

## Late interventricular septal defect after blunt chest trauma: a case report and a review of the literature

*Alberto Molardi<sup>1</sup>, Francesco Nicolini<sup>1</sup>, Igino Spaggiari<sup>1</sup>, Francesco Maestri<sup>2</sup>, Tiziano Gherli<sup>1</sup>*

<sup>1</sup> Cardio-nephro-pulmonary Department, Section of Cardiac Surgery, Azienda Ospedaliero-Universitaria di Parma, Italy;

<sup>2</sup> University Medical School of Parma, Italy

**Abstract.** Cardiac injuries from blunt chest trauma are usually the result of motor vehicle accidents; cardiac injuries result in 20% of such accidents, but they are also associated to mild-to-moderate sports injuries. The severity of external injuries does not necessarily reflect the severity of cardiac trauma. Blunt chest trauma can cause a variety of cardiac injuries such as myocardial contusion, myocardial rupture, pericardial trauma, valvular disruption and acute myocardial infarction. We report a case of traumatic rupture of the interventricular septum caused by a blunt chest trauma following a car crash and its successful surgical repair. In this particular case the clinical signs of interventricular shunt began evident 12-14 days after the accident. ([www.actabiomedica.it](http://www.actabiomedica.it))

**Key words:** blunt cardiac trauma, cardiac contusion, interventricular septal defect

### Introduction

Cardiac injuries from blunt chest trauma are usually the result of high speed motor vehicle accidents; cardiac injuries are present in 20% of such accidents (1) but they are also associated to mild-to-moderate sports injuries (2, 3).

The severity of external injuries does not necessarily reflect the severity of cardiac trauma. Blunt chest trauma can cause a variety of cardiac injuries such as myocardial contusion, myocardial rupture, pericardial trauma, valvular disruption and acute myocardial infarction.

In many of the previously reported cases myocardial infarction was usually diagnosed on admission by ECG that commonly shows significant ST-T changes (2, 4, 5).

We report a case of delayed traumatic rupture of the interventricular septum caused by a blunt chest trauma following a car crash and its successful surgical repair.

### Case report

A 35-years-old man was admitted to our hospital in III-IV NYHA class. His recent past medical history was significant for a car accident with chest trauma happened 20 days before followed by a period of rehabilitation. During this period he developed initial signs of cardiac failure so he was referred to our hospital for further medical investigations.

At admission he was haemodynamically stable: sinus rhythm with a 90 beats/min pulse rate, blood pressure 140/50 mmHg, stable T inversion on all ECG derivation, no alteration of blood gas analysis and blood tests were normal without myocardial enzymes.

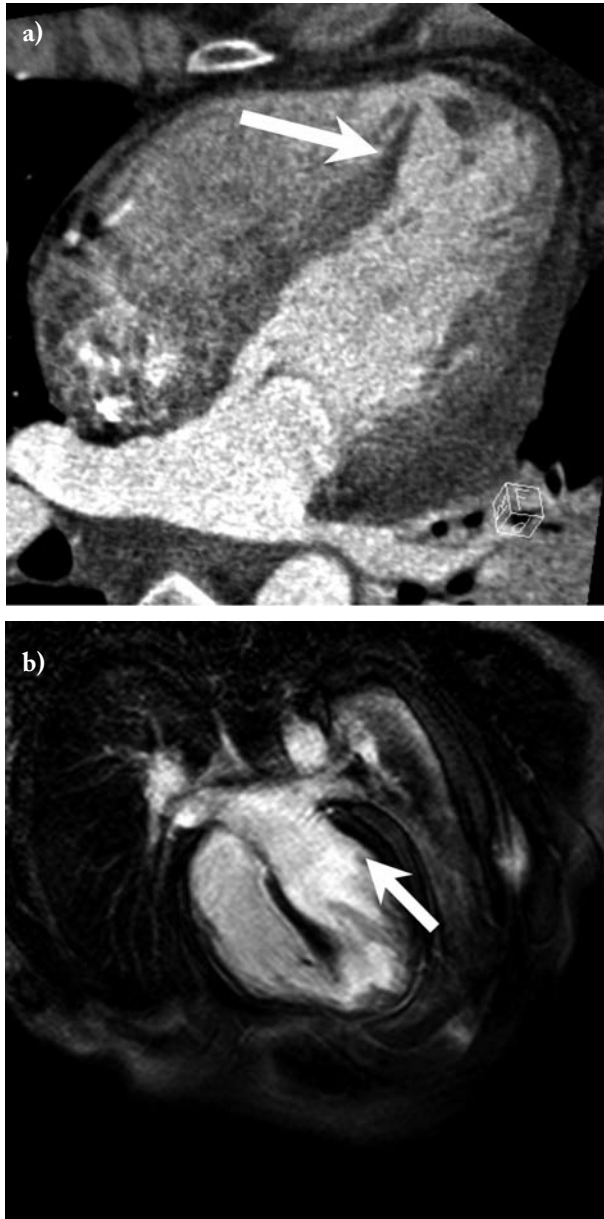
The chest X-ray revealed early signs of pulmonary congestion and fractures of the left 3<sup>rd</sup> and 6<sup>th</sup> rib, a comminuted fracture of the left femur treated 10 days before by positioning an intramedullary device.

An echocardiography revealed a minimal pericardial effusion, akinesia of a small portion of the poste-

rior interventricular septum with a 1 cm-diameter defect in proximity of the apex.

The interventricular defect was confirmed by angio-computer-tomography (angio-TC) and cine-magnetic-resonance (cine-MR) of the heart (Fig. 1 a, b).

The initial heart failure was treated medically with medical therapy and the patient was scheduled for surgery.



**Figure 1.** a) Preoperative contrast-Angio CT showing interventricular septal defect; b) Preoperative contrast-Angio MR showing the interventricular septal defect

At operation, a minimal haematic pericardial effusion was found and the inspection of the heart showed a postero-apical aneurism of the left ventricle. Cardiopulmonary bypass was instituted with aorto-bicaval cannulation and cardioplegic protection achieved with intermittent antegrade warm haematic cardioplegia.

A right ventriculotomy was performed on the spot and a double defect of the apical portion of the interventricular defect was found with a large amount of clots adherent to the ventricular walls.

After removal of clots, the ventricular septal defect was exposed and appeared like a double orifice of 2 cm in diameter. The defect was repaired using a Teflon felt patch using interrupted sutures with pledgets.

Intraoperative transesophageal echocardiography after cardiopulmonary bypass showed no residual shunt with a normal left ventricular function.

At six month follow-up the patient was asymptomatic and back to his normal life.

## Discussion

Cardiac injuries from blunt chest trauma usually results from high speed motor vehicle accidents.

Blunt chest trauma can cause a variety of cardiac injuries such as myocardial contusion, myocardial rupture, pericardial trauma, valve rupture and myocardial infarction (5).

Myocardial contusion is the most frequent cardiac injury following blunt chest trauma and occurs in 16-76% of patients involved in motor vehicle accidents (6).

Ventricular septal defects following chest trauma are extremely rare.

Hewett, in 1847 reported the first case, and the first surgical correction was carried out by Lillehei in 1958 (8, 9).

In 1958, Parmely et al (7) reviewing 5467 cases of blunt chest trauma, reported only five cases of isolated ventricular septal defect. The rupture of the interventricular septum may occur almost immediately after injury or many days later.

The lesion is believed to occur because the heart is compressed between the sternum and the spine, or

as result of extreme intrathoracic pressure during sudden deceleration. It is more likely to occur in late diastole end early systole, the septum near the apex being the most common site of rupture (8).

The rupture of the interventricular septum may occur immediately after injury and it can appear with symptoms that resemble those seen in postinfarction ventricular septal defect.

In our case, the clinical deterioration occurred 14 days after the accident. The cause of the ventricular septal defect was probably a post-traumatic myocardial infarction which usually appears 2 or 3 days after trauma (10).

The most probable mechanism for myocardial infarction in the present case was the myocardial contusion caused by a local intimal tear, subintimal or adventitial haemorrhage, or direct damage of the myocardium: in effect at the preoperative angio-TC of coronary vessels no coronary dissection or occlusion was found.

In conclusion, acute myocardial infarction and its complications are a possible complication after blunt chest trauma.

In rare cases, however, ventricular septal defect can occur several days later. Therefore, patients with blunt chest trauma require systematic monitoring of cardiac function to enable early diagnosis and successful surgical repair.

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Correspondence: Dr. Molardi Alberto MD  
Azienda Ospedaliero-Universitaria di Parma  
Dipartimento Cardio-nefro-polmonare  
Sezione di Cardiochirurgia  
Via Gramsci 14, 43100 - Parma (Italy)  
Tel. 039 0521 703270  
Fax 039 0521 293196  
E-mail: alberto.molardi@gmail.com