Case Report

Thoracoscopic and Endovascular Management of Retained Haemothoarx Associated with an Intercostal Artery Pseudoaneurysm

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Abstract

Intercostal artery pseudoaneurysm (IAP) is a rare entity and may complicate a percutaneous intervention through an intercostal space or follow thoracic trauma. Its rupture into the pleural space can give rise to haemothorax, which if untreated may lead to a retained haemothorax (RH). Traditionally both the IAP and the RH are managed by a thoracotomy. We report a patient who developed an IAP with haemothorax following a trauma. The diagnosis was established by computed tomography. The patient was treated by endovascular embolisation of the IAP followed by thoracoscopic decortications of the RH. **[Indian J Chest Dis Allied Sci 2014;56:37-39]**

Key words: Chest trauma, Haemothorax, Pseudoaneurysm, Thoracoscopy, Decorticaion.

Introduction

Haemothorax is commonly associated with penetrating trauma to the chest and is managed by insertion of an intercostal drain. Between1%-20% patients are likely to develop a retained haemothorax (RH) if there is an insidious or delayed bleeding into the pleural space that fails to get absorbed. Intercostal artery pseudoaneurysm (IAP) is a rare complication of penetrating trauma to the chest and its rupture may also result in an RH. Traditional treatment of this entity requires a thoracotomy for ligation of the vessels feeding the pseudoaneurysm as well as for evacuation of the haemothorax. We present a patient with an RH managed successfully by endovascular treatment of the IAP followed by thoracoscopic decortication. We believe this to be the first reported case utilising a dual minimally invasive approach in the treatment of RH due to an IAP.

Case Report

A 52-year-old diabetic and hypertensive male was stabbed on the right side of the back of his chest and was treated at another institution by insertion of an intercostal chest drain (ICD). The tube was removed 14 days later after full expansion of the lung and the patient was discharged. After two weeks he developed low-grade fever that was treated initially by multiple courses of antibiotics. As the fever persisted for more than three weeks he was referred to our institution.

The haemoglobin was 10.7g%, the leucocyte count 13,300/cm^2 and the erythrocyte sedimentation rate was 44 mm at the end of the first hour. A chest radiograph revealed opacification of the right lower haemithorax. A contrast-enhanced computerised tomography (CECT) of the chest showed a moderate right-sided pleural effusion with collapse of the lower lobe of the right lung (Figure 1).

A focal 1.6cm x1.3cm sized intensely enhancing nodular area suggestive of an intercostal artery aneurysm was identified along the right posterior chest wall. A diagnosis of RH following a ruptured intercostal artery aneurysm was made. The option of endovascular and thoracoscopic treatment was discussed with the patient. He underwent angiography under local anaesthesia and via a right transfemoral route. A 5-French Shepherd hook angiographic catheter (Cordis, Miami Lakes, FL, USA) was advanced into the abdominal aorta and engaged into the right

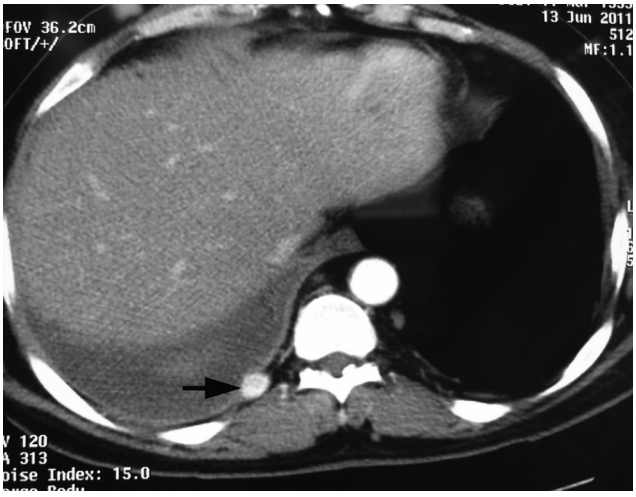

Figure 1. A contrast enhanecd computed tomography of the chest showing a right-sided haemothorax and an intercostal artery pseudoaneurysm (arrow).

[Received: April 24, 2012; accepted after revision: September 7, 2012]

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11th posterior intercostal artery, that confirmed a pseudoaneurysm arising from the proximal portion of the artery (Figure 2A). Injection of the contrast into the intercostal arteries above and below this level did not show any other vessels feeding the pseudoaneurysm. A 2.7-French Progreat microcatheter (Terumo Corporation, Tokyo, Japan) was coaxially introduced through the Shepherd hook catheter and was advanced distal to the pseudoaneurysm. Coil embolisation was performed from the distal to the proximal portion of the artery with three Hilal embolisation microcoils (Cook Inc, Bloomington, IN, USA). Post-embolisation angiogram revealed occlusion of the vessel and exclusion of the pseudoaneurysm from circulation (Figure 2B).

The next day, a right thoracoscopic decortication was carried out under general anaesthesia with single-lung ventilation using two 10mm and one 5mm ports. The haemothorax was evacuated and the pleural as well as the parietal peel entrapping the lung were dissected meticulously and excised. At the conclusion of the procedure, the lung expanded well. Two intercostal drains were placed through the 10mm port-sites. The patient made an uneventful recovery and the drains were removed on the second and the fourth post-operative days, respectively. He was discharged on day 5 and made an uneventful recovery and remains well at four months follow-up.

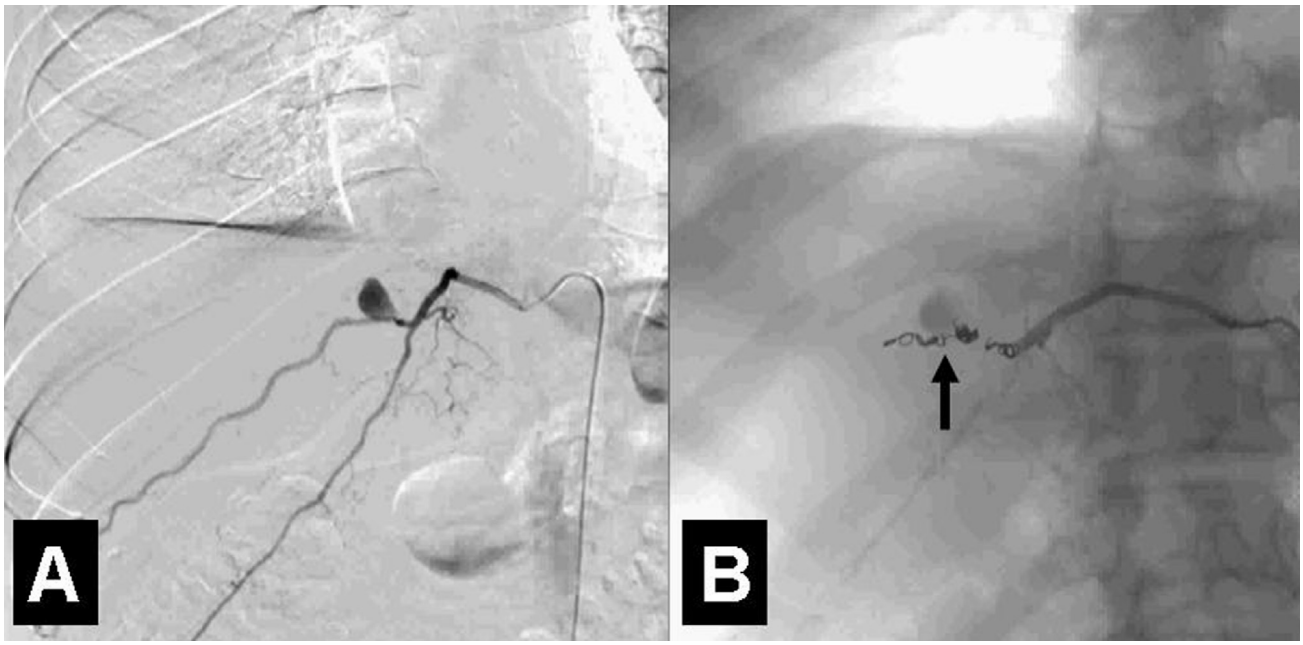

Figure 2. Digital subtraction angiography image shows (A) the pseudoaneurysm; and (B) embolisation with microcoils (arrow). The faint opacification of the pseudoaneurysm is due to contrast stagnation in the sac.

Discussion

IAP is a rare condition and only a handful of cases have been reported in the literature. The causative factors identified include a diagnostic or a therapeutic procedure, such as a computed tomography-guided percutaneous fine-needle lung biopsy,[2] biliary intervention,[3] thoracoscopic sympathectomy[4] or a median sternotomy.[5, 6] Only two cases of IAP related to trauma, including one due to a stab injury, have been previously reported.[7, 8] The diagnosis of an IAP may be made prior to its rupture if the patient presents with a pulsatile mass, as reported in two patients.[5, 6] In such patients a colour doppler ultrasound examination confirms the diagnosis. All other reported cases presented with a haemothorax following rupture of the IAP. It is essential that patients who present with a RH following chest trauma or a percutaneous intervention should have a CECT to exclude this rare cause.

The treatment options for IAP employed at open surgery include over-sewing[4] of the pseudoaneurysm or aneurysmectomy and proximal ligation.[7] Alonso *et al*[6] reported ultrasound-guided percutaneous injection of thrombin into an unruptured IAP. However, in their patient a second injection of thrombin was required two days after the initial sitting as a follow-up colour doppler demonstrated reperfusion of the IAP. Endovascular interventions including coil embolisation (as in our case and that of Sekino *et al*[8]), placement of a covered stent[5] and embolisation with a combination of coils and n-butyl cyanoacylate[9] have been described. When the expertise is available, endovascular therapy forms the preferred treatment option for an IAP. The case reported by Sekino *et al*[8] highlights the importance of identifying the precise vascular pattern feeding the IAP. Having identified a pseudoaneurysm of the *sixth intercostal artery* on selective angiography performed via the musculophrenic artery, they embolised the anterior intercostal branch. Two weeks later the angiography had to be repeated as a follow-up colour doppler as well as a CECT demonstrated perfusion within the

pseudoaneurysm. The angiography of the *eighth posterior intercostal* artery via the descending aorta showed that the musculophrenic artery was also feeding the pseudoaneurysm. The sixth posterior intercostal artery and the musculophrenic artery were both embolised resulting in exclusion of the pseudoaneurysm. In our patient, mindful of this pitfall, the interventional radiologist had taken care to confirm the absence of additional vessels feeding the pseudoaneurysm prior to as well as after its embolisation with coils.

Most patients with IAP, including our patient, present with RH secondary to its rupture. The ideal treatment of RH and its timing in the setting of thoracic trauma remains debatable. Proponents of the conservative treatment in stable patients reason that the pleural fluid collection would eventually get resorbed. It has been increasingly recognised that an untreated RH is likely to result in an empyema and /or an entrapped lung and consequently increase patient morbidity. In patients with thoracic trauma the inflammatory process within the pleural space severely limits its absorptive capacity and this makes spontaneous resolution of an RH less likely.[10] There is strong evidence that early surgical evacuation of RH, particularly when achieved by thoracoscopy, improves patient outcomes.[11,12] The surgery in these patients may be challenging and it is imperative not only to evacuate all the clotted blood and fibrinous matter but also to remove the entire visceral peel entrapping the lung. Confirmation of satisfactory expansion of the lung at the conclusion of the thoracoscopic intervention ensures prompt obliteration of the dead space post-operatively and hastens the recovery, as was evident in our patient.

In summary, although IAP is a rare entity, the diagnosis should be entertained in patients in the appropriate clinical setting, such as a prior thoracic trauma or an intervention through the intercostal spaces. As highlighted by the case presented here, a ruptured IAP presenting with an RH can be safely and efficaciously treated with a minimally invasive combination of endovascular intervention and thoracoscopic decortication.

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