Abstract

Mycotic aneurysms located on aortic arch are rare and have extremely high mortality. The presented case is a 75-year-old man with a thoracic aortal mycotic aneurysm successfully treated with surgical intervention. To prevent recurrent infection and postoperative pulmonary complications, we performed single-stage surgery including extensive debridement, graft replacement using rifampicin soaked prosthetic graft and omental wrapping. Although mycotic aneurysm with inflammation tissue usually interferes with surgical manipulation because of severe adhesion to the lung, semi-clamshell approach helped us perform all these procedures. The patient rapidly recovered from the surgery, and has shown no recurrence after 35 months follow-up.

Keywords: Clamshell approach; Mycotic aneurysm; Aortic aneurysm; Omental wrapping; Rifampicin

1. Introduction

Management of thoracic mycotic aneurysm is a great challenge because of its destructive nature and high incidence of rupture. Control of local or systemic infection is difficult despite intensive pharmacotherapy before and after surgery. Surgical intervention is indispensable to fully eliminate this disease. We present a case of mycotic thoracic aneurysm successfully treated by a single-stage surgery including extensive debridement, graft replacement using rifampicin soaked transverse thoracosternotomy (semi-clamshell incision).

2. Case

A 75-year-old man was admitted to our hospital with a 22-day history of chest pain and fever. Enhanced computed tomography (CT) of the chest revealed saccular aneurysm with a maximum diameter of 5.7 cm, located just adjacent to the left subclavian artery (Fig. 1a). The aneurysm had staining of the aneurysmal wall and periaortic inflammatory tissue including lung parenchyma. The patient had received intravenous administration of antibiotics for two weeks before admission. Laboratory findings were as follows: white blood cell count 6490/µl, platelet count 372,000/µl, serum hemoglobin concentration 8.4 g/dl, C-reactive protein 9.8 mg/dl. Diagnosis of the mycotic aneurysm was made.

An urgent operation was performed because the aneurysm had a substantial risk for rupture. Since extensive debridement of infected tissue was needed and manipulation of the aorta with inflamed region might induce intolerable hemorrhage during operation, total arch replacement approaching with semi-clamshell incision was employed. The patient was placed in right lateral position and skin incision was incised from the right midclavicular line to left anterior axillary line along the fourth intercostal space (Fig. 2a). Although the left internal thoracic artery (ITA) was ligated, the right ITA was spared. There was firm inflammatory adhesion of the aneurysmal wall with the upper lobe of the left lung and the mediastinum. Cardiopulmonary bypass was introduced by left femoral arterial perfusion and venous drainage from the right atrium and the pulmonary artery trunk. Hypothermic extracorporeal circulation was established and cardiac arrest was induced by administration of the crystalloid cardioplegic solution into the ascending aorta. Antegrade cerebral perfusion of three arch branches was used during circulatory arrest. The aneurysm had large amounts of necrotic tissue and thrombus inside. After resection of aneurysmal wall, debridement of surrounding tissue and lavage with saline, total arch replacement using a rifampicin-soaked woven aortic arch graft was performed. After weaning from the extracorporeal circulation, omental flap was harvested through a small median abdominal incision and introduced to the left pleural cavity through a small incision in the diaphragm. The prosthetic graft was completely covered with omental flap. The aortic cross-clamp time and cardiopulmonary time was 135 and 280 min, respectively. Postoperative course was uneventful, and the patient was weaned from mechanical ventilation 17 h after the surgery. Although cultures of surgical specimens were all negative, pathological analysis showed...
bacterial clusters of gram-positive cocci from the aneurysmal wall. After adjunctive antibiotic therapy, the patient was discharged from our hospital without any complications. Postoperative CT demonstrated no abnormality on prosthetic graft (Fig. 1b). The patient took oral antibiotics for six months after the discharge. The patient recovered well and has been alive for 35 months since surgery without recurrent infection.

3. Discussion

Although the strategy for treatment of mycotic aneurysms of the thoracic aorta is still controversial, consensus is made upon the importance of early diagnosis, immediate pharmacotherapy and surgical intervention [1–4]. The rate of rupture has been reported to be as high as 85% [1]. Extensive debridement of infected tissue and resection of aneurysmal wall is essential to prevent recurrent infection.

Simultaneous resection of the affected lung lobe may be recommended in patients with aortobronchial fistula. However, several problems exist in surgical treatment of these patients, including: 1) surgical approach, 2) prevention of graft infection, 3) management of systemic inflammatory response, and 4) management of pulmonary complication. As for surgical approach, median sternotomy is advantageous from a viewpoint of access to aorta and cerebral perfusion in the mycotic aneurysm of the arch. However, this approach does not allow for adequate exposure of the entire thoracic aorta, resulting in laboriousness to perform extensive debridement due to additional hemorrhage. The left anterior thoracotomy is another option, although access to the proximal site of aneurysm was difficult because of inflammatory adhesion of aneurysm to the left lung. We therefore opted to use a semi-clamshell incision. Clamshell incision is one of the surgical approaches to the pleural cavity that enables access to the entire part of the thoracic aorta. However, the ‘classic’ clamshell incision causes instability of chest wall and sacrifice of bilateral ITA. Some authors also describe a serious deleterious effect on pulmonary function [5]. By using semi-clamshell incision,
we were able to overcome these disadvantages. This approach is less invasive for the patient and made it feasible for us to perform extensive debridement of infected tissue with resection of adhered lobe of the left lung (Fig. 2b).

The second problem is recurrent infection. Regarding prevention of recurrent infection, Hayes et al. first reported successful outcomes using rifampicin soaked Dacron graft for infected aortic aneurysms [6]. Kuniyoshi et al. reported significant efficacy of omental flap over the prosthetic graft [7]. Although they performed omental wrapping at the time of skin closure in staged operation, we believe single-stage operation including graft replacement and omental wrapping is a better way for managing postoperative respiratory function. Single-stage operation can shorten the time of ventilator support so that patients have a smaller risk of pulmonary complications, such as acute respiratory syndrome and ventilator-associated pneumonia. It is true that the patient had potential risk for postoperative respiratory dysfunction and systemic inflammatory response syndrome due to use of extracorporeal circulation, nevertheless, our patient rapidly recovered after the surgery.

In conclusion, the single-stage surgery for mycotic aneurysms including rifampicin soaked prosthetic graft replacement and omental wrapping can minimize the risk of recurrent infection and postoperative pulmonary complications. Semi-clamshell incision allows all these procedures to be performed with extensive debridement of infected structures.

References