Kardiologia Polska
2012; 70, 1: 85–87
ISSN 0022–9032

Giant post-infarction pseudoaneurysm of the left ventricle manifesting as severe heart failure

Ogromny pozawałowy tętniak rzekomy lewej komory z objawami ciężkiej niewydolności serca

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Abstract

A 57 year-old female was admitted for chronic heart failure (HF) with NYHA class IV symptoms. Transthoracic echocardiography revealed ruptured left ventricular (LV) lateral and posterior wall between their basal and middle segments resulting in giant, round pseudoaneurysm formation with a diameter of 12 cm. Bidirectional flow through a 2.9 cm orifice between the LV and the pseudoaneurysm cavity was shown. A 12-cm diameter pseudoaneurysm was resected and the orifice was closed with a Dacron patch. Twelve months after the diagnosis, the patient is in a stable condition with NYHA class II HF symptoms.

Key words: pseudoaneurysm, infarction, heart failure

Kardiol Pol 2012; 70, 1: 85–87

CASE REPORT

A 57 year-old female was admitted to our department with symptoms of heart failure (HF) in NYHA class IV. Seven months previously, she had experienced episodes of spontaneously resolving anginal chest pain. At that time, the patient did not contact the health care services. Five months later, impaired exercise tolerance followed by dyspnea at rest started. On the day of admission, clinical signs of severe decompensated HF were present. The ECG showed sinus rhythm with inverted T waves in I, II, aVL, V_2–V_6 leads (Fig. 1). A chest X-ray revealed an enlarged cardiac silhouette and left-sided pleural effusion. An increased *serum* B-type natriuretic peptide level — 853 pg/mL — was also observed. Transthoracic echocardiography showed left ventricular (LV 6.0 cm) and left atrium enlargement (4.7 cm), lateral segments hypokinesis with a moderate decrease of the LV ejection fraction (LVEF 49%). In the lateral and posterior wall between the basal and middle segments a myocardial rupture was observed, together with a giant round pseudoaneurysm with a diameter of 10 cm. Bidirectional flow through a 2.9 cm orifice between the LV and pseudoaneurysm with spontaneous ECHO contrast within the pseudoaneurysm cavity was shown (Fig. 2–4). A coronary angiography revealed occlusion in the distal portion of the left circumflex coronary artery (13 segments) and non-significant (40%) stenosis of the right coronary artery (Fig. 5).

The patient was diagnosed with past myocardial infarction (MI) complicated by a LV free wall rupture and pseudoaneurysm formation resulting in HF symptoms. After surgical consultation, the patient qualified for surgery. The procedure was performed using extracorporeal circulation. The pseudoaneurysm was resected and the orifice was closed with a Dacron patch (Fig. 6). The external diameter of the pseudoaneurysm cavity was 12 cm. A histopathologic examination revealed fibrous tissue together with thrombi — typical constituents of the pseudoaneurysm wall. Twelve months after surgery, the patient remains in a stable condition in NYHA functional class II, without angina symptoms.

DISCUSSION

The LV free wall rupture is an infrequent complication of acute MI, afflicting about 4% of patients. Almost instantly, it leads to heart tamponade and the death of 23% of these patients [1]. The clinical course of this complication is usually dramatic: pericardial haemorrhage results in tamponade and ulti-

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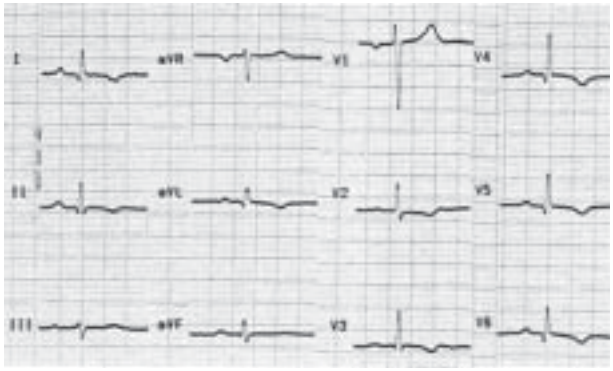

Figure 1. Patient's electrocardiogram

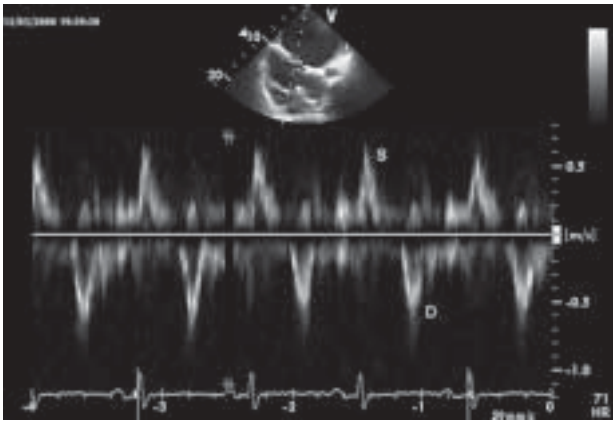

Figure 4. Pulsed wave Doppler revealing flow in pseudoaneurysm orifice: toward pseudoaneurysm cavity in systole (S) and toward left ventricle in diastole (D)

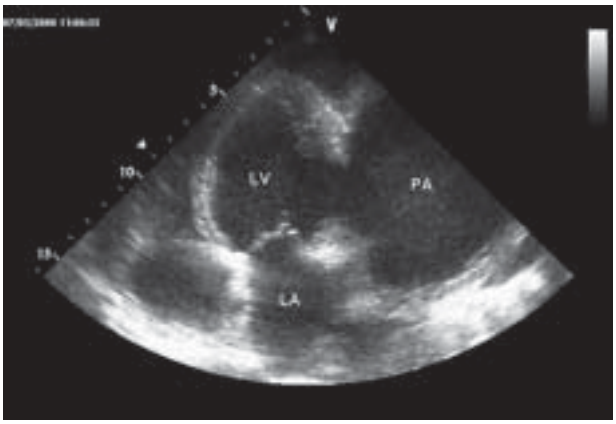

Figure 2. Transthoracic echocardiogram (apical four-chamber view) — giant pseudoaneurysm (PA); LV — left ventricle; LA — left atrium

Figure 5. Left coronary artery angiogram

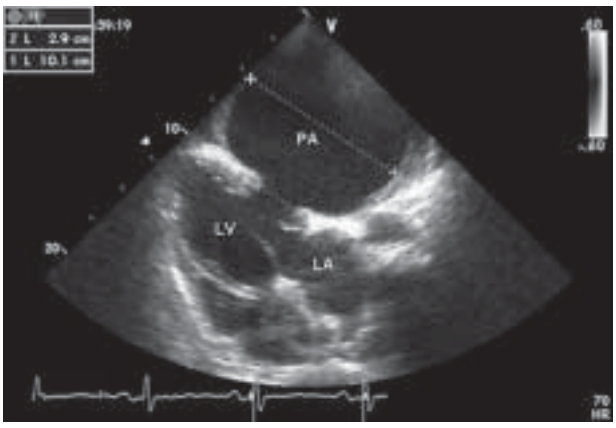

Figure 3. Transthoracic echocardiogram (substernal view) — pseudoaneurysm (PA) (diameter 10.1 cm) and orifice (diameter 2.9 cm); LV — left ventricle; LA — left atrium

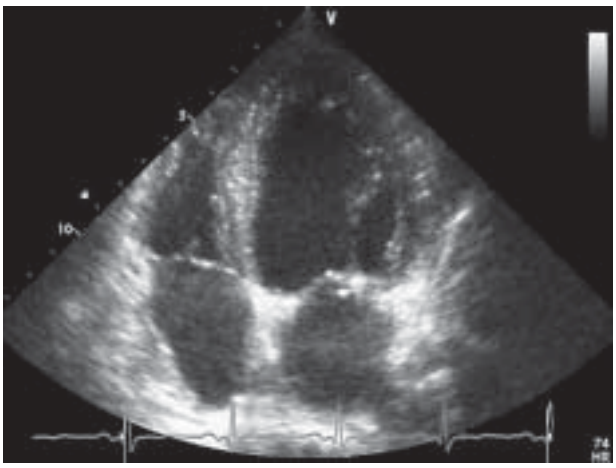

Figure 6. Transthoracic echocardiogram of patient after surgery

mately shock leading to death caused by pulseless electrical activity. Very rarely, bleeding may be confined by pericardial tissues which together with thrombus forming *in situ* build a pseudoaneurysm wall preventing cardiac tamponade. Blood flow is retained through the orifice between the LV and pseudoaneurysm cavity. The high risk of spontaneous rupture of the pseudoaneurysm, with fatal consequences, makes this group of patients candidates for immediate surgery [2].

The main causes of pseudoaneurysm formation are as follows: LV free wall rupture in the course of MI — 55% of cases; cardiac surgery complication — 33%; chest trauma — 7%; infective endocarditis sequele — 5%; and rarely during purulent pericarditis and heart tumour infiltrating [3].

Pseudoaneurysms are three times more often localised on the inferior and postero-lateral wall as a result of myocardial necrosis caused by occlusion of the right coronary artery or left circumflex artery. In contrast, true aneurysms in 80––90% of cases are located within the apical region or on the antero-lateral wall, being a consequence of the left anterior descending artery occlusion [3, 4].

Patients with a pseudoaneurysm usually present with anginal chest pain, HF symptoms, ventricular arrhythmias, thromboembolic complications or, less frequently, hypotension and syncope. About 10% of all cases are asymptomatic and are associated with a high risk of sudden cardiac death resulting from pseudoaneurysm rupture, ventricular arrhythmias or thromboembolic events [3, 5].

Imaging diagnostic methods, especially echocardiography as it is non-invasive and universally accessible, play a crucial role in the diagnostic process and differentiation between pseudoaneurysm and the much more frequent true aneurysm of the LV. Pseudoaneurysms, apart from their different localisation, are also dissimilar in shape, being round or saccular, and are usually larger. However, the most prominent feature determining the diagnosis of a pseudoaneurysm is a myocardial tissue defect, thus, the distinct visualisation of the aneurysm orifice. While true aneurysms have a wide connection with the LV, pseudoaneurysms are generally characterised by a narrow so-called aneurysm neck. A ratio between aneurysm orifice dimension and its cavity diameter of less than 0.5 is highly indicative of pseudoaneurysm, whereas a value above 0.9 suggests a true aneurysm of the LV [5, 6].

This difference results in turbulent blood flow through the pseudoaneurysm orifice; typically the laminar one in true aneurysms is visible in Doppler echocardiography. It is sometimes possible to visualise by means of a pulsed wave Doppler and colour Doppler the bidirectional blood flow through the pseudoaneurysm neck: toward its cavity in systole and toward the LV in diastole [5, 6].

In the present case, echocardiographic examination revealed a myocardial tissue defect, typical orifice configuration and characteristic blood flow through the pseudoaneurysm neck. The ratio between aneurysm orifice dimension and its cavity diameter was 0.3.

In uncertain cases, diagnostic methods such as transesophageal echocardiography, ventriculography, computed tomography, magnetic resonance and radionuclide scintigraphy may be helpful. After the confirmed diagnosis of an acute pseudoaneurysm, the treatment of choice is surgery. In patients with acute MI, surgery is associated with a 23–30% mortality rate, but the risk of pseudoaneurysm rupture is significantly higher and reaches 50% [1, 7]. As for chronic pseudoaneurysm, the treatment modality has not yet been established. During a four-year follow-up of patients with pseudoaneurysm treated conservatively, Moreno et al. [7] reported the probability of one-year survival at 90% and a four-year survival rate of 75%. Observation of this group of patients also indicates a significant correlation between the risk of sudden cardiac death and the severity of HF symptoms, the degree of LV dysfunction and ischaemic heart disease advancement.

Therefore, symptomatic patients or those with a large (> 3 cm) or gradually enlarging pseudoaneurysm should be treated surgically [1, 8]. A conservative approach should be considered in asymptomatic cases, in small aneurysms (< 3 cm), and in those with stable dimensions during systematic follow-up [7, 8]. The clinical course of the presented case, with severe HF symptoms, determined the choice of surgery.

The diagnosis of pseudoaneurysm is not an easy one, considering the lack of specific signs and symptoms. It is also difficult to define the typical natural history of a disease that may be short and dynamic with a fatal outcome, or long-term and asymptomatic [9]. Undoubtedly, imaging techniques, especially echocardiography, have a crucial significance in the diagnosis of LV pseudoaneurysm.

Conflict of interest: *none declared*

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