

NOT JUST CONTAMINANT: A RARE CASE OF CORYNEBACTERIUM ENDOCARDITIS OF A NATIVE HEART VALVE

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Introduction

Infective endocarditis (IE) is a relatively uncommon disease that affects the endothelial surface of the heart. The diagnosis is traditionally based on the modified Duke criteria (Table 1), which relies on clinical features and, to a lesser extent, laboratory findings, microbiological assessment, and cardiovascular imaging. If IE is not diagnosed and treated correctly, mortality rates are high. Although *Corynebacterium* species are normal components of skin flora and mucosal membranes and are thus frequently regarded as contaminants in blood cultures, there have been increasing reports of their pathogenicity and potential to cause life-threatening diseases.¹ Although rare, *Corynebacterium* accounts for 3% of all infective endocarditis cases, and thus should not be dismissed when found in blood cultures in a patient with a suspicious clinical picture.

Case Presentation

A 67-year-old man with a medical history of chronic atrial fibrillation, chronic obstructive pulmonary disease, Type II diabetes, hypertension, and peripheral arterial disease presented with cough, shortness of breath, and fever for approximately 24 hours. He had recently been admitted to an outside hospital for treatment of aspiration pneumonia and was discharged home after improvement of symptoms and completion of a five day course of Moxifloxacin. A blood culture drawn during that admission later resulted as *Corynebacterium* but was initially dismissed as contaminant. When the patient presented again two days after discharge, with fever and shortness of breath, initial blood cultures grew gram positive bacilli and the patient was transferred to our facility for further evaluation by the infectious disease service.

On admission, he appeared nontoxic, and had a temperature of 38.6°C, a pulse of 90 beats/minute, a blood pressure of 160/88 mmHg, a respiratory rate of 16 breaths/minute, and an oxygen saturation of 92% on 2 L/min via nasal cannula. His physical examination was remarkable for bilateral pretibial hyperpigmented patches with scant crusting and a right medial malleolus shallow exudative ulcer that was 1x1 cm. There was no fluctuance and only mild tenderness. He had an irregularly irregular rhythm, no murmur was appreciated, and only mild wheezing was noted in bilateral lungs. He did not have any dermatological stigmata of endocarditis and had normal dentition with no significant tooth decay.

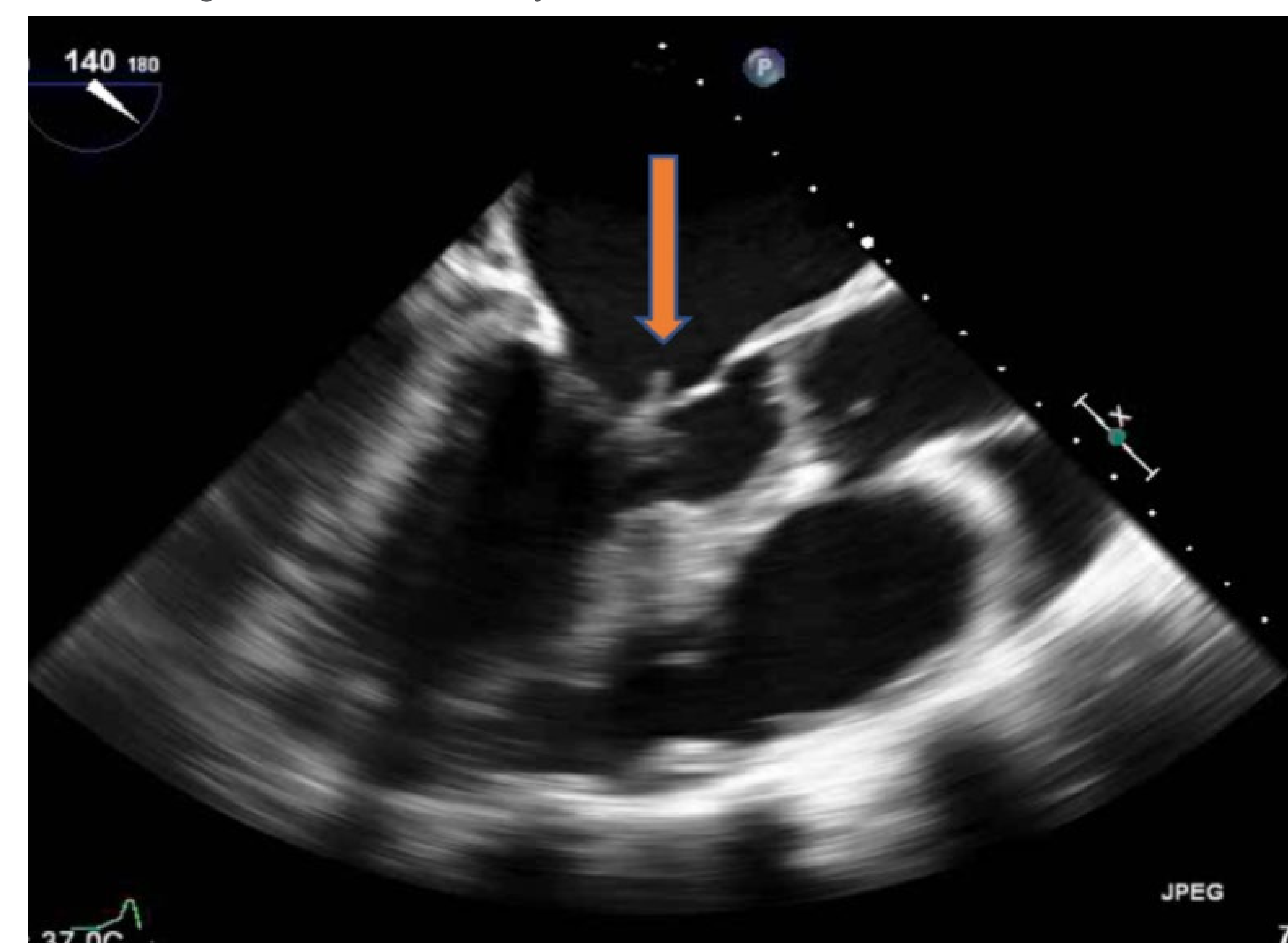


Figure 1. Echocardiogram showing vegetation in the native anterior mitral valve leaflet (arrow).¹¹

Case Presentation Continued

The laboratory tests were remarkable only for anemia with a hemoglobin and hematocrit of 10.8 g/dL (13-17) and 38.1% (42-52) respectively, and his C-reactive protein (CRP) was elevated at 6.3 mg/dL (normal < 1 mg/dL). A plain film of the chest revealed mild cardiomegaly, bibasilar atelectasis, and no infiltrate. He had no history of heart failure or valvular disease, his diabetes was well-controlled on metformin, and he followed up regularly with wound care for his leg wounds.

In the emergency department, the patient received intravenous (IV) vancomycin and meropenem, after blood cultures had been obtained. He was admitted to the medicine team for bacteremia. A preliminary blood culture report was positive for gram positive bacilli. The patient continued to be dyspneic but remained afebrile throughout the duration of the admission. Dermatology was consulted and recommended routine wound care. The infectious disease consult obtained recommended continuation of vancomycin 2 g every 12 hours and obtaining a transthoracic echocardiogram (TTE). The TTE revealed left ventricular ejection fraction of 60-65%, mild mitral regurgitation, and a density on the mitral valve leaflet consistent with possible vegetation. He then had a transesophageal echocardiogram (TEE) which confirmed a mobile 1.2 cm vegetation on the anterior mitral leaflet and resultant moderate to severe mitral valve regurgitation (Figure 1). The admission blood cultures were finalized as *Corynebacterium striatum* (*C. striatum*) in the aerobic bottles (2/2). A swab of his nares was negative for methicillin-resistant *Staphylococcus aureus*. A 2/6 systolic murmur was appreciated and cardiac and cardiothoracic surgery services were consulted. Prophylactic surgery to prevent a primary embolic event was not indicated in this case per American Association for Thoracic Surgery (AATS) guidelines.² The patient remained afebrile and was able to be weaned off supplemental oxygen. Surveillance blood cultures drawn were negative. He was discharged to a subacute rehabilitation center to complete a 6-week course of vancomycin as well as close follow up with his primary care physician, infection disease specialist, and cardiologist.

Table 1. Modified Duke criteria for diagnosis of infective endocarditis.

Definite infective endocarditis
Pathological criteria: Microorganisms (culture or histology in a vegetation or intracardiac abscess), or Pathological lesions (vegetation or intracardiac abscess)
Clinical criteria: Two major criteria, or One major criterion and three minor criteria, or Five minor criteria
Possible infective endocarditis
Consistent findings that do not meet definite definition but not rejected
Rejected
Alternative diagnosis, or Resolution of manifestations with antibiotic therapy for ≤ 4 days, or No pathological evidence at surgery or autopsy

Adapted from Li et al., 2002.

Table 2. Definition of modified Duke clinical criteria for diagnosis of infective endocarditis.

Major criteria
1. Positive blood culture for infective endocarditis.
2. Evidence of endocardial involvement (positive echocardiogram or new valvular regurgitation)
Minor criteria
1. Predisposing heart condition or intravenous drug use
2. Fever
3. Vascular phenomena (e.g. arterial emboli, septic pulmonary infarcts, etc.)
4. Immunologic phenomena (e.g. glomerulonephritis, Osler nodes, etc.)
5. Microbiological evidence (does not meet a major criterion definition)

Adapted from Li et al., 2002.

Discussion

Native valve infective endocarditis (IE) is a rare infection of the endothelium, with an annual incidence of 2 to 10 cases per 100,000 people in industrialized countries and has a high morbidity and mortality without timely intervention.^{3,4} *Staphylococci* and *Streptococci* are the causative pathogens in 80% of cases of IE with *Staphylococci* now the most frequently commonly identified microorganism due to an increase in the number of health-care associated cases.⁵ *Corynebacterium* species are aerobic, non-sporulating, gram positive bacilli that are often considered to be non-pathogenic components of normal skin flora and mucosal membranes. However, *Corynebacterium* are also a rare cause of infective endocarditis, implicated in 9% of early and 4% of late prosthetic valve endocarditis and only 0.2% to 0.4% of native valve endocarditis.⁶

Most cases of IE due to *C. striatum* involve adult male patients, with the mitral valve being most commonly affected. Approximately one-third of patients have underlying valvular disease.^{6,7} The modified Duke criteria (Table 1) provide the framework for diagnosis of infective endocarditis, with a sensitivity of approximately 80% for definite cases and higher if possible cases are included.³ Blood cultures are the most important microbiologic tests for diagnosis and treatment and 90 to 95% of native valve IE are found to have positive blood cultures. Negative blood cultures in suspected IE may be due to recent antibiotic use or pathogens that grow poorly in standard blood culture, such as bartonella species, *Coxiella burnetii*, *Tropheryma whippelii*, and legionella.³ Testing for these organisms should be guided by epidemiologic clues and include serologic and molecular studies. Echocardiographic imaging is an essential tool for the diagnosis of IE, with the sensitivity for detection of vegetations by TEE of 90%. Since TTE has a sensitivity of only 50 to 60% for detection of these lesions in native valve IE, TEE is preferred to rule out IE.³ This patient was surprisingly well compensated, initially complaining only of fever, shortness of breath, and a mild cough. Although the significance of *C. striatum* in the blood cultures was initially questionable, TTE findings were suspicious for a mitral valve vegetation, the presence of which was confirmed with TEE.

This case demonstrates the importance of echocardiographic imaging in a patient with infective endocarditis. Current recommendations for antibiotic therapy for *C. striatum* are based primarily on observational studies which have shown vancomycin to have the lowest MIC among antibiotics.⁸ The three main indications for surgical management of native valve IE are heart failure due to valvular dysfunction or perforation, uncontrolled infection, such as persistent positive blood cultures despite antibiotics or fungal endocarditis, and for the prevention of embolic phenomenon such as in cases of vegetation size more than 10 mm especially with an with an embolic event.³ In a review of case reports published over the past few decades, approximately half of patients with *C. striatum* native valve endocarditis received a mitral valve replacement.^{3,9} This patient responded well to treatment, without recurrence of fever or hemodynamic compromise and negative surveillance blood cultures after initiation of IV vancomycin, and thus did not require surgery. However, with such a high rate of required surgical intervention, the seriousness of *Corynebacterium* endocarditis cannot be ignored.¹⁰

It is imperative to keep these organisms in mind as rare causes of endocarditis, particularly when managing patients who present with bacteremia due to gram positive bacilli. Bacteremia due *C. striatum* should not be dismissed as contaminant. If clinically suspected, infective endocarditis workup should be completed. Although rare, *C. striatum* may be the causative source as was likely the case in this patient due to his bilateral leg skin wounds.

C. striatum should no longer be regarded simply as contaminant of blood cultures but rather appreciated for its potential to cause serious infections, such as endocarditis. In a patient with predisposing risk factors for infective endocarditis, early diagnosis is essential and empiric therapy with vancomycin should be initiated when *C. striatum* is suspected as a causative agent. Removal of medical devices and valve surgery may also be required for a successful outcome.

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