

# Surgical Treatment of *Enterococcus Faecalis* Mitral Valve Endocarditis Complicated with Mycotic Aneurysm

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University of Health Sciences Turkey, Bursa City Hospital, Clinic of Cardiovascular Surgery, Bursa, Turkey

## Abstract

*Enterococcus faecalis* is a Gram-positive bacterium that can cause rapidly progressive endocarditis and requires urgent and aggressive treatment, including surgical intervention. Bacterial endocarditis may present itself with complications. Care should be taken when interpreting the differential diagnosis. In this article, we present a case of *Enterococcus faecalis* mitral valve endocarditis accompanied by subarachnoid hemorrhage and mycotic intracranial aneurysms, which are very rarely observed in the literature.

**Keywords:** Infective endocarditis, mycotic aneurysm, enterococcus faecalis, mitral valve replacement.

## Introduction

*Enterococcus faecalis* (*E. faecalis*) is a Gram-positive bacterium that can cause a wide range of neurological diseases, such as ischemic and hemorrhagic strokes, cerebral abscesses, mycotic aneurysms, meningitis, and encephalopathy<sup>(1)</sup>. Infective endocarditis (IE) due to *E. faecalis* is acute, can cause valve destruction, and is

often fatal. IE due to *E. faecalis* may require urgent and aggressive treatment, including surgical intervention. In this study, we present a case of *E. faecalis* mitral valve endocarditis accompanied by subarachnoid hemorrhage and mycotic intracranial aneurysms, which are rarely documented in the literature. A patient with *E. faecalis* mitral valve endocarditis may initially present to the emergency department due to neurological complications.



**Address for Correspondence:** Nöfel Ahmet Binicier

University of Health Sciences Turkey, Bursa City Hospital, Clinic of Cardiovascular Surgery, Bursa, Turkey

**Phone:** +90 505 925 83 22 **e-mail:** dr.n.a.b@hotmail.com **ORCID:** orcid.org/0000-0001-8857-2596

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It is crucial to exercise careful consideration in the differential diagnosis.

## Case Presentation

A 61-year-old male patient was admitted to the emergency department with complaints of persistent weakness, fever, weight loss, and sudden collapse. An increase in body temperature, C-reactive protein, and white blood cell counts was observed. Computed tomography angiography (CTA) revealed a subarachnoid hemorrhage. Multiple small aneurysms (<2-3 mm) were identified in the right middle cerebral artery (MCA), including saccular and fusiform types in the M2 distal and M3 areas, and fusiform aneurysms in the left MCA M2 distal area. Neurosurgical consultation was performed, and surgical intervention was recommended. The patient was admitted to the neurosurgical intensive care unit and evaluated by an infectious disease specialist. Cerebrospinal fluid and blood samples were collected, and empiric parenteral antibiotics were initiated for suspected meningitis. The patient underwent emergency surgery by a neurosurgical team. The blood in the subarachnoid space was evacuated, and the aneurysms responsible for the hemorrhage were successfully controlled using the surgical clipping method. Postoperative follow-up revealed a body temperature of 38.5 °C, tachycardia (114/min), hypotension (90/60 mmHg), and mild preibial edema. A pansystolic murmur was detected at the apex during cardiac auscultation. CTA showed no evidence of subarachnoid hemorrhage or intracranial aneurysm. Transthoracic echocardiography revealed vegetation in the mitral valve, which is indicative of infective endocarditis. Transesophageal echocardiography was planned to further evaluate the mitral valve structure. The patient was transferred to the cardiology intensive care unit. Blood cultures grew *E. faecalis*, whereas cerebrospinal fluid cultures remained negative. The patient was re-consulted for infectious diseases, and cultures were repeated according to the IE protocol. Parenteral antibiotics were initiated for *E. faecalis* endocarditis. Significant vegetation was detected on both mitral leaflets

on transesophageal echocardiography, with 20 mm mobile vegetation and chordal rupture on the posterior leaflet and 14 mm vegetation on the anterior leaflet. Severe mitral regurgitation was also detected (Figure 1a). The patient was transferred to the cardiovascular surgery department for mitral valve replacement. Although biological mitral valve replacement was recommended, the patient preferred mechanical valve replacement to avoid another heart surgery in 15-20 years. An opinion was obtained from the neurosurgeon regarding the risk of intracranial bleeding associated with mechanical valve replacement, which was presented to the patient. After discussing the risks, the patient and his relatives accepted the risks and insisted on mechanical mitral valve replacement. Informed consent was obtained from the patients prior to the procedure. However, rapid clinical deterioration and acute pulmonary edema necessitated emergency cardiac surgery.

## Surgical Procedure

After adequate heparinization, median sternotomy was performed. Aortic artery cannulation and bicaval venous cannulation from the right atrium were performed. A vent cannula was inserted into the right upper pulmonary vein. Cardiac arrest was induced using antegrade del Nido cardioplegia after aortic cross-clamping. The mitral valve was accessed through a transeptal approach, revealing vegetation on the anterior and posterior leaflets, as well as ruptured chordae tendineae (Figures 1b-d). Both mitral leaflets and their associated vegetation were excised (Figures 2a, b). The ruptured chordae tendineae were also excised. The area was thoroughly irrigated with physiological saline and aspirated. Mechanical mitral valve replacement (St. Jude, no.: 33, USA) was performed (Figures 2c, d). After the procedure, the cross-clamp was removed, and weaning from CPB was uneventful (Video 1). Intraoperative transesophageal echocardiography showed that the implanted mitral valve was functioning properly with no significant transvalvular gradient. The patient was extubated early in the postoperative period. *E. faecalis* was cultured in tissue and

blood. The patient received *E. faecalis*-sensitive parenteral antibiotics for six weeks and was discharged without any complications. Clinical and echocardiographic follow-up at six months postoperatively were unremarkable.

## Discussion

*E. faecalis* is an opportunistic Gram-positive bacterium that lives in the gastrointestinal tract of humans. *E. faecalis* accounts for 5-15% of all IE cases. It is the third leading cause of IE worldwide, after *Viridans streptococci* and *Staphylococcus aureus*. *E. faecalis* IE is a serious infection with high mortality (20-40%) despite significant advances in antimicrobial therapy. Unlike other types of infective endocarditis, approximately 40% of patients with *E. faecalis* require surgical intervention<sup>(2)</sup>.

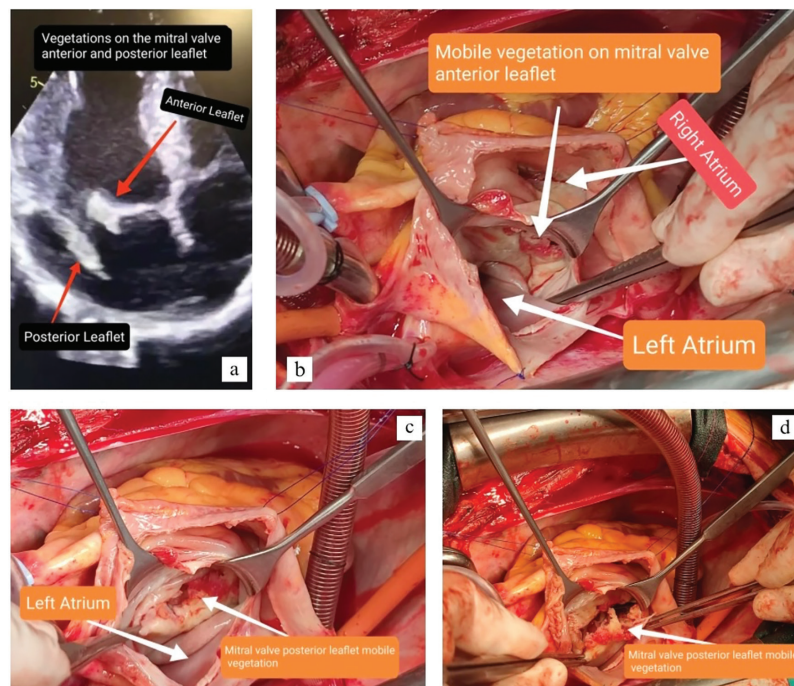
The diagnosis of IE is usually based on clinical findings, blood cultures obtained following the endocarditis protocol, and echocardiographic findings.

IE complicated by severe mitral or aortic valve stenosis or regurgitation, uncontrolled intracardiac abscess, pseudoaneurysm, fistula, rapidly enlarging vegetation, vegetation  $\geq 10$  mm with recurrent embolic events, or vegetation  $\geq 15$  mm, refractory pulmonary edema, or cardiogenic shock, despite optimal medical therapy warrants consideration of cardiac surgery<sup>(3)</sup>. We performed emergency surgery because of severe mitral insufficiency and rapidly progressing pulmonary edema.

Valve replacement is preferred for patients with infected endocarditis. Defects caused by debridement should be repaired with plegitic sutures. Valve replacement should be performed after establishing a clean, solid, and safe area for valve replacement has been established<sup>(4)</sup>.

Atherosclerosis, diabetes, chronic kidney disease, male sex, advanced age, and immunosuppressive states are important risk factors for mycotic aneurysms<sup>(5)</sup>.

CTA, magnetic Resonance Imaging, and digital subtraction angiography (DSA) are used to diagnose intracranial mycotic aneurysms.



**Figure 1.** a) Echocardiographic image of vegetation on the mitral valve b) Surgical image of vegetation on mitral valve c) Surgical image of vegetation on the mitral valve posterior leaflet d) Surgical image of mobile vegetation on the mitral valve posterior leaflet

DSA is the gold standard for diagnosis. The shape, number, localization, and size change of the mycotic aneurysm is evaluated in periodic DSA. Treatment of intracranial mycotic aneurysms depends on the general health of the patient, characteristics of the aneurysm, and presence of rupture. If the patient is at very high surgical risk and the aneurysm has not ruptured, conservative treatment with antibiotics is recommended based on the results of blood and cerebrospinal fluid cultures. Surgical treatment of mycotic aneurysm includes open surgery and clipping of the aneurysm. In addition, with endovascular surgery, occlusion of the aneurysmal artery can be performed using coils or liquid embolice agents<sup>(1)</sup>. As in this case, patients with IE may present to the hospital with initial neurological complications. Care should be taken when interpreting the differential diagnosis.

## Conclusion

*E. faecalis* is a Gram-positive bacterium that can cause rapidly progressive endocarditis and requires urgent and aggressive treatment, including surgical intervention. This case demonstrates the importance of early diagnosis, appropriate antibiotic therapy, early surgical intervention, and multidisciplinary management for the successful treatment of complicated infective endocarditis. In this study, we shared a case of *E. faecalis* mitral valve endocarditis accompanied by subarachnoid hemorrhage and mycotic intracranial aneurysms, which are very rarely reported in the literature. A patient with undiagnosed IE may present to the emergency department due to initial neurological complications. IE should be considered in the differential diagnosis.

## Ethics

**Informed Consent:** Informed consent was obtained from the patients prior to the procedure.

## Authorship Contributions

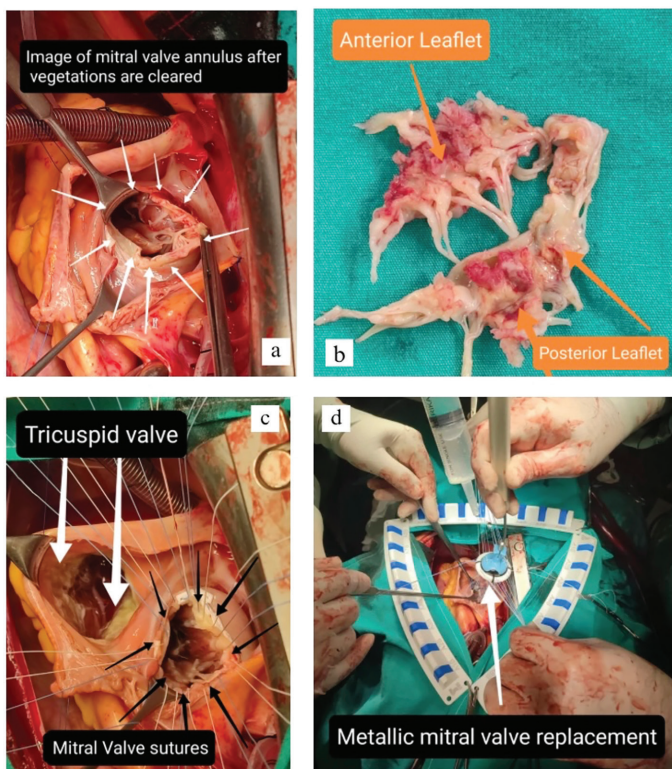
Surgical and Medical Practices: Kahraman N, Binicier NA, Concept: Kahraman N, Binicier NA, Design: Binicier NA, Data Collection and/or Processing: Binicier NA, Analysis and/or Interpretation: Binicier NA, Literature Search: Binicier NA, Writing: Binicier NA.

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**Figure 2.** a) Image of vegetation on the mitral valve b) Image of an infected mitral valve c) Placement of mitral valve sutures d) Mechanical mitral valve replacement image

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**Video 1.** All stages from the beginning to the end of mitral valve infective endocarditis  
[https://www.youtube.com/watch?v=aewzibB4\\_rk](https://www.youtube.com/watch?v=aewzibB4_rk)

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