

The Battle Between Heart Team And Staphylococcus Aureus: The Winner Was The Patient

Kalp Ekibi ile Stafilokokus Aureus Arasındaki Savaş: Kazanan Hasta Oldu

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Abstract

Infective endocarditis (IE) is a serious infectious condition with high morbidity and mortality despite improved diagnostic tools and expanded therapeutic options especially in cases caused by Staphylococcus aureus. Despite effective antibiotic regimens, deciding on surgical intervention in appropriate patients can be lifesaving. In this report, we presented the case of a 59-year-old man, admitted for fever, which was found to be the result of methicillin-sensitive Staphylococcus aureus aortic valve endocarditis, complicated by complete atrioventricular (AV) block, valvular perforation, heart failure, and systemic embolism.

(*Sakarya Med J* 2017, 7(4):256-260)

Key words: complete av block, infective endocarditis, Staphylococcus aureus

Abstract

Objective: Enfektif endokardit, gelişmiş tanı araçları ve geniş tedavi seçeneklerine rağmen, özellikle stafil okokusaureus'a bağlı ise, yüksek morbidite ve mortalitesi olan ciddi bir enfeksiyöz durumdur. Etkili antibiyotik rejimlerine rağmen, uygun hastalarda cerrahi müdahale kararı vermek hayat kurtarılabilmektedir. Bu raporda, ateş nedeniyle başvuru metisilin-duyarlı stafilokokusaureus'un yol açtığı aortik kapak endokarditine bağlı atriyoventriküler tam blok, kapak perforasyonu, kalp yetersizliği ve sistemik emboli gelişen 59 yaşındaki erkek hastayı sunduk. (*Sakarya Tıp Dergisi* 2017, 7(4):256-260)

Keywords: av-tam blok, enfektif endokardit, stafilokokus aureus

Introduction

Despite developments in the diagnosis and management of IE, it is still associated with significant mortality and morbidity, especially in cases caused by *Staphylococcus aureus*. Complete AV block that associated with increased morbidity and mortality is one of the serious and rare complications of endocarditis. In addition, an early diagnosis and surgical treatment would be mandatory for these cases because of the high risk of potential complications such as valve perforation, valve destruction, abscesses, and heart failure.^{1,2}

Case

A 59-year-old male with history of hypertension presented to our emergency room with a 5-day history of antibiotic-resistant fever ($> 38.5^{\circ}\text{C}$). He was normotensive with a blood pressure of 130/80 mm-Hg, tachycardic with a pulse of 110 bpm, and maintaining adequate oxygen saturation on room air. His cardiopulmonary examination was unrevealing except from mild-moderate diastolic murmur at right second intercostal area. Roth spots in the eye examination and non-tender erythematous nodules on the foot compatible with a Janeway's lesion were seen (Figure 1).



Figure 1. Non-tender erythematous nodular lesions on the third foot finger.

Electrocardiography (ECG) on admission was normal and echocardiography revealed that normal left ventricular ejection fraction, increased end-diastolic diameter (68mm) and ascending aortic di-

ameter (63mm), minimal pericardial effusion, vegetation on aortic valve and severe aortic insufficiency. Laboratory testing revealed a white blood count of $26 \times 10^3/\mu\text{L}$, a hemoglobin concentration of 12.2 g/dL, a C-reactive protein level of 254 mg/L, and creatinine level of 1.3 mg/dL. The patient was hospitalized with the diagnosis of IE, blood cultures were drawn, and intravenous vancomycin and gentamicin therapy were started. On the third day of hospitalization, the PR interval in the ECG prolonged (260 ms) and a day later symptomatic complete AV block developed with ventricular escape rhythm (50 bpm) (Figure 2).

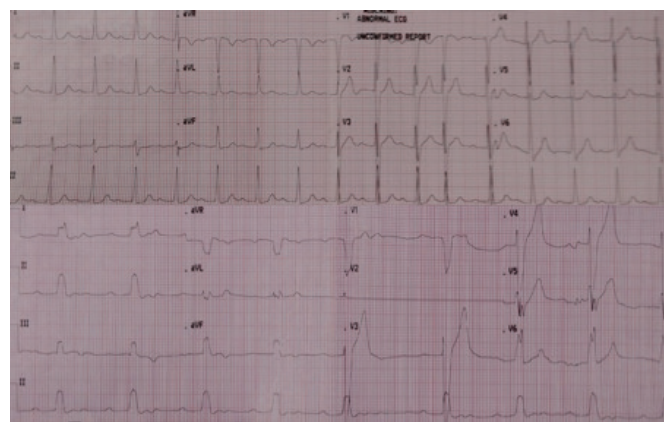


Figure 2. ECG recordings from the patient on third and fourth day of hospitalization.

The patient was transferred to the coronary care unit where a temporary transvenous pacemaker was placed. Due to the resistant hypotension and respiratory distress, the patient was intubated and inotropic agents was started. Transesophageal echocardiography revealed that multiple perforations on aortic valves and severe aortic regurgitation. Considering resistant heart failure, emergency surgical intervention was planned and Bentall procedure was performed (Figure 3). After the operation, the patient who did not need temporary pacemaker was extubated. Blood cultures were remarkable for methicillin-sensitive *Staphylococcus aureus*. After the antibiotic treatment was completed, the patient was discharged in a healthy manner. At sixth months follow-up, echocardiography revealed normal aortic prosthetic valve function and normal end-diastolic diameter.

Discussion

The clinical diagnosis of IE requires a high index of suspicion be-

cause it may present as an acute, rapidly progressive infection, but also as a subacute or chronic disease. The diagnosis should be always considered in patients presenting with fever and a new regurgitant murmur, embolic phenomena, predisposing risk factors such as prosthetic valves and/or devices, intravenous drug abuse etc. Although minor criteria is quite important, the cornerstones of diagnosis are blood cultures and echocardiography, which are the major criteria of the Duke classification. According to these criteria, our patient had definite endocarditis: positive blood cultures, compatible echocardiographic findings (vegetation, leaflet perforation), fever, and embolic events.^{2,3}

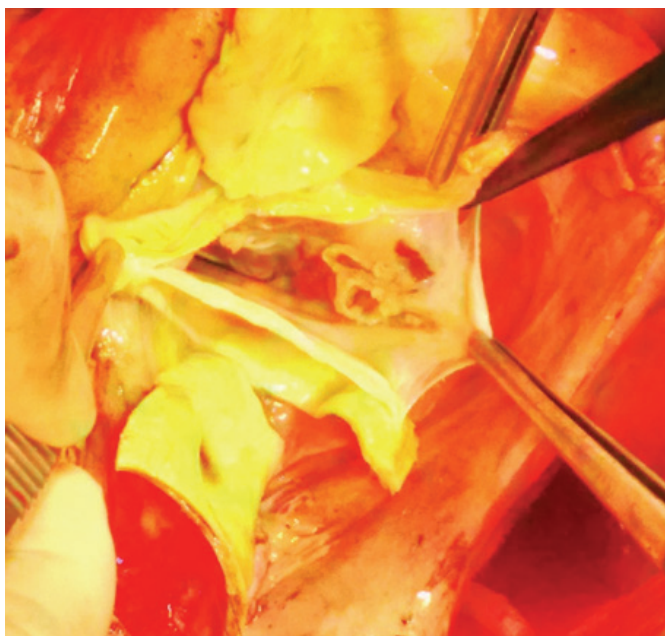


Figure 3. Intraoperative appearance of aortic valve. Multiple perforations and vegetation can be seen

Follow-up of electrocardiographic findings as well as echocardiography has also important role for the management of the patients. As a result, complete AV block can be seen in about 10% of the patients. Heart block is associated with 36% of aortic and 33% of mitral valve diseases. The aortic valve is located near the atrioventricular node. This may explain why infection of aortic cusps account for most cases of complete AV block in endocarditis.^{4,5}

Although there are various antimicrobial regimens according to

the microbial agent, surgical therapy in the active phase of the disease should be considered in the presence of heart failure or uncontrolled infection and to prevent embolic events. Detailed indications of surgical treatment were presented in table 1. Our patient had major indications for early surgery: severe aortic regurgitation and resistant pulmonary edema, leaflet perforation, and complete AV block due to periannular involvement. In these situations, the decision to operate should be discussed with a multidisciplinary group and should be individualized.⁶ In developed countries, Staphylococcus aureus is now the leading cause of left-sided IE. Moreover, Staphylococcus aureus infection is a powerful predictor of a poor in-hospital outcome. Its course is frequently fulminant when it involves the mitral or aortic valve, with widespread metastatic infection, and death in approximately 25–30% of cases. Staphylococcus aureus has a number of cell wall-associated factors that allow it to attach to extracellular matrix proteins, fibrin, and platelets. In particular, clumping factors A and B (ClfA and ClfB, respectively; also known as fibrinogen-binding proteins) are key for attachment to and colonization of the valvular tissue. In addition, Staphylococcus aureus produces numerous enzymes, such as proteases, lipases, and elastases that enable it to invade and destroy host tissues and metastasize to other sites.^{7,8} In our case, the effects of Staphylococcus aureus on the aorta were shown in the pathological examination (Figure 4, panel A and B). Destruction of elastin and collagen fibers and intense inflammation helps us understand why the disease is rapidly progressive.

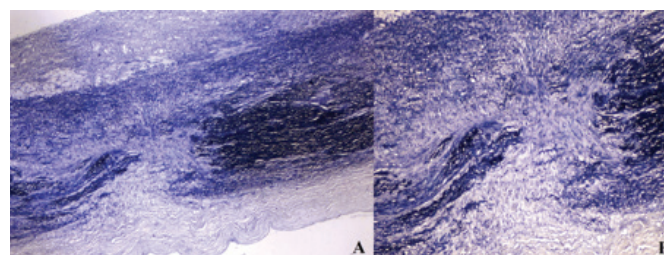


Figure 4. Pathologic examination of the aorta with EVG stain. Degeneration of elastin fibers in the vessel wall can be seen (Elastic fibers are seen as black with EVG stain).

Table 1. Indications for surgery in patients with infective endocarditis**A. Left-sided valve involvement****1. Heart failure**

- Aortic or mitral native or prosthetic valve endocarditis with severe acute regurgitation, obstruction or fistula causing refractory pulmonary edema or cardiogenic shock (class I)
- Aortic or mitral native or prosthetic valve endocarditis with severe regurgitation or obstruction causing symptoms of HF or echocardiographic signs of poor haemodynamic tolerance (class I)

2. Uncontrolled infection

- Locally uncontrolled infection (abscess, false aneurysm, fistula, enlarging vegetation) (class I)
- Infection caused by fungi or multiresistant organisms (class I)
- Persisting positive blood cultures despite appropriate antibiotic therapy and adequate control of septic metastatic foci (class IIa)
- Prosthetic valve endocarditis caused by staphylococci or non-HACEK gram-negative bacteria (class IIa)

3. Prevention of embolism

- Aortic or mitral native or prosthetic valve endocarditis with persistent vegetations >10 mm after one or more embolic episode despite appropriate antibiotic therapy (class I)
- Aortic or mitral native or prosthetic valve endocarditis with vegetations >10 mm, associated with severe valve stenosis or regurgitation, and low operative risk (class IIa)
- Aortic or mitral native or prosthetic valve endocarditis with isolated very large vegetations (>30 mm) (class IIa)
- Aortic or mitral native or prosthetic valve endocarditis with isolated large vegetations (>15 mm) and no other indication for surgery (class IIb)

B. Right-sided involvement

- Microorganisms difficult to eradicate (e.g. persistent fungi) or bacteraemia for >7 days (e.g. *S. aureus*, *P. aeruginosa*) despite adequate antimicrobial therapy (class IIa)
- Persistent tricuspid valve vegetations > 20 mm after recurrent pulmonary emboli with or without concomitant right heart failure (class IIa)
- Right heart failure secondary to severe tricuspid regurgitation with poor response to diuretic therapy (class IIa)

Conclusion

Since there are atypical presentations and fulminant disease course, early diagnosis of IE is almost important. Beside echocardiography, ECG have a key role in early suspicion of perivalvular dissemination and complications. Although antibiotics are the basic treatment of IE, aggressive treatments including surgery should be considered at an early phase in patients with such complications. The presenting case showing that the importance of follow-up ECG and urgent surgical treatment decision could be lifesaving.

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