Isolated Ventricular Septal Defect Secondary to Low-Velocity Blunt Chest Trauma

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ABSTRACT

Damage to the ventricular septum resulting from low velocity blunt trauma to the anterior chest wall is a rarely reported disorder. We wish to report a case of an isolated large ventricular septal defect secondary to blunt chest trauma requiring urgent surgical repair in an otherwise healthy 19 year old male. The patient endured a long hospital stay complicated by repeated episodes of pulmonary oedema and ARDS but eventually made a good recovery. (**Critical Care and Resuscitation 2001; 3: 95-96**)

Key words: Ventricular septal defect, blunt chest trauma, transoesophageal echocardiography

Myocardial damage following blunt chest trauma is rare. However, cardiac damage should be considered in any patient with an unusual cardiovascular disturbance following chest injury.

We report a case of an isolated large ventricular septal defect secondary to low-velocity blunt chest trauma requiring urgent surgical repair.

CASE REPORT

During an altercation an otherwise healthy 19 year old man was pushed violently against a parked car. He presented some hours later to his local medical clinic complaining of a productive cough. Antibiotics were prescribed and he was discharged home. When he presented again the following day with ongoing productive cough and shortness of breath, he was transferred to the local hospital for further investigation.

On admission the patient had a pulse rate varying between 130 to 150 beats per minute, a blood pressure of 75/40 mmHg and a prominent precordial systolic murmur. Chest radiographs showed diffuse infiltrates.

Intravenous fluids were infused in an attempt to improve the patient's cardiovascular status. However, pulmonary oedema occurred necessitating intubation and mechanical ventilation. A diagnosis of acute mitral insufficiency was made and the patient was transferred by helicopter to our intensive care unit (ICU) for ongoing management. Immediately on arrival a trans-oesophageal echocardiography was performed which revealed a tear in the ventricular septum (figure 1).

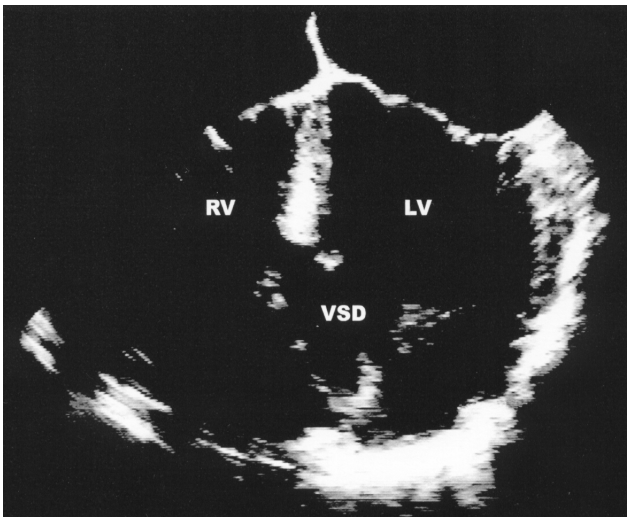

Figure 1. The transesophageal echocardiograph on presentation demonstrating the right ventricle (RV), left ventricle (LV) and the ventricular septal defect (VSD).

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The patient was taken to the operating theatre, where haemodynamic instability necessitated prompt establishment of cardiopulmonary bypass. The operative findings included a small amount of pericardial fluid but no evidence of cardiac tamponade. The ventricular septum was torn from just behind the left anterior descending artery towards the base of the anterior papillary muscle, with a large band of muscle with intact trabeculae spanning a 2 cm hole in the middle of the septum. No other cardiac injuries were identified.

The defect necessitated placement of a pericardial patch via the right ventricle, although a residual leak in the anterior region of the patch remained. As the residual leak on transoesophageal echocardiography was estimated to be small, the defect was accepted. Following surgery, the patient returned to the ICU where he underwent a prolonged recovery. This included a significant setback on day two of his ICU stay where deterioration in his cardiovascular status required an increase in inotropic support including the addition of milrinone. Significant impairment of his respiratory function also occurred due to recurrent episodes of pulmonary oedema and ARDS.

The transoesophageal echocardiography was repeated on the second postoperative day which revealed the residual leak across the patch. A further study at day 6 demonstrated the small persistent jet with a negligible shunt. After a 15 day ICU stay and a further two week inpatient stay, the patient was discharged for regular transthoracic echocardiography and follow up by the cardiology service.

DISCUSSION

The incidence of ventricular septal defect in the setting of non-penetrating low-velocity trauma is extremely rare. A New Zealand series published in 1999 by Chataline *et al*,[1] documented only one case in 28 years. Their patient had been involved in a light plane crash and sustained significant multisystem trauma with a concurrent rupture of the ventricular septum and avulsion of the septal leaflet of the tricuspid valve.

Traumatic ventricular septal defect may be acute (i.e. produced at the time of injury), subacute (i.e. with muscular contusion, necrosis and subsequent rupture) or delayed (i.e. due to the complications of valvular insufficiency).[2] The proposed mechanism of injury is an acute compression of the heart between the sternum and spine, resulting in extreme changes in intrathoracic pressure.[3] Our case was unusual in that the acute compression of the thoracic cavity produced during the assault occurred without a concomitant large deceleration force that commonly occurs in motor vehicle accidents where the majority of non-penetrating ventricular septal defect injuries are recorded.

The management of ventricular septal defect usually involves timed surgical repair. This depends on the patient's clinical condition and the presence of other injuries. Cases have been reported where a delay of up to two months occurred before formal closure, without significant sequelae.[4] Cases of spontaneous closure of post traumatic ventricular septal defects, have also been reported.[5,6]

While a conservative approach has been proposed in patients with post traumatic ventricular septal defects in which the shunt is 2:1 or less,[7] in our patient the cardiovascular deterioration caused by the large defect prevented a conservative approach. Following the patch repair, the residual shunt was estimated to be 1.2:1 which subsequently resolved to be nearly undetectable.

In our case, the traumatic ventricular septal defect was extremely unusual in that the damage to the myocardium was isolated and there was no major deceleration force associated with the injury.

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