after the surgery. Postsurgical control echocardiogram revealed that pulmonary artery pressure was decreased to 30 mm Hg. The postoperative period of the patient was uneventful, and she was discharged on the seventh postoperative day. The patient’s latest follow-up visit was 6 months after the operation, and no signs or symptoms were found.

Comment

A fistula between the systemic artery or vein and the pulmonary vessel is rare abnormal communication. A small number of cases were described in the literature before. They are usually congenital, but can be iatrogenic or traumatic or occur because of tumors or inflammatory diseases [3]. As our patient had no previous history of trauma, tumor or placement of a central venous catheter, this case was considered congenital.

The feeding arteries of a fistula can originate from abnormal aortic branches or subclavian, axillary, diafragmatic, mediastinal, or coronary arteries. Outflow of a fistula can be through the pulmonary artery, pulmonary vein, or both [4]. As stated earlier, this type of communication between the pulmonary artery and innominate vein is rare. According to the literature search performed during the preparation of this manuscript, only one similar case was reported [2].

The possibility of enlargement of the untreated fistula leading to high-output congestive heart failure and presenting with acute pulmonary symptoms owing to increased preload must be kept in mind in the management of the fistula [5, 6]. Treatment options should include surgical ligation and intravascular coil embolization with interventional techniques. In this case, the fistula between the left pulmonary artery and innominate vein was causing dyspnea, pulmonary hypertension, and mild right heart dilatation secondary to a shortcut between cardiac chambers creating volume overload.

CT images should be investigated carefully, because preaortic round lesions can be confused with lymph nodes, which can lead to misdiagnosis, as occurred in our case during an earlier CT evaluation by another radiologist. The continuity of this tubular structure in the consecutive images of the scan directs the physician to diagnosis. Axial images of the chest with MRI may show similar findings, but consecutively repeated angiographic sequences help to reconstruct the three-dimensional images. Moreover, coronal images of the chest may reveal the abnormal vascular communication. MRI angiography is as helpful as CT, but with the benefit of non-ionizing radiation [5].

Interstitial lung disease was suspected clinically and could not be ruled out as an etiology of the patient’s symptoms. Even if imaging studies were revealed the nature of anatomic and functional details of anomalous vascular structure connecting the pulmonary artery with innominate vein, the expectation of an alternative diagnosis directed us to perform a lung biopsy in addition to surgical ligation.

In conclusion, mediastinal arteriovenous fistula is a rare, congenital malformation of high variability. In this report, we describe an adult patient with chronic dyspnea owing to a fistula from the left pulmonary artery to the innominate vein. She recovered completely from her symptoms after the surgical ligation.

References


An Unexpected Complication of Titanium Rib Clips

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Surgical stabilization of the rib fractures has been successfully performed for the management of pain in multiple rib fractures, fixation of chronically painful nonunion, reduction of overriding ribs, and flail chest cases. Herein we report a patient who was treated with titanium rib clips after a motor vehicle accident leading to pulmonary parenchymal laceration and multiple painful rib fractures. Three of the rib clips were broken 4 months after the operation. The patient underwent the second operation for restabilization of the broken ribs. We review the relevant literature, with particular emphasis on the management of this complication.

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Rib fractures are the most common major thoracic injuries. Up to 40% of all thoracic trauma patients present with rib fractures and at least a third of these patients will require hospital admission [1]. Conservative management for the majority of patients with severe chest injuries has produced a reduction in mortality, complication, and hospitalization length. More recently, a resurgence of operative stabilization of rib fractures with titanium bars, plates, and screws has taken place with the implication of improved outcomes [2]. The Strasbourg thoracic osteosynthesis system (STRATOS; MedXpert GmbH, Eschbach, Germany) is based on titanium clips and bars and a vertical expandable prosthetic titanium rib system [3]. Here we present a patient whose titanium rib clips (STRATOS system) were broken, with no detectable reason after 4 months of placement, and the patient was operated again for restabilization of the painful ribs.

A 47-year-old man who was involved in a motor vehicle accident was transferred to our department. He complained of shortness of breath and severe left chest wall pain. Clinical examination revealed 88% of oxygen saturation in free air and the pain of the patient was aggravated with superficial palpation over the lateral aspect of the left fourth to eighth ribs. Visual analog scale (VAS) for pain score was 8. Chest radiograph revealed obviously displaced fractures of the left fourth to eighth ribs (Fig 1A); computed tomography of the thorax revealed intrathoracic hematoma. The patient underwent lateral thoracotomy to drain the hematoma. A laceration was also detected in the superior and lateral segments of the left lower lobe. The hematoma was drained and parenchymal laceration was repaired. Rib fracture stabilization was also performed on the fifth to eighth ribs by using titanium rib clips (STRATOS system; Figs 1B, 1C). We used one 6 segment and three 9 segment titanium rib clips (Fig 1D). The VAS pain score was 2 one week after the operation. Four months after the operation the patient referred to our department because of chest pain. The VAS pain score was 8. Lateral chest radiograph revealed 3 broken rib clips (Fig 2A). There was no history of trauma or any other reason that may have caused a break in rib clips. The patient underwent the second operation for restabilization of the ribs. We put two 9 segment titanium rib clips over and over for each broken rib to make it more powerful (Figs 2B, 2C). The patient was discharged on the second postoperative day. The VAS pain score was 1, a month after the operation. The patient is well 1 year after the second operation (Fig 2D).

Comment

The operative repair of severe chest wall injury restores chest wall integrity, improves pulmonary function, and is associated with lower rates of long-term morbidity and pain [2]. Tanaka and colleagues [4] presented a randomized controlled trial comparing surgical stabilization to...
conservative management using internal pneumatic stabilization. They were able to show a reduction in nosocomial pneumonia, duration of ventilatory support, length of intensive care unit stay, medical costs, and also a quicker return to work in their surgical group. In addition Granetzny and colleagues [5] reported that the duration of hospital stay for the surgical group that was as half as compared with the nonsurgical group [5].

Despite numerous reports suggesting beneficial outcomes for patients with operative rib stabilization, indications for surgery are still variable [4, 5]. The potential indications for operative rib fracture fixation are the following: flail chest; reduction of acute pain and disability; open chest defects; symptomatic rib fracture nonunion; and thoracotomy for other indications [2–6].

Titanium prosthetic devices (STRATOS clips and bars or Synthes; West Chester, PA, plates and screws) provide a light-weight but strong rigid support for rib fixation and chest wall reconstruction. The advantage of these systems relate first to the properties of the titanium material, which has a high strength to weight ratio that can integrate with bone, which further strengthens the reconstruction with time, and which is resistant to infection. Secondly, these titanium devices closely mimic anatomic contour of the ribs and the dynamic movements of rib clips systems have been shown to be synchronous with the normal ribs. On the other hand, plate and screw systems are especially used in broad rib fractures [3].

In the literature there are too few data about the complications of titanium rib clips. Billè and colleagues [7] experienced fractures of titanium prostheses in lung herniation repair. The patient had a large anterior chest wall defect involving the costal margin, with poor muscle coverage. In our case we use three-dimensional 6 and 9 segment titanium rib clips for rib fracture stabilization. The fractures were on the lateral side of the fourth to eighth ribs with good muscle coverage on them and these ribs were not broad.

In our department we mainly use a rib clip system for the fixation of rib fractures. In case of broad rib fractures we use a plate and screw system for stabilization. In fact, we could not find a reason for the fracture of rib clips in this case. There was no history of trauma and the patient was not working at hard labor. In the second operation we thought to use a plate and screw system, but in this instance a big incision was necessary for screwing the plates in proper position. We then decided to put 2 rib clips over and over to make it more powerful from a small incision.

In conclusion, we have an unusual experience of broken titanium rib clips, and there are too few data about the complications of titanium rib clips in the literature. Surgeons who are concerned with chest wall reconstruction or rib fracture stabilization should keep in mind about the fracture of titanium prosthetic devices without any reason.

References


Successful Management of Esophageal Necrosis After Endovascular Repair of Chronic Type B Aortic Dissection

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We report the case of a 65-year-old patient with esophageal necrosis that developed after thoracic endovascular aortic repair (TEVAR) of a previously stented, ruptured chronic type B aortic dissection. The cause of this complication may have been related to an infected mediastinal hematoma causing esophageal compression. Emergent esophagectomy was performed with success.


Esophageal necrosis is a rare but lethal complication after thoracic endovascular aortic repair (TEVAR). It can occur as a result of extrinsic compression from a mediastinal hematoma or can be due to overstretching of the esophageal arteries [1–3]. Only 3 cases of esophageal necrosis after TEVAR have been reported in the literature, all of which have been fatal [1–3]. We describe a case in which esophageal necrosis occurred as a complication after a TEVAR extension for a previously stented, ruptured chronic type B dissection that was successfully managed by esophagectomy.

A 65-year-old woman had undergone TEVAR at our institution in 2012 to treat a residual distal aortic dissection after successful arch replacement for an acute type A dissection. One year later, she presented to an outside institution with fever and paraplegia. An aortic graft infection was suspected. Magnetic resonance imaging was performed, and a diagnosis of anterior spinal artery syndrome was made by visualization of spinal cord ischemia at the C6 level. She improved with antibiotics and cerebrospinal fluid drainage until the abrupt onset of dysphagia. A computed tomography (CT) scan of the chest showed chronic type B aortic dissection with aneurysm of the false lumen and an associated large mediastinal hematoma compressing the esophagus and trachea (Fig 1). She was intubated and immediately transferred to our hospital for treatment of the acute aortic rupture. Successful TEVAR extension was performed across the reentry of the false lumen. A CT scan performed the next day showed no evidence of residual retrograde false lumen flow but did demonstrate progression of the esophagotracheal compression (Fig 2). A tracheotomy was performed. However, the patient worsened, and 2 weeks after the TEVAR extension, she became septic with Enterococcus faecium. On day 15, a chest CT scan showed air bubbles within the false lumen of the dissected aorta (Fig 3). Esophagoscopy revealed circumferential esophageal necrosis and perforation at the 24-cm to 29-cm level.

The patient was emergently taken to the operating room for exploratory thoracotomy through a right fifth intercostal incision. Dense inflammatory adhesions were dissected. The hematoma was removed, and the infected false lumen of the aneurysm was partially excised. The previously placed graft was left in place. After the hematoma was removed, a 7-cm-long defect of the esophagus was observed. A decision was made to perform esophagectomy in the standard fashion. After dissection of the remaining esophagus, the resulting cavity and the esophageal bed were debrided and irrigated. To cover the graft, we decided to perform gastric pull-up during the same surgery. Through laparotomy, the stomach was mobilized and fashioned into a tube in the usual manner. Gastric pull-up reconstruction was completed by end-to-side cervical esophagogastrostomy. Chest tubes were placed. Pathology examination confirmed transmural ischemic esophageal necrosis.

The operation was complicated by cardiac arrest requiring 15 minutes of resuscitation and defibrillation with subsequent stabilization. The postoperative course was uneventful, although paraplegia persisted. The patient was discharged to a weaning center on postoperative day 28. Currently, at 5 months after the esophagectomy, she is at a residential care facility and is eating a regular diet.

Comment

Esophageal necrosis is a rare complication after TEVAR. The 3 previously reported cases have all been fatal [1–3].

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