

Olgu Sunumu

Implantation of ECMO Instead of Left Ventricular Assist Device Because of Right Atrial Thrombus Detected by Intraoperative Transesophageal Echocardiography

Mustafa Emre GÜRCÜ*, Atakan ERKİLİNÇ*, Ömer Faruk ŞAVLUK*, Füsün GÜZELMERİÇ*, Deniz CEVİRME*, Servet İZCİ*

ABSTRACT

Dilated cardiomyopathy (DCM) is characterized by an enlargement of cardiac chambers and decrease in ventricular functions which may consequently lead to thrombus formation and embolic events, Transthoracic or transesophageal cardiac echocardiography is an important diagnostic tool to detect intracardiac thrombi. We will present a 16-year-old female admitted to the emergency department with the complaints of fatigue, palpitation and dyspnea. She had a diagnosis of DCM and was included in heart transplantation list 2 years previously. Her oxygen saturation significantly dropped despite the intensive ventilation and eventually she underwent endotracheal intubation. Transesophageal echocardiography revealed left and right ventricular failure and pericardial effusion. Implantation of left ventricular assist device (LVAD) was planned but at the beginning of the surgery, intraoperative TEE showed hypochoic, floating masses measuring 5.3x2.6 cm and 2.3x1.9 cm in diameter in the right atrium. Therefore, surgical plan switched to ECMO implantation. As a conclusion, if enough preoperative preparation can not be made, intraoperative transesophageal echocardiography may be useful in planning the surgical strategies aiming to decrease the risk of embolic complications and intraoperative complications.

Keywords: *intraoperative transesophageal echocardiography, ECMO, dilated cardiomyopathy, left ventricle assist device*

ÖZ

İntraoperatif TEE ile Tespit Edilen Sağ Atriyal Trombus Nedeniyle Sol Ventrikül Destek Cihazı Yerine ECMO İmplantasyonu Yapılması

Dilate kardiyomyopati kalp boşluklarında genişleme ve ventrikül fonksiyonlarında azalma ile karakterizedir, trombus oluşumuna eğilim yaratabilir ve sonuçta embolik olaylara neden olabilir. Kardiyak ekokardiyografi ister transtorasik isterse de transözofageal (TEE) olsun, intrakardiyak trombusün tespit edilmesinde önemli bir araçtır. Biz 16 yaşında halsizlik, çarpıntı ve yorgunluk yakınması ile acil ünitesine başvuran kadın hasta sunacağız. Dilate kardiyomyopati tanısı almış olan hasta 2 yıl önce kalp nakil listesine alınmış. Sattürasyonu yoğun ventilasyona rağmen, anlamlı derecede düşen hastaya endotrakeal entübasyon uygulandı. Transtorasik ekokardiyografi ile sol ve sağ ventrikülde yetersizlik ve perikardiyal sıvı tespit edildi. Sol ventrikül destek cihazı takılması planlandı ama operasyonun başında intraoperatif TEE ile 5.3x2.6 cm ve 2.3x1.9 cm çaplarında sağ atriyum içerisinde yüzen hipoekoik kiteller tespit edildi. Bu nedenle operasyon kararı ECMO (ekstrakorporeal membran oksijenasyonu) implantasyonu olarak değiştirildi. Sonuç olarak, eğer operasyon öncesi yeterli hazırlık yapılmadığı takdirde intraoperatif TEE cerrahi stratejilerin planlanmasında, embolik komplikasyonların riskini azaltmada ve intraoperatif komplikasyonları azaltmada yararlı olabilir.

Anahtar kelimeler: *intraoperatif transözofageal ekokardiyografi, ECMO, dilate kardiyomyopati, sol ventrikül destek cihazı*

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*Kartal Koşuyolu Yüksek İhtisas Eğitim ve Araştırma Hastanesi
Yazışma adresi: Uzm. Dr. Mustafa Emre Gürcü, Kartal Koşuyolu Eğitim ve Araştırma Hastanesi Kartal / İstanbul
e-mail: emregurcu@gmail.com

INTRODUCTION

Dilated cardiomyopathy (DCM) is characterized by enlargement of cardiac chambers and decay in ventri-

cular functions which may lead to formation of thrombi and embolic events. It represents a poor long-term prognosis with mortality rates ranging between 70% to 80% at eight years for most patients whose clinical condition progressed to heart failure [1]. The right heart thrombus which can be seen in patients with DCM rarely presents higher mortality with a risk of pulmonary embolization [2]. Therefore, early diagnosis of the thrombus has paramount importance.

Transthoracic (TTE) or transesophageal (TEE) cardiac echocardiography is an important diagnostic tool for intracardiac thrombus. However, intraoperative TEE has a vital role for the assessment of cardiac chambers in those cases who urgently require surgical intervention. The findings in this setting may play a significant role in the decision-making process for surgical strategy.

CASE REPORT

A 16-year-old female with diagnosis of DCM, listed for heart transplantation 2 years ago was admitted to the emergency department with the complaints of fatigue, palpitation and dyspnea. On her physical examination; jugular venous dystension, generalized edema, cyanosis and filiform pulse were detected. Atrial fibrillation was seen on ECG and her chest X-ray determined minimal pleural effusion. She was urgently transferred to ICU with progressive dyspnea and hypotension. Her oxygen saturation significantly dropped despite intensive ventilation and eventually she underwent endotracheal intubation with 7.0 mm cuffed oral endotracheal tube. Anesthesia was induced with titrated doses of fentanyl, rocuronium and midazolam. Because of this acute decompensation and low cardiac output she was transferred to the operation room with the plan of left ventricle assist device implantation (LVAD).

The patient was monitored with invasive arterial pressure, central venous pressure, electrocardiogram, pulse oxymetry, nasopharyngeal temperature, end-tidal CO₂ and BIS. We performed TTE for routine cardiac evaluation and revealed an EF of 20-25%, left and right ventricular failure and pericardial effusion. During the intraoperative TEE examination,

two hypoechoic masses floating in the right atrium measuring 5.3x2.6 and 2.3x1.9 cm in diameter were detected on the midesophageal (ME) four chamber 0° (Figure 1) and ME 90° bicaval views (Figure 2). Therefore, pulmonary emboli developed in the setting of right heart failure was suspected which caused acute deterioration in the health state of the patient. Therefore we made a change in the surgical plan. After median sternotomy, aortic, and selective bicaval venous cannulations were performed. During on-pump beating-heart coronary surgery, the right atrium was exposed and thrombi were removed. Then, the atriotomy was closed and central V-A ECMO was implanted right atrium to ascending aorta instead of performing LVAD implantation. Later, the patient was taken to the ICU.

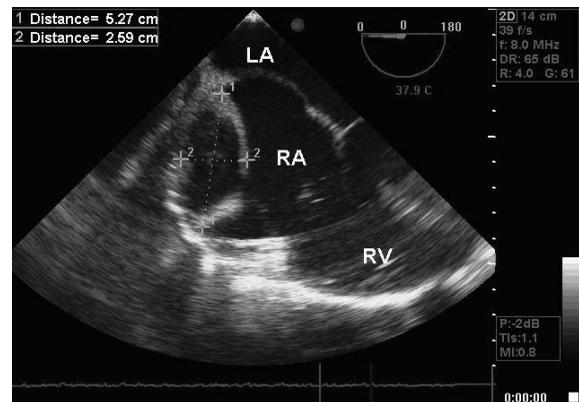


Figure 1. Midesophageal 0° four chamber view.
Abbreviations: LA:left atrium, RA:right atrium, RV:right ventricle

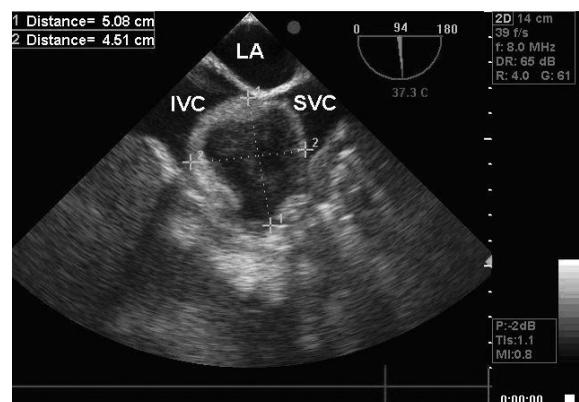


Figure 2. Midesophageal 90° bicaval view.
Abbreviations: LA: left atrium, IVC: Inferior vena cava, SVC: Superior vena cava

DISCUSSION

DCM is a multifactorial disease which is characterized by left ventricular and/or whole heart dilatation and deterioration of heart functions. In terminal course of the disease due to progressive heart failure symptoms and arrhythmias, there is a potential risk of atrial thrombus formation which may cause thromboembolic events. Floating right heart thrombi are uncommon but probably underdiagnosed in patients with pulmonary embolism^[3]. Previous studies suggested that they occur in 7% to 18% of the patients^[4,5]. These thrombi have the potential risk of degradation resulting in either paradoxal or massive pulmonary emboli. They may develop within right heart because of atrial fibrillation, hypercoagulable state caused by the disease or peripheral venous clots that temporarily embolized to the right heart which was also facilitated with the bedridden condition of the patient. This type of thrombus presents higher mortality^[6] with a risk of potential fragmentation and resulting in massive pulmonary embolization^[7].

The finding of right ventricular thrombus in pulmonary embolism is associated with a higher mortality rate compared to pulmonary embolism without right heart thrombus. In a meta-analysis Rose et al.^[8] reported a mortality rate of up to 27% while de Very et al.^[9] reported a mortality rate of >44 percent.

Information coming from intraoperative TEE has a significant impact on surgical plan in those group of patients. Especially in emergency situations, preoperative and peroperative TEE can give valuable information to form the plan of the surgical procedures. As reported in the literature, in 5591 cases the surgical strategy changed after performing TEE^[10]. The type, origin and the localisation of the masses and the function of the heart can be determined by performing TEE. It has been reported that intraoperative TEE can provide new information in 12.8-38.6% of the cases that is unknown before operation and lead to a change in the treatment strategy in 9.7-14.6% of the cases^[11]. In our case, by performing intraoperative TEE, we revealed acute decompensated right heart failure secondary to right atrial mass. This evidence switched the surgical plan from implantation of LVAD, to cent-

ral ECMO implementation and thrombus excision. As in the TEE indication guideline that is updated in 2010^[12], an undiagnosed and undetermined right atrial mass can be disclosed which increase the possible risk of mortality. Also, unnecessary LVAD implantation can be avoided.

In conclusion, this case illuminates the importance of intraoperative TEE in decreasing intraoperative complications and planning surgical strategies, especially in cardiac surgery if enough preoperative preparation could not be made.

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