

## Transatrial Repair of Post-infarction Posterior Ventricular Septal Rupture

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Ventricular septal rupture (VSR) is a rare but lethal complication of myocardial infarction. The event occurs 2~8 days after an infarction and often precipitates cardiogenic shock. Post myocardial infarction VSR is known for difficult to repair. Especially, Transmural myocardial infarction involved in the posterior VSD area, exposure of the affected site is difficult and postoperative mortality rate is high. We have experienced a case of a 75-year-old female patient who suffered posterior VSD due to acute myocardial infarction, and attained good result by approaching the lesion through right atrial incision and repaired the defect by using patch closure technique.

Key words: 1. Myocardial infarction  
2. Ventricular septal rupture  
3. Complication

### CASE REPORT

A 75-year-old female patient was transferred from a nearby hospital, where she had been diagnosed with myocardial infarction due to a complete occlusion of the right coronary artery and had received a stent operation five days prior. She was admitted to the ER for an interventricular septal defect and pulmonary edema. The patient had a medical history of hypertension and diabetes, and at the time of the clinical visit the patient's vitals and consciousness were normal with a BP of 130/80 mmHg, heart rate of 93 bps, and body temperature of 36.8°C. Hematological testing resulted in a WBC count of 6,300/mm<sup>3</sup>, a hemoglobin level of 10.4 g/dL, 31.9% hematocrit, a platelet count of 169,000/mm<sup>3</sup>, a CK-MB level of 3.5 ng/mL, a Troponin-I level of 2.55 ng/mL, and a BNP

level of 1,120.88 pg/mL. Chest X-ray results showed pleural fluid pooling and pulmonary edema. After admission to the ICU, 2D echocardiography resulted in a diagnosis of posterior VSR, a complication of myocardial infarction, and the operation was performed 13 days after the rupture of the ventricular septum. Under general anesthesia, a median sternotomy was performed, followed by hypothermia induction under vena cava intubation, and cold blood cardioplegic solution was used throughout. After injecting cardioplegic solution, the right atrium was opened and the location of the VSR was found by retracting the tricuspid valve. The ventricular septal defect was about 30 mm in diameter due to rupture, and was located near the myogenic part of the posterior tricuspid valve. Necrotic cardiac muscle tissue was distinguishable from its surroundings. After fixing thread at the septal leaflet

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and the posterior leaflet of the tricuspid valve, a transeptal simple suture of Gore-Tex patch (1 mm) was made from the lateral side of the left ventricle using pledgeted Prolene 4-0 in order to remove the necrotic tissue of the ventricular septum and occlude the defected area. Upon evaluation of tricuspid valve insufficiency, air was removed from the heart and the suture of the right atrium, the patient's body temperature was raised, and the cardiopulmonary bypass machine was removed. The extracorporeal circulation time was 150 min and the aortic blockade time was 109 min. The patient's postoperative hemodynamics were normal and echocardiography on the ninth postoperative day showed no findings of any residual short circuit, with an ejection fraction of 53%. The patient was discharged on the tenth postoperative day and there have been no incidents after a year of monitoring her as an outpatient.

## DISCUSSION

Ventricular septal rupture (VSR) occurs as a postoperative complication of myocardial infarction and is a rare complication that happens in only 1~2% of myocardial infarction patients. However, it is a lethal complication which often accompanies congestive heart failure and psychogenic shock due to acute bilateral short circuits. When given only conservative treatments, the mortality rate is 95%. Even in cases of surgical treatment, the early mortality rate reported has varied from 20~50% [1]. Ever since Cooley's first successful operation [2], there have been continuous efforts to improve operation results. The actual timing and method of operation for the condition, however, have remained fairly controversial [1]. VSR frequently occurs in patients with a single vascular disorder with fewer collaterals than in multi-vascular disorder patients, and risk factors include age, being female, hypertension, and no history of myocardial infarction. Anterior VSR is often related to stenosis of the proximal part of the left anterior descending branch, and posterior VSR often occurs due to stenosis of the dominant right coronary artery or the left circumflex branch. The crucial part of diagnosing this type of patient is consideration of potential complications. If a patient who had been stable after an infarction suddenly complains of chest pain, and the symptoms

of heart failure, pulmonary edema, and a decrease in urine are found, VSR and papillary muscle rupture should be suspected. In addition, depending on need, cardiac and pulmonary edemic murmur from auscultation in physical examination, radiography, and echocardiography can confirm the condition [3]. When VSR occurs, natural mortality is about 7%. Mortality in 4 weeks has been reported to be over 80% [4]. Although the timing of operation has been controversial, currently immediate operation is prioritized even in cases of high risk. In general, VSR operation is conducted with a ventricular incision approach. However, increased postoperative bleeding, ventricular malfunction, and other complications such as ventricular arrhythmia due to ventricular incision often follow. Posterior VSR's anatomical location and the difficulty of lesion exposure can make the operation especially technically difficult. The morbidity and mortality rates are high for this reason [5]. In order to minimize these issues, an alternative operational approach using a right atrium incision was reported by Filgueira and his colleagues in 1986 [6]. VSR operation through a right atrium incision is frequently carried out in pediatric patients with congenital VSR, but it is a rare approach for patients with post-infarction VSR. The approach through the right atrium reduces the risk of complications by avoiding a ventricular incision, and it is especially favored in patients with an interventricular septal defect. According to existing research, broad inferior wall infarction and right ventricular damage often accompany an operation in patients of this type. Therefore, by avoiding an incision of the right ventricle, whose function plays the most crucial rule in prognostic factors, exacerbation of functional loss can be avoided and resulting psychogenic shock, bleeding, and arrhythmia can be reduced [7,8]. Case reports on the right atrial approach are still limited, but based on the available reports, the mortality rates of post-infarction VSR based on each approach are 6/18 (33%) for the atrial approach and 20/40 (50%) for the ventricular approach, representing a higher survival rate of no statistical significance. Although the accumulation of sufficient case reports are needed, an atrial approach for the treatment of post-infarction VSR reduces ventricular incision-related complications, as well as operation time due to its technical simplicity. As a result, an appropriate approach for VSR operation should be selected depending on

the location of the rupture and the degree of myocardial damage. If it is possible, a right atrial approach for posterior VSR is likely to bring positive results. The authors report a successful right atrial approach operation conducted 12 days after the post-infarction rupture of the posterior ventricular septum.

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