation with cardiac echocardiography was performed to rule out infective endocarditis. Transesophageal echocardiography revealed a 0.56 cm vegetation on the prosthetic mitral valve, confirming the diagnosis of infective endocarditis. Although this did not warrant surgical intervention, antibiotic therapy was required [7]. The vegetation resolved after eight weeks of ceftriaxone therapy, and the patient was discharged. Based on the clinical presentation and diagnostic findings, it was postulated that infective endocarditis involving the mitral valve developed first, subsequently leading to hematogenous dissemination and resulting in infectious spondylitis at the L3-4 level.

A review of reported cases to date indicates that infective endocarditis caused by *C. valvarum* is either asymptomatic or presents only with constitutional symptoms of insidious onset [3]. Therefore, it is essential to carefully assess predisposing factors such as pre-existing heart conditions and recent dental procedures. Early recognition and targeted diagnostic efforts enable the identification of hidden life-threatening conditions, ultimately facilitating timely and effective treatment.

Ethics statement

According to the Gyeongsang National University Hospital Institutional Review Board (IRB) policy, IRB review of the study and the need to obtain informed consent from patients for publication were waived (202503001).

Conflicts of interest

Jung-Hyun Byun has been an associate editor of the *Annals of Clinical Microbiology* since 2022. However, she was not involved in the review process of this article. No other potential conflicts of interest relevant to this article were reported.

Funding

This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korean Government (ICT) (NRF-2020R1F1A1066895).

Data availability

The datasets generated during the current study are available from the corresponding author upon request.

References

1. Brouqui P and Raoult D. Endocarditis due to rare and fastidious bacteria. Clin Microbiol Rev 2001;14:177-207.
2. Han XY, Meltzer MC, Woods JT, Fainstein V. Endocarditis with ruptured cerebral aneurysm caused by *Cardiobacterium valvarum* sp. nov. J Clin Microbiol 2004;42:1590-5.
3. Hauser EG, Nizamuddin I, Yarusi BB, Krueger KM. An unusual case of *Cardiobacterium valvarum* causing aortic endograft infection and osteomyelitis. Ann Clin Microbiol Antimicrob 2021;20:14.
4. Abraham R, Irwin RB, Kannappan D, Isalska B, Koroma M, Younis N. Cerebral vasculitis and *Cardiobacterium valvarum* endocarditis. J Med Microbiol 2012;61:1625-30.
5. Ha SM, Kim CK, Roh J, Byun JH, Yang SJ, Choi SB, et al. Application of the whole genome-based bacterial identification system, TrueBac ID, using clinical isolates that were not identified with three matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS) systems. Ann Lab Med 2019;39:530-6.
6. Clinical and Laboratory Standards Institute. Methods for antimicrobial dilution and disk susceptibility testing of infrequently isolated or fastidious bacteria. 3rd ed. CLSI guideline M45. Wayne, PA; CLSI: 2016.
7. Habib G, Lancellotti P, Antunes MJ, Bongiorni MG, Casalta JP, Del Zotti F, et al. 2015 ESC Guidelines for the management of infective endocarditis: the task force for the management of infective endocarditis of the European Society of Cardiology (ESC). Endorsed by: European Association for Cardio-Thoracic Surgery (EACTS), the European Association of Nuclear Medicine (EANM). Eur Heart J 2015;36:3075-128.