Burkholderia cepacia: A Rare Source of Endocarditis

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ABSTRACT

A 37-year-old male with a past medical history of previous mitral valve replacement due to bacterial endocarditis and intravenous (IV) drug use was found to have Burkholderia cepacia bacteremia. Transesophageal echocardiogram revealed large mitral and tricuspid valve vegetations. Medical management was initially attempted but his bacteremia persisted, and he required urgent prosthetic mitral valve replacement and native tricuspid valve replacement. Prosthetic valve endocarditis has been associated with surgery in 48.9% of patients and a mortality of 22.8%. In patients with prosthetic valve endocarditis due to B. cepacia, valve replacement occurred in approximately 61.5% of patients and mortality is estimated to be 33.3%. To our knowledge, this is one of only a few prosthetic valve endocarditis cases caused solely by B. cepacia and our case is the first to affect multiple valves including prosthetic and native valves.

KEYWORDS: Burkholderia cepacia, infective endocarditis, prosthetic valve endocarditis

INTRODUCTION

Infective endocarditis (IE) is an infection of the native valves, prosthetic valves, or endocardium that can cause significant morbidity and mortality in those affected. Mortality estimates are as high as 25%. The incidence of IE in the United States increased from 11 per 100,000 population to 15 per 100,000 population over a 10-year period (2000–2011).

Most cases are caused by Streptococci viridans, Staphylococcus aureus, and enterococci. Primary risk factors include structural heart disease, congenital heart defects, prosthetic heart valves, and intravenous drug use (IVDU). Clinical manifestations are variable; patients may present with fever, chills, anorexia, myalgia, night sweats, and weight loss. Diagnosis of infective endocarditis is made using the Modified Duke Criteria. Medical treatment options can be elucidated by susceptibility studies, while size of vegetations, valve function, and ejection fraction can help determine need for surgical intervention. For rare pathogens, it is important to review both susceptibility studies and prior literature to determine best treatment modalities.
chronic, residual, left-sided deficit, and mitral valve replacement due to bacterial endocarditis with an uncomplicated hospital course in 2018.

Three years later, he developed chest discomfort and progressive shortness of breath, leading him to seek care at an outside hospital, where he received broad-spectrum antibiotic therapy. He eloped two days later from their facility, after initiating treatment there with vancomycin and piperacillin/tazobactam. Several days later, he re-presented to our hospital. He was tachycardic and afebrile on presentation. His labs revealed leukocytosis. Serial blood cultures revealed bacteremia with *Burkholderia cepacia*. Transthoracic (TTE) and transesophageal (TEE) echocardiography demonstrated a mobile mass in his prosthetic mitral and native tricuspid valves (Figures 1, 2). Mild tricuspid and mitral insufficiency were originally noted with an ejection fraction (EF) of 50%. Ceftriaxone and doxycycline were initially given, but he was transitioned to ceftazidime, meropenem, and sulfamethoxazole-trimethoprim. The patient’s bacteremia persisted despite treatment. Subsequently, he was taken to the operating room for an urgent mitral valve replacement. During the operation, it was revealed that his prosthetic mitral valve was completely destroyed with vegetations. Postoperative hospital course was uncomplicated, and the patient was discharged with outpatient follow-up.

**DISCUSSION AND LITERATURE REVIEW**

Our patient was found to have *Burkholderia cepacia* endocarditis in both native and prosthetic valves. This microbe is a catalase-positive, aerobic, lactose-producing, gram-negative bacillus that mostly affects immunocompromised individuals. It has a predilection for cystic fibrosis (CF) and chronic granulomatous disease (CGD) patients. It also affects patients with intravenous drug use (IVDU). This bacterium is ubiquitous and is commonly found in water and soil; it can survive in harsh environments and can live in 10% iodine solution for greater than one year.

Only 15 cases of infective endocarditis attributed to *B. cepacia* have been reported in English-language literature. Prior cases describe patients with similar comorbidities of IVDU and prior history of endocarditis. These patients were mostly treated with combinations of vancomycin and cefepime, or Sulfamethoxazole-trimethoprim and meropenem. Despite medical treatment, most of these patients ultimately required valvular surgery. Only one patient, an immunocompetent woman with no known risk factors, was found to have *B. cepacia* endocarditis. She was medically managed with ceftriaxime for six weeks and then outpatient ciprofloxacin for two weeks; she continued to do well at a two-year follow-up. Sulfamethoxazole-trimethoprim is the drug of choice for *B. cepacia* infection. Prior to initiation of antibiotics, cultures should be obtained; sensitivity analysis should be performed due to high resistance. Antibiotics should be continued for six weeks.

We treated our patient with ceftazidime, meropenem, and sulfamethoxazole-trimethoprim. His bacteremia persisted despite optimal medical treatment. Based on American Heart Association/American College of Cardiology and the European Society of Cardiology guidelines, early surgery is considered in patients with severe valvular pathology, signs of heart failure, heart block, annular abscess, fungal or highly resistant organisms, and in recurring emboli or enlarging vegetations. Our patient ultimately required both native and prosthetic valve replacements.

Few cases of prosthetic valve endocarditis (PVE) have been reported. Surgery was performed in 48.9% of PVE patients (repair or replacement). An associated mortality of 22.8% has been reported for PVE. Heart failure is the most common complication of PVE, with an incidence of up to 56%. The most common cause of sudden death is disruption of the valve. It is necessary to perform TEE on patients with suspected prosthetic valve endocarditis, as sensitivity ranges from 82% to 96% in comparison to TTE with the sensitivity of 17% to 36%. TEE is the gold standard for the diagnosis of PVE.

Incorporating our case to prior literature review data on PVE caused by *B cepacia*, results in valve replacement rate of 61.5% and a mortality rate of 33.3%, which are higher than seen in PVE of all sources. There seems to be increased mortality and necessity for prosthetic valve replacement in IE associated with *B. cepacia*. We hypothesize that the increased morbidity and mortality associated to this organism is due to its virulence factors and immune-mediated tissue damage. This organism is known to induce virulence through exopolysaccharide production associated
with evasion of host response and lipopolysaccharides contributing to immune-mediated tissue damage. There may be a similar pathogenesis contributing to increased tissue damage in patients with IE.

Further research will be required to understand the pathogenesis of this organism in IE. To our knowledge, our patient is the first to have native tricuspid valve endocarditis and prosthetic mitral valve endocarditis attributed to a single pathogen origin of *B. cepacia*.

References