Internal thoracic artery pseudoaneurysm after redo aortic root replacement

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Abstract
Pseudoaneurysm or bleeding of the internal thoracic artery (ITA) is an extremely rare complication after cardiovascular surgery via a median sternotomy, especially during the delayed postoperative phase. Early treatment may be needed in the case of massive haemorrhage or a rapidly enlarging pseudoaneurysm. Herein, we describe a case of pseudoaneurysm of the ITA in a patient with Marfan syndrome after redo aortic root replacement.

Keywords: Marfan syndrome, post aortic root replacement, pseudoaneurysm of the internal thoracic artery

Case report
The patient was a 49-year-old woman who underwent aortic root replacement (re-implantation procedure) and total arch replacement for a type A aortic dissection. Although she was asymptomatic, four months after the aortic root replacement, a massive aortic root pseudoaneurysm was detected on routine follow-up computed tomography (CT) scan. Redo aortic root replacement (Bentall procedure) through re-median sternotomy was urgently performed.

After the surgery, complete atrioventricular block occurred, and pacemaker implantation (PMI) was performed via the right axillary vein through a cut-down procedure two days after the redo aortic root replacement. On the following day, chest radiography revealed massive right pleural effusion (Fig. 1A). Although chest radiography performed the day before PMI revealed little pleural effusion (Fig. 2). A large amount of blood (1 600 ml) was drained by thoracentesis.

Emergency CT conducted immediately after thoracentesis revealed upper anterior extra-pleural haemorrhage, extravasation of contrast media inside the haemorrhage and pleural effusion (Fig. 1B). Although the extravasation inside the extra-pleural haemorrhage detected on CT looked like a tortuous abnormal vessel, pre-operative CT revealed a normal ITA and its branch vessels (Fig. 3). Additionally, the origin of the extravasation was...
unclear on CT. Selective angiography of the right ITA detected extravasation from a thin branch of the right ITA running to the mediastinum (Fig. 4A). Right ITA embolisation was completed with coils and n-butyl-2-cyanoacrylate, and the bleeding was controlled (Fig. 4B).

The patient had an uneventful postoperative recovery, and follow-up CT showed no evidence of contrast media extravasation from the ITA or recurrent extra-pleural haemorrhage.

Discussion

Injury and pseudoaneurysm or bleeding of the ITA are reported as rare postoperative complications of surgery via a median sternotomy, which are caused by closure wire injury, sternum retraction and electric cautery injury.1-3 Other causes of pseudoaneurysm of the ITA are idiopathic, trauma, penetrating injury, infection, PMI and central vein cannulation.1,4,5 Massive bleeding may result in life-threatening conditions. Pseudoaneurysm of the ITA is commonly diagnosed using medical imaging modalities such as CT and ultrasonography; however, it could also be diagnosed through surgical exploration.1

In our case, ITA aneurysm occurred in the delayed phase after surgery and the pathogenesis of the right ITA pseudoaneurysm formation was uncertain. Direct injury during the opening or closure of the sternum or a manoeuvre during PMI was suspected as the cause of the ITA pseudoaneurysm, although it was unlikely that it was caused by PMI because this was performed using a cut-down technique. The fragility of vessels in patients with Marfan syndrome was also considered to contribute to the formation of the ITA pseudoaneurysm.

CT is a useful diagnostic tool; however, detecting the origin of bleeding using this modality is difficult. Selective angiography allowed precise identification of the origin of bleeding. Nanami et al. reported that ITA angiography was a useful diagnostic tool for the treatment of ITA pseudoaneurysm.1 Furthermore, the bleeding could be controlled soon after the diagnosis by simultaneous embolisation of the ITA.

Conclusion

Although the possibility of the occurrence of a delayed pseudoaneurysm or bleeding of the ITA is low after a median sternotomy procedure, postoperative management of patients who have undergone median sternotomy should also focus on the prevention or early detection of pseudoaneurysm of the ITA to avoid life-threatening conditions.
References


