Case Report

Pseudoaneurysm of the Ascending Aorta

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Abstract

A 37 year-old woman underwent aortic and mitral valve replacement and 3 months later developed a pseudoaneurysm from the anterior aspect of the proximal ascending aorta (AA). The pseudoaneurysm was approached through a redo-median sternotomy, on cardiopulmonary bypass (CPB), moderate hypothermia, and repaired successfully using autologous pericardium. The standard approach to such pseudoaneurysm is a CPB and hypothermic circulatory arrest prior to mid-sternotomy, and repair or replacement of the AA; but when a pseudoaneurysm arises from a narrow ostium on the anterior aspect of the AA, as in this case, it can be repaired under CPB with moderate hypothermia.


Keywords: Pseudoaneurysm ● Aorta ● Aortic valve replacement

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Introduction

Pseudoaneurysm is a pulsating hematoma that occurs after an injury to all layers of the arterial wall. Pseudoaneurysms of the ascending aorta are rare entities. False aneurysms have a tendency to early and late rupture, necessitating early diagnosis and prompt surgical intervention. The pseudoaneurysms of the AA can originate on anastomotic sites, suture lines, or canulation sites. Concomitant sternal wound and mediastinal infection predispose to pseudoaneurysm formation. High morbidity and mortality rates are seen in the repair of thoracic pseudoaneurysms. We present a case of a pseudoaneurysm of the AA in aortotomy suture line that was successfully repaired.

Case Report

A 37 year-old woman underwent surgical replacement of the aortic and mitral valve due to severe aortic insufficiency and severe mitral stenosis 3 months ago. A St.Jude Medical (SJM) aortic prosthesis, n° 21mm, was implanted and mitral valve also replaced with SJM mitral prosthesis n° 27mm and the pericardiotomy site was closed by interrupted sutures. Routine tests were normal on hospital discharge. After this, the patient was referred to clinical follow-up and medicated with warfarin and metoprolol. Clinical controls at 30 and 60 days of the postoperative period showed a normal evolution. On the third postoperative month, the patient sought medical assistance because of fever (38.5°c) and petechiae in palms and soles and in January 2006, she was admitted to our heart center. The chest X-ray was not specific. White blood cell count was $12 \times 10^3$/mm$^3$ and blood culture was negative. Transesophageal echocardiography showed aortic and mitral prosthesis functioning normal and a mass in the anterior portion of the ascending aorta measuring 5cm. The neck of the pseudoaneurysm was about 1 cm, located approximately 2cm above the level of the metallic valve, and had blood flow and intraluminal clots. The patient underwent aortic root angiography that confirmed the diagnosis and showed that saccular formation occupied the anterior mediastinum in the retrosternal portion (figure1). Because of these finding, the patient was referred for urgent surgery. After initial preparation, the right common femoral artery and vein were cannulated, and extracorporeal circulation was installed with moderate hypothermia (30°c), but with the heart beating, a sternotomy was performed and dissection of the proximal ascending aorta allowing for cross clamping at the level of the innominate artery take off (figure2). After insertion of the cardioplegic catheter proximal to the innominate artery and cross clamping of the aorta, cold blood cardioplegic infused. The pseudoaneurysm was opened laterally, allowing identification of the origin (neck) of the pseudoaneurysm at the anterior aspect of the previous aortotomy that caused by dehiscence of the suture line (figure 3). The ascending aorta was reconstructed by patch aortoplasty using autologous pericardium because of tissue fragility in the suture line. All clots were cleared from the cavity, and surgery was completed in the conventional manner. The postoperative period was uneventful, and the patient stayed in the hospital for 10 days. In the early postoperative period, a control echocardiography showed the complete occlusion of the neck of the pseudoaneurysm.
Conclusions

Pseudoaneurysms of the ascending aorta are relatively uncommon (<1%) and this is undoubtedly due to the high mortality associated with rupture of the aorta\(^3\). Pseudoaneurysm results from complications of cardiac surgery, in which the ascending aorta is cannulated or incised \(^4\). Pseudoaneurysm is a pulsating hematoma that develops secondary to a local defect in the arterial wall. The conditions required for the formation of a pseudoaneurysm include substantial injury to the arterial wall, local hemorrhage or bulging of arterial wall, and tamponade by the surrounding soft tissues\(^5,6\). The amount of time required to covert a pulsating hematoma into a false aneurysm is unknown, although Groves observed such a transformation as early as 23 days\(^7\). The natural history of pseudoaneurysm is continuous expansion and eventually rupture\(^8\). Most ascending aorta pseudoaneurysms occur after surgeries on the aortic valve, coronary revasculations, usually at the site of the proximal anastomosis of the grafts, aortotomies, or in the cannulation sites. Despite the evidence of some cases of ascending aorta pseudoaneurysm occurring because of infection\(^9\) or in aortas with weak points (Marfan's syndrome)\(^10\), a great percentage, results from mechanical rupture of aortic sutures. Most ascending aortic pseudoaneurysms are asymptomatic unless they compress important structures, such as coronary arteries, venous or arterial grafts, pulmonary arteries, or the superior vena cava causing acute clinical manifestations. It may be infected or cause peripheral embolism, like the one we presently report. One of the main problems of surgical therapy for these complex cases is choosing an approach which allow for safe reentry into the chest. The initial objective during mediastinal dissection should be control of the distal ascending aorta. The critical risk is pseudoaneurysm rupture, which may lead to a catastrophic hemorrhage during sternotomy, therefore these patients may benefit from different methods of cannulation in relation to pseudoaneurysm sites\(^10\). Mortality reported by several authors range from 29% to 46%\(^11,12\). In our patient, to avoid this situation, femorofemoral extracorporeal circulation\(^13\) was started with hypothermia and then sternotomy was performed.

Angiography is traditionally the gold standard for diagnosis suspected vascular injuries. Although, echocardiography was extremely useful in our case, however helicoidal angiography and magnetic resonance angiotomography can provided all details for surgical planning. In conclusions, early recognition of aortic pseudoaneurysm is required because of its potential risk of rupture. A well-planned operative strategy guided by preoperative imaging allowing for careful analysis of the lesions, and complete repair, results in low operative mortality and morbidity rates.


