Case Report

Dissecting Intramyocardial Haematoma Diagnosed by Contrast Echocardiography

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Intramyocardial dissecting haematoma is a rare form of cardiac rupture that can occur as a complication following acute myocardial infarction or during the remodelling process. It is usually caused by a haemorrhagic dissection among the spiral myocardial fibres and needs urgent surgical treatment. Here we report the case of a 67-year-old man with indications of a previous infarction, in whom a dissecting intramyocardial haematoma was identified using contrast echocardiography.

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Echocardiography is a highly suitable method for the non-invasive assessment of cardiac structure and function. With the advent of contrast media and the evolution of hardware/software packages enabling cardiologists to assess myocardial perfusion with contrast echocardiography (CE), it is now possible to evaluate the microvascular integrity of a region and thus predict its potential for functional recovery.[1] During the past several years, through advances in contrast agents and ultrasound technology, CE has reached the stage where it is able to detect and evaluate coronary artery disease based on an evaluation of the myocardial perfusion.[2] CE is an easily applicable, efficient and diagnostically accurate technique that may provide the clinician with valuable information about the microvascular integrity of a dysfunctional area of the myocardium and the potential for it to recover its function following reperfusion. In the acute event setting, CE may offer significant prognostic information, contributing to patient risk stratification as well as to the assessment of the success of primary interventions.[1]

Left ventricular (LV) free wall rupture after acute myocardial infarction (AMI) is a catastrophic complication[3-5] and typically results in immediate collapse of the patient and electromechanical dissociation. In rare cases, however, the rupture is contained by pericardial and fibrous tissue, and the result is a pseudoaneurysm.[6,7] A pseudoaneurysm of the left ventricle is a myocardial rupture contained by pericardium and thrombus with no remnants of myocardial tissue. Though it is considered as a rare complication of myocardial infarction, it has been reported after chest trauma, cardiac surgery, inflammation, and endocarditis.[8]

Intramyocardial dissecting haematoma is a rare form of cardiac rupture that can occur as a complication following AMI or during the remodelling process. It is usually caused by a haemorrhagic dissection among the spiral myocardial fibres and needs urgent surgical treatment.[9]

Case presentation

A 67-year-old man was admitted because of deterioration of dyspnoea, reporting an episode of persistent precordial pain one month earlier. There was no family history

of hyperlipidaemia or ischaemic heart disease, and the patient's lipid profile was within normal limits. He had developed adult-onset diabetes 4 years earlier. He was a heavy cigarette smoker. The physical examination revealed a regular pulse rate of 90 beats/min and a blood pressure of 110/70 mmHg. Chest radiographs in the posteroanterior and lateral views showed cardiomegaly with a cardiothoracic ratio of 0.8. His electrocardiogram (ECG) demonstrated signs of an anterior infarction (ST-segment elevation in precordial ECG leads), while the transthoracic echocardiogram demonstrated akinesia of the apex and the anterior wall, with an LV ejection fraction of 0.25. Echocardiography also showed normal right dimensions according to body surface area. LV end-diastolic diameter (LVEDD) was 62 mm and left atrium (LA) diameter 50 mm. Tissue Doppler imaging revealed abnormalities of diastolic function (E<A). All cardiac valves appeared normal and there were no findings of any coexisting congenital lesion. Nor was there any pericardial effusion. The results of routine laboratory work and cardiac enzymes were normal.

CE was performed using a Sonos 5500 device (Philips Medical Systems) and Bracco contrast agent, following intravenous infusion of SonoVue. This showed a thickened area of the apex with a small intramural cavity (Figure 1), as well as a pseudo-channel consistent with a dissecting intramyocardial haematoma (Figure 2). Echo-Doppler and CE found no communication with the right ventricle. Coronary angiography demonstrated a left anterior descending artery that was occluded in its proximal portion. A magnetic resonance imaging examination was proposed, but the patient refused. Surgical intervention was recommended; however the patient also refused this treatment and died 3 months later. No further information is available on the cause of death and no autopsy was performed in this patient.

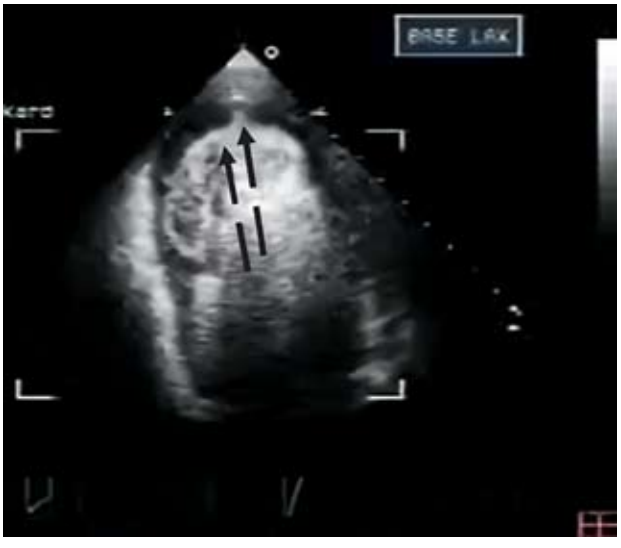

Figure 1. Myocardial contrast echocardiography images in the apical four-chamber view. The arrows show the contrast extrusion from the left ventricular cavity into the myocardium in the apex, suggesting a dissecting intramyocardial haematoma.

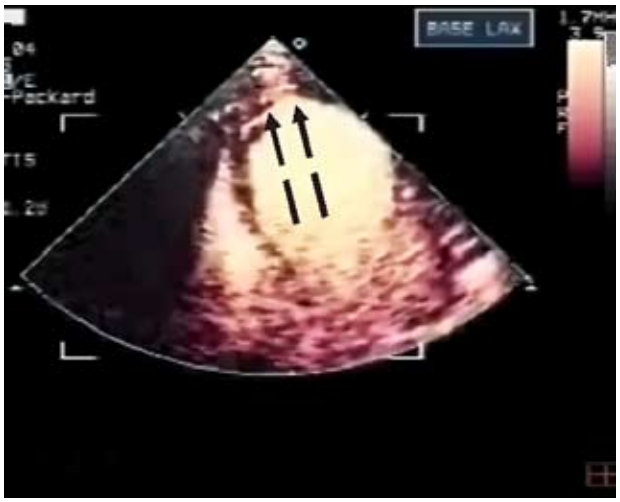

Figure 2. Myocardial contrast echocardiography images (myocardial perfusion) in the apical four-chamber view. The arrows show the contrast extrusion from the left ventricular cavity into the myocardium in the apex, suggesting an impending rupture.

Discussion

Intramyocardial dissecting haematoma, with or without sub-epicardial haematoma, is a rare, but known complication of AMI,[10] chest trauma,[11] surgery,[12] percutaneous coronary intervention,[13] after cineventriculography,[14] or even spontaneously.[15] Most of the cases are associated with inferior myocardial infarction.[16] The diagnosis is made by autopsy or surgery, and only exceptionally by echocardiography.[5,17] To our knowledge, numerous cases are described in the literature with only 10% survival rate in patients treated medically, compared with 100% survival in those who were referred for surgery.[16]

Cardiac rupture as a complication of AMI causes 7% to 10% of early deaths after AMI.[18] Early diagnosis leads to emergent life-saving procedures. Usually, diagnosis of subacute myocardial rupture by echocardiography after AMI depends on the identification of pericardial effusion (haemopericardium) and the

signs of cardiac tamponade. The presence of pericardial effusion greater than 5 mm in thickness, signs of cardiac tamponade, echogenic pericardial effusion, and ventricular wall collapse during early diastole have shown a high sensitivity (70%) and specificity (90%) for the diagnosis of cardiac rupture. However, every one of these variables has a high rate (20%) of false-positive findings.[19] The absence of pericardial effusion in a patient with AMI excludes the diagnosis of myocardial rupture, but its isolated presence is not equivalent to myocardial rupture. Thus, an accurate diagnosis is essential in order to make a decision concerning emergency surgery.

Intramyocardial dissecting haematoma is considered to be an incomplete form of cardiac rupture without haemopericardium. Pathophysiologically, an initial bleed may appear "contained", only to progress in a relentless fashion along naturally occurring dissection planes between the ventricular spiral muscles, dissecting its way through the myocardium and in the process avulsing perforating vessels, which in turn bleed further, thereby establishing a self-propagating process.[13] From an anatomical and pathological point of view, an intramural haematoma is a type of myocardial rupture, with planes of dissection occurring between the spiral muscles of the ventricle and a laminated thrombus included in its contents, together with a few myocytes and fibrous tissue.[20-22]

Pathological findings consist of a cavity filled with blood, the outer wall of which is the myocardium and pericardium while the inner wall, which faces the ventricular cavity, is part of the myocardium and endocardium. Clinical presentation depends on the cause of the haematoma. ECG findings are variable: persistent ST elevation is seen in patients who initially present with ST-elevation AMI;[10] there may be no ischaemic changes;[12] ST elevation can sometimes appear late;[14] it can mimic AMI;[15] and it can present with recurrent ventricular tachycardia.[23] Persistent ST elevation is an important clue in suggesting intramyocardial dissecting haematoma. In the present case, ST elevation was observed in the precordial leads. Imaging modalities used to diagnose intramyocardial dissecting haematoma are transthoracic and transoesophageal echocardiography,[10] computerised tomography scan and magnetic resonance imaging.[24,25]

The differential diagnosis of intramyocardial dissecting haematoma includes prominent ventricular trabeculations, intracavitary thrombi, and pseudoaneurysm. Careful examination of the endocardial and epicardial layers is extremely important, and contrast material is useful to delimit the endocardial borders and distinguish prominent ventricular trabeculations, thrombi, or pseudoaneurysm, whereas colour Doppler ultrasound would detect the presence of a communication with the endocardial or pericardial cavities.[10] The haematoma's acoustic characteristics depend on the time of evolution. It can be seen as an echodense mass in acute bleed or cystic-like; an echo-lucent cavity may be seen adjacent to severely hypokinetic or dyskinetic infarct-related segments.[10] Haemodynamically stable patients are managed conservatively with spontaneous resolution occurring in some cases,[24] while in unstable patients surgical evacuation with or without glue patch repair has been reported.[12,13,21,23]

In patients with AMI, it is very important to establish the diagnosis of intramyocardial haematoma and to differentiate it from intracavitary thrombosis or cardiac rupture temporarily confined by pericardium (ventricular pseudoaneurysm).

In our patient, the diagnosis of intramyocardial haematoma was established by identifying the formation of a left ventricular neocavitation with acoustic characteristics of blood in its centre, using transthoracic echocardiogram and CE. Ventricular myocardium was identified on the external aspect of the haemorrhage. The echocardiographic diagnosis was also supported by recording a thin endomyocardial layer surrounding the haematoma with ample movement – a finding that differentiated it from an intracavitary thrombus. The echocardiographic study dismissed the possibility of a pseudoaneurysm by showing minimal pericardial effusion without epicardial disruption.

In conclusion, transthoracic echocardiography, and especially CE, seems to be an alternative non-invasive method for the early diagnosis of left ventricular free wall rupture.

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