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INTRODUCTION

Infective endocarditis (IE) is a challenging disease because of different clinical *Enterococcus faecalis* presentations, the possibility of embolic events, and a wide array of causative organisms. Mortality levels among the patients with IE can be up to 20-40% (1). Mostly, gram-positive bacteria, for example, staphylococci and streptococci cause IE. But, in rare cases, *Citrobacter koseri*, *Escherichia coli*, *Clostridium species*, *Finexgoldia magna* and other gas-producing organisms also can cause the development of IE (2-4). Enterococci, mainly *Enterococcus faecalis* can develop IE approximately in 5-20% of cases. Enterococcal IE is mostly seen in old males and the

Native valve endocarditis of aortic and mitral valve involving left coronary artery ostium and interventricular septum: Medical and surgical therapy

Abstract

Infective endocarditis (IE) is an infection of the inner lining of the heart muscle (endocardium) caused by bacteria, fungi, or germs that enter through the bloodstream. Despite improvements in its management, IE remains associated with high mortality and severe complications. The management of IE is multidisciplinary and is comprised of cardiologists, intensive care physicians, and cardiac surgeons. IE involving coronary ostium is very rare and sometimes such cases can cause acute coronary syndrome or sudden cardiac death.

In this article, we report the case of a 48-year-old man who developed infective endocarditis involving aortic and mitral valves, as well as interventricular septum and left main coronary ostium as a result of *Enterococcus faecalis*. The vegetation on the ostium of the left main coronary artery has not caused coronary obstruction, but because of possible embolic events, all vegetation has been cleaned and a more appropriate repairment technique has been applied.

Patient treated with vancomycin, rifampicin, and gentamicin before surgical replacement of damaged valves. We have performed aortic valve replacement, and mitral and tricuspidal valve repairment procedures. Beside of that vegetations on the interventricular septum and on the coronary ostium were extracted and damage repaired. The patient has discharged from the hospital on day 5 postoperatively without any signs of IE.

Conclusion *E. faecalis*-associated infective endocarditis should be included in the differential diagnosis of valvular vegetation, especially in patients with a rapidly progressing clinical course. A multidisciplinary approach to IE is critical for improving the life quality of patients by reducing mortality and preventing complications. This case also highlights the importance of collecting blood cultures before initiation of antibiotic treatment.

Keywords: *Enterococcus faecalis*, aortic regurgitation, antibiotic therapy, native valve, coronary ostium, interventricular septum

introduction site of infection is mostly the genitourinary system (5).

The principle of antibiotic prophylaxis for IE was developed on the basis of observational studies and animal models and aimed at preventing the attachment of bacteria onto the endocardium after transient bacteremia following invasive procedures. This concept led to the recommendation for antibiotic prophylaxis in a large number of patients with predisposing cardiac conditions undergoing a wide range of procedures (6).

The diverse nature and evolving epidemiological profile of IE ensure that it remains a diagnostic challenge. The clinical history of IE is highly variable according to the causative

microorganism, the presence or absence of pre-existing cardiac disease, the presence or absence of prosthetic valves or cardiac devices, and the mode of presentation. Thus IE should be suspected in a variety of very different clinical situations. (7). Up to 90% of patients present with fever, often associated with systemic symptoms of chills, poor appetite, and weight loss. Heart murmurs are found in up to 85% of patients. Up to 25% of patients have embolic complications at the time of diagnosis. Therefore, IE has to be suspected in any patient presenting with fever and embolic phenomena (7).

Based on clinical presentation IE has 3 different types:

1. Acute IE
2. Subacute IE
3. Prosthetic valve endocarditis

Management of IE demands a multidisciplinary approach with the attendance of cardiologists, ICU physicians, infectious diseases specialists, and cardiovascular surgeons (9). The main points in the management of IE are antibacterial therapy, intensive medical asses, and surgical intervention. The purpose of surgical intervention is prolonging survival of patients and prevention of further damage to valves. Surgical intervention can be performed early (48 hours after the commencement of antibacterial therapy) or late (3 weeks after antibacterial and medical therapy) (8).

Indications for surgical intervention:

- Congestive heart failure
- Severe valve stenosis or regurgitation
- Periannular dilatation
- Systemic embolization
- Cerebrovascular complications
- Persistent sepsis
- Prosthetic valve endocarditis

Acute coronary syndrome (ACS) is a rare complication associated with infective endocarditis (IE). Vegetation may cause direct occlusion of the coronary artery, especially in the case of aortic valve (AV) vegetation. Intraoperative TEE is a valuable tool for the evaluation of vegetation size and location. We report a case

of infective endocarditis involving both aortic and mitral valves. Beside of that vegetation has been seen on the interventricular septum and left main coronary ostium.

CASE PRESENTATION

A 48 years old male patient has been admitted to Republican Diagnostic Centre with high temperature and arrhythmia complaints. Based on the words of the patient, his complaints started approximately 2 years before admission. During these years he has suffered periodic high-temperature episodes.

Upon admission to the hospital patient's height was 178 cm, and weight was 86.4 kg. In physical examination his vital signs have been measured as below: body temperature 38.3 C, arterial blood pressure 120\80 mm mercury, heart rate 84/min. During auscultation, a pansystolic murmur appropriate for mitral regurgitation was heard. Besides that early diastolic murmur has been detected. Intestinal movements were normal. No mass or edema has been detected during palpation of the abdomen. Results of laboratory tests were as below: HGB 9.3q/dl, HCT 32.4 %, WBC 7.6/L, NEU 5.9/l, PLT 149/l, ESR 54 m/h, troponin I 180,3 pg/ml, ferritin 392,2 ng/l, AST 22ng/dl, ALT 15mg/dl, GGT 58.5 mg/dl. Blood urea 50mg/dl, creatinine 1.4 mg/dl, CRP 83.9 mq/l. Results of HIV, HBV, HCV, and RV tests were negative.

In the transthoracic echocardiographic examination of the patient septic, endocarditis have been suspected. During TTE, a mobile mass (vegetation) has seen on the right coronary cusp of the aortic valve. The ejection fraction of the left ventricle was decreased because of diffuse hypokinesia (LVEF = 47%). Color Doppler echocardiography revealed severe aortic regurgitation, and moderate mitral and tricuspid regurgitation. atherosclerotic changes have been revealed in examination of bilateral carotid arteries by color doppler examination, but stenosis or occlusion have not been detected. Hepatomegaly, steatotic changes in pancreatic parenchyma, and a simple cyst in the right kidney were revealed in USG examination of the abdominal cavity. Figure 1 A, 1B).

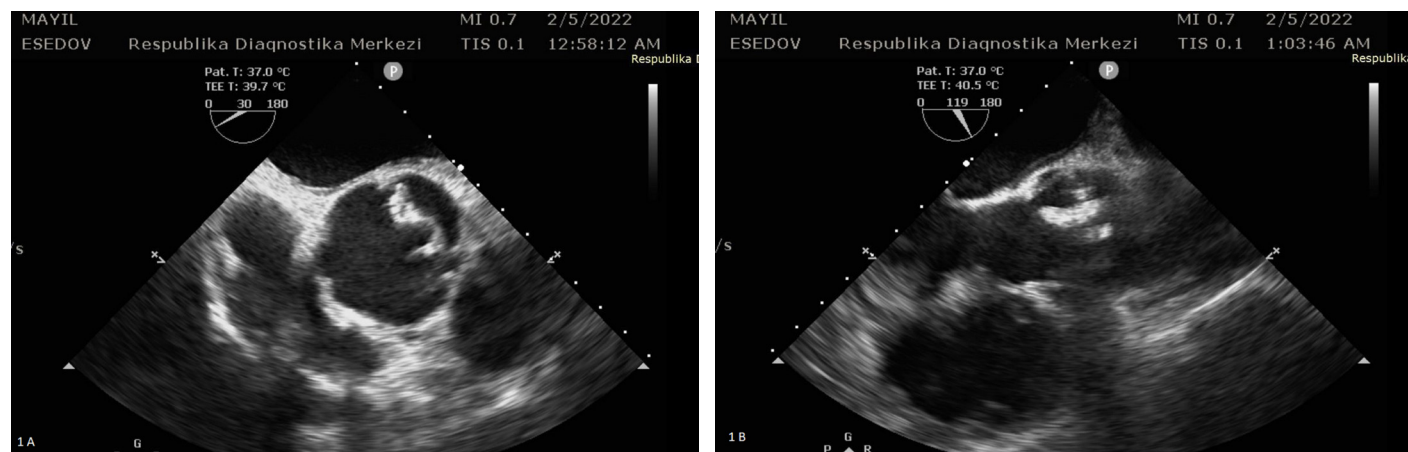


Figure 1. Echocardiography shows vegetation on right coronary cusp of aortic valve (white arrow)

Because of IE suspicion blood sample was collected to determine antibiotic sensitivity and MIC value. Afterward, empiric antibacterial therapy with vancomycin 1g x 2, rifampicin 300 mg

x 2, and gentamicin 240 mg x 1 has started. The patient has treated with empirical antibiotic therapy and then surgical intervention has performed.

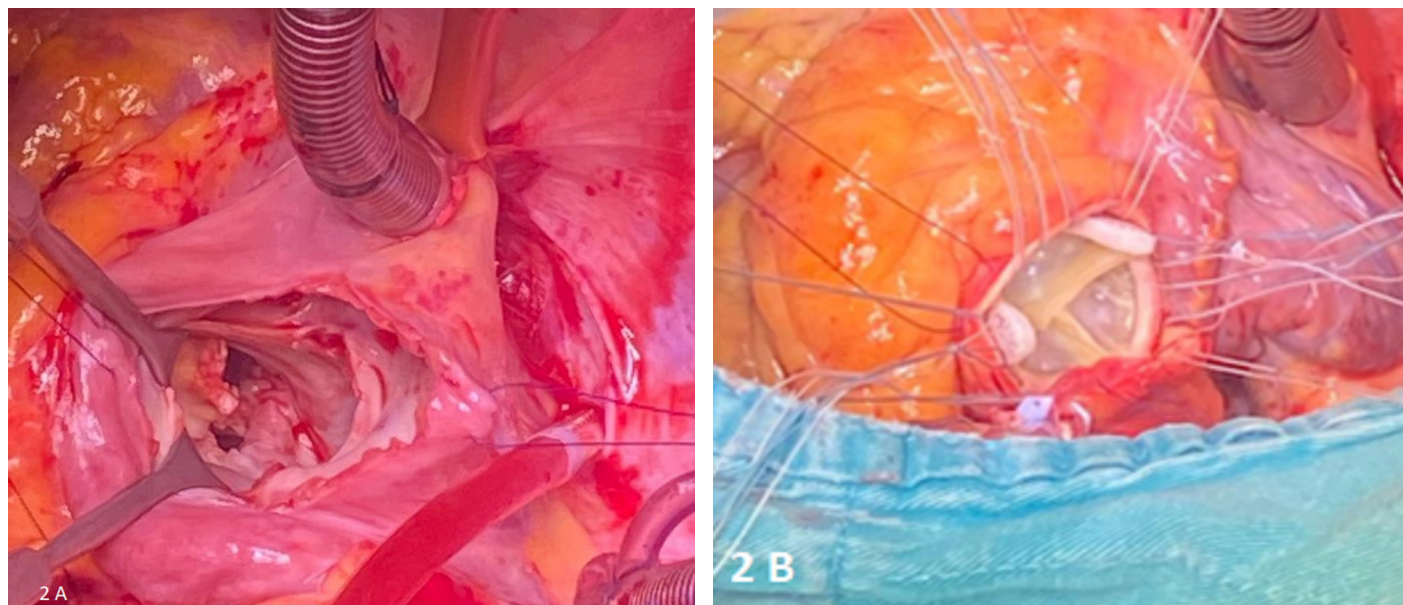


Figure 2. A) Infective native aortic valve. B) Infective aortic valve has removed and biological prosthetic aortic valve has implanted.

5 days after hospitalization, a consilium has arranged with the attendance of cardiac surgeons, cardiologists, anesthesiologists, intensive care physicians, and infection diseases specialists and surgical intervention has been decided. An intraoperative TEE examination has been performed before commencing cardiopulmonary bypass. In TEE examination, vegetation on aortic and mitral valve, as well as on the interventricular septum has been observed. During surgery, an aortotomy has been performed and severe damage to the aortic valve and moderate damage to mitral and tricuspid valves were revealed. In intraoperative inspection, vegetation has been detected on the left main coronary artery ostium and on the interventricular septum. This vegetation has been removed surgically and the defect that occurred in the orifice of the coronary artery has been repaired by 6/0 prolene sutures. The vegetation located on the wall of the interventricular septum has been cleaned carefully. In order to clean this vegetation, we performed a myectomy in the interventricular septum. Replacement of aortic valve with biological prosthetic aortic valve has been performed. In the inspection of the mitral valve, vegetation sized approximately 1.5 cm x 1.2 cm has been revealed. Vegetation has been removed surgically and the defect on the anterior leaflet was repaired. Besides that, the edge-to-edge mitral valve repair technique has been performed to improve the coaptation area. To repair tricuspid valve regurgitation, we performed tricuspid valve annuloplasty by modifying Kay technique.

The results of blood cultures revealed *Enterococcus faecalis*. Based on that, antibiotic therapy has continued with tigecycline

50 mg x 2 and levofloxacin 500 mg x 2 (Figure 3).

Ciprofloxacin	1	H
Levofloxacin	2	H
Linezolid	1	H
Daptomycin	4	O
Trimethoprim-Sulfamethoxazole	≥ 320	D
Vancomycin	1	H
Tigecycline	≤ 0.12	H
Nitrofurantoin	≤ 16	H
Teicoplanin	≤ 0.5	H

Figure 3. Antibiotic sensitivity and MIC value

The postoperative period has been without complications and the patient has discharged from the clinic on the 5th day of the postoperative period.

DISCUSSION

Infective endocarditis (IE) is a deadly disease. Despite improvements in its management, IE remains associated with high mortality and severe complications. In the management of infective endocarditis, it is crucial to have a multidisciplinary approach. Or has been shown to significantly reduce the 1-year mortality in infective endocarditis (7).

One of the main reasons for having difficulties in diagnosis of IE is the diverse nature and evolving epidemiological profile of IE. Signs and symptoms, clinical course of IE are highly variable depending on the causative agent, the presence or absence of prosthetic valve or cardiac devices, the presence or absence of pre-existing cardiac disease, and the mode of presentation.

S aureus is considered the most common causative organism

and accounts for approximately 30% of cases (9). *S aureus* endocarditis is characterized by aggressive disease with an increased risk of embolism, stroke, persistent bacteremia, and death (11). *S aureus* is also the most common cause of PVE, often requiring redo surgery, and is associated with mortality rates approaching 50% in some centers (12,13).

Enterococcus faecalis is responsible for the vast majority of cases of enterococcal IE. In one study in which species were identified, *E. faecalis* accounted for 52 (93%) of 56 cases of enterococcal endocarditis, while *Enterococcus faecium* was recovered in three cases (5%) and *Enterococcus durans* in one (2%) (14).

ACS is a rare complication associated with IE (15). Nonetheless, the anesthesiologist should consider the possibility of coronary compression due to periannular aortic valve abscess and pseudoaneurysms, and coronary embolism or obstruction of the coronary ostium due to the vegetation, to be able to make the diagnosis using TEE when the patients with IE present acute hemodynamic disturbance, a sign of ACS, or myocardial ischemia.

In this case presentation, our patient has had positive blood cultures for *Enterococcus faecalis* and on TTE examination we revealed vegetation on the aortic valve. In the first step, we started empirical antibiotic therapy right after collecting blood samples for cultivation. After concilium with the attendance of cardiac surgeons, cardiologists, anesthesiologists, intensive care physicians, and infection diseases specialists, we decided to do surgical intervention to clear all vegetations and repair damaged valve functions. The patient has undergone surgical intervention and the damaged aortic valve has been replaced with a biological prosthetic valve. Besides of that, the damaged mitral valve and the tricuspid valve have been repaired. The results of blood cultivation and antibiotic resistance were ready in the day of operation and in the postoperative period, appropriate antibiotic treatment started with levofloxacin and tigecycline. The patient has not had any symptoms related to endocarditis during the postoperative period and he has been discharged from the clinic on day 5th postoperatively. In further follow-ups, patient's condition has been improved without any residual signs and symptoms of IE.

This case demonstrates the importance of intraoperative TEE examination and well-organized intraoperative inspection. The vegetation located on the coronary ostium and interventricular septum has been visualized neither by TTE nor by TEE examination. Only during careful intraoperative inspection of all heart chambers, this vegetation has been detected and treated appropriately. Even though these vegetation on the coronary ostium and interventricular septum were small-sized, they could grow up in the postoperative period and would cause possible embolic events and even acute coronary syndrome.

CONCLUSION

In the patients who have vegetation on cardiac valves or who

have fulminant clinical course of IE, *E. faecalis* endocarditis should be included in the differential diagnosis. To increase the life quality of patients and decrease mortality related to IE, it is important to have a multidisciplinary approach. In this case presentation, we highlighted the importance of collecting blood cultures and determining antibiotic resistance. Beside of that, we mentioned the importance of intraoperative TEE examination and well-organized intraoperative inspection to detect all vegetation in different locations and clean them. It is important to prevent possible embolic events and even acute coronary syndrome in the postoperative period.

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