Case Report/Relato de Caso

Challenge in the management of infective endocarditis with multiple valvular involvement

Desafio no manejo clínico da endocardite infecciosa com acometimento multivalvar

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ABSTRACT

We describe the case of a 41-year-old man with congenital heart disease and infective endocarditis (IE), who presented multiple vegetations attached to the pulmonary, mitral, and aortic valves. Three valve replacements were performed, but the patient developed an abscess at the mitral-aortic intervalvular fibrosa and died due to sepsis. We briefly discuss the indications for surgery in IE, emphasizing its role in the treatment of uncontrolled infection.

Keywords: Infection. Endocarditis. Surgery. Valves.

RESUMO

Paciente do sexo masculino, 41 anos, portador de cardiopatia congênita apresentando-se com endocardite infecciosa (EI) e vegetações nas valvas pulmonar, aórtica e mitral. Três trocas valvares foram realizadas, mas o paciente evoluiu com recidiva da infecção, desenvolvendo abscesso na região da fibrosa intervalvar mitro-aórtica progredindo para sépsis e óbito. Nesse relato, discutimos brevemente as indicações para a cirurgia na EI, destacando sua indicação no tratamento da infecção não controlada.

Palavras-chaves: Infecção. Endocardite. Cirurgia. Valvas.

INTRODUCTION

Infective endocarditis (IE) remains a medical challenge. Despite major advances in both diagnostic and therapeutic procedures, this disease still carries a poor prognosis and a high mortality rate.

IE is not a uniform disease but presents a variety of forms, varying according to the initial clinical manifestation, the underlying cardiac disease, the microorganism involved, and the presence of complications. Thus, clinical decision-making is difficult, especially in unusual cases where there is no uniform consensus.

Herein, we report the case of a middle-aged man with a ventricular septal defect and IE with multiple vegetations attached to three different cardiac valves. The right and left heart involvement determined a peculiar evolution that posed a challenge to management.

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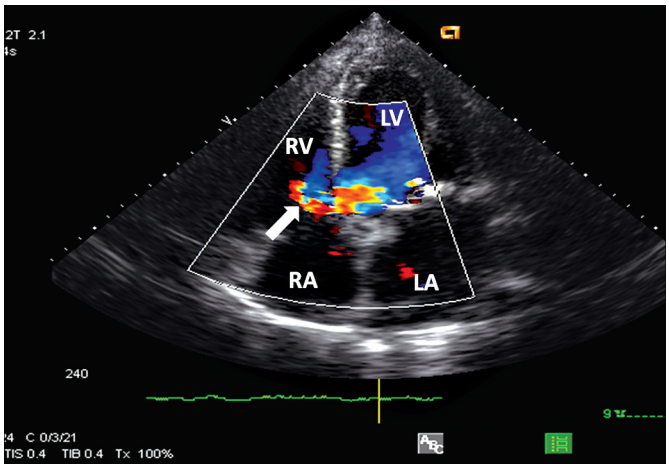
CASE REPORT

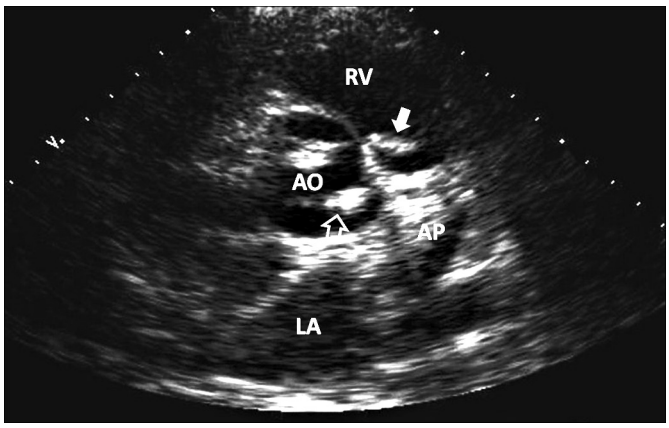
A 41-year-old man was admitted to the University Hospital, Federal University of Minas Gerais, Belo Horizonte, Brazil, with productive cough, fever, and pain upon breathing of a few weeks' duration. The chest X-ray showed a nodular image in the right lung and right pleural effusion. Due to suspicion of pneumonia, moxifloxacin was started. The patient was previously diagnosed with type-2 diabetes and a congenital ventricular septal defect.

Laboratory investigations showed hemoglobin level of 9g/dL, a white blood cell count of 9,880/μL, and C-reactive protein of 128mg/L (normal value < 5mg/L). Serum chemistry and urine analysis were normal. Blood cultures disclosed *Enterococcus faecalis* in three samples. The electrocardiogram (ECG) was unremarkable. Transthoracic echocardiography (TTE) demonstrated severe pulmonary regurgitation, a ventricular septal communication (**Figure 1**), and two vegetations: The larger one (23×11mm) was attached to the pulmonary leaflet and the other (7×7mm) to the aortic leaflet (**Figure 2**). Considering the diagnosis of IE, the initial pulmonary picture was ascribed to septic pulmonary embolism with infarction, and the antibiotic was changed to ampicilin plus gentamicin. One week later, transesophageal echocardiography (TEE) confirmed the TTE findings and additionally demonstrated a small vegetation (3×2mm) attached to the anterior mitral leaflet.



LV: left ventricle; **RV:** right ventricle; **RA:** right atrium; **LA:** left atrium.

FIGURE 1 - Transthoracic echocardiography with color Doppler showing the ventricular septal communication with a left-to-right ventricular shunt.



RV: right ventricle; **AO:** aortic valve; **AP:** artery pulmonary; **LA:** left atrium.

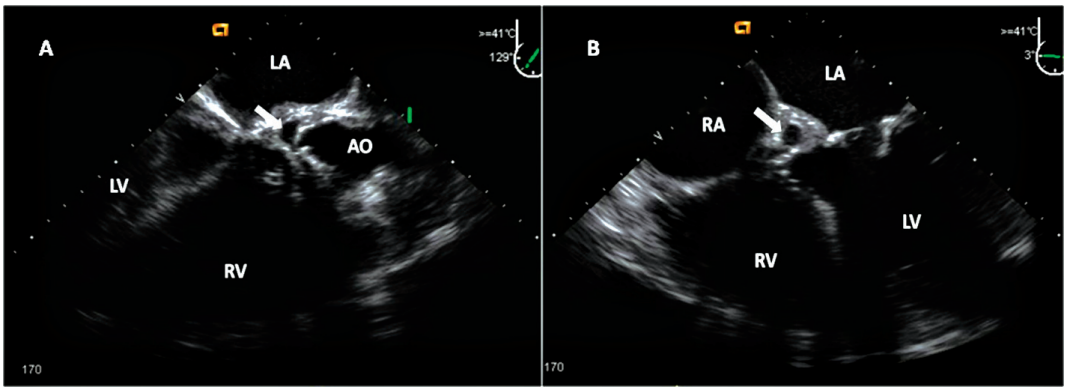
FIGURE 2 - Transesophageal echocardiogram showing vegetations attached to the pulmonary valve (full arrow) and to the aortic valve (empty arrow).

On the following 10 days of therapy, the patient remained relatively stable; however, fever persisted and the respiratory rate increased. Laboratory exams showed elevated C-reactive protein and a slight increase in the white blood cell count. New blood cultures were negative, and a new TEE revealed no further complications. Leucocytosis and the persistency of fever were attributed to infected pulmonary infarction, and meropenem was added to the antibiotic regimen. The abdominal ultrasound was unremarkable.

After a transient improvement, fever and **tachypnea** reappeared. Once again, the blood cultures were negative, and a new TEE showed no further evidence of IE complications. The unfavorable clinical evolution despite two weeks under specific antibiotic therapy was ascribed to locally uncontrolled infection, and for this reason, surgical treatment was indicated.

The surgical approach comprised aortic and pulmonary valve replacement, and ventricular septal communication repair. The patient remained stable, and the antibiotics were discontinued after six weeks. Approximately eight weeks after the surgery, fever and dyspnea reappeared. TEE revealed severe mitral regurgitation and a vegetation attached to the anterior mitral leaflet, which could be related to the primary aortic IE with aortic regurgitation. Antibiotics were restarted, and a new surgery was performed in order to replace the mitral valve.

The patient remained unstable, presenting hypotension and renal failure for approximately four weeks after this second surgical procedure. TEE performed at that time showed an echolucent area, suggestive of an abscess cavity at the mitral-aortic intervalvular fibrosa **(Figures 3A** and **B)**. Unfortunately, the patient died due to septic shock in spite of clinical treatment before a new surgical intervention could be performed.



LA: left atrium; **LV:** left ventricle; **AO:** aorta; **RV:** right ventricle; **RA:** right atrium.

FIGURE 3 (A and B) - Transesophageal echocardiogram showing an abscess evolving into an aneurysm in the mitral-aortic intervalvular fibrosa (arrow).

DISCUSSION

Infective endocarditis is clearly an evolving disease with significant changes in its epidemiological profile, surgical rates, and outcome over the last few years. Congenital heart disease is the substrate for IE in 2% to 18% of the reported cases in young adults and in 8% in older individuals[1-2]. The risk of endocarditis seems to be related to the specific type of congenital heart lesion, being higher in cases of aortic stenosis and ventricular septal defects[3].

The case reported here is very complex due to the involvement of multiple valves and infrequent in clinical practice. Moreover, according to a multicenter international database, diabetes mellitus, as presented by our patient, is an independent predictor of endocarditis in-hospital mortality[4].

Successful treatment of IE relies on microbe eradication by antimicrobial drugs. Surgery contributes by removing infected material. A difficult aspect of our case was the decision about surgical treatment. In 1961, surgery emerged as a treatment option for IE, and since then its indications have been expanded. Additionally, it has been performed earlier in the disease course[5-7].

According to the current American and European guidelines[1,8], surgical treatment should be performed in native valve IE when the following indications are present: development of heart failure, especially if moderate or severe; severe aortic or mitral regurgitation with evidence of abnormal hemodynamic status; endocarditis caused by fungi or other resistant organisms; perivalvular infection with fistula or abscess formation; and signs of uncontrolled infection, such as persistent fever and positive blood cultures beyond seven to 10 days of appropriate antibiotic therapy. Other possible indications include embolic events in spite of adequate antibiotic therapy or associated with vegetations larger than 10mm in diameter; and presence of vegetations larger than 10mm in diameter with or without embolic events, if mobile and associated with other signs of severe illness.

Considering right-sided IE, which is more frequent in intravenous drug users, surgery is recommended given the following indications: right ventricular failure due to severe tricuspid valve regurgitation,

endocarditis caused by microorganisms difficult to eradicate, and tricuspid vegetations in excess of 20mm in diameter persisting after recurrent pulmonary embolism. Our patient presented severe pulmonary valve involvement, which is not addressed by these criteria.

Although the prognosis of right-sided IE is relatively good with an in-hospital mortality rate of less than 10%[1], a vegetation length >20mm was demonstrated to be the main predictor of in-hospital death in a recent large retrospective cohort of right-sided IE[9]. This was the situation of our patient, in whom the pulmonary vegetation length was >23mm.

Our case illustrated that the approach to patients with IE must be individualized and that all the factors associated with a bad outcome identified at the time of diagnosis should be taken into account[10]. In fact, in the current case, there were initially no clear indications for surgical intervention. Successive echocardiograms showed preserved systolic function and no signs of fistulas or abscesses. The pulmonary valve, not the tricuspid, presented the most severe insufficiency. The persistent fever could be attributed to a concomitant pulmonary infection uncovered by the antibiotic regimen prescribed, and no new positive blood cultures were obtained; thus, the criteria for defining uncontrolled local infection were not completely fulfilled. The vegetation on the pulmonary valve had a diameter larger than 10mm, was mobile, and was associated with pulmonary embolism; however, the surgical indications concerning the vegetation sizes are not absolute and refer to the native left valves (aortic and mitral).

The periannular extension of the infection in IE is a serious and relatively common complication that is associated with high mortality rate[8]. It appears to be caused by bacterial invasion and destruction of the local tissue and usually leads to abscess formation. In our case, the TEE was particularly useful in the diagnosis of such lesion. Although surgical intervention is warranted when there is echocardiographic evidence of paravalvular abscess, our patient died before a new surgical intervention could be performed.

The choice of the surgical treatment was based on the unfavorable clinical evolution. The persistent fever could be related to locally uncontrolled infection is spite of the repeated negative blood cultures. In synthesis, our case did not strictly fulfill the clinical and echocardiographic criteria available for surgical indication[1,8].

In conclusion, IE has a broad spectrum of presentations, constituting a medical challenge. Important decisions, such as the need and the appropriate time for surgical intervention, do not always find support in the current consensus. Further research and the development of new criteria are necessary to guide medical management in less usual circumstances. The case described here illustrated that although patients at high risk of death may benefit from a more aggressive treatment strategy involving surgery, the infectious process may relapse and in-hospital mortality remains high.

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