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Late ventricular septal defect due to blunt trauma

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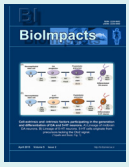

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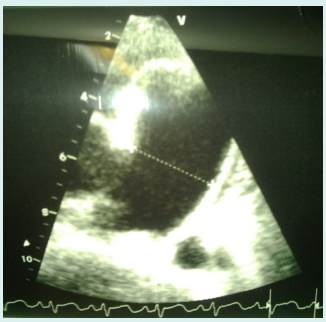
Abstract

Introduction: This is very rare case report regarding late ventricular septal defect (VSD) following blunt trauma.

Case Report: A 23-year-old motorcycle rider lost control and crashed to another motorcycle. He was transferred to emergency department by emergency medical services. Initial evaluation revealed some minor trauma which was managed, and he was discharged. There was a lately developed large apical VSD with delayed cardiopulmonary deterioration. The defect was recognized more than 10 days after accident, and repaired the day after.



Discussion: Most VSD patients with blunt trauma remain asymptomatic following trauma while those with no primary findings experience gradual decompensation.

Introduction

Crashes involving motorcyclists have become an important issue, considering that the numbers of two-wheel vehicles are increasing across the world. Because of mostly unprotected nature of driving a motorcycle, specific severe and fatal injuries are found in these cases. Defining them is essential in order to offer better protection and better approach to diagnosis and treatment.[1]

Cardiac injuries from blunt chest trauma usually result from violent motor vehicle accidents.[2-4] They consist of a variety of cardiac problems such as myocardial contusion, valve disruption, myocardial rupture, and ventricular septal defect (VSD).[5] Here we report a case of interventricular septum delayed rupture caused by a low velocity motorcycle crash and its successful surgical repair.

Case report

The patient was a 23-year-old white male driving a motorcycle with no safety helmet. He was brought to emergency department by emergency medical services (EMS) after head-to-head collision with another motorcycle. The patient was agitated and was not able to move his left upper extremity. At arrival, his vital signs was blood pressure (BP):130/85, pulse rate (PR):86, RR:19, BT = 36.7°C, with SpO_2: 96% and Glasgow Coma Scale (GCS):13. In primary survey, his airway was intact and cervical collar was in place. In neck exam, trachea was in the midline with no lacerations, and neck veins were not distended. He was receiving O_2 by mask. In chest exam, there was no obvious chest trauma and lung sounds was normal. In cardiovascular exam, heart sounds was normal and distal pulses were ++ and symmetric. Abdominal exam was unremarkable and pelvic exam was normal. Left upper extremity had a deformity and was splinted.

Chest, pelvic and spinal x-rays were normal. Focused assessment with sonography for trauma (FAST) was done with no positive findings. Sub-arachnoid hemorrhage (SAH) and contusion were found at brain CT scan. In left upper extremity x-rays, there were ulnar and wrist fracture. Past medical history was unremarkable.

The patient was admitted to the trauma ward due to brain injury findings. Brain function and consciousness

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was improved after 3 days and he was transferred to the orthopedic ward. Surgical repair of the left forearm fracture was done under general anesthesia.

One week after discharge from the orthopedic ward, he developed exertional dyspenia that was progressive. The patient was re-evaluated for chest lesions, with a finding of left side pleural effusion. A chest tube was placed. In bed-side echocardiography, a large VSD (connection site of moderator band to inferior vena cava (IVC), size=9 mm in diameter, 2 cm) with left to right shunt was found (Fig. 1, panels A and B). There was no right ventricular hypertrophy or sign of Eisenmenger syndrome at the echocardiography.

He was admitted to the cardiac surgery ward. Open heart surgery was done the next day. There was no pericardial effusion. The 2.5 by 2.5 cm ventricular septal defect was found and repaired by Dacron patch. Tricuspid valve anterior leaflet chordae tendineae were torn which were re-implanted. At the end of operation, there was no detectable VSD or tricuspid valve regurgitation at trans-esophageal echocardiography. The patient was discharged with good outcome and was doing well on the follow-up visits.

Discussion

The incidence of VSD following blunt chest trauma in motor vehicle accidents is truly rare.[2,3,6,7] The autopsies of 207 548 cases of non-penetrating thoracic trauma related deaths because of car accidents identified VSD in 0.01% of the cases, and the defects were isolated in only 0.002% of cases. Rupture of the free ventricular wall was the most common form of presentation among these cases.[6]

Traumatic VSD can be acute (at the time of primary insult), sub-acute (with myocardial contusion, necrosis, and rupture), or delayed (with valvular insufficiency).[8] In acute setting, compression of the heart between sternum and vertebrae causes an abrupt increase of heart chambers in late diastole and early systole, and the patient presents with dyspenia and decreased blood pressure. In sub-acute cases (as in our case), there is an undisclosed myocardial infarction in the interventricular septum that progresses to necrosis and usually after about 3 days develops a symptomatic septal defect.[2,9-12]

Diagnosis of blunt cardiac injury can be difficult and measuring cardiac enzymes can be useful, but this was not performed in our case because it was not suspected at initial presentation.

Surgical repair of traumatic VSD is greatly encouraged as soon as possible to normalize the patient hemodynamics. Interventional techniques also have been described.[7] Spontaneous closure of traumatic VSD has been reported. If the shunt is 1:2, the patient can be managed conservatively. But when there is a large defect, it must be closed, as in our case.[13-16]

Considering the mechanism of trauma in patient with antero-posterior compression of chest wall and the targeted evaluation of the patient can help in timely diagnosis of this rare injury.

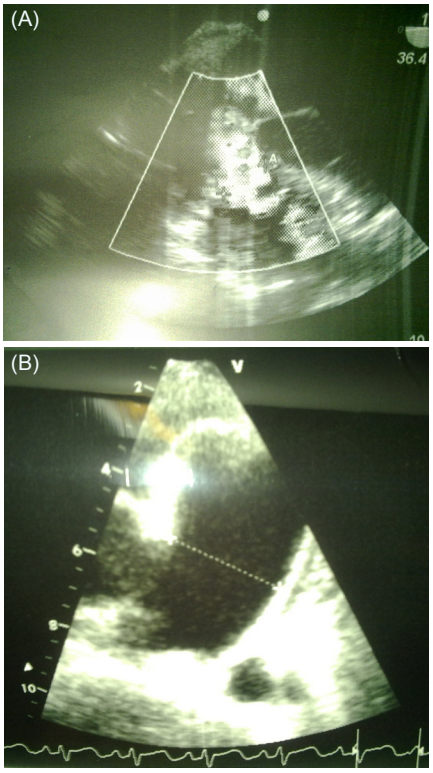

Fig. 1. Patient's echocardiography showing VSD with Doppler (A) and without Doppler (B).

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Ethical issues

An institutional ethical approval was obtained for this work from Tabriz University of Medical Sciences and a signed written informed consent form was obtained from patient.

Competing interests

The authors declare no conflict of interests.

Case Highlights

What is current knowledge?

√ ECG monitoring and cardiac examination including auscultation of heart sounds are currently used for all multiple trauma patients based on the advanced trauma life support (ATLS) guideline.

What is new here?

√ Including echocardiography in the ATLS guideline can reduce morbidity and mortality, especially in multiple trauma patients with positive findings, i.e. ECG changes, heart murmur and muffled heart sounds.

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