

Left Ventricular Pseudo-False Aneurysm Detected With ECG-Gated Multidetector Computed Tomography and Cardiac Magnetic Resonance Imaging

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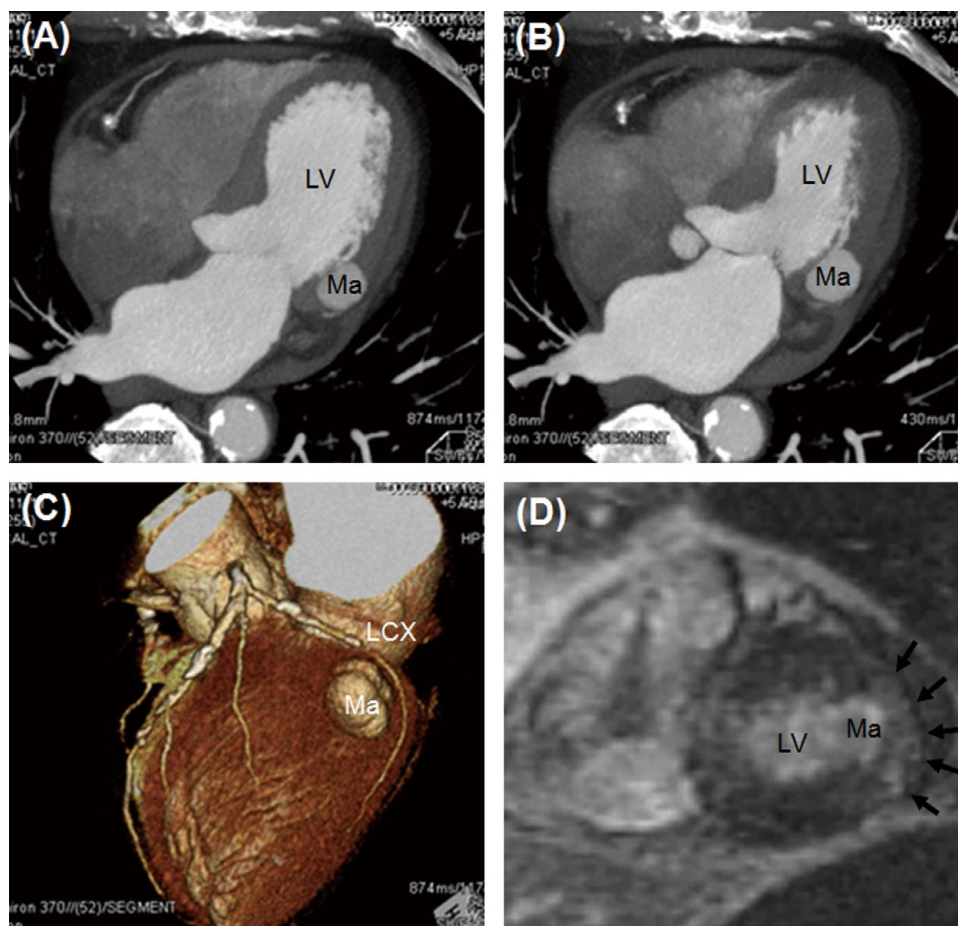


Figure 1. (A, B) Horizontal axis ECG-gated multidetector computed tomography images. The intra-left ventricular (LV) wall mass (Ma) protrudes more in end-systole (B) than in end-diastole (A). (C) The 3-dimensional volume-rendering image shows the intra-LV wall mass and severe stenotic lesion in the left circumflex artery (LCX). (D) Cardiac magnetic resonance image (short axis) shows late gadolinium enhancement, which is transmural but inhomogeneous (black arrows) around the mass, because the LV wall includes spotty non-enhanced areas.

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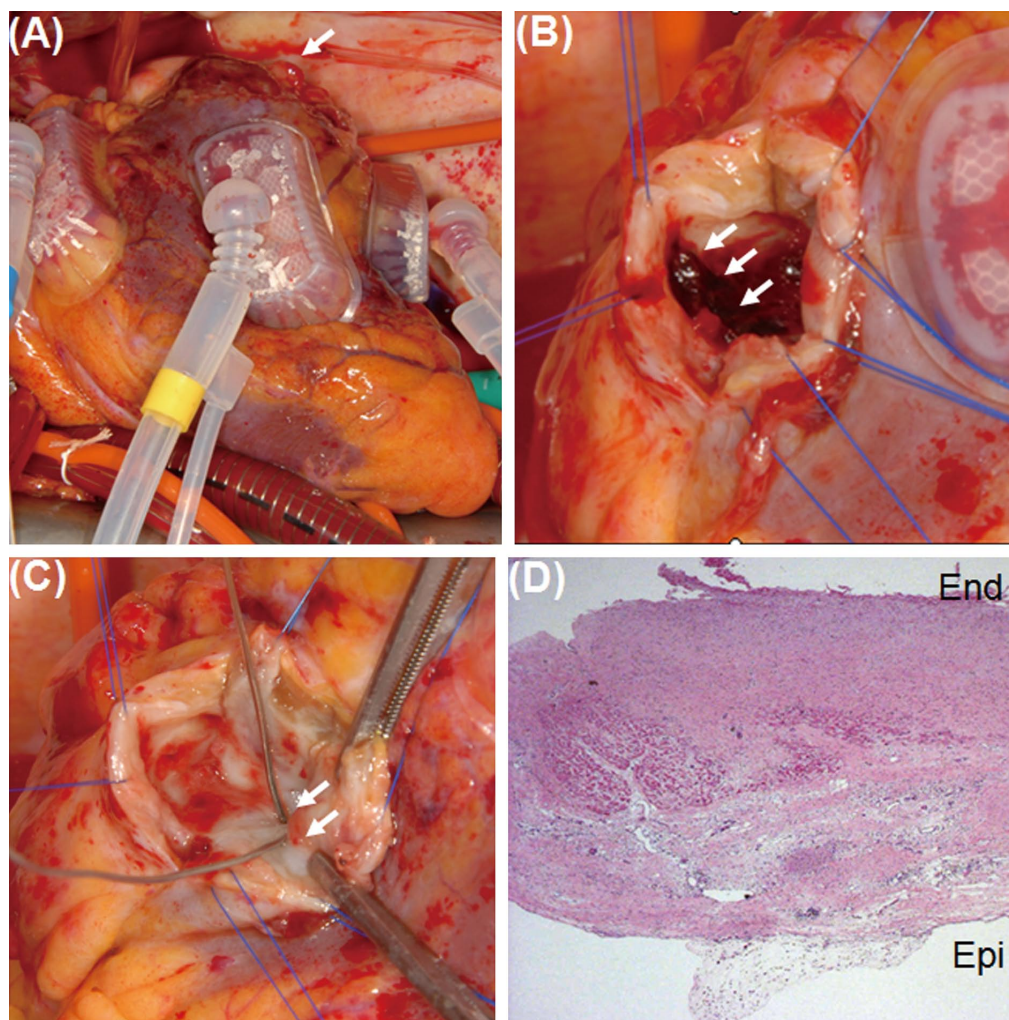


Figure 2. (A) Intra-operative image of the aneurysm in the basal lateral wall of the left ventricle (white arrow). (B) The incised aneurysm filled with many blood clots (white arrows). (C) Probes passing through small holes linked to the LV cavity (white arrows). (D) Histology showing the wall of aneurysm richly composed of fibrous tissues, but some myocardial fibers are evident (H&E, $\times 10$).

An 85-year-old man with diabetes mellitus complained of sudden-onset back pain and attended hospital. The 12-lead ECG showed tall R waves in the right precordial leads, ST-segment elevation and PR-segment depression in both the inferior and precordial leads. His blood pressure was 146/78 mmHg and heart rate was regular at 88 beats/min. Blood examination revealed elevated white blood cell counts and C-reactive protein level, but the creatine kinase level was normal. The echocardiogram revealed an echo-free space on the cardiac circumference, although the global left ventricular (LV) wall motion was almost normal. The segmental wall motion in the basal lateral wall was slightly reduced, and an echogenic mass in the LV wall was observed. The patient was initially diagnosed as having acute pericarditis with pericardial effusion, and was admitted to the cardiology department.

To investigate the echogenic mass in the LV wall, the patient underwent both ECG-gated multidetector computed tomography (MDCT) and cardiac magnetic resonance (CMR)

imaging. Cardiac MDCT demonstrated that the mass was contrast-enhanced and linked to the LV cavity with small tears within the LV wall. In addition, the mass protruded more in systole than in diastole (Figures 1A,B). The 3-dimensional volume-rendering image showed the intra-LV wall mass and severe stenosis in the left circumflex artery (Figure 1C). The left anterior descending artery and right coronary artery also had significant stenotic lesions. The late gadolinium enhancement (LGE)-mode of CMR showed LGE in the LV wall around the mass (Figure 1D). The LGE was transmural but inhomogeneous because the LV wall included spotty non-enhanced areas. Based on these findings, we considered that the pericardial effusion was caused by an oozing rupture from the intra-LV wall aneurysm associated with recent (or old) myocardial infarction.

The pericardial effusion decreased without requiring pericardiocentesis during the patient's hospital stay, and 4 weeks later he underwent coronary arterial bypass surgery with patch occlusion of the aneurysm. After incision of the aneurysm,

many blood clots that filled the aneurysm and the 2 small holes linking it to the LV cavity were observed (Figures 2A–C). The patient was discharged without adverse events and is alive and asymptomatic under β -blocker, statin and aspirin treatment.

The pathology examination revealed that the wall of aneurysm had 3 layers (Figure 2D). Much collagen fibers were displaced from the myocardium, of which a small amount remained. These findings were concordant with those from CMR imaging, and confirmed that the intra-LV wall aneurysm was a “pseudo-false” aneurysm caused by an intramyocardial dissecting hematoma. The pseudo-false aneurysm is a rare form of cardiac rupture that can occur as a complication of acute myocardial infarction. It is usually caused by a hemorrhagic dissection among the spiral myocardial fibers, and therefore contains myocardial elements. Because the myocardium progressively dissects, with resultant complete ventricular rupture, urgent surgical treatment is needed.^{1–3}

This patient did not have an apparent history of myocardial infarction, but the combination of cardiac MDCT and CMR imaging could predict the etiology of pericardial effusion and the intra-LV mass. Cardiac MDCT can provide detailed information of the coronary arteries and LV wall simultaneously with high spatial resolution.⁴ CMR is also non-invasive, and does not expose the patient to ionizing radiation. Cine-mode CMR is one of the most accurate methods

of evaluating ventricular function, and LGE-mode CMR can exhibit the histological changes in the LV wall.⁵ Additionally, it is known that an imaging approach combining the LGE-mode and T2-weighted CMR can differentiate acute from chronic myocardial infarction, because T2-weighted CMR depicts infarct-related myocardial edema.⁵

In conclusion, the combination of cardiac MDCT and CMR imaging is valuable for diagnosing pseudo-false aneurysm complicating acute myocardial infarction.

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