

Mitral regurgitation and ventricular septal defect as a complication of penetrating cardiac trauma: a case report

Penetran kardiyak travma sonrası oluşan ventriküler septal defekt ve mitral kapak regürjitasyonu: Olgu sunumu

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A 30-year-old male patient was admitted to our clinic with the complaints of dyspnea and fatigue. It was found out that two years ago in Ukraine, he had been operated on because of a right ventricular laceration following a stabbed injury and then he had been operated on again because of a ventricular septal defect that was detected in his first postoperative follow-up. On echocardiography, 1 cm defect on the anterior leaflet of the mitral valve, severe mitral regurgitation and patent foramen ovale (PFO) were detected. In our clinic, the defect on the anterior mitral leaflet was primarily repaired with 8/0 prolene and the PFO was closed. No residual regurgitation was traced in the postoperative control echocardiography. This is a rare case in which three different operations were required to repair the injuries in the right ventricle, ventricular septum and the mitral valve. This case stresses both the importance of a team work and the value of echocardiography as an adjunct to the clinical evaluation, in the emergency evaluation of a traumatic patient with a probable heart injury.

Key words: Echocardiography; mitral regurgitation; ventricular septal defect; wound, penetrating trauma/complication.

Penetrating cardiac traumas especially occur with a stab wound or are caused by a weapon. In the United States of America, 35 to 96% of the cardiac traumas are caused by weapons, followed by stab wounds with a ratio of 39 to 66%.^[1,2] The mortality rate of penetrating cardiac traumas are high. Although penetrating cardiac traumas mostly result in injuries of the free wall of the heart valves, papillary muscles, chordae tendinae, ventricular or atrial septum and coronary arteries can also be involved.

In only one third of cardiac traumas, multiple heart structures are affected and in only 2% of the patients that were treated previously, a reoperation was indicated

Otuz yaşında erkek hasta nefes darlığı ve yorgunluk yakınması ile kliniğimize başvurdu. Hastanın, iki yıl önce Ukraynada delici ve kesici aletle yaralanma sonrası sağ ventrikül laserasyonunun primer olarak onarıldığı ve takiben ameliyat sonrası ilk kontrolünde ventriküler septal defekt saptandığı ve bu nedenle ikinci bir kez ameliyat edildiği öğrenildi. Ekokardiyografide mitral kapak ön yaprakçıkta 1 cm defekt, ileri mitral yetersizliği ve patent foramen ovale (PFO) saptandı. Kliniğimizde mitral ön yaprakçıkta bulunan defekt 8/0 prolene ile primer onarıldı, PFO ise kapatıldı. Ameliyat sonrası kontrol ekokardiyografide rezidüel kaçak izlenmedi. Bu yazıda sağ ventrikül, ventriküler septum ve mitral kapak yaralanması nedeniyle üç kez ameliyat uygulanan nadir bir olgu sunuldu. Kalbinden yaralanmış olma ihtimali olan travmalı hastanın acil değerlendirmesinde, klinik değerlendirmeye ilaveten çok önemli bilgiler sunan ekokardiyografinin kullanımı ve ekip çalışmasının önemi vurgulandı.

Anahtar sözcükler: Ekokardiyografi; mitral kapak yetersizliği; ventriküler septal defekt; yara, delici travma/komplikasyon.

because of a residual defect.^[2] In literature, there is only one case of a penetrating heart trauma leading to both a ventricular septal defect and a mitral regurgitation.^[3] As there was a requirement for three separate and consecutive operations for the same patient, this is a rare case. It not only stresses the value of echocardiography in the emergency evaluation of a traumatic patient with a probable heart injury, but it also reminds us about the importance of a team work.

CASE REPORT

A 30-year-old male patient was admitted to our clinic with complaints of dyspnea and fatigue. He had a history

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of a stab wound injury two years ago. In his first admission to a hospital in Ukraine, an urgent mediastinal exploration with a left anterior thoracotomy was performed and a laceration approximately 2 cm in length was detected on the right ventricular side of the heart. Three litres of blood was aspirated from his pericardial space. There had been no additional pathology detected. The 2 cm long laceration on the right ventricular side was primarily repaired with two sutures and then the operation was completed. As we learned from his discharge note, in his postoperative follow-up, a ventricular septal defect was detected in the control echocardiography of the patient suffering from fever. As a result of all laboratory analyses and imaging studies, infective endocarditis was diagnosed. While waiting for the results of the blood cultures, intravenous penicillin G in a dose of 18 million units per day administered in six equally divided doses every four hours, plus intravenous gentamicin in a dose of 1 mg per kilogram every eight hour were started.

Following the blood cultures positive for *pseudomonas aeruginosa*, 1 gram of amikacin three times a day and 2 grams of ceftazidime two times a day were started. As it was not possible to control the fever under antibiotherapy in the following seven days, it was decided to refer the patient to surgery. The time interval between his first and second operation was nearly six months at the time. They had primarily repaired the ventricular septal defect through a median sternotomy. During the operation, they recognized that the cause of the ventricular septal defect was the stab wound injury itself. The patient continued to receive amikacin for 14 days and ceftazidime for six weeks. In his postoperative follow-up, a holosystolic murmur was heard in his physical examination but this finding was thought to be normal. As his fever was controlled and the level of acute phase reactants were fallen to the normal range, and there was no recovery of microorganisms in his control blood

cultures, the patient was discharged from the hospital in Ukraine. At his discharge, the patient was told that his exertional dyspnea was due to the two operations he had and that it would relieve in time with the help of the diuretics prescribed. As his exertional dyspnea persisted and even worsened, the patient was admitted to a health center. Here, the physician heard a holosystolic murmur during his physical examination, but as the patient was evaluated by an old model echocardiography lacking color Doppler function in this center, no information was given about any valvular regurgitation. Thereupon, the patient was referred to our clinic. Following his physical examination, an echocardiography was performed. Through the color Doppler ultrasound imaging, a mitral regurgitant jet was detected on the mitral anterior leaflet near the annuloaortic region (Fig. 1). The leaflet was anatomically normal. The diameters of the left atrium and the left ventricle were found to be increased and the left ventricular systolic functions were normal. Between the perimembranous region and the muscular septum, there was a ventricular septal defect which was probably the one that was formerly repaired. There was an accompanying small patent foramen ovale as well. On the 08th of October, in 2003, the patient was taken into the operation room. A median sternotomy was applied. The 1 cm long defect on the mitral valve anterior leaflet located near the annulus was detected after a left atriotomy and was repaired with 8/0 prolene sutures. Patent foramen ovale was primarily repaired. A postoperative control echocardiography was performed where no residual regurgitation has been traced (Fig. 2). On the tenth day of his hospitalization, the patient was discharged. He was followed on an outpatient basis with periodical echocardiographic examinations.

DISCUSSION

Penetrating heart traumas are generally observed in young patients. The heart space affected in penetrating

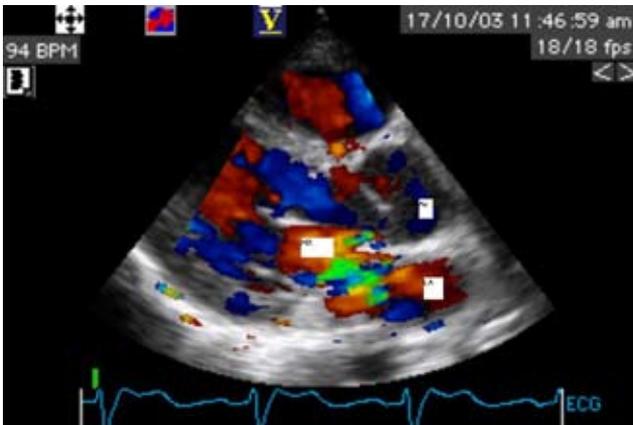


Fig. 1. A rupture on mitral anterior leaflet is seen in preoperative views.

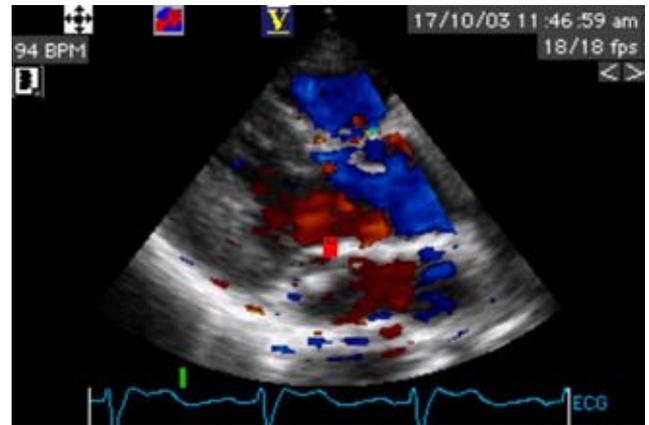


Fig. 2. There was no mitral regurgitant jet observed, following the primary repair.

traumas correlate with the injured thoracic region. The left and right ventricles are more prone to damage in these penetrating traumas because of their anatomical location. In one study involving 711 patients with penetrating cardiac traumas, it was found that stab wounds were responsible for 54% of cases, 42% of which were due to weapons. The site of injury was the right ventricle in 40% of cases and the left ventricle in another 40% followed by the right atrium with 24% and the left atrium in 2% of the cases. Cases with multiple injury sites form only one third of all cases. In only 2% of the cases treated previously, a new operation was necessary because of a residual defect.^[2] Patients who experience penetrating heart traumas usually die in a short while. Because of the high mortality and morbidity, a quick approach is very important in these cases.

The site, width, length of the injury and the absence or presence of pericardial involvement all characterize the clinical picture. If the pericardium can contain it within its borders or close the site of the injury, the clinical picture occurs as a tamponade; but if it cannot, blood may pass into the pleural region and cause hypovolemic symptoms. In the past, explorative surgery and conservation was done in suspected cases, but today, there is a cost-effective, noninvasive, easily-available equipment such as echocardiography at hand. It is also a helpful diagnostic tool for the surgeon. In the prospective study by Jimenez et al.^[4] on penetrating cardiac traumas, in injury sites near the precordial region, the echocardiography was successful in the diagnosis with 97% specificity, 90% sensitivity and 90% definitivity. But it has limitations in determining the injury site, especially in cases with serious heart traumas associated with hemopneumothorax,^[5] since echocardiography determines all heart injuries except for those associated with hemopneumothorax. Therefore, echocardiography is a trustworthy, noninvasive method in determining

the heart injuries. This method can be performed on patients regardless of their hemodynamic stability. It gives the surgeon the chance of operating directly through a median sternotomy, and in a serious number of cases, the subxiphoid procedure ceases to be an obligation. In our case, if echocardiography had been done during the first approach, the ventricular septal defect and magnetic resonance would have been determined. This case proves once again that the echocardiography plays an important role in cases of cardiac traumas for the detection of the injury site, selection of type of surgery and the diagnosis of postoperative residual defects. Because of the risk of these residual defects and late complications, the patient should be followed up closely by the clinician postoperatively. Cardiovascular surgeons and cardiologists should achieve a good team work. As a final point, intraoperative transesophageal echocardiography may be the best choice in cases of penetrating heart traumas, as it is superior to transthoracic echocardiography with respect to the quality of the image and may be a better guide for surgery.

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