



Traumatic Aneurysm of Innominate Artery Resulting in Tracheal Stenosis and Rapidly Progressive Respiratory Failure; A Case Report and Literature Review

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ABSTRACT

Traumatic injuries to great vessels are relative common in trauma practice. Blunt thoracic trauma may result in dissection injury to aorta and innominate artery. We herein present a late presentation of traumatic innominate artery aneurysm. A 29-year-old woman presented with dyspnea to our emergency department. She had previous motor-vehicle accident a month before presentation for which had undergone chest tube insertion. She was diagnosed to have traumatic aneurysm of innominate artery resulting in tracheal stenosis resulting in acute life threatening respiratory failure. She underwent simultaneous aneurysm resection and tracheal reconstruction. She was uneventfully discharged from hospital. Any post-traumatic respiratory and cardiovascular symptoms may propound an undiagnosed serious injury to the great vessels. Extra and repetitive imaging studies may help us in better evaluation of traumatized patients with high energy mechanisms and sharp injuries to chest and neck.

Keywords: Traumatic aneurysm; Innominate artery; Tracheal Stenosis; Respiratory failure; Surgical remove.

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Introduction

Great vessels of thorax consist of ascending and transverse aorta and three branching arteries (innominate, left carotid, left subclavian respectively from left, are prone to be ruptured and dissected as the result of blunt and sharp trauma to the thorax [1]. Traumatic injuries to great vessels are relative

common in trauma practice. Blunt trauma to thorax may result in dissection injury to aorta and innominate artery [2-4]. Tracheo-innominate artery fistula is an almost a common clinical condition and well known situation that is caused by tumors or prolonged existence of tracheostomy tube. Any anatomic change in trachea can affect innominate artery and vice versa [5]. There have also been few

reports of trachea being compressed by aneurysm of innominate artery as the result of trauma [6-8]. Most of these reported cases were presenting with hoarseness and dyspnea but none developed life threatening complications. We herein report a case with rapidly progressive life threatening respiratory signs and symptoms requiring emergency operation due to traumatic aneurysm of innominate artery.

Case Presentation

A 29-year-old woman with motor-vehicle trauma a month before admission, presented to our emergency room with progressive dyspnea. She had underwent left thoracic tube insertion at the time of trauma due to left massive hemothorax and pneumothorax, but she had never got intubated. In physical examination, she showed prominent and obvious stridor suggesting a major occlusion in her upper respiratory tract. Despite the normal chest radiography after discharging from trauma hospital, dyspnea and breathing symptoms had no remission. The patient underwent bronchoscopy during which, granulation tissue and stenosis had been detected in lower parts of trachea (based on the written report from the primary hospital). Thus she was referred to thorax surgery department of our center. CT-scan revealed considerable stricture in trachea which was concomitant with dilatation of innominate artery (Figure 1) and normal diameter trachea at the upper level.

She underwent operation due to progressive dyspnea. Findings during operation included right brachiocephalic artery aneurysm with pressure effect on trachea resulting in fibrosis of 5th to 7th tracheal rings. We also detected a tracheoesophageal fistula which was occluded by fibrin material. During the

operation the aneurysmal part of the innominate artery was resected and replaced by synthetic graft arising from ascending aorta and was anastomosed to distal part of innominate artery. Affected and stenotic parts of trachea was resected and healthy parts of trachea were anastomosed end to end using Prolen suturing material. Fistula part of esophagus was also repaired. Ligation of brachiocephalic vein was also performed. The patient was transferred to ICU and detached from ventilator after one week. Bronchoscopy and color Doppler study showed healthy anastomosis. Hospital course was uneventful and she was discharged from hospital without any complication. She was fine without respiratory distress and obstruction signs in two consequent outpatient visit within 3 months after discharge.

Discussion

The innominate artery is the second most common vulnerable vascular structure of the upper thorax to blunt trauma after the isthmus of thoracic aorta. Motor vehicle accidents accounts for 90% of civilian injuries followed by crush injuries in 8% and falls in 2% [3,9]. It is proposed that 2 types of forces are responsible for the innominate artery injury. One is transverse compression between the sternum and the spine, and the other is longitudinal shear stretch when the neck is hyperextended and the heart is displaced downward. Both forces cause increased tension on the innominate artery, especially in the proximal segment, because it is relatively fixed on the arch. Innominate artery aneurysms accounts for only 3% to 6% of all aneurysms occurring in the supra-aortic vessels [10,11].

In the majority of patients, the diagnosis of

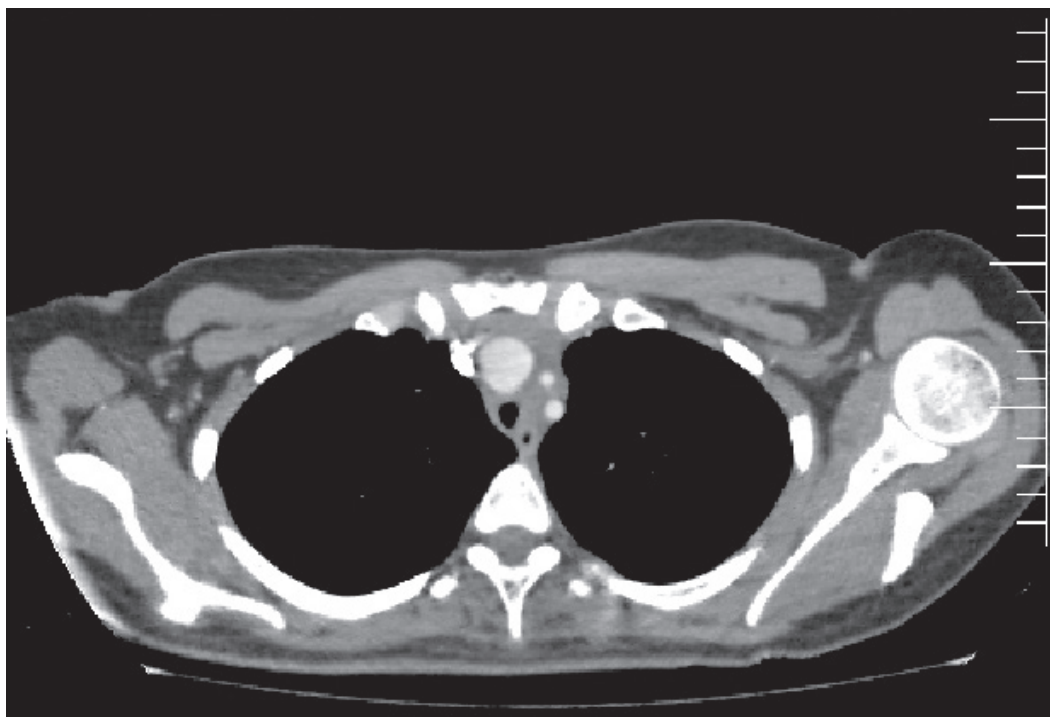


Fig. 1. Chest CT-scan of the patient with arterial phase showing the aneurysmal part of innominate artery and narrowing of trachea.

innominate artery injury after blunt trauma can be established in the acute phase. However, delayed presentation-up to 34 years after the injury [12] has been reported in 12.3% of patients. The most common types of innominate artery injury are intimal tears and pseudoaneurysm formation. Concomitant respiratory manifestations, mainly resulting from pneumothorax, can be seen in about 15% of patients [13]. Airway distress caused by direct compression from the pseudoaneurysm, as seen in this patient, is rare [2,14].

Several operative approaches have been reported for innominate artery injury, including primary repair, graft replacement, and bypass. Protective measures for cerebral perfusion, such as shunting and CPB, may or may not be used. Most patients with a normal circle of Willis can tolerate temporary clamping of the innominate artery. However, shunting must be used when backflow pressure is insufficient (<50 mm Hg). CPB is usually reserved for patients whose pseudoaneurysm cannot be safely exposed or those with concomitant arch injury, the pending or contained rupture of the pseudoaneurysm requiring anastomosis under circulatory arrest. Recently, endovascular repair has been applied for posttraumatic innominate pseudoaneurysm [15]. Endovascular repair is less invasive and more expeditious than open surgical repair, but its

success is highly dependent on the site of rupture and the operator's expertise. Endovascular repair was not suitable for our patient for 2 reasons: (1) life-threatening airway compression that mandated prompt use of CPB and (2) bovine arch anatomy that precluded an adequate landing zone for a stented graft.

In this case we faced lethal complications of innominate artery aneurysm that affected trachea and esophagus and left brachiocephalic vein and life threatening symptoms expeditiously progressed. Despite the procedures of same previously reported cases, we had to simultaneously repair aneurismal part, affected left brachiocephalic vein, resect severely stenosis trachea and a repair fistula of esophagus. We experienced a new multidisciplinary surgical approach in this kind of operation. Regarding to similar cases, we recommend proper vascular imaging in trauma patients with respiratory symptoms of unknown cause.

In conclusion, any post-traumatic respiratory and cardiovascular symptoms may propound an undiagnosed serious injury to the great vessels. Extra and repetitive imaging studies may help us in better evaluating the traumatized patients with high energy mechanisms and sharp injuries to chest and neck.

Conflict of interest: None declared.

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