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Case Report

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Residual Shunts in Ventricular Septal Patch Portions 12 Years after Surgery for Ventricular Septal Perforation Due to the Ventricular Septal Myocardial Infarction: A Case Report

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Abstract

This is the first case report showing the pressure changes in the leak flow at the patched portions and the right ventricular pressure changes over a period of 11 years. In July 3rd in 2005, a 79 years old woman suffered from from an acute myocardial infarction with 99% stenosis and thrombosis of the right coronary artery. Therefore, she received percutaneous coronary intervention. The following day, she underwent surgery to close the ventricular perforation with patches. Postoperatively, a residual shunt was reported in the patched portion. In Feb, 2006, she presented at our hospital and received rehabilitation care. Following CT imaging of the head, we identified a cerebral infarction in the right temporal lobe. Then 12 years post - surgery, an examination showed paradoxical movement of the ventricular septum. In addition, there was a reduction in the left ventricular ejection fraction and an increase in the left ventricular end-diastolic diameter.

Keywords: Residual Shunts; Ventricular Septal Perforation

Introduction

Ventriculr Septal Defects (VSD) are life-threatening mechanical complications of acute Myocardial Infarction (MI). Patient with VSD are associated with a high in-hospital mortality rate.

Pathological clinical studies have demonstrated that the mean time from MI to VSD is 3 to 5 days, however in the patients treated with thrombolytic therapy for MI, VSD may develop within the first 24 hours. Echocardiography fascilitates the localization and determination of the size of the VSD using Doppler ultrasound.

Additionally, it assists the assessment of the left and right ventricular functions, and calculation of the Right Ventricular Systolic Pressure (RVSP). Moreover, the left to right shunt is quantified using the pulsed Doppler technique. The Right Ventricular Systolic Pressure (RVSP) is calculated from the tricuspid regurgitation jet velocity. The Right Ventricular Systolic Pressure (RVSP) is calculated from the tricuspid regurgitant jet velocity. The equation for the RVSP requires the addition of an assumed right atrial pressure (10 mmHg).

This is the first case report demonstrating the changes in leakage flow within the patched portion for a VSD after MI and indicating the long-term function of the left ventricle.

Case Presentation

A 79 year old female was first presented with dysarthria and hemiplegia. In 2000, she was dignosed with diabetes mellitus.

On June 3rd 2005, she suffered acute myocardial infarction which that showed 99% stenosis and thrombosis of the right coronary artery. Right heart catheterization revealed the followin findings: right atrium 2 mmHg, RV 20/3 mmHg, PA 18/7 mmHg and PCWP 4mmHg. In addition, the cardiac output was 4.2L/min with a cardiac index of 2.96L/min. She then received PCI and underwent an operation to close the ventricular perforation with patches, the following day. After surgery, a residual shunt was observed in the patched portion.

On June 19th, 2005, she had a cerebral infarction attack. On the following day,the pressure gradient within the perforation was found to be 46 mmHg, and the pressure gradient between the right

ventricle and right atrium was 43 mmHg. She could walk using parallel bars.

In July 2005, the pressure gradient between both ventricles was 61 mmHg,whereas in Feb, 2006, was 93.3 mmHg (Figure 4).

She subsequently received rehabilitation at our hospital.

Presentation

The patient had left hemiplegia and elevated tonus of the right upper limbs and could open her eyes. She was able to sit. Her heart rate was 90 beats per minute, and the heart sound was clear, Her blood pressure was 110/74.

Clinical data

CT imaging of the head revealed a cerebral infarction in the right temporal lobe, CTR was 51.1% in the chest Xray. ECG showed a small q wave in the, Ⅱ,Ⅲ and aVf leads (Figure 1). Cardiac echography (Figure 2) revealed paradoxical movement of the ventricular septum (Figure 3). Suspected RV pressure was 34.5 mmHg, whereas the pressure gradient within the patch leak portion was 39.4 mmHg. The blood analysis showed the following: RBC 369x10, WBC 8400, Hb 11.8g/dl, Ht 33.6 %, thrombocyte 264000, HbA1c 7.2%, BNP 8.0pg/ml, Cr 0.62 mg/dl, BUN 8.8mg/dl, T.P. 6.8g/dl, Alb 3.7g/dl, GOT 23U/L, GPT 23 U/l, LDH 156 U/L, ALP 381U/L, γ-GPT16U/L, Tbili 0.3mg/dl, CK 103U/L, Na 133mEq/L, K 4.6mEq/L, Cl 97mEq/L, and CRP 0.20mg/dl.

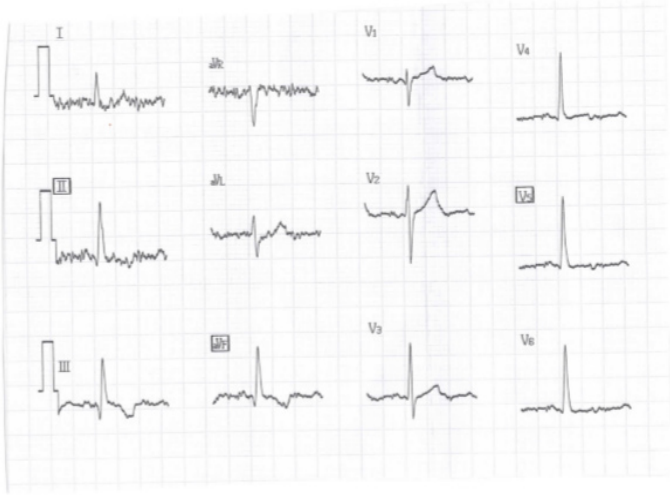

Figure 1: Electrocardiogram.

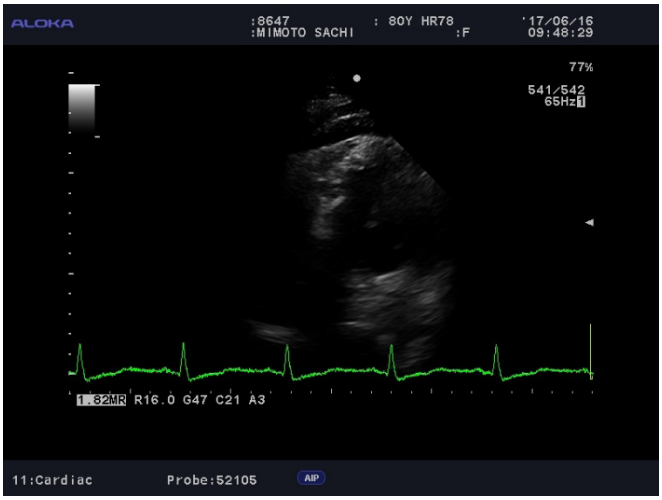

Figure 2: Cardiac echogram showing the ventrcular septum perforation with the patches.

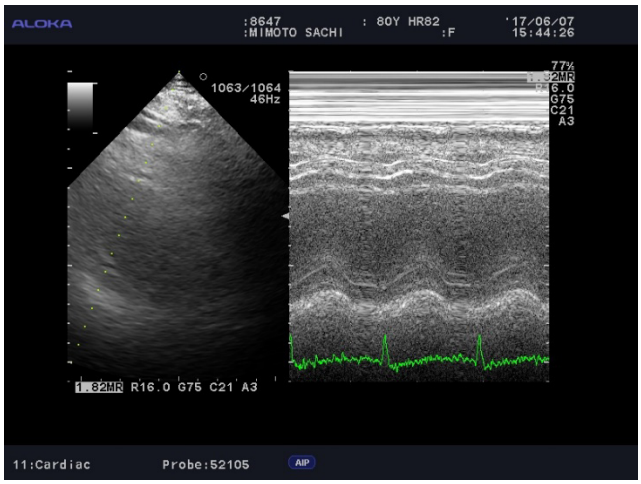

Figure 3: Cardiac echogram showing paradoxical movement of the ventricular septum.

Shunt pressure (left to right) was 93 mmHg after closure with the patch. After 12 years, we found that the shunt pressure level had decreased (34mmHg) (Figure 4). Although RV pressure was 53 mmHg, post surgery, it decreased to 22 mmHg. In June 2017 we found that the LV end-diastolic dimension had increaed and LV ejection fraction had decreased (Figures 5,6).

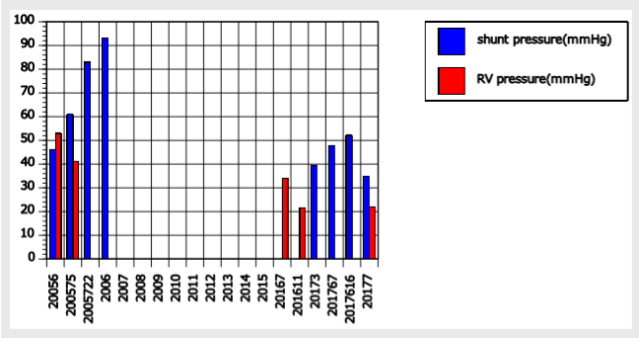

Figure 4: Time course of shunt pressure (mmHg) and systolic pressure (mmHg) of the right ventricle.

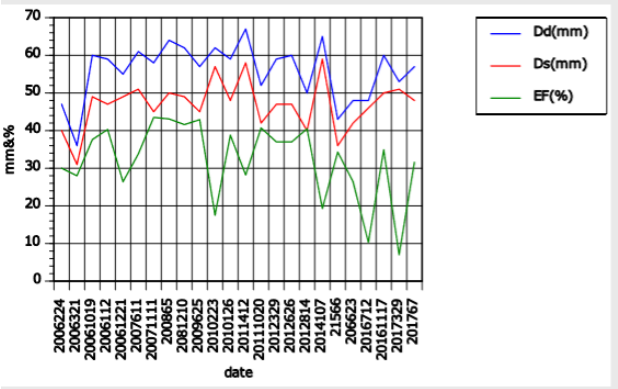

Figure 5: Time course of end-diastolic diameter (mm) and end-systolic diameter of the left ventricle and ejection fraction (%) of the left ventricle.

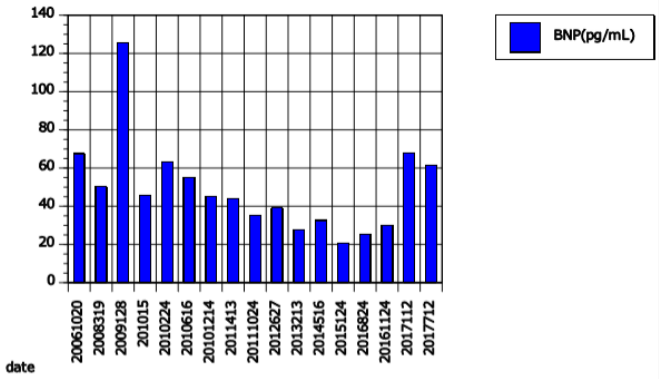

Figure 6: Time course of BNP levels.

Discussion

This is a rare case of a patient whose shunt pressure was recorded for 12 years following surgery to close the shunt between both ventricles [1]. Although RV pressure increased following the surgery to close the VSD, 12 years later RV pressure was found to be normal.

After surgery, shunt pressure between both ventricle had increased to 93 mmHg, and 12 years later, it had dropped to 34 mmHg (Figure 4). Recently, we found that the ventricular septum showed paradoxical movement (Figure 3). After 12 years later, it dropped to 34 mmHg (Figure 4) Recently, we found that the ventricular septum showed paradoxical movement (Figure 3). LV ejection fraction was reduced, and LV end-diastolic diameter was enlarged (Figure 5).

We postulated that after LV systolic function reduced,shunt pressure between both ventricles was reduced. This is the first case report showing the pressure changes in the leak flow at the patch portion and right ventricular pressure over 12 years. This case showed a progressive decline in the left left ventricular fraction (Figure 5), whereas ventricular septum showed paradoxical movement.

VSD occurrs in a necrotic zone of the infarcted myocardial tissues and results in a left-to-right shunt. The degree of shunting is determined by the size of the septal rupture, level of pulmonary and systemic vascular resistence, and the function of the left and right ventricles. As the left ventricular systolic fuction deteriorates and forward flow declines, compensatory vasoconstriction leads to increased systemic vascular resistence, which in turn, increases the magnitude of the left-to-right shunt [1]. In our patient, we found that BNP levels increased at the time of surgery and decreased to normal values recently, despite an increase in 2017 (Figure 6). Closure of post-MI VSD decreases mortality as compared with medical treatment alone and should be attempted as early as ossible after the diagnosis. The choice between a transcatheter and surgical closure should be based on factors, including the complexity of the defect, availavility of the closure device, expertise of the operator, and clincal condition of the patient [2].

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