Postinfarction ventricular septal defect following blunt chest trauma in a 7-year-old child

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Blunt cardiac injury may result in traumatic ventricular septal defect (VSD) in the pediatric population, but presence of postinfarction VSD with accompanying coronary artery thrombosis has not been reported in the literature thus far. We present a seven-year-old patient who underwent surgery for posttraumatic VSD closure and bypass grafting of thrombotic left anterior descending coronary artery (LAD) occlusion following blunt chest trauma.

A high index of suspicion and early use of the appropriate imaging studies are essential for diagnosis and surgical treatment of this condition.

Key words: coronary artery bypass graft surgery, CABG, myocardial infarction, pediatric, trauma, blunt.

Traumatic ventricular septal defect (VSD) is a rare but well-known entity after blunt chest trauma in children[1-3], but postinfarction VSD with accompanying thrombotic lesion of the left anterior descending coronary artery (LAD) has not been reported thus far. This injury should be suspected in any patient with a history of major trauma.

A case of postinfarction VSD with accompanying thrombotic occlusion of the LAD after blunt chest trauma is presented. The diagnostic approach, intraoperative findings and choice of surgical procedure are discussed.

Case Report

A seven-year-old boy suffered from blunt chest trauma in a traffic accident. He had no open wounds and was conscious while being transported to emergency service. Whole body computerized axial tomography (CAT) scan revealed contusion in both lungs and minimal fluid accumulation in the pararectal area. He was kept under observation for 24 hours. After he complained of chest pain, ECG was obtained and ST segment elevation was detected. Echocardiography showed 18 mm VSD in the anterior portion of the mid muscular septum. There was no medical record of congenital VSD when parents were queried in this regard. The patient was referred to another institute for further examination to detect any possible coronary artery lesion. Cardiac magnetic resonance imaging (MRI) was performed and the first septal branch was found to be thrombosed with an accompanying narrowing lesion of the LAD. Cardiac catheterization was also done to confirm the diagnosis (Figs. 1, 2). Eventually, the patient was referred to our clinic for surgery.

At first, the patient was consulted to interventional cardiology for transcatheter closure, but localization of the defect and presence of the coronary lesion forced us to schedule surgery. A median sternotomy was done and the patient was placed on cardiopulmonary bypass (CPB) with bicaval cannulation. Following moderate hypothermia, cardiac arrest was achieved with cold antegrade crystalloid cardioplegia. Margins of the defect could not be visualized clearly through the initial right atriotomy, so we had to switch to right ventriculotomy. The defect measured approximately 20 mm and was located in the anterior portion of the muscular septum. Since it was the 8th day following the accident, we expected to find friable tissue around the VSD,

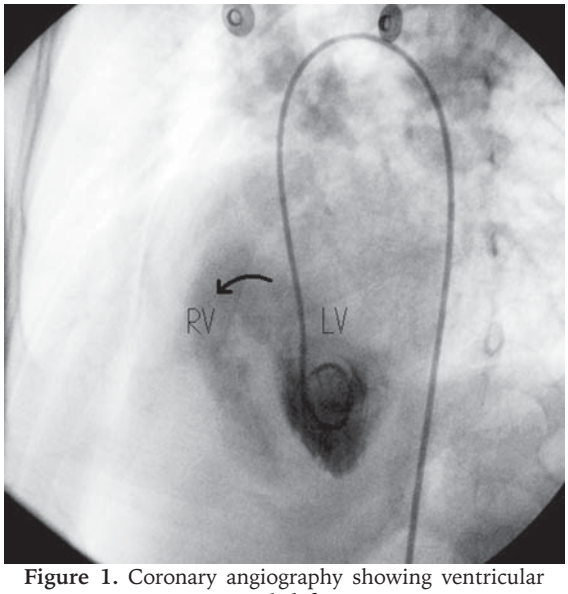

Figure 1. Coronary angiography showing ventricular septal defect.

but we could not clearly visualize the margins because it was located deeply between muscle trabeculations. A Dacron patch was sewn with 10 interrupted Teflon pledget sutures to the healthy muscle tissue surrounding the defect. The LAD lesion was bypassed with the saphenous vein, which was harvested from the right thigh. Right ventriculotomy was repaired primarily. The postoperative course was uneventful, and the patient was discharged on the 6th day following surgery.

Discussion

Postinfarction VSD is a well-known notorious complication of atherosclerotic coronary disease, with mortality rates reaching 47% in the elderly population[4], but we could not find any similar case report in the literature with respect to the age of the patient.

A recent review suggests the incidence of cardiac trauma may be as high as 20% after blunt chest trauma[5]. It has also been reported that 4.5% of penetrating chest injuries result in VSD. Tiao et al.[6] reviewed 2,744 blunt chest trauma victims and reported three patients with anatomic cardiac injury. They all suffered from traumatic VSD without any sign of coronary lesion.

It may be postulated that the defect was congenital. In our patient, the VSD was located in the anterior middle portion of the septum beneath the accompanying LAD lesion. Both the localization of the VSD and ischemic ECG findings imply that it was secondary to the myocardial infarction. It was also unlikely that the child would have survived without any sign of pulmonary hypertension with a defect of this size if the VSD was congenital. Another controversy for such a young patient may be the choice of bypass graft. We preferred to use the saphenous vein in order to spare the left internal mammary artery (LIMA) for any possible repeat procedure in the future in view of the patient's young age.

On his first arrival to the emergency service, the patient had no visible sign of cardiac injury but presence of typical chest pain, and ischemic ECG findings led to the diagnosis, which was confirmed with cardiac catheterization. Hypotension, arrhythmia and dyspnea are the symptoms caused by cardiac injury in a trauma patient. Although echocardiography is the major diagnostic tool, conventional coronary catheterization or computed tomography (CT) angiography may be necessary if additional coronary lesion is suspected[3].

Ventricular septal defect (VSD) is a lethal complication following major trauma, and it is generally due to the trauma itself, but accompanying coronary artery pathology should be suspected regardless of the age of the patient. Surgical treatment is mandatory with low mortality and morbidity when it is performed on time.

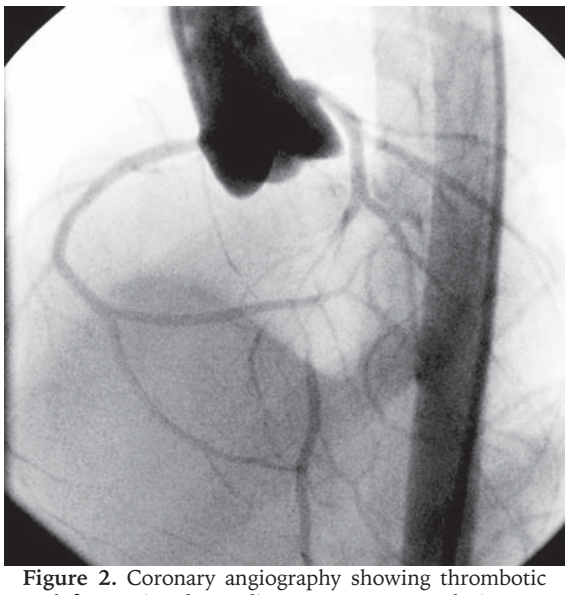

Figure 2. Coronary angiography showing thrombotic left anterior descending coronary artery lesion.

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