

A continuous murmur following a nonpenetrating chest trauma



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We reported a rare case of non-penetrating chest trauma-induced fistula from the right sinus of Valsalva to the right heart chambers. The ruptured sinus of Valsalva aneurysm was diagnosed preoperatively and operated on successfully. The rarity of this case highlights the need for a precise preoperative diagnosis, the role of transthoracic echocardiography, and the importance of a prompt surgical management.

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Introduction

Fistulas from a ruptured congenital aneurysm of the sinus of Valsalva (SV) to the heart chamber are not unusual, but a SV fistula caused by a chest trauma is extremely rare [1]. In this paper, we present a nonpenetrating traumatic SV to the right ventricular fistula.

Case report

A previously healthy, 36-year-old man, with no history of connective tissue disease or Marfan

syndrome, had voluntarily jumped into a deep well. A severe chest contusion and a mandibular fracture were diagnosed. The patient was hospitalized for surgical repair of the mandibular fracture. At admission, the heart was auscultated and was found to be normal. The patient was successfully operated without incidents. Two days later, he presented an acute congestive heart failure. His blood pressure was 125/45 mmHg. He had bilateral carotid bruits and a hyperdynamic left ventricular impulse with a thrill over the left sternal border. A continuous grade 5/6 murmur, loudest in systole, was best heard near the left lower sternal border. There were rales at

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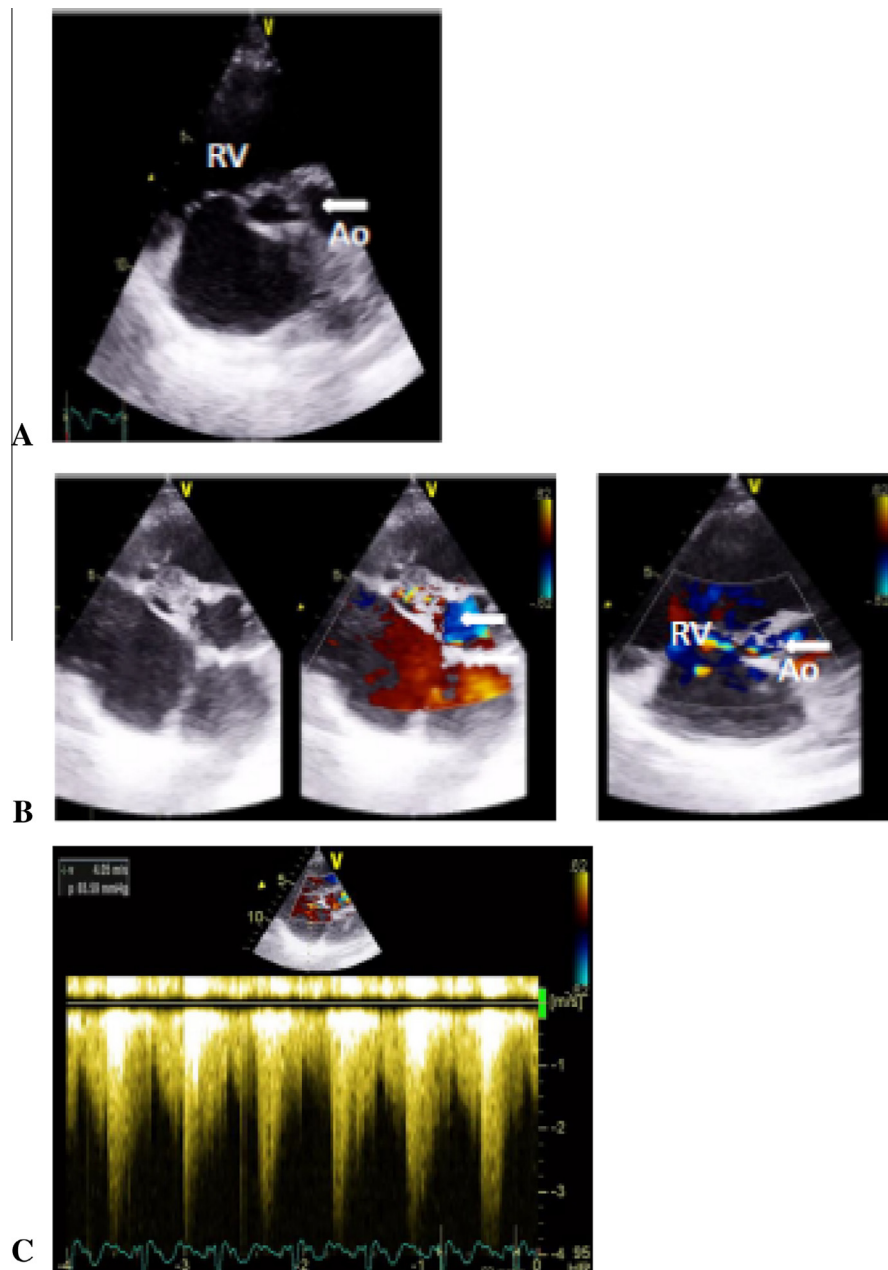


Figure 1. Two-dimensional transthoracic echocardiography showing rupture of the right sinus of Valsalva aneurysm and flow of blood into the right ventricle. (A) Shows the right sinus of Valsalva aneurysm (arrow). (B) Color Doppler interrogation shows the flow between the ruptured right sinus of Valsalva aneurysm and the right ventricle (arrow). (C) Doppler interrogation shows the presence of a ruptured right coronary sinus of Valsalva aneurysm with high-velocity flow (4 m/s) into the right ventricular cavity during both systole and diastole. Ao = aorta; RV = right ventricle.

both lung bases. Two-dimensional transthoracic echocardiography (2D-TTE) revealed a fistula between the aorta and the right ventricle (RV) through a ruptured right coronary SV. The color-Doppler technique showed shunting from the SV into the RV and passing through the tricuspid leaflets (Fig. 1). The RV and the pulmonary artery were moderately dilated. The left ventricular ejection fraction was normal. The aortic and

pulmonary valves were tricuspid with no valvular disease. There were no other cardiac defects. The suprasternal view showed a red color flow in the aortic arch and the descending aorta. The end-diastolic flow velocity in the descending aorta just beneath the aortic isthmus was 39 cm/s (Fig. 2).

The patient underwent surgical repair via a median sternotomy and under cardiopulmonary bypass between the ascending aorta and the two

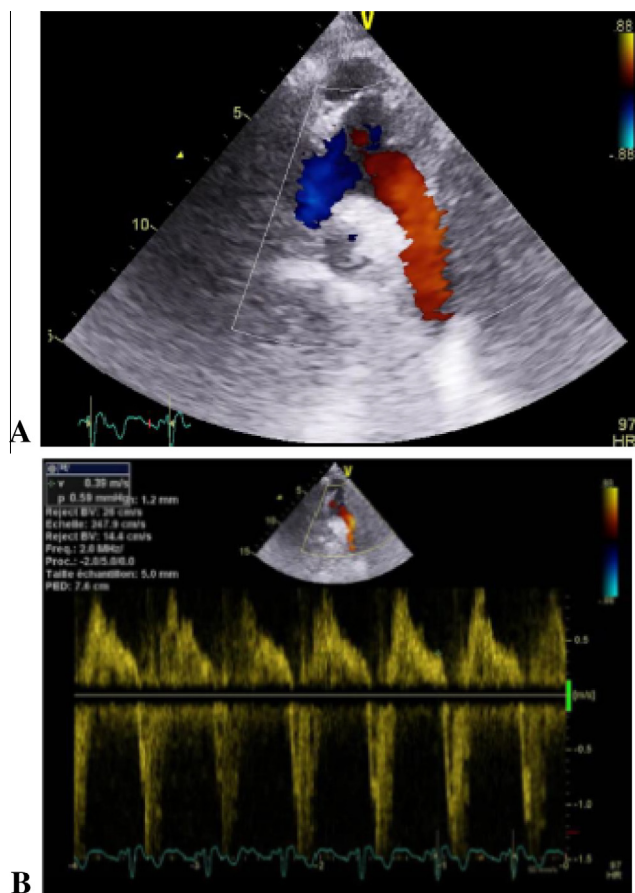


Figure 2. Two-dimensional transthoracic echocardiography, suprasternal view. (A) Color-Doppler flow in the aortic arch and the descending aorta. (B) The end-diastolic flow velocity in the descending aorta just beneath the aortic isthmus shown by pulsed wave Doppler.

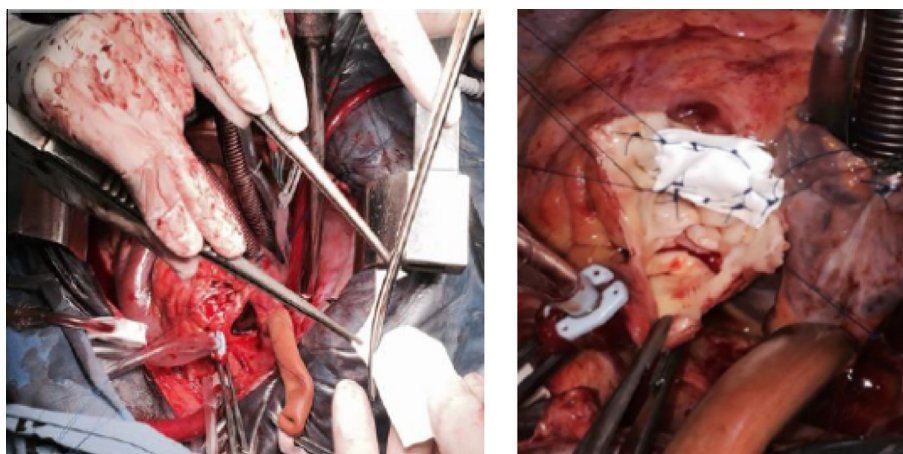


Figure 3. Surgical treatment of the ruptured right sinus of Valsalva aneurysm into the right ventricle with patch repair.

vena cava. The aorta was cross-clamped and the myocardial protection was achieved through an intermittent antegrade warm blood cardioplegia. A 20-mm transverse tear was found in the right sinus of Valsalva, just below the right coronary ostium. The right coronary artery was completely freed. The fistula tract ended in the

right ventricle near the membranous portion of the interventricular septum. It was closed by a polytetrafluoroethylene patch (Fig. 3). The aortic valve appeared to be untouched and competent. The patient was then weaned off cardiopulmonary bypass without any need for inotropic support. The immediate postoperative course

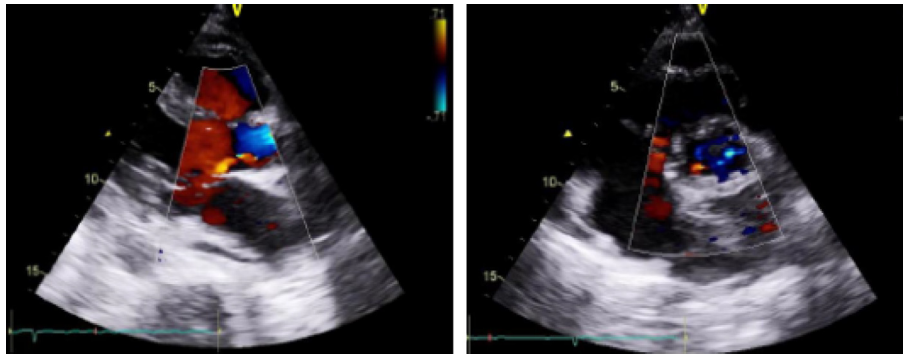


Figure 4. Postoperative two-dimensional transthoracic echocardiography showing the absence of residual communication between the right ventricle and the aorta and a trivial aortic regurgitation.

was uneventful. Postoperative 2D-TTE demonstrated the absence of any residual shunt between the aorta and the RV and a trivial aortic regurgitation (Fig. 4). At 1-month and 6-month follow-up, the patient was asymptomatic.

Discussion

In this paper, we have presented an unusual case of a right SV to RV fistula resulting from a nonpenetrating chest trauma secondary to a suicide attempt. The SV fistula caused by chest trauma is extremely rare. Only six cases of sinus of Valsalva to right cardiac chambers resulting from nonpenetrating trauma have been reported previously [1]. These cases had several common features: most individuals had been in severe traffic accidents; all had transverse tears of the right SV, located between the valve annulus and the coronary ostium; and all had fistulas that drained into the right heart chambers [1]. Most patients who had traumatic aortic rupture died of bleeding immediately after the accident. On very rare occasions, the aorta may rupture into one of the heart chambers and thus save the patient's life, as happened with the right SV rupture described here. The diagnosis should be considered in the case of a sudden onset of dyspnea, chest pain, or acute pulmonary edema with cardiac murmur following a chest trauma. Before the introduction of echocardiography, the diagnosis of a ruptured SV aneurysm in living patients was rare, with most of the reports coming from autopsy or surgery [2]. Currently, the diagnosis is possible with both TTE and transesophageal echocardiography [3]. The TTE with color-flow imaging and spectral Doppler interrogation is the first investigation of choice and frequently establish the diagnosis and provide very detailed information to the surgeon, as was done in this case. In this reported case, there was no associated significant aortic

valvular regurgitation, but the end-diastolic flow velocity in the descending aorta beneath the aortic isthmus was >20 cm/s. Thereby, the rupture of the right SV aneurysm into cardiac chambers with important left to right shunt should be remembered as an unusual etiology of a common aortic valvular lesion such as severe acute aortic regurgitation. The optimal care for a ruptured sinus of Valsalva aneurysm is surgical repair; however, transthoracic minimally invasive closure has also recently been proposed [4]. The first case of transcatheter closure of SV aneurysm using Rashkind umbrella was reported in 1994 [5]. Since then, multiple reports have described different approaches for percutaneous closure of SV aneurysm using septaloccluder device, ductal occluder, and Amplatzer vascular plug [4]. Up to now, the surgical treatment of ruptured aneurysm remains the gold standard. The surgical technique involves an exploration of both aorta and the chamber of termination. The aneurismal sac would be excised and the defect will be sutured or patched without causing heart block or aortic valve dysfunction. If the coronary ostium is very close to the tear, an additional coronary artery bypass graft is needed [6]. Several authors recommended using patch to close SV aneurysm in all cases because it avoids deforming the aortic valve, reduces stress on the suture line and diminishes the chance of recurrence [6,7].

This unusual case highlights that preoperative diagnosis is feasible and surgical treatment is safe and effective.

Conclusion

The presence of a continuous murmur along with nonpenetrating chest trauma and a sudden onset of chest pain or dyspnea might be secondary to a ruptured SV aneurysm into the heart chambers. Echocardiography is a useful tool for

diagnosis and the surgical repair of the aneurysm still remains the standard treatment.

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