

Successful Surgical Treatment of a Giant Mediastinal False Aneurysm 30 Years after Bentall Operation

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Abstract

False aneurysm occurring after replacement of ascending aorta by a vascular prosthesis is a rare, but life-threatening complication. In spite of advances in endovascular techniques, surgery remains the treatment of choice in the majority of cases. We report the case of a huge pseudoaneurysm caused by late dehiscence of the right coronary ostium-aortic tubular graft anastomosis, occurred 30 years after replacement of aortic valve and ascending aorta by classical Bentall operation. A fistula originating from the aneurysmal sac extended across the sternum into the thoracic subcutaneous soft tissues and gave rise to a pulsatile mass well appreciable on the anterior chest wall. The surgical treatment, consisting of partial resection of the aortic tubular graft and sternal reconstruction was effective and uneventful.

Keywords

Re-Do Aortic Surgery, False Aneurysm of the Ascending Aorta, Bentall Operation

1. Introduction

Reoperations for large false aneurysms of the ascending aorta secondary to previous surgical interventions represent a surgical challenge [1] [2]. Usually they are located just below the sternum, with higher risk of a fatal, uncontrollable hemorrhage often associated to massive cerebral air embolism, during repeat sternotomy.

Establishment of cardiopulmonary bypass before opening the chest is therefore mandatory; deep hypothermia

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and circulatory arrest are required in the vast majority of instances [3], as well as in the case reported here, where the aneurysm lied completely below the sternum and extended into the subcutaneous tissue of the right front chest, giving origin to a well visible pulsatile mass.

Surgery is mandatory in most cases and consists of false aneurysm exclusion and excision along with reconstruction of the aortic vascular prosthesis.

The risk of operation is higher in patients older than 65 yrs, and in patients with severe left ventricular dysfunction (E.F. less than 35%) or in NYHA class III or IV [4]. Additional risk factors are the size of the false aneurysm (diameter > 55 mm), obesity, urgent surgical intervention, sepsis, pre-existing dilation of the ascending aorta and arterial hypertension. The authors report the case of a patient who had undergone three previous surgical procedures, the last being a classical Bentall operation performed 30 years before. Due to a complete dehiscence of the right coronary artery ostium-vascular prosthesis anastomosis, occurred on uncertain date, a huge retrosternal false aneurysm had developed, along with a fistula expanded into the subcutaneous tissue of the left anterior upper chest wall. The purpose of this paper is to report and to discuss the surgical strategy which has been selected in order to better address this difficult and unusual complication appearing late after aortic surgery.

2. Case Report

A 54 year-old male patient was admitted to our hospital with a diagnosis of giant mediastinal false aneurysm originating from an aortic tubular prosthesis and extended through a fistula into the subcutaneous tissue of the anterior upper chest wall where it was possible to appreciate a prominent pulsatile mass. The patient, already submitted to two different operations for aortic valve repair in childhood, had undergone in 1975 a replacement of the ascending aorta and aortic valve by classical mechanical valve Bentall operation.

A computed tomography (CT scan) showed a huge pseudoaneurysm surrounding the aortic graft and almost completely occupying the anterior mediastinum, which had partially eroded the sternal plate and communicated with the parasternal soft tissue, reaching the subcutaneous tissue of the left anterior upper chest wall (**Figure 1**).

After right femoral artery and vein cannulation at the groin, cardiopulmonary bypass was commenced and the nasopharyngeal temperature was lowered to 25°C. Circulation was arrested and a repeat sternotomy was carried out, with immediate entry into the false aneurysmal sac, which was completely adherent and partially incorporated into the sternal tissue. After accurate and complete dissection of the false aneurysm and isolation of the ascending aortic vascular prosthesis, it was possible to identify a 6 mm diameter hole in the graft at the site of the dehiscent right coronary artery ostium-graft anastomosis. At this point the distal aortic graft was cross-clamped,

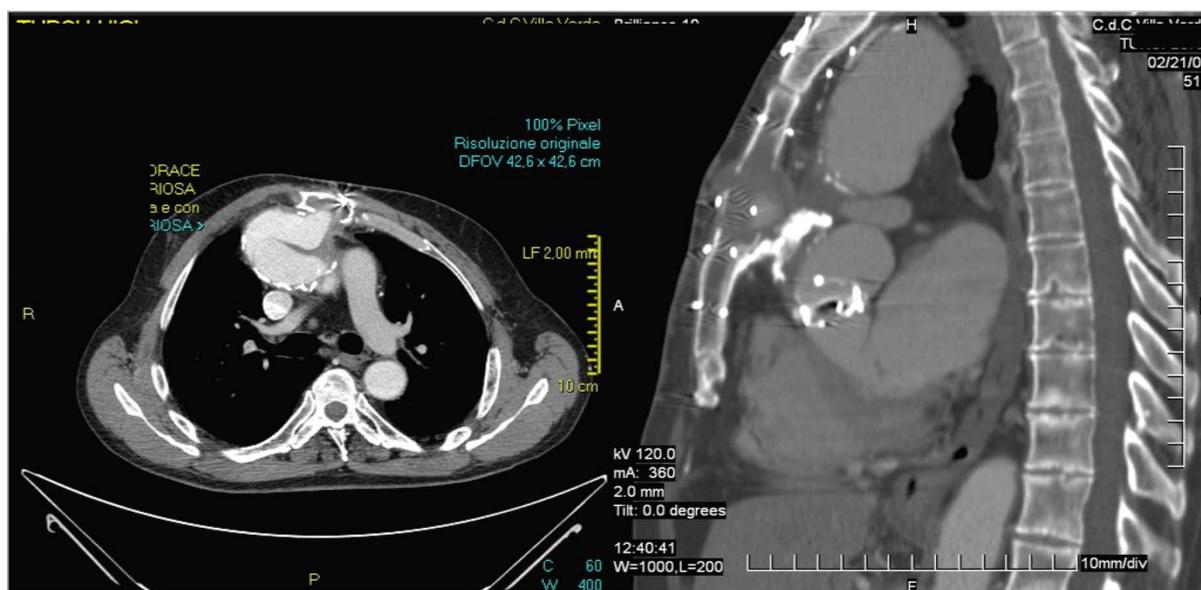


Figure 1. CT scan showing the giant pseudoaneurysm behind the sternum and the fistula protruding into the subcutaneous tissue.

the extracorporeal circulation was resumed, and the rewarming phase started.

The tube graft was fully transected and a 2 cm. circular portion of prosthesis where the hole was present completely resected. Cristalloid cardioplegia was given retrogradely and antegradely, directly into the left coronary ostium. The tube graft was extensively mobilized, and the two residual stumps were approximated and anastomosed using a continuous 4 - 0 polipropilene suture. Aortic cross clamp was removed and the patient was wined off extracorporeal circulation after rewarming at 36.5°C nasopharyngeal temperature. No trace of the dehiscent right coronary ostium was found within the mediastinal tissue.

The postoperative course was uneventful and the patient was discharged home ten days after surgery.

The control CT scan (**Figure 2**) showed an excellent result with normal flow into the prosthesis and absence of residual fistulae or false aneurysm. The patient remains in excellent conditions eight years after repair. At routine transthoracic echo examination non-signs of prosthetic dehiscence or residual false aneurysm were found.

3. Comments

The development of a pseudoaneurysm of the ascending aorta is a rare, but serious complication after composite graft surgery for aortic valve and ascending aorta pathology. Late onset is very insidious and variable symptoms may appear; this occurs when the false aneurysms grows into the tissue adhesions limiting his expansion. Sometimes the aneurysm growth follows unpredictable routes causing compression of various mediastinal structures, so giving origin to a wide spectrum of symptoms and signs, like dyspnea, congestive heart failure, unexplained chest pain, angina (due to compression of the coronary arteries), hemoptysis, dysphagia, superior vena cava syndrome. Because of this wide variability of clinical signs a precise and early diagnosis is necessary in order to determine the more appropriate surgical approach.

False aneurysms are often associated with infectious endocarditis of the aortic valve, representing a frequent complication of surgery on infected tissues [2]. Locations at reduced resistance include previous anastomotic sites or incisions, like the aortic cannulation hole, the proximal or distal aortic suture lines, the aortic vent and the cardioplegic needle site [2] [5]. The mechanism of false aneurysm development is variable, the tension strength at the level of the suture line playing an important role [5] along with tissue frailty or an incorrectly made surgical suture.

As for the aneurysms, the mortality is essentially related to the increase in size and to the serious complications that may occur (rupture, fistula, compression of local structures and thrombosis) [4] [6] [7]. This risk can be reduced by achieving an early diagnosis. In the majority of cases this is obtained during routine periodical clinical and instrumental imaging controls. The most useful techniques employed to discover a false aneurysm consist of transthoracic and transesophageal echocardiography, thoracic angio-CT scan, angio-MR and aortography [6]. These techniques allow for accurate diagnosis and consequently lead to the most appropriate surgical approach.



Figure 2. Control CT scan after the repair.

Mohammadi *et al.* [7] reported a series of reoperations for false aneurysm after replacement of the ascending aorta with a vascular prosthesis. Among 28 patients, only six had undergone a Bentall or modified Bentall as initial operation, and dehiscence of the right coronary ostium was reported in one case. They recognize as one of the main problems of surgical strategy of these patients the choice of an adequate approach allowing for a safe re-entry into the chest, especially in patients where the false aneurysm had developed anteriorly and retrosternally, as in the reported case. They suggest the arterial and venous cannulation of the groin along with a short period of hypothermic cardiac arrest as method of choice. We have adopted successfully the same surgical strategy in our reported case.

The natural history of false aneurysms subsequent to surgical procedures on the aorta can be variable, and is essentially related to the delay between the surgical intervention and the first diagnosis. Although surgical techniques have improved considerably, aortic surgery still remains challenging and difficult, and is often associated with various complications [3]. In the case reported the time interval between the first surgery and the occurrence of the false aneurysm, 30 years, is exceptional, and it may be due to the slow growth of the aneurismal sac in absence of clear symptoms.

Indication to treatment is related to the size and location of the false aneurysm, being mandatory for the post-surgical false aneurysms of the aortic prostheses.

Recently, stent graft or septal occluders have been proposed for the treatment of false aneurysms originating from aortic implants. Komanapalli *et al.* [8] reported a case of a patient affected by false aneurysm originating from the ascending aorta and successfully excluded using a septal occluder. Endovascular approaches alternative to high-risk surgery may indeed represent a viable possibility in patients with suitable anatomy; however a relative contraindication exists in those cases where a relief of the compression of vital structures must be necessarily associated with the exclusion of the fistula.

4. Conclusions

Post-surgical false aneurysm originating from ascending aortic prostheses is a rare and life-threatening complication of aortic surgery. Its development is unpredictable and may occur quite late after surgery, particularly after Bentall (especially classical Bentall) procedures. It generally occurs at the site of anastomotic or coronary buttons suture lines. The diagnosis is often occasional, mostly achieved by systematic morphologic exploration carried out in order to investigate the onset of non-specific symptoms. Early diagnosis is crucial. In our case the diagnosis has been made quite late, and the patient was lucky to survive this rare complication.

Surgical repair is mandatory. A careful approach consisting of peripheral venous and arterial cannulation along with deep cooling and a short period of cardiocirculatory arrest before sternotomy is recommended in order to avoid catastrophic and uncontrollable bleeding [9] during sternal reentry.

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