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Traumatic tamponade and ventricular septal defect

Case report

A 30-year-old man sustained a knife wound in the 9th left intercostal space when he was involved in a fight as a bodyguard in a night club. In the emergency room he developed hypotension and dyspnea, with a heart rate of 110 bpm and on the ECG electrical alternans was seen. The chest X-ray showed no pneumothorax. An echocardiogram revealed an important pericardial effusion with diastolic compression of the right ventricle.

A percutaneous pericardiocentesis with drainage of fresh blood led to transient improvement. However, ten minutes later shock recurred with loss of consciousness and the patient was transferred to the operating room. Following thoracotomy a perforation of the

Figure 1

Transthoracic short axis view of the left ventricle with a large ventricular septal defect.
VSD = ventricular septal defect.

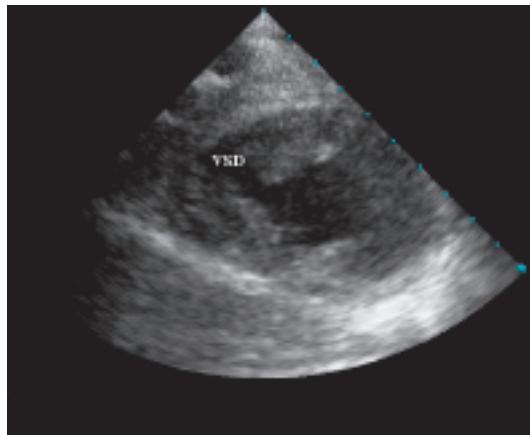


Figure 2

Modified apical view with color Doppler showing a left-to-right shunt through an apical VSD and a large left pleural effusion with collapsed lung.
LV = left ventricle.

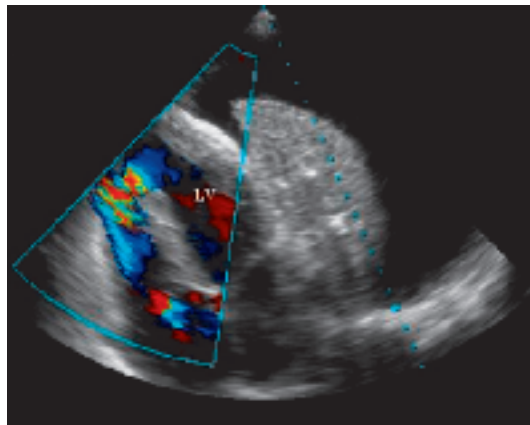


Figure 3

Left ventriculography depicting a large shunt into the right ventricle through the apical VSD.
VSD = ventricular septal defect.

right ventricular wall was identified one centimetre from the apex and the lesion was sutured.

On the 2nd postoperative day a loud pansystolic murmur was heard over the precordial area. An apical ventricular septal defect (VSD) was diagnosed by echocardiography, estimated at 7 mm in size, with a left-to-right shunt (fig. 1 and 2). Cardiac catheterisation confirmed the location of the VSD (fig. 3) with a step up in O₂-saturations: 61% in the right atrium, 78% in the right ventricle and 68% in the pulmonary artery. The Q_p/Q_s-ratio was calculated at 1.35 and the pulmonary pressure was 45/14 mm Hg. A laceration of the distal left anterior descending artery and left ventricular apical akinesia were also noted. No intervention was performed and the patient was discharged from the hospital.

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Figure 4

Sizing balloon placed in the VSD using an aortovenous loop created with an exchange wire travelling from the femoral vein to the right cavities, and through the VSD to the left ventricle and aorta. VSD = ventricular septal defect.

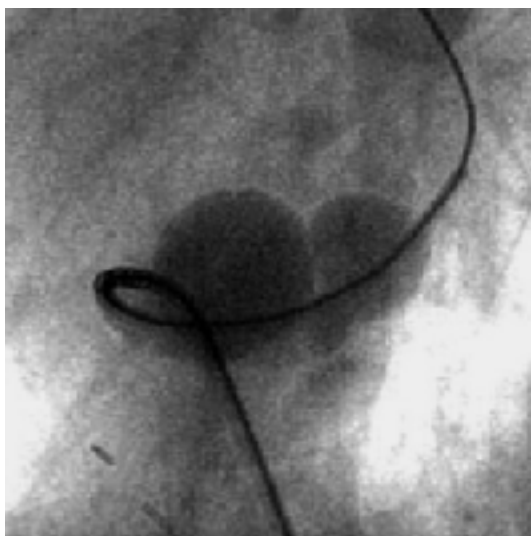


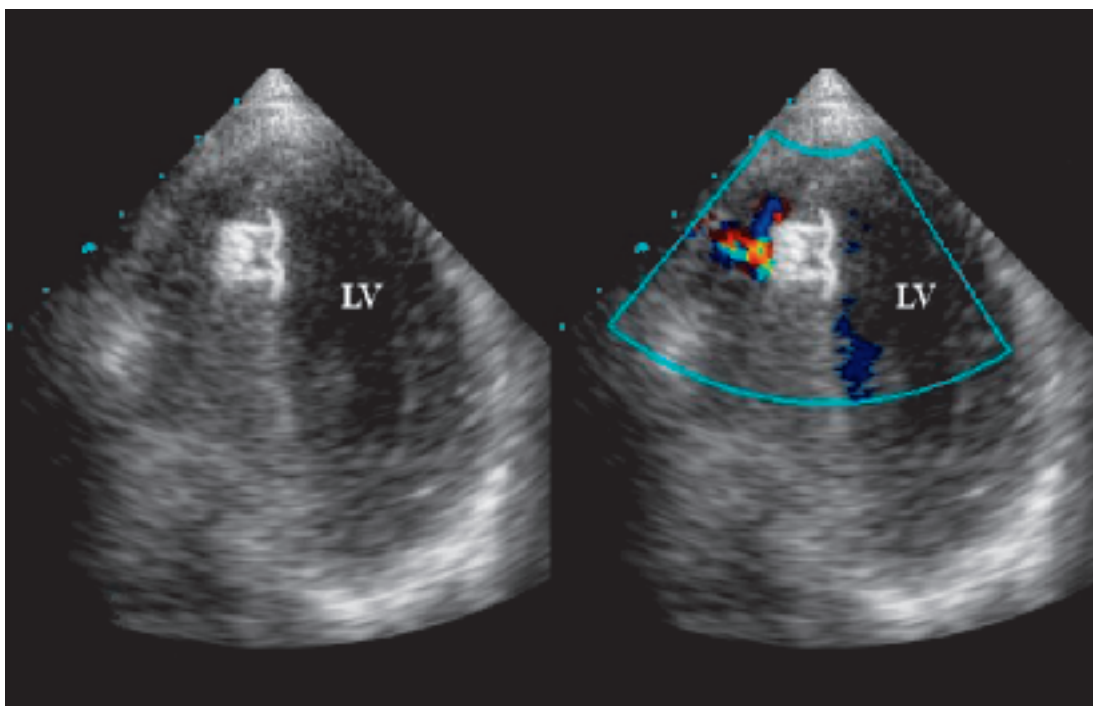
Figure 5

Amplatzer device in the VSD before release from the catheter in the right ventricle. VSD = ventricular septal defect.



Figure 6

Apical view showing the device implanted in the septum, with a small residual shunt detected by color Doppler. LV = left ventricle.



Five months later, the patient complained of exertional dyspnea and the decision to close the VSD percutaneously was made. Using a femoral approach and under local anaesthesia, a multipurpose catheter was introduced in the right heart with an exchange guidewire 0.21, and advanced through the VSD into the left ventricle and the aorta. A second catheter was introduced in the femoral artery and the descending aorta with a duplicate 0.014 guide wire forming a loop. This loop served as a lasso to snare out the exchange guide wire from the aorta through the femoral artery. Thus, a stable system with an aortovenous loop was built (fig. 4). A sizing balloon was positioned through the VSD and a stretched diameter of 24 mm was obtained. The same loop allowed the introduction and delivery of an Amplatzer Duct Occluder 9 (10–12 × 3 mm) (fig. 5). After release of the device, left ventriculography revealed only a small residual left-to-right shunt. An echocardiogram performed six months later showed the device in place, with a small persistent left-to-right shunt, no ventricular dilatation and no pulmonary hypertension (fig. 6).

Discussion

Ventricular septal defects due to penetrating chest injuries can occur either directly due to perforation of the septum or indirectly following laceration of an epicardial artery, causing

local necrosis with subsequent rupture. A VSD is reported in about 1% of cases of chest trauma, the most common location being at the apex [1]. Surgical repair of a traumatic VSD implies a left ventriculotomy, with significant morbidity and mortality [2].

Percutaneous closure of VSDs has been successfully performed in children with congenital VSDs [3] and in adults with post-infarction VSDs. In most studies the use of specific Amplatzer VSD occluders are reported, but Amplatzer Duct Occluders have also been implanted [4].

In congenital defects, complete closure is achieved in 95% of patients with a muscular VSD and 92% of patients with a perimembranous VSD [3]. In a study examining post-infarction VSDs, an Amplatzer device was successfully implanted in 16 out of 18 patients, even though the 30-day-mortality amounted to 28% [5]. In a series of mixed cases the authors reported successful VSD closure in 30 out of 32 patients [6]. So far only sporadic cases of traumatic VSDs with successful percutaneous closure have been described [1, 2]. The present case illustrates the usefulness of this percutaneous approach, particularly in light of the high risk of cardiac surgery in these patients.

References

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