# CASE REPORT

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# Cardiac Rupture Due to Severe Fatty Infiltration in the Right Ventricular Wall

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**ABSTRACT:** An extremely rare case of sudden death caused by cardiac rupture due to severe fatty infiltration in the right ventricular myocardium is presented. The patient, a 74-year-old woman, had no history of chest trauma, hypertension, or pulmonary disease. The autopsy showed a small tear in the right ventricle and cardiac tamponade, but no coronary artery lesion. In the right ventricular myocardium, muscle fibers were definitely atrophic or absent, with massive fatty replacement. Fatty infiltration of the myocardium, if severe, can be a cause of serious cardiac dysfunction or, occasionally, sudden death.

**KEYWORDS:** pathology and biology, death, cardiovascular system, cardiac rupture, sudden death, fatty infiltration

The most common cause of sudden death is ischemic heart disease or intracranial bleeding. Recently, sudden cardiac death has attracted notice because of the sudden death of some joggers and marathon runners, but none of these deaths has been due to rupture of the heart [*1*]. Most of these cases are found to have coronary lesions or arrhythmias. In over 14 000 autopsies done at the authors' pathology department, the case described in this paper is the first known case of sudden cardiac death caused by cardiac rupture due to severe fatty infiltration of the right ventricle. This report describes the detail of the pathologic findings and calls pathologists' attention to fatty infiltration of the myocardium as a possible mechanism of unexplained cardiac dysfunction or sudden death.

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**The Case**

A 74-year-old woman complaining of severe lumbago due to osteoporosis was admitted to the Orthopedic Surgery service of the Mie Prefectural General Shiohama Hospital, Mie, Japan. Her laboratory data showed only a few abnormalities: mild anemia ($3.01 \times 10^6/mm^3$), mild hypoproteinemia (5.6 g/dL), and some leukocytes and bacilli in her urine. Chest radiographs revealed no abnormalities in the lungs or heart but showed severe osteoporosis. Bed rest and estrogen treatment were prescribed, but no surgery. Her lumbago improved; however, she was found dead in bed several hours after the last inspection in the early morning of the eleventh hospital day. No cardiopulmonary resuscitation was done.

The autopsy showed cardiac rupture in the right ventricle with tamponade. The heart weighed 340 g and its shape was normal. The pericardial sac was filled with 120 mL of blood. An irregular tear measuring 0.2 by 0.8 cm was observed in the anterior wall of the right ventricle at the apex, without any evidence suggesting acute infarction (Fig. 1). The heart was neither hypertrophic nor dilated. There was no finding of systemic arteriosclerosis, including the coronary arteries. The only abnormality was severe fatty replacement in the right ventricular myocardium. Histologic examination showed severe fatty infiltration and replacement of almost the full thickness of the right ventricular myocardium. At the rupture site, only several layers of muscle fiber were left at the endocardial site of the fatty wall, into which slight bleeding had penetrated (Fig. 2). The fatty ingrowth appeared within the connective tissue stroma, resulting in separation and atrophy or loss of muscle fibers (Fig. 3). There was no evidence of ischemic change or fatty degeneration in the ventricular myocardium. Other autopsy findings were moderate congestion of the lungs and acute pyelonephritis. The pulmonary arterial system was intact. The liver and the pancreas had no fatty ingrowth.

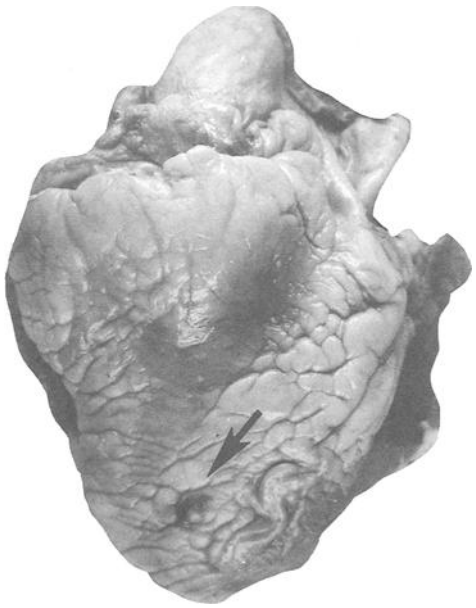

FIG. 1—*A rupture* (arrow) *in the right ventricle.*

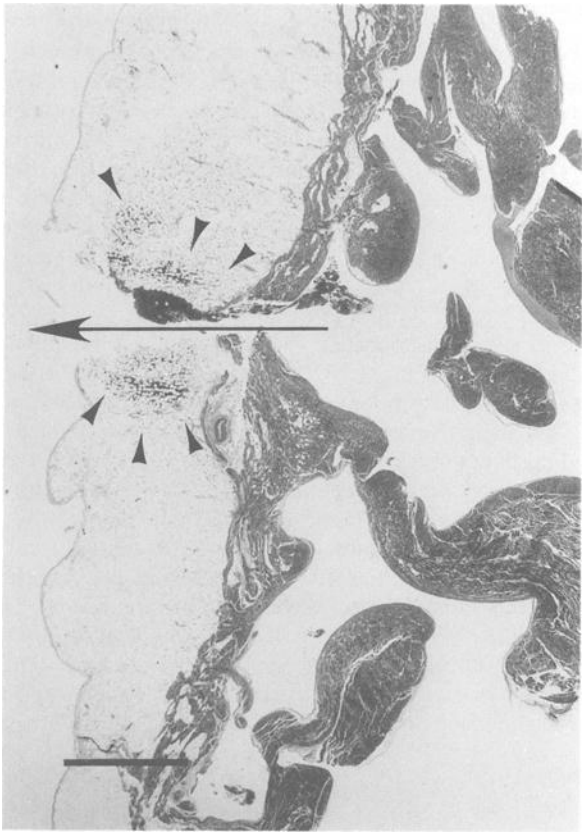

FIG. 2—*A rupture* (arrow) *in the fatty wall. Only several muscle fiber layers are left at the endocardial site. Hemorrhage into the ventricle is indicated by arrows. The bar indicates 1.0 mm.*

## Discussion

Fatty infiltration is usually found in the heart and pancreas and is associated with obesity and aging [*2*]. In the heart, the fatty condition involves the right ventricle more often than the left. The fatty heart is seldom detected by clinicians, however, as the lesion has not been any cause of significant clinical manifestations. Electrocardiography and radiological diagnostic methods do not reveal fatty change of the heart. There is only a small possibility of severe fatty infiltration causing cardiac dysfunction by inducing right ventricular dilation following cardiac failure or arrhythmia. The lesion is, however, rarely the primary cause of cardiac death. Therefore, there are few reports in the literature on fatty infiltration of the heart. Saphir and Corrigan reviewed the findings of 58 cases of fatty infiltration of the myocardium and referenced the literature [*3*]. They described two cases of sudden death due to fatty infiltration of the heart and suggested the significance of the fatty myocardial change as a contributory factor to cardiac dysfunction. A few textbooks describe cardiac rupture at the site of fatty infiltration [*4,5*]; however, they do not cite the literature. Recently, a case of right ventricular cardiomyopathy was reported in which a young man died suddenly from a massive replacement with adipose tissue in the right ventricular myocardium, with no clinical signs before his death [*6*]. In

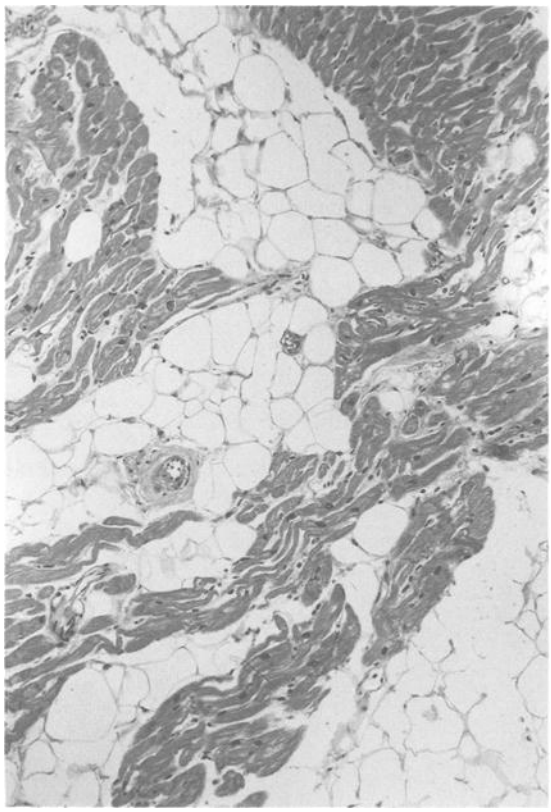

FIG. 3—*Small islands of atrophic muscle fibers isolated by severe fatty replacement in the right ventricle.*

our case, fatty lesion was found only in the heart. The pathogenesis was not clear but might be one of the aging processes because the patient was not obese. The factor inducing the rupture in the fatty right ventricle was also unclear, although a temporary increase of the right ventricular blood pressure was the expected cause. However, there was no lesion in the pulmonary circulation which would have caused an excess load of the right ventricle. The patient had 120 mL of blood in the pericardial sac. This volume might not be sufficient to impede cardiac function; however, pathological abnormality sufficient to cause death was seen only in the heart. We therefore concluded that cardiac tamponade, followed by acute cardiac arrest in an aged patient, could occur even when the volume of blood was under 200 mL if blood filled the pericardial sac suddenly after rupture.

Sudden death occurs from various causes, especially cardiac lesions, ischemic heart diseases, cardiomyopathy, valvular dysfunctions, abnormalities of the conduction system, and electrolyte derangements [*7*,*8*]. It is, however, sometimes difficult to determine the primary cause of sudden cardiac death. Not infrequently, there are sudden cardiac deaths without discernible cardiac abnormalities [*9*]. Therefore, one should document all pathologic findings in sudden cardiac deaths in the hope that future study of the pathogenesis of sudden death and its early diagnosis will help to prevent sudden death.

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