



Case report

Right ventricular free wall dissection as a rupture tract in left ventricular rupture during acute myocardial infarction



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ABSTRACT

Three rare cases of cardiac rupture with right ventricular wall dissection during acute myocardial infarction (AMI) were reported. The cases comprised 2% among our 148 previously reported postinfarction cardiac ruptures with sudden death. The dissections occurred in hearts with biventricular inferior wall AMI and developed between the superficial layers and the deeper layers of inferior wall of the right ventricle. All had an endocardial tear at the basal septum where it meets the inferior free wall of the left ventricle, and had an epicardial tear on the middle inferior wall of the right ventricle. Based on the evidence of the ages of the thrombi of the rupture tracts, delayed epicardial rupture was found besides that soon after the right ventricular dissection.

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1. Introduction

Cardiac rupture during acute myocardial infarction (AMI), leading to tamponade, is an important cause of sudden death. We have pathologically studied 148 hearts with rupture during AMI and reported the detailed pathology including the intimal tear, rupture tract, coronary lesion, and age of infarction [1–3]. Right ventricular wall dissection (RVWD) is a rare and complex form of rupture tract in left ventricular rupture during AMI and its pathological findings have been scarcely reported. Among our 148 cases studied, three cases of RVWD are included; we present here the pathological features and discuss the development of right ventricular wall dissection.

2. Report of three cases

2.1. Case 1

A 72-year-old man with diabetes mellitus and old cerebral infarction had had facial edema for a few days

before death. He was found dead in front of the door of his company.

The heart weighed 440 g, and was ruptured on the surface of the middle third of the right ventricle (1.5 cm) (Fig. 1a). Acute inferior wall infarction (aged 10–14 days) of the left and right ventricle and the RVWD were seen in the transverse section (Fig. 1b and c).

An endocardial tear (1.0 cm) was situated at the basal third and where the septum meets the free wall of the left ventricle. The rupture tract started at the endocardial tear and dissected the superficial layers and deeper layers of cardiac muscle of the inferior wall of the right ventricle, ultimately rupturing the epicardium of the middle third of the inferior wall of the right ventricle (Fig. 1a and b). Histologically, a recent thrombus was seen on the inside wall of the rupture tract of the RVWD.

There was no ventricular septal rupture or rupture into the right ventricular lumen (re-entry).

Severe atherosclerosis of the main epicardial coronary arteries and thrombus formation in the right coronary artery (segment 2) were found. Histologically, the main occlusive component of the coronary thrombus was organizing thrombus (Fig. 1d) and the late component was recent thrombus.

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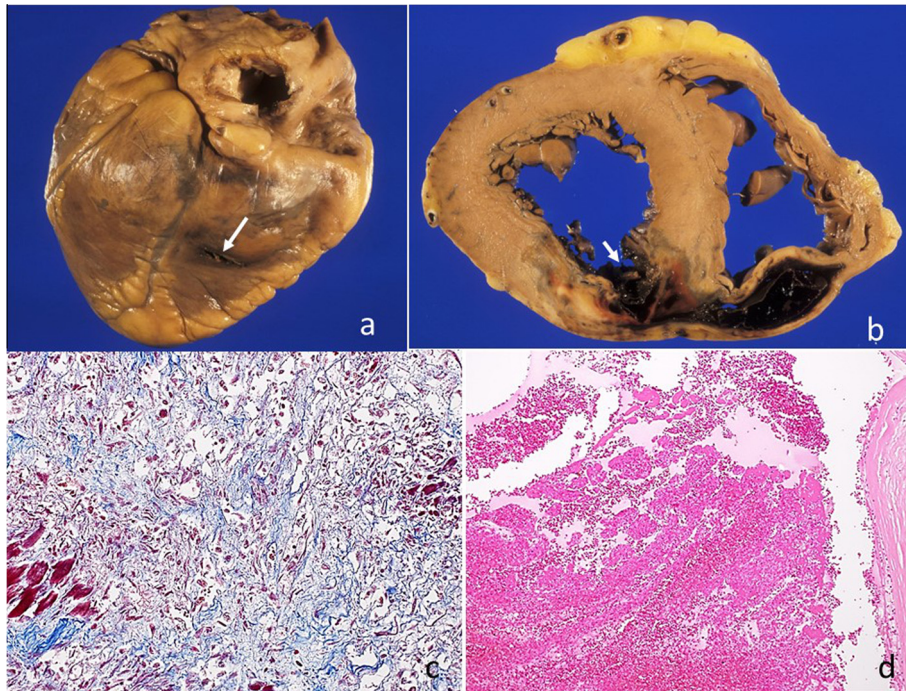


Fig. 1. (Case 1) Macroscopic view of the ruptured heart: epicardial tear (long arrow) on the surface of the posterior wall of the right ventricle (a). Transverse section of the ventricles (basal third). Acute myocardial infarction of the inferior wall of the left and right ventricle, and endocardial tear (short arrow) of the left ventricle and the right ventricular wall dissection (b). Microscopic view of infarcted myocardium (Azan stain), 10–14 days' infarction (c). Organizing thrombus (main component) in the right coronary artery (HE stain) (d).

2.2. Case 2

An 80-year-old woman with osteoporosis and dementia was found dead one morning at the base of the stairs. She had shown appetite loss the previous day.

The heart weighed 390 g, and was ruptured on the surface of the middle third of the right ventricle (0.6 cm) (Fig. 2a). Acute inferior wall infarction (aged 6–10 days) of the left and right ventricle and the RVWD were seen in the transverse section (Fig. 2b and c).

An endocardial tear (1.0 cm) was situated at the basal third and where the septum meets the free wall of the left ventricle. The morphology of the rupture tract was similar to that of Case 1 (Fig. 2a and b), and no ventricular septal rupture or re-entry to the right ventricular lumen was observed. A fresh thrombus, mainly a platelet thrombus, was seen on the inside wall of the rupture tract of the RVWD, histologically.

Severe atherosclerosis of the main epicardial coronary arteries and thrombus formation in the right coronary artery (segment 3) were found. Histologically, the main occlusive component of the coronary thrombus was recent thrombus (Fig. 2d) and the latest component was platelet thrombus.

2.3. Case 3

A 66-year-old woman with hypertension and rheumatic disease went to a doctor because of nausea and chest pain. Because of her normal electrocardiogram, she was sent home. The next day she felt lassitude, followed by vomiting and loss of consciousness. She fell into cardio-pulmonary arrest on the way to the hospital and died soon after.

The heart weighed 410 g, and was ruptured on the surface of the middle third of the right ventricle (4.0 cm) (Fig. 3a). Acute inferior wall infarction (aged <12 h) of the left and right ventricle and the RVWD were seen in the transverse section (Fig. 3b and c).

The endocardial tear (3.0 cm) was situated at the basal to middle third and where the septum meets free wall of the left ventricle. The morphology of the rupture tract was similar to that of Case 1 (Fig. 3a and b) and no ventricular septal rupture or re-entry to the right ventricular lumen was observed. A fresh thrombus was seen in the inside wall of the rupture tract of the RVWD.

Severe atherosclerosis of the main epicardial coronary arteries and thrombus formation in the right coronary artery (segment 1) were found. Histologically, the main occlusive component of the coronary thrombus was fresh thrombus (Fig. 3d) and the latest component was platelet thrombus.

3. Summarized pathological features of the infarcted heart in the present three cases

Pathological findings of the three hearts are summarized in Table 1. We experienced 29 hearts with inferior wall infarction among the 148 previously studied cases [1], and these 29 ruptured inferior infarction cases were divided into two categories according to their association or not with right ventricular infarction, as a reference (Table 2).

- (1) All three RVWD cases were found to have ruptured hearts with inferior wall MI of the left and right ventricles. Namely, all three hearts had right ventricular infarction.
- (2) All the rupture tracts started and continued in same manner: namely, they started at the endocardium of the basal third and where the septum meets the free wall of the left ventricle, dissected the superficial layers and deeper layers of the cardiac muscle of inferior wall of the right ventricle, and ultimately ruptured at the epicardium of the middle third of the inferior wall of the right ventricle. The entry of the rupture characteristically existed at the basal site of the left endocardium.

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