Intercostal artery pseudoaneurysm: a rare complication of transaortic transcatheter aortic valve implantation

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Abstract

In this case report, we present an 86-year old patient with an intercostal pseudoaneurysm after transaortic transcatheter aortic valve implantation (TAVI). This new technique of a transaortic approach is considered a possible alternative to the more usual transfemoral, trans-subclavian or transapical access site, mainly in patients with extensive peripheral arterial disease. A mini-thoracotomy or mini-sternotomy is needed to access the ascending aorta. The patient presented with a painless but progressive pulsatile mass right parasternally, 3 months after the procedure. An intercostal pseudoaneurysm was diagnosed with duplex examination and chest CT. Successful treatment with an ultrasound-guided injection of thrombin resulted in a complete obliteration of the pseudoaneurysm. Only nine reported cases of intercostal pseudoaneurysms have been reported worldwide, and this is the first case in a patient who underwent a transaortic TAVI. Since the transaortic access is used more frequently, it is important to report on possible complications of this new technique.

Keywords: Transaortic transcatheter aortic valve implantation • Pulsatile mass • Intercostal artery pseudoaneurysm • Ultrasound-guided thrombin injection

INTRODUCTION

Transcatheter aortic valve implantation (TAVI) is now considered the standard of care in extreme-risk patients with severe aortic stenosis and as an alternative to surgery in those considered high-risk. Considering the older, comorbid population in whom this treatment is performed, vascular access is of great importance because an important part of post-procedural complications are of a vascular nature. In patients with severely diseased femoral arteries, the subclavian (for the Medtronic CoreValve) or transapical access (for the Edwards Sapien Valve) were the first accepted alternatives. Transaortic TAVI is a relatively recently explored new access for those who are not candidates for either alternative access site, and little is documented concerning the possible access-related complications of this new approach [1].

The transaortic approach requires a mini-sternotomy or mini-thoracotomy to access the ascending aorta. A sheath is introduced in a non-calcified area of the ascending aorta, in a direct line with the aortic root and with enough space between the tip of the sheath and the native aortic valve. Delivery of the device is done using the Seldinger technique. The proximity of the sheath to the aortic root makes the device easier to steer compared with the subclavian or transfemoral approach. The procedure itself, on the other hand, is less invasive compared with the transapical approach, in which the left ventricular apex is punctured after a more invasive thoracotomy.

CASE REPORT

We present the case of an 86-year old, female patient who underwent a transaortic TAVI with a CoreValve prosthesis by mini-sternotomy (Fig. 1A). Her old age and previous CABG directed the heart team’s decision towards TAVI, and because of diseased femoral and subclavian arteries, the transaortic approach was chosen. The procedure was performed successfully with no aortic regurgitation on angiography and no direct post-procedural complications. The thoracic drain and wound drain (Fig. 1B, arrows) could be removed after 1 day and the patient could be discharged in good health 7 days after the procedure.

Three months later, she presented in a routine outpatient visit with a painless but progressive pulsatile swelling right parasternally without other symptoms. Duplex examination (Fig. 2A) and chest CT (Fig. 2C) confirmed the presence of an intercostal artery pseudoaneurysm. Treatment consisted of an ultrasound-guided injection of thrombin which resulted in complete obliteration (Fig. 2B) of the pseudoaneurysm. A control examination, 3 months after the thrombin injection, showed persistent complete closure of the initial pseudoaneurysm.

DISCUSSION

Intercostal artery pseudoaneurysms are extremely rare with, to the best of our knowledge, only nine reported cases worldwide.
While a true aneurysm of an intercostal artery may be associated with genetic disorders such as neurofibromatosis and coarctation of the aorta, the aetiology of an intercostal artery pseudoaneurysm is mainly traumatic or iatrogenic, occurring after a sternotomy, thoracotomy or even thoracoscopy for lung biopsy [2]. A haemothorax, as a severe complication, was the initial presentation in five known cases, but an asymptomatic pulsatile mass has also been described [3].

Diagnosis is established by duplex examination or CT angiography and less frequently by intra-arterial subtraction angiography. Treatment should not be delayed since rupture of the pseudoaneurysm is a potential danger and may even be fatal. Treatment options are endovascular embolization, surgical aneurysmectomy and, more recently, stent grafting has been applied. Ultrasound-guided thrombin injection is a known and easy-to-use treatment, with excellent results for femoral

Figure 1: (A) Mini-sternotomy during transaortic TAVI to access the ascending aorta. (B) Closure of the mini-sternotomy with a small wound drain (w) and thoracic drain (t) in situ, after a successful procedure.

Figure 2: (A) Duplex imaging of the intercostal pseudoaneurysm (PA: pseudoaneurysm). (B) Duplex imaging of the thrombosed pseudoaneurysm (32 × 17 mm internal diameter) after a successful ultrasound-guided thrombin injection. (C) Chest CT imaging of the pseudoaneurysm (arrows) in the axial and lateral view.
pseudoaneurysms. The complication rate is very low, with only a few known cases where arterial occlusion occurred and vascular surgery was needed. In the literature, one case of successful ultrasound-guided percutaneous thrombin injection of an intercostal pseudoaneurysm has been described [4].

In our centre, we have performed 130 TAVI procedures since 2007, of which only seven were done using the transaortic approach. Worldwide, this new approach is used more frequently considering the promising results, but little is documented concerning possible access-related complications. This case of an intercostal artery pseudoaneurysm illustrates one of the possible complications of the transaortic TAVI. Whether the pseudoaneurysm was the result of a laceration of an intercostal artery when performing the mini-sternotomy or secondary to an accidental puncture of the artery during the insertion of the thoracic drain remains uncertain.

CONCLUSION

To the best of our knowledge, this is the first case of an intercostal artery pseudoaneurysm in a patient who underwent recent transaortic TAVI. Since this is a relatively new access site, this complication is important to consider in the follow-up of these patients.

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REFERENCES