

## A Patient with Prior History of Open Heart Surgery, who Survived from a Traumatic Ventricular Free Wall and Coronary Artery Rupture, without Surgical Repair

Jae-Bin Seo, MD, Sang-Ho Cho, MD, Chang-Hwan Yoon, MD, Seung-Jeong Park, MD, Woo-Young Chung, MD, Dae-Won Sohn, MD, Young-Bae Park, MD and Yun-Shik Choi, MD

*Division of Cardiology, Department of Internal Medicine, Seoul National University, Seoul, Korea*

### ABSTRACT

A case of a 23 year-old man who, thanks to his parietal pericardium, scarred by previous open heart surgery, survived traumatic ventricular free wall and coronary artery rupture, without surgical repair, is reported. He was injured in a traffic accident and transferred to our hospital immediately. On arrival, he was hypotensive, with blood pressure of 53/25 mmHg. Because hemoperitoneum was suspected, an emergency exploratory laparotomy was performed. After surgery, his blood pressure stabilized, but electrocardiography showed abnormal findings that had not existed before the traffic accident. To find the probable cause of the electrocardiographic changes, echocardiography was performed, which showed a right ventricular free wall and right coronary artery ruptures. Nevertheless, he survived, without surgery, due to the thickened and adhered pericardium around the rupture site, which presumably resulted from the prior open heart surgery. Since discharged, he has remained well for nine months, with no further events. (*Korean Circulation J* 2004;34(1):104-106)

**KEY WORDS:** Heart rupture; Coronary vessels; Injuries.

### Introduction

A ventricular free wall rupture is a well-known complication of acute myocardial infarction (AMI).<sup>1)</sup> However, it may also result from a penetrating, or even blunt, chest trauma, in isolation or association with coronary artery injury.<sup>2)</sup> Surgery is the only option for the preservation of life in this situation. We recently encountered a patient with traumatic ventricular free wall and coronary artery ruptures, who survived without surgery, due to the thickened and adhered pericardium around the rupture site, which presumably resulted from the prior

open heart surgery.

### Case

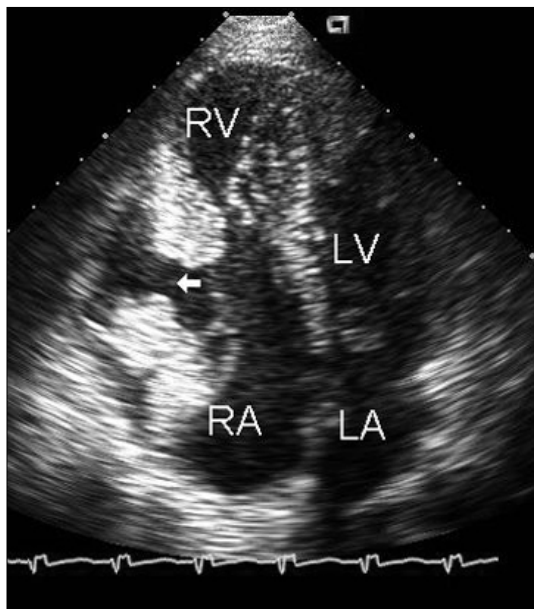
A 23-year-old male was transferred to our hospital immediately after a traffic accident. On arrival, the patient was hypotensive, with blood pressure of 53/25 mmHg. Hemoperitoneum was strongly suspected, and emergency exploratory laparotomy was performed. In the operative field, a splenic rupture and hemoperitoneum were found, and thus, a splenectomy and evacuation of the hematoma were performed.

His blood pressure stabilized to 110/60 mmHg after surgery, but the electrocardiography (ECG) showed ST elevation and a Q wave in the inferior leads, ST segment depression and T wave inversion in the precordial leads. He had a past medical history of ventricular septal defect (VSD) and patent ductus arteriosus (PDA), which were repaired when he was aged seven. The ECG taken after

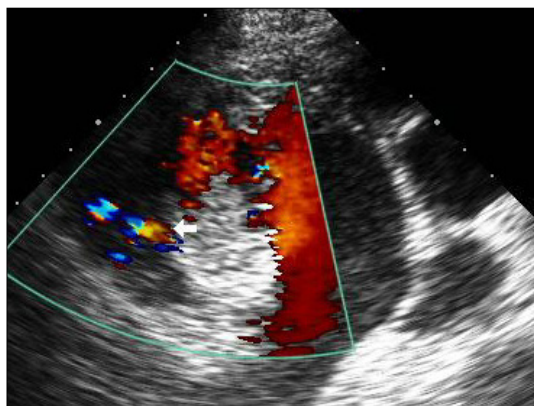
**Received** : November 4, 2003

**Accepted** : November 25, 2003

**Correspondence** : Woo-Young Chung, MD, Division of Cardiology, Department of Internal Medicine, Seoul National University Bundang Hospital, 300 Gumi-dong, Bundang-gu, Sungnam 463-707, Korea  
Tel : 82-31-787-7016, Fax : 82-31-787-4051  
E-mail : DanielCH@hitel.net

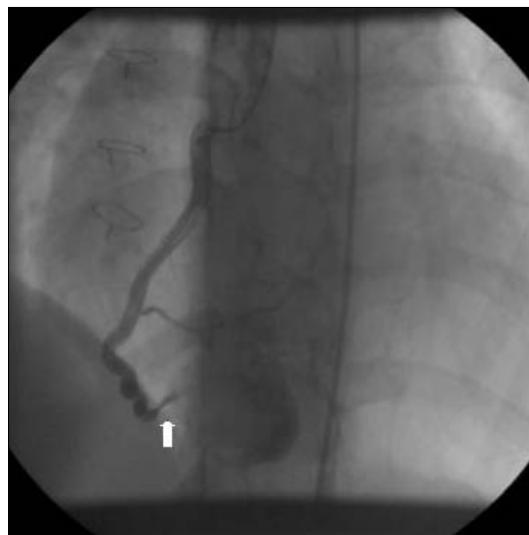


**Figure 1.** Two-dimensional echocardiography. This showed the rupture of the right ventricular free wall (arrow), a large amount of pericardial effusion and parietal pericardial thickening.



**Figure 2.** Color Doppler echocardiography. The figure revealed jet flow from the right coronary artery to the pericardial space (arrow) and blood flow through the ruptured myocardium. This was captured in the late diastolic period.

the open heart surgery, and that taken at the age of 19, four years before this traffic accident, both showed right bundle branch block and left ventricular hypertrophy. The echocardiography performed prior to the traffic accident showed only a tiny residual VSD, with an insig-



**Figure 3.** Coronary angiography. The figure revealed flow from the right coronary artery to the right ventricle, via the pericardial space (arrow).

nificant amount of shunt and mild tricuspid regurgitation. To find the probable cause of the ECG changes, echocardiography was performed, which showed a right ventricular free wall rupture and large loculated pericardial effusion (Figure 1). Also, color flow showed leakage from the right coronary artery into the pericardial space, which suggested a right coronary artery rupture (Figure 2). The coronary angiography performed later confirmed the right coronary artery rupture (Figure 3).

The cardiac tamponade was not accompanied, and the vital signs remained stable. In the serial follow-up echocardiographic examinations during admission, no evidences of deterioration were noted. The patient was discharged, and has been doing well for nine months, with no further events. There was also no evidence of deterioration on the echocardiography during the follow-up period.

## Discussion

A ventricular free wall rupture is a catastrophic condition,<sup>1)</sup> which develops in acute myocardial infarction (AMI), and is responsible for about 15 percent of all deaths from AMI.<sup>3)4)</sup> However, a ventricular free wall

rupture may also result from a penetrating, or even blunt, chest trauma.

A ventricular free wall rupture usually leads to hemo-pericardium and death from cardiac tamponade. A patients' survival depends on the early detection, hemodynamic stabilization, and especially prompt surgical repair.

On arrival at the emergency room, our patient was in hypovolemic shock due to splenic rupture. Abdominal surgery was successfully performed, and the patient hemodynamically stabilized after surgery. The echocardiography performed after surgery showed a right ventricular free wall rupture, with some differences in the ECG findings before and after the traffic accident. These ECG changes went unnoticed, but were actually present before the exploratory laparotomy. Therefore, it is more reasonable to assume that the ventricular free wall rupture already existed at the time of the exploratory laparotomy, rather than developed after the exploratory laparotomy. The patient was hemodynamically stabilized after the exploratory laparotomy, and thereafter, the ventricular free wall rupture did not significantly contribute to the hemodynamic instability in this patient.

Contrary to the usual fatal outcomes in patients with a ventricular free wall rupture, this patient survived, probably due to the thickened and adhered pericardium around the tear site, which probably resulted from the previous open heart surgery. This was thought a surprising outcome, which was attributed to his parietal pericardium which had previously been scarred by open heart surgery, as the pericardium becomes adhesive and thick after open heart surgery.

#### REFERENCES

- 1) Antman EM, Braunwald E. *Acute myocardial infarction*. In: Braunwald E, Zipes DP, Libby P, editors. *Heart Disease: a textbook of cardiovascular medicine*. 6th ed. Philadelphia: W.B.Saunders; 2001. p.1182-3.
- 2) Meluzin J, Groch L, Toman J, Hornacek I, Fischerova B. *Rupture of the coronary artery after blunt nonpenetrating chest wall trauma detected by color Doppler echocardiography: a case report*. *J Am Soc Echocardiogr* 2000;13:1043-6.
- 3) Reeder GS. *Identification and treatment of complications of myocardial infarction*. *Mayo Clin Proc* 1995;70:880-4.
- 4) Pappas PJ, Cernaianu AC, Baldino WA, Cilley JH Jr, del Rossi AJ. *Ventricular free-wall rupture after myocardial infarction*. *Chest* 1991;99:892-5.