

## Case Report: Identification of a Small Valsalva Sinus Pseudoaneurysm Following Type A Aortic Dissection Using 64 Slice CT Angiography

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**Abstract:** Pseudoaneurysms are rare complications occurring after prosthetic ascending or aortic arch replacement for the treatment of dissections, aneurysms and aortic dilatation with or without aortic valve pathology, and are a consequence of suture line weakness and increased tissue fragility. However, in cases of thoracic aorta reconstructive surgery, the occurrence of false aneurysms or dissections originating from suture lines between grafts and the aorta varies greatly. Suture line disruption is a life threatening complication after thoracic aortic surgery that always requires reoperation. This case emphasises the potential role of CT scanning in the follow-up of patients after aortic surgery.

**Keywords:** Cardiac surgery, aortic dissection, false aneurysm, CT scan, cardiac complications, redo surgery.

### INTRODUCTION

The reported incidence of false aneurysms after aortic surgery is approximately 2 - 3% [1] but in the case of acute aortic dissections the incidence is between 7 - 25% [2]. Even in haemodynamically stable patients in which the false aneurysm does not appear to be expanding, reoperation is deemed essential. Predisposing factors to false aneurysms are; disruption of the native aorta, infections, pre-existing connective tissue disorders, preoperative and postoperative arterial hypertension, aortic atheroma and the so called "blowout" [3] of the aortotomy site (which can occur if the suture line is not reinforced with Teflon felts) [4].

Clinically, false aneurysms can present as a pulsatile mass, alternatively patients can report angina, dysphagia or experience stridor [5]. Redo operations for large pseudoaneurysms of the ascending aorta present a complex surgical problem because of their proximity to the sternal plate. Sternal re-entry can precipitate a fatal haemorrhage and massive brain air embolism.

From a diagnostic point of view, high resolution ECG-gated spiral 64-slice CT angiography is now the gold standard for the detection of even small pseudoaneurysms of the ascending aorta, demonstrating both a high sensitivity and specificity. There is still some debate however, over the clinical significance of very small false aneurysms that are found at the level of the suture line and which are discovered incidentally at follow-up evaluation are clinically asymptomatic.

### CASE REPORT

This case describes that of a 73 year old male who underwent ascending aorta replacement with an artificial conduit for an acute Type I dissection. The operation was conducted in hypothermic circulatory arrest and the suture lines were reinforced with Teflon felt strips (DuPont Pharmaceuticals, Wilmington, DE). Both the intraoperative and postoperative courses were uneventful and the patient was discharged after twenty days. He was seen 12 months later for a follow-up evaluation and at this time was in good health and reported no adverse symptoms. Follow up investigations including electrocardiogram, chest radiograph and laboratory blood tests were normal, as was clinical evaluation.

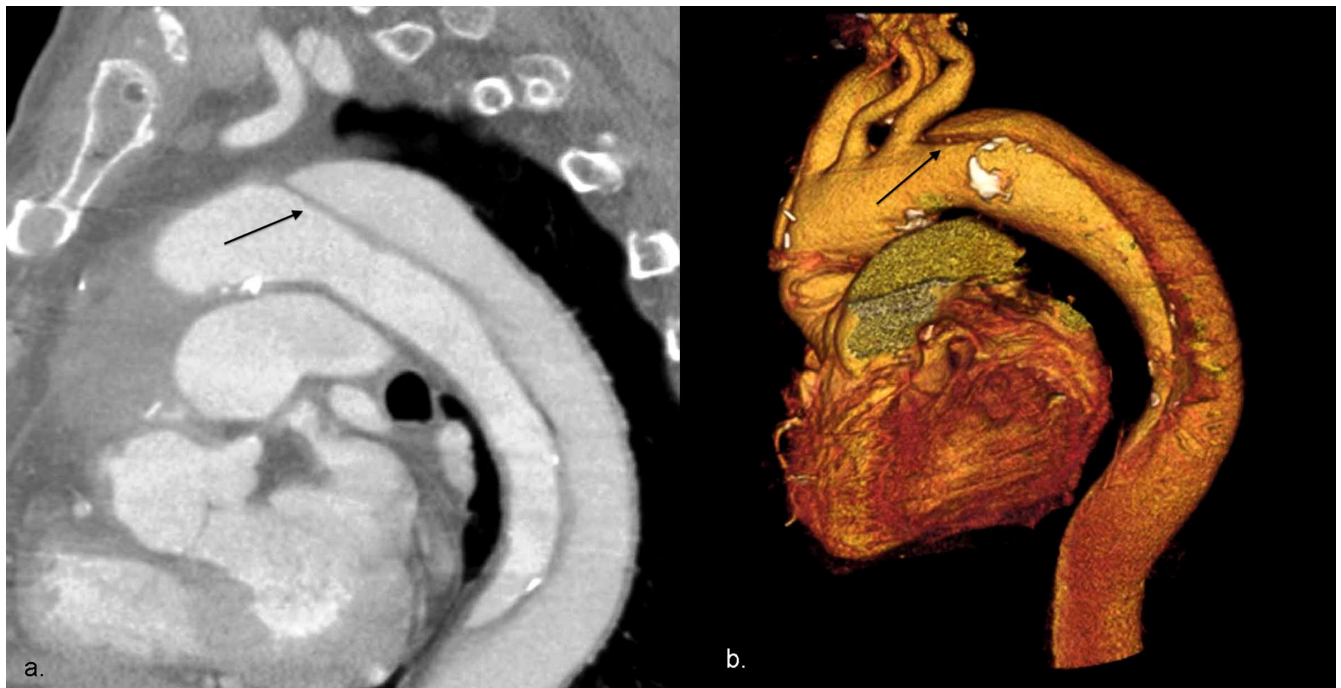
High resolution ECG-gated spiral 64-slice CT angiography of the chest revealed a 0.8-1 cm pseudoaneurysm (Movie I) resulting from the surgery for the Type I dissection (Fig. 1a, b). The scan was able to accurately document its pulsatility and volume changes synchronous with heart cycle phases (Fig. 2a-c; Movie II). The cause of the pseudoaneurysm appeared to be a 'blowout' at the proximal suture line site. There was no evidence of infection postoperatively.

It was decided that immediate surgery was unwarranted and the patient was discharged with a 6 monthly planned programme of follow-up surveillance.

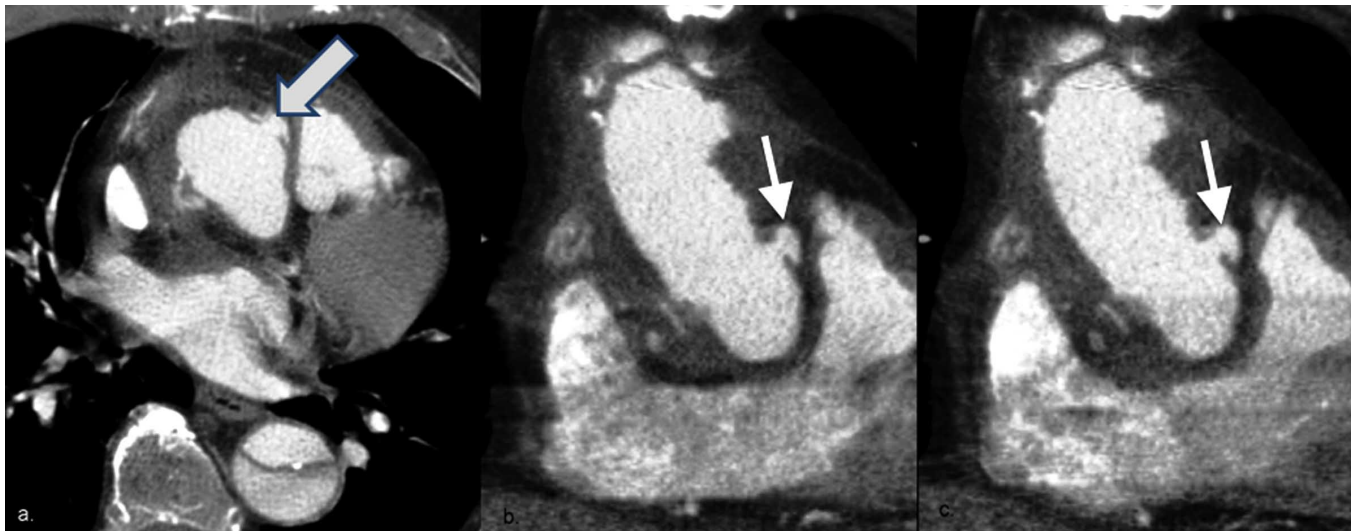
### COMMENT

False aneurysms are well recognised complications after aortic surgery, following repair of dissections, aneurysms and after valve repair/replacement. In the case of aortic replacement with prosthetic components, the false aneurysm arises at the level of the suture line [4].

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**Fig. (1).** MPR image (a) shows the presence of a Type A dissection extending from the aortic root to the descending aorta, the true and false lumen can also be clearly seen (b).



**Fig. (2).** A small pseudoaneurysm is noted on the suture line (a). Its pulsatility is more clearly demonstrated on two single frames (b, c.) indicating the neck size changing simultaneously with the heart cycle phases.

The interval between the first surgical treatment and the occurrence of the false aneurysm is highly variable. The incidence of developing a false aneurysm post surgery for aortic dissection is reported to be 2-3% [6]. As in the case, the pseudoaneurysm may be very small in diameter, but patients must be subject to rigorous follow up. Other pseudoaneurysms can be very large, requiring extensive and challenging surgery [7].

The highly variable interval between the first procedure and the occurrence of this pathology highlights the need for regular annual echocardiography and CT scanning, alongside evaluation of anastomoses and the native vessel integrity.

Newer multi-detector CT scanners provide a high temporal resolution (approximately 170 msec) allowing images to be reconstructed without motion artefact and with a higher spatial resolution (Siemens, Somatom Sensation®).

Computed Tomography with ECG synchronisation, is able to acquire motion free images during the entire heart cycle, in particular during the systolic and diastolic phases. Measuring false aneurysms during the different phases of the heart cycle is important in order to correctly estimate their actual dimensions. A change in dimension from the diastolic to the systolic phase reflects the structural characteristics of the aneurysm, the larger the increase in dimension during the

systolic phase, the greater the risk that the aneurysm will enlarge over time [8].

The discovery of a false aneurysm on the site of previous cardiac surgery for ascending aortic dissection is not necessarily a bad prognostic factor, as new imaging techniques allow early diagnosis and monitoring of these lesions, as they are often asymptomatic but potentially dangerous. By closely monitoring the size of the pseudoaneurysm and by taking an early surgical approach it is possible to reduce resulting secondary mortality and thus we strongly recommend patients with this premature complication routinely undergo a CT scan evaluation.

#### ACKNOWLEDGEMENT

Declared none.

#### CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

#### NOTE

This article contain movie files, and it can be viewed online at publisher's website.

#### Movie Legends

Movie I: Volume rendering reconstruction shows the small pseudoaneurysm localised on the suture line.

Movie II: Pulsatility changes of the pseudoaneurysm. The ECG-gated CT device allows synchronous image acquisition during the heart cycle phases, showing the changes in volume during the systolic and diastolic phases.

#### REFERENCES

- [1] Bachet JE, Termignon JL, Dreyfus G, *et al.* Aortic dissection-prevalence, cause and results of late reoperations. *J Thorac Cardiovasc Surg* 1994; 108: 199-206.
- [2] Barbetseas J, Crawford ES, Safi HJ, Coselli JS, Quinones MA, Zoghbi WA. Doppler echocardiographic evaluation of pseudoaneurysms complicating composite graft of the ascending aorta. *Circulation* 1992; 85: 212-22.
- [3] Sabri MN, Henry D, Wechsler AS, Di Sciascio G, Vetrovec GW. Late complications involving the ascending aorta after cardiac surgery, recognition and management. *Am Heart J* 1991; 121: 1779-83.
- [4] Strauch JT, Spielvogel D, Lansman SL, Lauten AL, Bodian C, Griep RB. Long-term integrity of Teflon felt-supported sutures lines in aortic surgery. *Ann Thorac Surg* 2005; 79:796-800.
- [5] Sullivan KL, Steiner RM, Smullens SN, Griska L, Meister SG. Pseudoaneurysm of the ascending aorta following cardiac surgery. *Chest* 1988; 93: 38-43.
- [6] Henriques JPS, Brytel de la Riviere A, Schepens MAAM, Ernst JMPG. Percutaneous occlusion of the entry to a leaking false aneurysm after ascending aortic replacement for the aortic dissection type A facilitating surgical repair. *Eur J Cardiothorac Surg* 2001; 20: 252-6.
- [7] Al-Githmi I, Hariri M, Baslaim G, Jamjoom A, Batawil N. High resolution spiral CT scan in the diagnosis of pseudoaneurysm of ascending aorta. *Heart Lung Circ* 2007; 16: 460-461
- [8] Muhs BE, Vincken KL, Van Prehn J, *et al.* Dynamic cine-CT angiography for the evaluation of the thoracic aorta; insight in dynamic changes with implications for thoracic endograft treatment. *Eur J Vasc Endovasc Surg* 2006; 32: 532-6.

Received: December 13, 2011

Revised: February 26, 2012

Accepted: February 28, 2012

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