Acute type II aortic dissection and liver contusion in a 6-year-old boy due to fall from height

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Abstract

Acute type II aortic dissection and liver contusion due to free-fall from a height is a very rare coexisting injury. We are presenting a 6-year-old boy patient with these two conditions who was successfully treated with surgery and medically.

Keywords: Aortic dissection, Pediatric, Multiple blunt traumas.

Introduction

Falls from a height leads to a specific type of trauma, which is produced by rapid vertical deceleration and impact forces is one of the exceptionally rare causes of blunt aortic injury in the pediatric population [1]. In spite of, the liver is the most affected abdominal organ in victims of falls from a height [2], in association with acute type II aortic dissection and liver contusion is a very rare coexisting injury. Hereby we present, to our knowledge, the youngest patient with this very rare condition treated with the surgical procedure.

Case Report

A 6-year-old boy with no known history of cardiac diseases was admitted to the emergency service in another city, after falls from a height (6 m) accidentally. In the emergency service, the patient was conscious with a Glasgow Coma Scale score of 15. He was hemodynamically stable and complained of mid-sternum and right upper quadrant located at arcus costarum pain. The physical examination revealed a 1-2/3 diastolic murmur in the precordium. All upper and lower extremity pulses were palpable. There was no blood pressure difference between the extremities. Electrocardiography of the patient indicated sinus rhythm with no ST elevation. Transthoracic echocardiography demonstrated within normal limits of global left ventricular systolic function, no pericardial effusion, a non-aneurysmatic, tricuspid aorta and a posteromedial intimal flap; starting 1.5 cm above the coronary osmium’s and ending on the half of the ascending aorta. Computerized angiography showed that there was a false lumen appearance with a thickness of 5.5 mm and laceration reaching from caudate lobe to 4a to 8e segment of the liver, hypodensity, and hypoperfusion at the caudate lobe, the portal hilus, and the periportal area. He was diagnosed by acute type II aortic dissection, and then, he was transported to our hospital immediately [Figure 1a, 1b, 1c].

Figure 1: Computed tomography angiography: posteromedial intimal flap in ascending aorta

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The patient was hospitalized in our pediatric cardiac surgery intensive care unit at the second day of trauma. Pediatric surgery has consulted the patient for the liver contusion. Their opinion was emergency open heart surgery could be harmful due to the heparin administration in association with liver damage while levels of hepatic enzymes such as AST (505 U/L), ALT (238 U/L) were high at admission. The liver contusion was treated conservatively by N-acetylcysteine IV infusion. After 36 hours of trauma, AST (153 IU/L) and ALT (162 IU/L) levels were determined. Pediatric surgery mentioned that these levels were within safe limits for the cardiac surgery. Meanwhile, at first admission, laboratory testing revealed elevated levels of troponin I (142.2 pg/mL), CK-MB (7.9 ng/mL). In the surgery day, troponin-I and CK-MB levels were as follow respectively; (0.010 ng/ml) and (6.4 ug/L); the remaining laboratory values were within normal limits on the surgery day.

The parents were informed about the risks associated with such procedures in pediatric patients and a written consent was obtained. During routine anesthetic preparation, central venous line via right internal jugular vein and arterial pressure line was placed in the right radial artery. After median sternotomy, he had no sternal fracture. There was no pericardial effusion or blood in the pericardial sac. As perfusion method, under mild hypothermia, consists of hypothermia to 28 C© done, by cannulation of a 5 mm Gore-Tex® (WL. Gore & Associates, Flagstaff, AZ, USA) vascular graft sewn to the innominate artery at 30 to 40 mL /kg/ min. during the ascending aortic reconstruction, and bicaval cannulation was preferred for venous cannulation. Custodiol® HTK solution (Essential Pharmaceuticals LLC, GER.) for cardioplegia was delivered to the coronary ostia directly. After the aorta transected, the entry point of dissection was identified at the posterior aortic wall at the 1.5 cm above of the left coronary ostium [Figure 2]. The aortic valve was tricuspid, though it appeared as competent and anatomically normal. After excised intimal flap side of the aorta, the free margin of the distal aorta was preserved with a double layer of autogenic fresh pericardium felt inside and outside using 6.0 polypropylene sutures. The proximal ascending aortic part was performed in the same manner [Figure 3a, 3b]. Anterior part of the aorta was closed by using a diamond shape porcine pericardial patch (Bio Integral Surgical Inc., CAN) to avoid an iatrogenic supravalvular aortic stenosis. At the end of the procedure, after re-warming to 37°C, the patient was easily weaned off cardiopulmonary bypass. No complications developed at the postoperative stage and no collagen tissue disorders were detected in the pathological specimens from the excised aortic segment. Postoperative echocardiography demonstrated normal results. Liver contusion sign and symptoms were not detected postoperatively. The patient was discharged home from the pediatric cardiac surgery unit on the 7th hospital day with normal left ventricular systolic function.

Comment

Traumatic aortic injuries in children are very rare with a detected incidence of <0.1% in pediatric chest trauma [3]. Especially, as in the reported case, we performed coexisting of acute type II aortic dissection and liver contusion due to falling from a height is an extreme situation. In our case, liver trauma treated by medically. Sign and symptoms of the liver damage after open heart surgery were not detected.

The liver is the most affected abdominal organ in victims of falls from a height [4]. The liver trauma is a serious complication if open heart surgery necessary. Pediatric patients with myocardial contusions have multisystem trauma; pulmonary contusion is the most common coexisting injury, found in 50% of patients. So as, we have seen right pulmonary lower lobe contusion, but no complication was detected related to the pulmonary contusion [5].

Figure 2: Arrow indicates the entry point of dissection was identified at the posterior aortic wall 1.5cm above the left coronary ostium.

Figure 3a, 3b: The free margin of the distal aorta was preserved with a double layer of autogenic fresh pericardium felt inside and outside.
under control of serial transthoracic echocardiography postoperatively.

The blunt thoracic aortic injury is uncommon in the children. The aortic arch is relatively fixed, and the descending aorta is more mobile, making it susceptible to shearing forces during horizontal and vertical deceleration. As seen in our case, this is an unusual condition that contains not only falling from the height but also direct blunt trauma to the sternum. This aortic injury is an unexpected combination of these traumas in a patient with normal aortic tissue.

**Conclusion**

To our knowledge, we successfully performed an operation in the youngest patient with the preservation of the aortic valve and treated the acute type II aortic dissection without using any synthetic material.

**Disclosure:** No disclosure

**References**