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Corynebacterium striatum: An Increasingly Important Cause of Lethal Infective Endocarditis after Trans Catheter Aortic Valve Replacement

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Abstract

This case report presented a case of infectious endocarditis due to *Corynebacterium striatum* in a patient with complaints of fevers and chills 2 months after having a Trans catheter aortic valve replacement (TAVR) for severe symptomatic aortic valve stenosis. The organism exhibited sensitivity to daptomycin, rifampin, gentamicin and vancomycin. The selection of the antibiotic regimen and length of therapy was made according to surgical aortic valve replacement guidelines (SAVR).

This case emphasise the importance of early institution of therapy to optimize positive outcomes.

Keywords *Corynebacterium striatum*; Lethal infective; Endocarditis; Catheter

Learning Objectives

Highlight the management of infective endocarditis after TAVR.

Introduction

Infective endocarditis (IE) is a rare though serious complication of TAVR. This complication has a high morbidity and mortality because patients suffering from aortic stenosis are usually elderly with multiple high risk comorbidities. IE after TAVR has been reported in the literature in few cases, only 0% to 2.3% of patients enrolled in large TAVR cohorts [1]. Corynebacterium species live commensally on the skin and have rarely been associated with endocarditis; however, this species can be found in the initial set of blood cultures and requires dedicated investigation to clearly establish its relationship with IE. Its association may be ascribed to periprocedural contamination, parenteral drug use, or increased vulnerability due to pre-existing heart disease [2].

Case Presentation

Initial presentation and history

An 89 year old male with prior St.Jude mitral valve replacement in 1997, biventricular implantable cardioverter defibrillator (ICD), and recently TAVR via transfemoral route with a 31-mm Sapien 3 bioprosthesis valve performed 2 months prior presentation to the emergency department with a 5 days history of progressive shortness of breath and fever. Past medical history was remarkable for hypertension, chronic congestive heart failure, chronic atrial fibrillation, adrenal insufficiency, dementia, benign prosthetic hypertrophy, and severe osteoarthritis.

Physical examination and emergency department course

The patient was afebrile (36.3°C) with a blood pressure of 151/57 mm Hg. Cardiac exam presented a grade II/VI systolic ejection murmur at the apex, a prosthetic click heard along with the first heart sound, bilaterally clear lung fields, and trace edema on lower extremities. No stigmata of endocarditis such as Janeway lesions, Osler's nodes, or Roth spots, were noted. Laboratory testing revealed a white blood cell count of 4.4 cells/μL, hemoglobin 9.4 g/dL, serum creatinine level of 1.0 mg/dL, C-reactive protein of 6.7 mg/dL and an international normalized ratio of 2.5. Chest radiograph revealed moderate cardiomegaly, normal pulmonary vascularity and no infiltrates or consolidations. An electrocardiogram showed possible atrial fibrillation and ventricular paced rhythm. A transthoracic echocardiogram (TTE) showed prosthetic valves in the mitral and aortic positions, as well as device wires in right atrium and right ventricle. The aortic valve prosthesis was stable, rocking, with trace to mild periprosthetic regurgitation but novegetations nor obvious periprosthetic space noted. Urinalysis was unremarkable and urine culture was negative. 4 sets of blood cultures were drawn and intravenous vancomycin and ceftriaxone were started for suspected IE.

Clinical course

The following days, the patient remained afebrile and without signs of respiratory or cardiac decompensation. On gram staining of the blood culture taken on admission, the cells appeared primarily as gram positive *coccobacilli* bacteria. Blood cultures were incubated for a period of 3 days in blood media and chocolate agar. The bacterium was described as slowly growing, non-hemolytic, greyish transparent, forming small colonies, highly suggestive of *Corynebacterium* species. Based on the results of the RapID™CB plus panel, (which is helpful for identifying anaerobes, coryneform gram-positive *Bacilli enterics*, nonfermenters, *streptococci*, and *yeast* all within 4 hours) a profile number was generated identifying the organism as *Corynebacterium accolens*. The same combination therapy was continued. Due to the need of a clear identification, the organism was sent for further investigation to a different microbiology laboratory.

The findings of this second laboratory differed from those of the initial one, since the organism was found to be *Corynebacterium striatum* resistant to ceftriaxone 4, clindamycin >2, penicillin 4, and sensitive to vancomycin<=1, rifampin <=0.50, linezolid <=0.50, gentamycin 4, and daptomycin <=0.25. The medications were adjusted according to this list. Vancomycin 1250 mg every 24 hours was continued and ceftriaxone was replaced with rifampin 600 mg by mouth every 24 hours.

A TEE demonstrated St. Jude tilting disk mechanical mitral valve prosthesis present with small paravalvular leak and trace to mild mitral valve regurgitation. Prosthetic aortic valve in place with trivial mild periprosthetic leak. A pacer wire in the right atrium and right ventricle was detected without signs of vegetations.

The patient received treatment as IE and was discharged on the mentioned antibiotic regimen to be continued for 6 weeks.

Discussion

IE often presents in an occult fashion, and early diagnosis depends on a thorough history and physical exam and a high index of clinical suspicion. Accurate identification of the causative organism is key as it will determine treatment, will allow. The case patient met 3 minor Duke clinical criteria, making possible IE our working diagnosis.. We suspect that periprocedural contamination during the transfemoral TAVR 2 months ago may have been the port of entry of *Corynebacterium striatum* [1]. This patient with pre-existing heart disease presented with fever for 5 days, positive blood cultures for a rare but increasingly recognized causative organism for IE [3,4]. There were no signs of cardiac decompensation during hospital stay. Gastrointestinal and urinary sources of infections were ruled out with cultures. Keeping pace with the stream of emergent procedures to treat valvular conditions.This case underscores that IE after TAVR deserves prompt diagnosis and treatment. Until further evidence is present, IE after TAVR should be managed according to SAVR guidelines [1-3].

The diagnosis of possible IE has had variable definitions, from Von Reyn's criteria to the currently in practice Modified Duke's criteria, because IE can be a difficult diagnosis to make. Some authors believe that patient with possible IE (defined as 3 minor criteria according to the Modified Duke criteria) manifest findings that are sufficiently suggestive to not reject this diagnosis [5] and should be treated without delay. Among the presenting symptoms fever is a non-specific but the most frequent one. Among the clinical findings, cardiac murmurs in a febrile patient should alert to IE, especially if newly occurring regurgitant murmurs or growing intensity of preexisting regurgitant murmurs [6]. Blood cultures are the primary investigation in the diagnosis of IE and yield the causative micro-organism in up to 95% of cases. Careful collection and culture assist in the correct identification of the causative micro-organisms, and ultimately the correct use of antibiotics. Echocardiography is another key investigation as it can assess underlying cardiac function. Vegetations on prosthetic valves cannot be reliably detected by TTE, but even with TEE, which is the preferred technique to distinguish between tissue degeneration and small vegetations, detection may not be possible [7]. In patients who meet the Modified Duke criteria for possible IE, it is necessary to start therapy as soon as possible.

Corynebacterium endocarditis

Corynebacterium striatum has been widely described in cases of native valve IE, but few cases of prosthetic aortic valve endocarditis have been reported. Mashavi et al in 2006 reported the first case of successful medical treatment of prosthetic mitral valve endocarditis due to C. striatum [4], emphasizing the complicated clinical course, since then it has been identified in infecting pacemaker leads and prosthetic valves. *C. striatum, C. jeikeium and C. hemolyticum* are associated with nosocomial risk factors [8]. The most common portal of entry is the skin, although it is also found in the upper respiratory system.

Diagnosis of *Corynebacterium striatum* endocarditis is similar to that of endocarditis caused by other micro-organisms. Thorough investigation should be completed to lead to a clear indentification of the sub-specie and its susceptibility to antibiotics. Empiric treatment with vancomycin plus gentamicin, rifampin or cefepime has been reported as effective and is recommended [6]. Mortality rate due to *Corynebacterium striatum* endocarditis is high. Puls et al reported a 38% mortality on their single center cohort study [8].

Summary

IE is a serious complication of TAVR and occurs in 0.3 to 2.3% of patients per year. This complication has a high in hospital mortality up to 38% [1]. The presentation may be atypical depending on the causative organism, which can cause a delay in the diagnosis and treatment. Despite a sound diagnostic approach, we may not be able to fully fulfill the diagnostic criteria. In order to reduce the risk of sub sequential complications, the decision to institute an appropriate empirical treatment should be made early on in the disease process.

Corynebacterium striatum is now a recognized pathogenic microorganism capable of causing IE with high mortality.

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Disclosures

None.

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