Successful Surgical Treatment of Traumatic Transection of the Innominate Artery: A Case Report

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Blunt traumatic injury to the innominate artery is relatively rare. We present the case of a 40-year-old woman who fell from a fourth-floor window and was transferred to our hospital with multiple injuries, hemodynamic shock, and disturbance of consciousness. Computed tomography with image reconstruction revealed transection of the innominate artery near its origin. Emergent surgery required establishment of cardiopulmonary bypass before sternotomy in preparation for uncontrollable hemorrhage. Proximal aortic arch replacement with a branch to the right axillary artery was successfully performed using circulatory arrest and selective cerebral perfusion.

Keywords: innominate artery, rupture, trauma

Introduction

Traumatic injuries to the thoracic great vessels are rarely seen in clinical situations because it has been reported that the majority of patients with such injuries die before arrival at the hospital. Blunt traumatic injury to the innominate artery is relatively rare for the same reason, and various surgical strategies for its repair have been reported according to the individual situation. We describe a rare case of traumatic intimal transection of the innominate artery due to a fall, complicated by hemodynamic shock and disturbance of consciousness, which was successfully treated with proximal aortic arch replacement.

Case Report

A 40-year-old woman who fell from a fourth-floor window was brought to our hospital by ambulance. Her peak blood pressure was 40 mmHg on arrival, and she was a transient responder to fluid resuscitation. The patient had some motor responses to pain but was not conscious (Glasgow Coma Scale [GCS] of 4); thus, neurological function could not be evaluated in detail. There were multiple lacerations on her body and extremities, and an open fracture was also seen on her left upper limb. Chest X-rays showed a widened superior mediastinum (Fig. 1), bilateral upper rib fractures, fractures of the sixth cerebral and second to fourth thoracic vertebral spinous processes, and a compression fracture of the third thoracic vertebral body. Enhanced computed tomography (CT) revealed a large hematoma in the superior mediastinum. Frontal CT image reconstruction suggested transection of the innominate artery near its origin (Fig. 2). Aortic dissection at either the ascending aorta or arch was equivocal. Although a brain CT did not show any apparent bleeding or damage, cerebral malperfusion was suspected because of her disturbance of...
To support an anastomosis, it was closed. Proximal aortic arch replacement was performed with a 20-mm Dacron prosthesis, creating the distal aortic anastomosis at a site just proximal to the left common carotid artery. Instead of reconstructing the closed innominate artery, a prosthetic branch to the right axillary artery was extended from the main graft (Fig. 3). During the postoperative period, the patient’s consciousness gradually recovered to clear but left hemiparesis remained persistently. Spinal cord injury was seen on magnetic resonance imaging. After placement of a tracheostomy for ventilatory support, the left arm fracture was also treated surgically. She was discharged to a rehabilitation facility on postoperative day 58.

**Discussion**

Blunt traumatic injury of the innominate artery is uncommon. According to an autopsy study by Dosios, et al., 94.5% of victims with blunt trauma of the thoracic aorta and aortic arch branches die at the scene of the accident or during transportation. The majority of these injuries occur at the aortic isthmus; only 8.3% are to the aortic arch branches. The most frequently injured of the aortic arch branches is the
Surgical Repair of Innominate Arterial Rupture

serious vascular injuries causing continuous bleeding and cephalic malperfusion may require prompt diagnosis and treatment.

Innominate artery injury is usually suspected when a widened mediastinum is seen on chest X-ray or clinical features seen on examination. Definitive diagnosis has been considered to require aortography; however, shock precludes its use. The recent introduction of helical CT scanning provides precise vascular mapping, and additional angiography can be abbreviated so that rapid treatment can be performed for critical patients. Our patient was hemodynamically unstable and aortography was not performed; however, a reconstructed coronal-section image provided enough information to make an accurate diagnosis and permit an emergent operation.

Various operative procedures have been reported previously, mainly according to the location and extent of injury. When injuries are located close to the origin of the innominate artery, bypass grafting from the ascending aorta to the distal part of innominate artery, with closure of the proximal stump, is preferred. This procedure usually requires partial aortic clamping for proximal anastomosis of the graft and for

Fig. 3  (A) An intimal transection existed at the root of the innominate artery, and the discolored surface was also seen from the ascending aorta to the aortic arch. (B) Proximal aortic replacement with a branch to the right axillary artery was performed.
Conclusions

Traumatic innominate artery injury is rare and can be lethal in cases with hemodynamic shock and neurological deficit. CPB and circulatory arrest can be useful for surgical treatment in cases suspicious for uncontrollable bleeding or extensive vascular damage.

Disclosure Statement

All authors have no conflicts of interest to report.

References