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Multivalvular Endocarditis Involving 3 Valves in a Nonsurgical Candidate

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Abstract

Infective endocarditis is associated with high morbidity and mortality. Hence, early diagnosis and prompt intervention is crucial. Multivalvular endocarditis involving 3 or more valves is rarely reported with little information regarding best management or prognosis, particularly in nonsurgical patients. Conflicting guidelines regarding medical versus surgical treatment in multivalvular endocarditis exist with few studies describing the outcome of medically managed patients. We report the case of a previously healthy male presenting with infective endocarditis involving 3 valves further complicated by multiple septic emboli and deemed a nonsurgical candidate.

Keywords

endocarditis, emboli, management, trivalvular, multivalvular

Introduction

Infective endocarditis (IE) is an acute or subacute infection of the endocardium with predilection for heart valve involvement. With an incidence of 15 000 cases per year in the United States, early diagnosis and prompt intervention is key to avoid high morbidity and mortality.[1] Predisposing risk factors include structural heart disease, presence of a prosthetic valve or cardiac device, intravenous (IV) drug use, immunosuppression, or recent invasive procedures.[2]

Staphylococci and *Streptococci* collectively account for 80% of IE, while 10% are considered culture-negative.[2] Numerous systemic complications can result when fragments of the platelet-fibrin matrix dislodge from the vegetation and travel. These septic emboli may cause infarction, visceral abscesses from embedded bacteria, or extracardiac manifestations from immune complex deposition or direct seeding.[2] Initial septic embolization characteristics are nonspecific and often go unrecognized by clinicians. Clinical features such as low-grade fever, cough, and hemoptysis are comparable with other pathologies, thus delaying diagnosis.[3] The diagnosis of IE is based on a combination of clinical presentation, positive blood cultures, and echocardiographic characteristics.[1] The current diagnostic gold standard is based on the modified Duke criteria, which is both sensitive and specific for IE based on major and minor criteria.[4]

Endocarditis involving 3 or more cardiac valves is highly uncommon. In most cases, vegetations are found on a single valve.[5] Conflicting mortality rates have been reported regarding medical versus surgical management in multivalvular endocarditis. Few studies describe the outcome of patients medically managed. We report the case of a previously healthy male without underlying structural heart disease presenting with IE involving 3 valves further complicated with multiple septic emboli and ultimately deemed a nonsurgical candidate.

Case Report

A 57-year-old male presented to the emergency department with shortness of breath over the past 4 months. Additionally, he reported fevers, chills, night sweats, weight loss, and back pain. His past medical history includes remote coccidioidomycosis, iron deficiency anemia, hypertension, and diabetes mellitus without a record of IV drug use. The patient was initially being treated for the possible recurrence of coccidioidomycosis by his outside primary care physician. Pending serologies, a chest, abdomen, and pelvis computed tomography was performed revealing multiple pulmonary nodules and cavitary lesions consistent with septic emboli (Figure 1). In addition, coccidioidomycosis serologies came back negative. The patient's clinical status further declined, notable for

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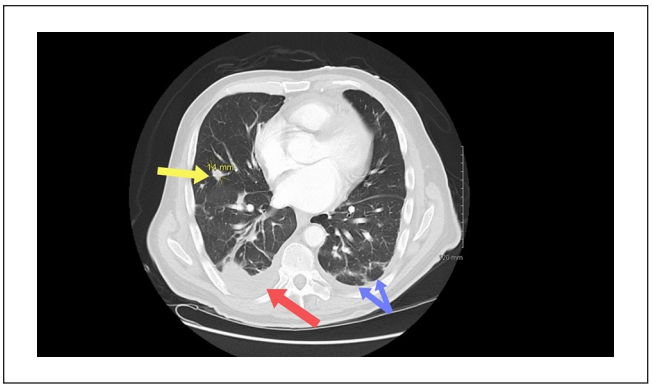

Figure 1. Chest computed tomography showing multiple pulmonary nodules, septic emboli measuring 14 mm (yellow arrow) with feeding vessel sign, right-sided pleural effusion (red arrow), and left-sided subpleural wedge-shaped densities without necrosis (blue arrows).

new-onset dyspnea at rest, intermittent chest pain with palpitations, and continued fever, chills, and night sweats, all of which prompted him to seek emergency care.

On physical examination, the patient was afebrile, tachycardic (heart rate: 145 bpm), hypertensive (blood pressure: 166/68 mm Hg), and tachypneic (respiratory rate: 30 breaths/min) with an oxygen saturation of 98% on room air. Cardiac auscultation revealed a grade 3/6 holosystolic murmur at the left sternal border and jugular venous distension. Bibasilar crackles were heard on lung auscultation. The patient had tenderness over his lower thoracic vertebrae and limited range of motion due to pain. There were no classic skin lesions associated with IE. Laboratory investigations were significant for leukocytosis (white blood cell count: 12.0 $\times$ 10^9/L) and microcytic anemia (hemoglobin: 7.6 g/dL) with normal ferritin value, and erythrocyte sedimentation rate of 68 mm/h. Troponin was elevated at 0.52 ng/mL and B-type natriuretic peptide at 997 pg/mL. Serum electrolytes and renal function tests were within the normal range. Apart from a positive rheumatoid factor, the autoantibody screen was negative. Urinalysis showed microscopic hematuria with macroalbuminuria. Normal sinus rhythm with left axis deviation was confirmed with electrocardiogram. Magnetic resonance imaging showed spondylodiscitis with vertebral osteomyelitis at the T12/L1 level (Figure 2).

Transthoracic echocardiography revealed biventricular dysfunction with an estimated ejection fraction of 25% to 30%, multiple vegetations on the aortic (Figure 3), pulmonic (Figure 4), and tricuspid (Figure 5) valves measuring 0.9 $\times$ 0.8 cm, 1.4 $\times$ 1.1 cm, and 1.4 cm, respectively. Blood cultures were obtained followed by empiric IV therapy with vancomycin and piperacillin/tazobactam. Blood cultures were positive for *Streptococcus mutans*; sensitive to ceftriaxone, cefotaxime, and benzylpenicillin (minimum inhibitory concentration $<$0.12, $<$0.12, and $<$0.06 mg/L,

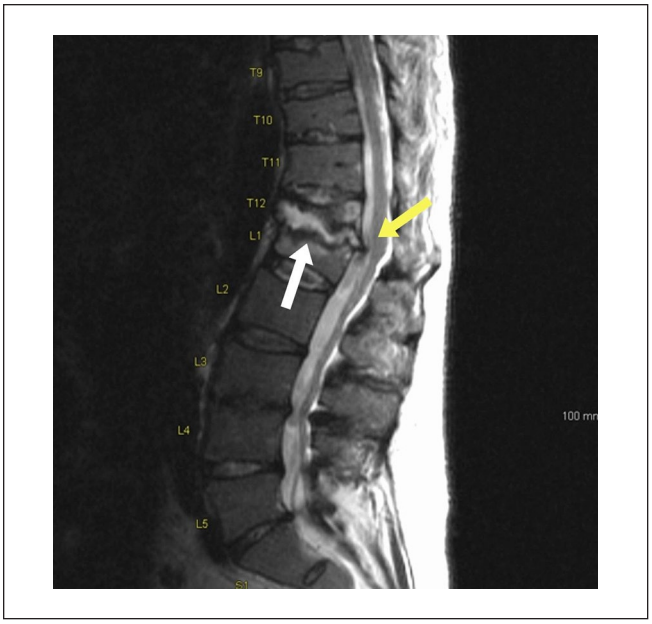

Figure 2. Magnetic resonance imaging of lumbar spine showing spondylodiscitis with vertebral osteomyelitis at T12/L1 level (white arrow), high signal intensity throughout cord with evidence of impingement (yellow arrow).

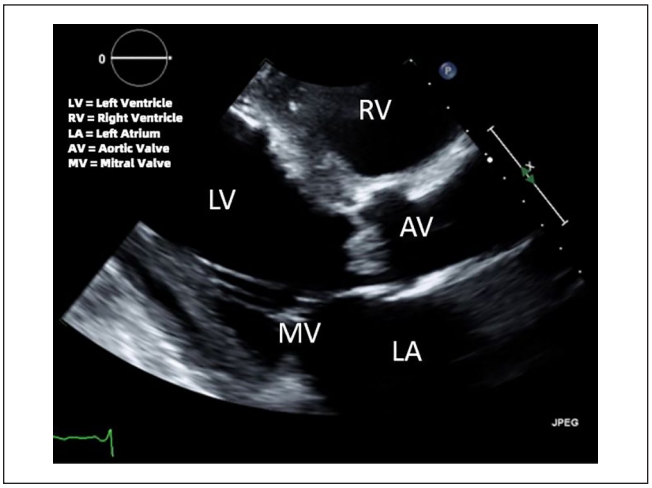

Figure 3. Transthoracic echocardiography showing vegetation attached to the aortic valve.

respectively). Antibiotic regimen was modified accordingly for optimal treatment. The patient was started on a 6-week course of IV ceftriaxone. Subsequent panoramic radiography revealed extensive dental disease. The patient was transferred to a tertiary care center for possible surgical intervention. His hospital course was complicated by an embolic stroke with residual left-sided hemiparesis and dysphagia requiring open gastrostomy tube placement. Additionally, the patient developed multiple pulmonary emboli and respiratory failure necessitating IV heparin.

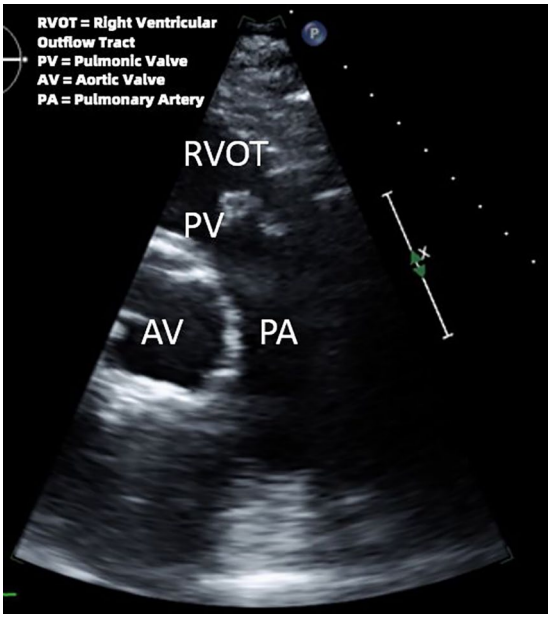

Figure 4. Transthoracic echocardiography showing vegetation attached to the pulmonic valve.

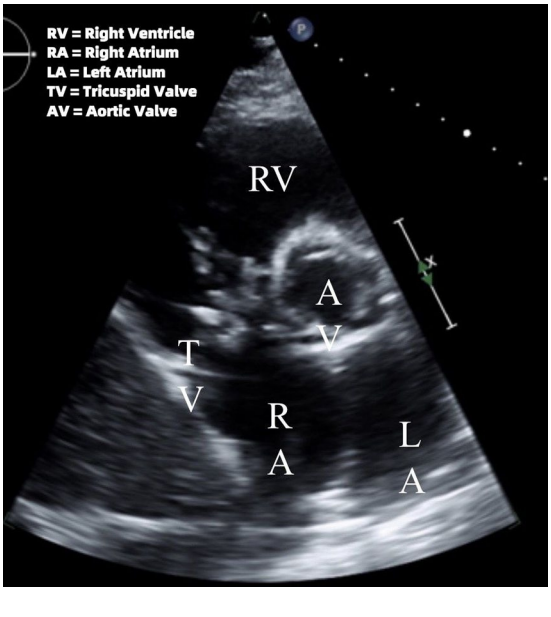

Figure 5. Transthoracic echocardiography showing vegetation attached to the tricuspid valve.

Ultimately, the patient was deemed a poor surgical candidate and transferred back to our hospital. The patient currently presents with worsening aortic regurgitation and dilated cardiomyopathy.

Discussion

The diagnostic challenge in our case was our patient's prior history of coccidioidomycosis. With indistinguishable symptoms to IE, initial misdiagnosis as coccidioidomycosis prevented the patient from receiving prompt antibiotic treatment, contributing to a prolonged hospital course, and life-threatening complications. Coccidioidomycosis is an endemic fungal infection found predominantly in the Southwestern United States where our patient is from.[6] The majority of cases present with pulmonary symptoms with 5% to 10% complicated by sequelae including nodules or peripheral thin-walled cavities, as demonstrated on our patient's computed tomography imaging.[6] Although coccidioidomycosis recurrence is relatively uncommon, the patient's radiographic findings were consistent with a primary pulmonary infection. Consequently, this led to a delay in starting antimicrobial treatment for IE. In an endemic area, clinical suspicion for coccidioidomycosis should remain high, particularly in a patient presenting with shortness of breath and constitutional symptoms. However, negative serologies should warrant alternative differentials.

Our case isolated *Viridans streptococci* as the causative organism. *Streptococcus mutans* accounts for 1.7% to 14% of streptococcal IE cases.[7] Many of the *Viridans streptococcal* species are part of normal microbial flora and are most prevalent in the oral cavity. Because *Streptococcus mutans* is usually a left-sided organism, inoculation is assumed to occur through a patent foramen ovale; however, our patient did not have a patent foramen ovale.[8] Bacteremia presumably occurred secondary to his underlying dental infection. His history of worsening back pain due to spondylodiscitis is suggestive of prolonged bacteremia. Although the patient had a structurally normal heart, he did have diabetes mellitus and gout, which renders an individual more susceptible to infections. Still, multivalvular endocarditis is exceedingly uncommon.[7]

Triple valve surgery for endocarditis continues to be challenging with limited data to guide best management. Multivalvular endocarditis has a poor clinical course with contradictory reports in statistics and recommendations.[8] Kim and colleagues found the mortality rate in patients with multivalvular infection was slightly higher at 21% compared with single valve at 18%.[9] This statistic further increases with surgical intervention. Patients undergoing 3-valve surgery have a mortality rate up to 25%.[9] However, in a similar study, Lopez et al found no difference in mortality rates between multivalvular versus single-valve endocarditis likely due to aggressive therapy.[10]

According to the literature, early operative intervention while the patient is receiving antibiotic treatment is recommended to avoid complications such as systemic embolization, progressive heart failure, or irreversible structural damage.[5] In a retrospective single-institution study reviewing multivalvular surgical patients, Yao and colleagues

concluded radical valvular and paravalvular resection with as needed valvuloplasty or valve replacement produced satisfactory in-hospital and long-term results, similar to patients with single-valve IE.[11] This may have been an option for our patient prior to the complications that ruled him out as a surgical candidate.

Although occasional reports on outcomes of surgical intervention exist, cases of therapeutic management are scarce. Sheikh et al reported the case of a 48-year-old male with triple-valve IE medically managed successfully.[8] Although this patient was an IV drug user, he was similarly infected by *Streptococcus mutans* and started on an antibiotic regimen of gentamicin for 2 weeks, benzylpenicillin for 6 weeks, followed by vancomycin for 1 week. He was discharged home and remained clinically stable at his 3-month follow-up. This case provides hope for our nonsurgical patient. Further documented cases are warranted to optimally manage these complex patients.

Conclusion

Infective endocarditis remains a diagnostic challenge as symptomatology is comparable with other pathologies. Multivalvular endocarditis involving 3 or more valves is rarely reported, and unfortunately, there is little information regarding best management, particularly in a patient deemed inoperable. Our patient highlights the importance of prompt identification and treatment of multivalvular endocarditis as well as the significance of documenting medically managed triple-valve endocarditis to help establish therapeutic guidelines in nonsurgical candidates.

Authors' Note

This case was presented as an abstract at the Kern Medical Research Forum, Bakersfield, CA, on May 2, 2019.

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Declaration of Conflicting Interests

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Ethics Approval

Ethical approval to report this case was obtained from the institutional review board (#18110).

Informed Consent

Written informed consent was obtained from the patient for their anonymized information to be published in this article.

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