

# Endovascular treatment of a traumatic ventricular septal rupture and coronary to ventricular fistula

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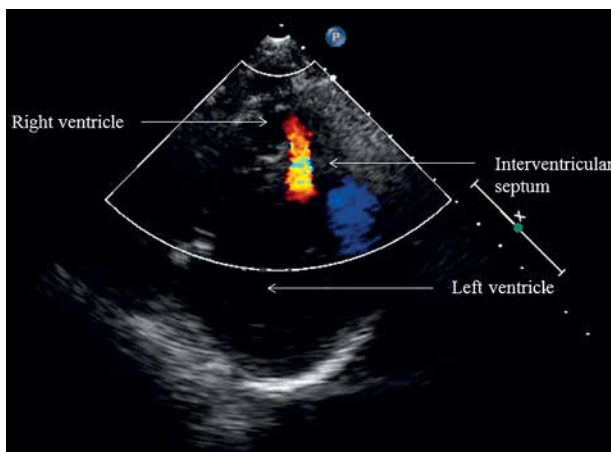
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About 10% of patients with chest trauma present with cardiac injuries, associated with 60% to 97% mortality [1, 2]. Penetrating cardiac traumas may injure not only the myocardium, but also other cardiac structures. Therefore timely and rapid diagnosis is critical for improving patient outcome.

A 27-year-old man was admitted to our department with exertional angina and dyspnea limiting his activities in the last week. A grade 2/6 continuous murmur was heard at the left sternal border of his chest. He had a history of sudden cardiac arrest due to stabbing to the thoracic region 1 month ago. According to the patient's report, he had been taken to the surgery emergently without further evaluation after successful cardiopulmonary resuscitation because of massive pericardial effusion and right ventricular collapse in transthoracic echocardiography (TTE). As operative treatment, a large hemothorax and a tense hemopericardium had been drained, and the right

ventricular laceration had been repaired. After a postoperative recovery period with normal control TTE, the patient was discharged. In our clinic, diagnostic transesophageal echocardiography (TEE) revealed turbulent flow with 0.53 mm diameter across the interventricular septum with normal left ventricular dimensions (Figure 1). Diagnostic angiography was performed to detect additional cardiac injuries. On his angiogram, the right coronary artery and the circumflex artery were normal. However, contrast material passed from the left anterior descending artery (LAD) to the right ventricle via a large fistula, the proximal segment of the LAD was large and tortuous, and the distal segment of the LAD after the fistula was very small due to poor distal flow (Figure 2 A). Ventriculography revealed normal left ventricular contraction with contrast flow from the left to the right ventricle at the mid portion of the interventricular septum (Figure 2 B). After discussion with cardiac surgeons we decided that the best therapeutic approach was surgery, but the patient refused the recommended redo surgery. So we decided to continue treatment with percutaneous closure. Before the procedure the patient received 80 mg of gentamicin and 2 g of cefazolin for endocarditis prophylaxis as well as 80 U/kg of unfractionated heparin by the intravenous route. The Seldinger technique was used to insert an 8 Fr introducer into both the femoral artery and jugular vein under general anesthesia. A 7 Fr pigtail catheter was advanced into the left ventricle. The ventricular septal rupture was measured before the procedure with TEE in the long axis view for occluder device size selection. An 0.038 inch J type PTFE coated hydrophilic guidewire was inserted via the right jugular vein across the tricuspid valve, through the septal rupture and aortic valve and located in the ascending aorta. This wire was exteriorized from the right femoral artery using a snare wire. A 4.0 mm membranous VSD occluder device (St. Jude Medical) was

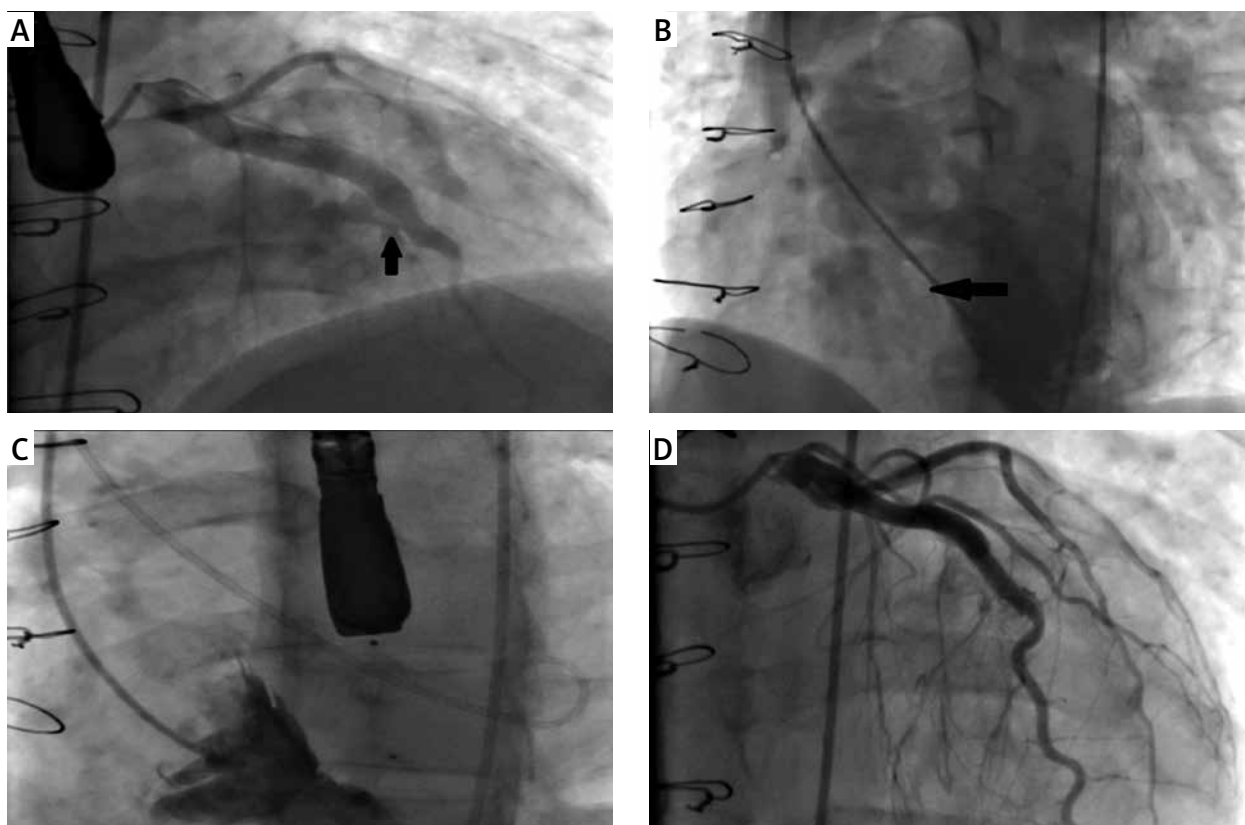


**Figure 1.** Flow from right to left ventricle in TEE examination with color Doppler suggesting a ventricular septal rupture

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**Figure 2.** Contrast passing from LAD artery into the right ventricle via a fistula (A, arrow). Contrast flow from left to right ventricle at distal portion of interventricular septum (B, arrow). Control angiography of interventricular septum with no residual shunting after successful deployment of an occluder device (C). Total occlusion of LAD fistula after implantation of a graft stent (D)

inserted by the Torque delivery system (45° angle curve) via the right jugular vein and advanced through the interventricular septal rupture and deployed under TEE guidance. Control left ventriculography showed a successful deployment with no residual shunting (Figure 2 C). After a 0.014 inch floppy guidewire was introduced into the LAD system, a 4.0 mm × 1.8 mm coronary graft stent was implanted at the aneurysm neck level, followed by post-dilatations using a 4.5 mm × 1.5 mm invader balloon. The aneurysm was completely sealed with restoration of normal flow into the distal LAD (Figure 2 D). The patient was discharged on the following day without any complications. Clopidogrel 75 mg/day for 2 months along with life-long ASA 100 mg/day were recommended.

Because timely and rapid diagnosis is critical for improving patient outcome, physicians who see the patient in the emergency room should suspect and rule them out or confirm them as soon as possible. Echocardiography is a diagnostic tool for the rapid bedside evaluation of cardiac trauma and quickly provides a high level of diagnostic accuracy, and therefore is especially useful preoperatively when cardiac trauma is strongly suspected and the patient is hemodynamically stable [3]. However, it was previously reported that the incidence of delayed sequel-

ae of penetrating cardiac injury was 23% using only TTE [4]. Hence a comprehensive transesophageal echocardiographic examination is imperative, because penetrating cardiac trauma may injure not only the myocardium, but also other cardiac structures such as coronary arteries, cardiac valves, interatrial or interventricular septa, multiple cardiac chambers, or the great vessels.

### Conflict of interest

The authors declare no conflict of interest.

### References

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