

Left Ventricular Pseudoaneurysm With Interventricular Septal Rupture As A Complication Of Myocardial Infarction Detected By 4D Echocardiography

Sol Ventrikül Psödoanevrizmasıyla Birlikte İnterventriküler Septum Rüptürünün Birlikte Olduğu Myokardiyal İnfarktüs Komplikasyonunun 4 Boyutlu Ekokardiyografi İle Saptanması:

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Left ventricular (LV) pseudoaneurysms form when cardiac rupture is contained by adherent pericardium or thrombus. Myocardial infarction (particularly inferior wall myocardial infarction) is the leading cause of left ventricular pseudoaneurysms followed by cardiac surgery, trauma, and infection. Although LV pseudoaneurysms are not common, the diagnosis is difficult and they are prone to rupture. In this report we present a case who sustained inferior myocardial infarction, which was complicated by both an pseudoaneurysm on the inferior wall of the left ventricle and a ventricular septal rupture diagnosed by two and four dimensional transthoracic echocardiography.

Key Words: Pseudoaneurysm, myocardial infarction, ventricular septal rupture, 4D-echocardiography.

Sol ventrikül psödoanevrizmaları kardiyak rüptürün komşu perikard ya da trombüs ile sınırlanması ile oluşur. Sol ventrikül psödoanevrizmalarının en sık sebebi miyokard infarktüsü (Mİ) (özellikle de inferiyor Mİ) olup, bunu kardiyak cerrahi, travma ve enfeksiyonlar takip etmektedir. Sol ventrikül psödoanevrizmaları sık görülmemekle birlikte, tanı güçtür ve rüptüre eğilimlidir. Bu makalede inferiyor Mİ ile başvuran ve transtorasik 2D ve 4D ekokardiyografi ile tanısı konulmuş olan, psödoanevrizma ile interventriküler septum rüptürü komplikasyonlarının birlikte geliştiği bir hasta incelendi.

Anahtar Sözcükler: Psödoanevrizma, miyokard infarktüsü, ventriküler septal rüptür, 4 boyutlu ekokardiyografi

Myocardial infarction accounted for most of left ventricular (LV) pseudoaneurysms followed by cardiac surgery, trauma, and infection. Ventricular free wall rupture occurs in most cases of pseudoaneurysm and is usually associated with sudden cardiac death because of hemopericardium and subsequent cardiac tamponade. This catastrophic complication occurs usually within a week after acute myocardial infarction. Since they are prone to rupture, immediate diagnosis is very important in these patients.

CASE REPORT

A 74 year old male patient with the complaint of angina for 15 days was hospitalized with the diagnosis of subacute inferior myocardial infarction (MI). He had hypertension for 5 years and no other cardiovascular risk factors. Since he was admitted with subacute MI he was not given any thrombolytic treatment. His blood pressure was 130/80 mmHg, heart rate was 89 beats/min. Cardiac auscultation revealed a 3/6 degree pansystolic murmur at meso-

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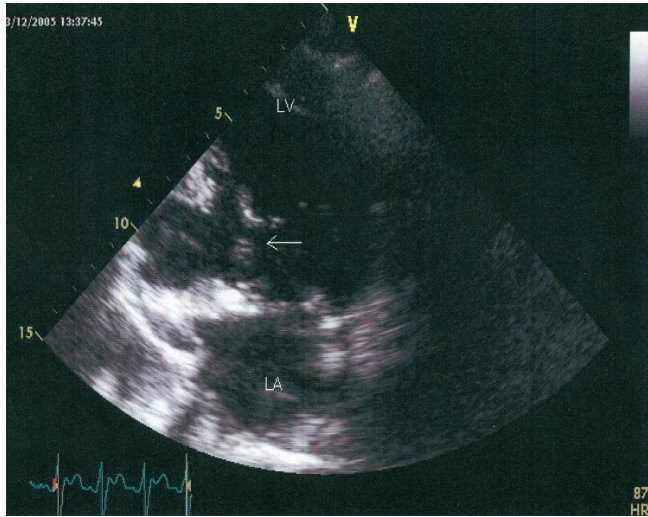


Figure 1: Discontinuity of myocardium (arrow) in pseudoaneurysm on the inferior wall of the left ventricle demonstrated by color flow Doppler transthoracic echocardiography in apical two chamber view.

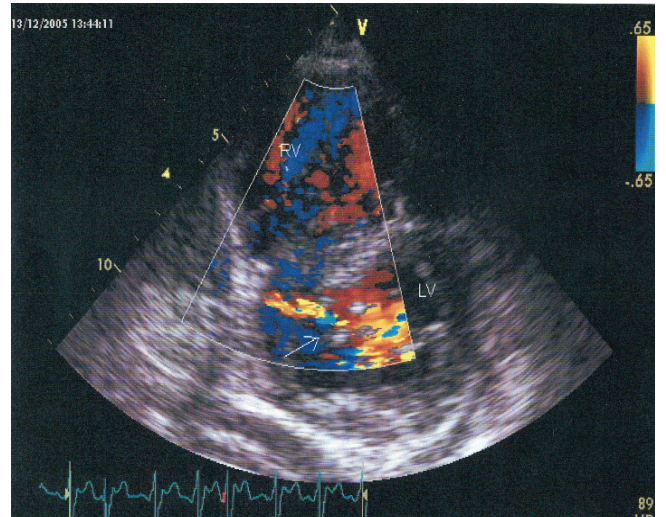


Figure 2: Color flow through ventricular septal rupture (arrow) demonstrated by color Doppler transthoracic echocardiography in parasternal short axis view at mitral valve level. LV; left ventricle, RV; right ventricle.

cardium. Electrocardiography revealed pathologic Q waves on inferior leads. Serum hemoglobin, hematocrit, urea, creatinin levels, CK-MB, LDH were 10.1 g/dL, 30.1%, 30 mg/dL, 1.21 mg/dL, 30 mg/dL, 862 U/L respectively. A two and four dimensional transthoracic echocardiography (GE, Vivid 7 Dimension, Horten, Norway) was done. There was discontinuity on basal region of inferior wall at 2D echocardiography, apical 2 chamber view. But there was a suspicion for interventricular septal rupture on basal region of interventricular septum which was not precisely differentiated from pseudoaneurysm at parasternal short axis view by color Doppler echocardiography (Figure 1, Figure 2). Left ventricular ejection fraction was 45%. By 4D echocardiography we achieved views simultaneously from different angles at the same cardiac cycle and tomographic slices have been developed from the same views. This new methodology, which allows us to take tomographic views of different slice thickness and different angles, clearly demonstrated basal muscular ventricular septal rup-

ture and pseudoaneurysm on the left ventricular inferior wall. (Figure 3, Figure 4, Figure 5). He underwent a coronary angiography that revealed 50% stenosis of mid of left anterior descending artery (LAD) and total occlusion of proximal of right coronary artery (RCA). Left circumflex (Cx) artery was giving grade 3 collateral flow to RCA. An intraaortic balloon pump was inserted immediately bridge to surgery. Hemodialysis was needed before surgery due to sudden increase in the urea and creatinine levels. Both of these complications were repaired successfully.

DISCUSSION

Most cases of LV pseudoaneurysms were related to myocardial infarction (particularly inferior MI). Inferior infarcts are approximately twice as common as anterior infarcts as the cause of this complication. Acute myocardial infarction is complicated by rupture of the myocardial free wall in about 6% of cases which occurs in the first 5 days in 50% of patients and

within 2 weeks in 90% of patients (1, 3) and usually is associated with sudden demise but may rarely result in pseudoaneurysm formation with unknown prevalence (2). Ventricular septal rupture occurs in 1-2 % of patients after acute MI in the prethrombolytic era but incidence has dramatically decreased in the post thrombolytic era (1). Ventricular septal rupture occurs with equal frequency in anterior and non-anterior sites (1). It may develop as early as 24 hours after MI but is usually seen 2 to 5 days after MI (1). Diagnosis is difficult because the most frequently reported symptoms are heart failure, chest pain and dyspnea, all of which are common in patients with coronary artery disease. In addition, patients also have nonspecific complaints such as cough, altered mental status, and dizziness that rarely elicit a concern for a LV pseudoaneurysm. Electrocardiographic and chest X-ray abnormalities are usually nonspecific. Left ventricular angiography is the most definitive test and can be useful in planning surgery since concomitant coronary angiography can be performed.

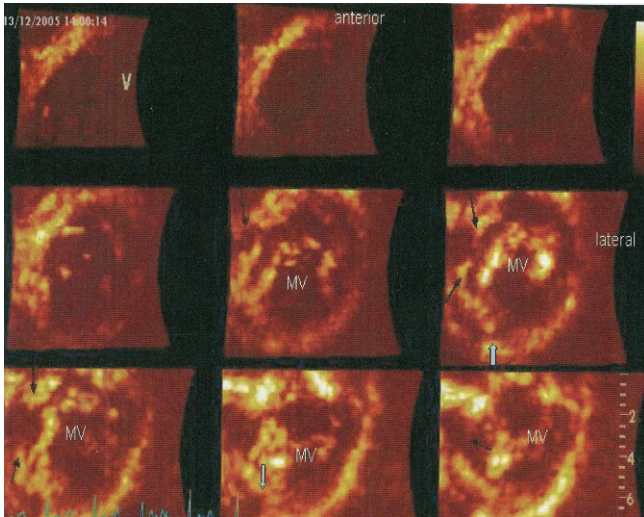


Figure 3: Apical to basal transversely acquired slices in apical four chamber view demonstrating interventricular septal rupture (black arrows) and pseudoaneurysm (white arrow) on the inferior wall by transthoracic 4D echocardiography. MV; mitral valve.

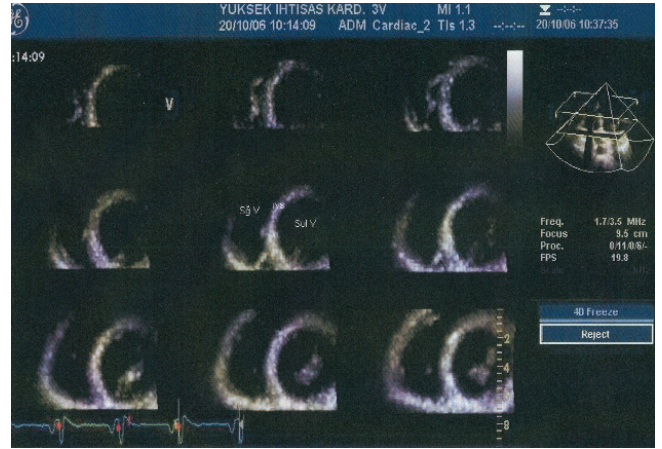


Figure 4: Apical to basal transversely acquired 9 slices in apical four chamber view of a normal left ventricle demonstrated by 4D echocardiography.

Transthoracic 2D echocardiography is the only alternative imaging modality that was usually not diagnostic. A definitive diagnosis was made in 26% of patients by 2D echocardiography. Because of this, for accurate diagnosis, this

onal echocardiography is a new method that can be useful in identification of these complications because it is less time consuming and non invasive method that can be done easily by an experienced echocardiographer. It

only one cardiac cycle time may be sufficient. Despite, ventriculography makes help for diagnosis, it may increase cardiac complication risk and also renal complication risk, already present due to use of opaque material. Computed tomography may also be used for diagnosis but it's time consuming and it also needs opaque material.

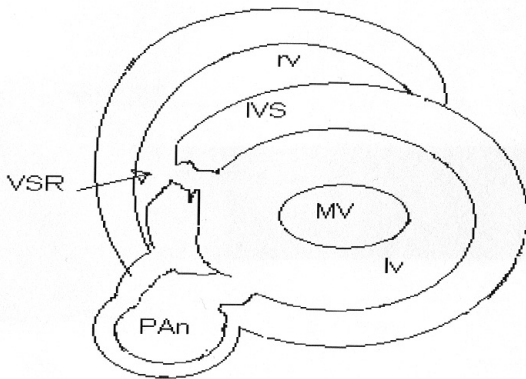


Figure 5: Schematic diagram of figure 3. lv; left ventricle, MV; mitral valve, rv; right ventricle, PAn; pseudoaneurysm.

test should be reinforced with other imaging modalities. Transesophageal echocardiography and MRI are alternative methods which appear to have diagnostic accuracies of 75% compared with angiography. Four-dimensi-

permits appreciation of different cardiac regions at the same time by using tomographic views from various windows which could be difficult to evaluate by 2D echocardiography.

As a consequence, both 2D and 4D echocardiographic methods can make diagnosis for this case. This case was presented because this was an infrequent complication of MI and at the same time it has got high mortality rate and long term survival after surgery was not common. This case was important because 4D echocardiography, which was newly started to be used in our country may offer an alternative practical way of diagnosis.

In order to achieve the same data at 2D echocardiography, different cross sections should be obtained by using multiple different image windows. However, image quality may not be good enough to make diagnosis at every image window. During 4D echocardiographic examination, only one best view at one image window and

We could not find any case report published yet in the literature in which complication of post-MI ventricular septal rupture and pseudoaneurysm occurred concomitantly in the same patient.

Survival of left ventricular pseudoaneurysm following acute myocardial infarction is rare. A few patients were reported to be alive with left ventricular pseudoaneurysm following myocardial infarction after surgery (4, 5). Surgical mortality is high among patients with basal septal rupture associated with inferior MI (70% compared with 30 % in patients with anterior infarcts) because of greater technical difficulty (1). There are limited experience of long term survivors following re-

pair of ventricular rupture and coronary revascularization (4). In this report we present a case in which both of these two complications occurred concomitantly. Both of these complications were repaired successfully and he has been living for 6 months with no symptoms but mild effort dyspnea.

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