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Pericardial fat flap for mycotic aneurysm of the thoracic aorta

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Abstract

Standard treatment for mycotic aneurysm of thoracic aorta is complete debridement with replacement of the aneurysm with a homograft or Dacron graft. However, contamination from surrounding tissues may occur after the graft replacement. Transposition of the viable, well-vascularized tissues should be used to fill surrounding dead space and isolate the graft to prevent reinfection. Although the omentum is regarded as the best tissue, it is not always available for use. We describe here a new alternative technique for such situations, that is, the use of a pericardial fat flap for patients with a mycotic descending thoracic aortic aneurysm.

Keywords: aorta • mycotic • aneurysm • infection • pericardial fat • graft replacement

INTRODUCTION

Standard treatment for mycotic aneurysm is complete debridement with replacement of the aneurysm with a homograft or Dacron graft. In addition, the graft has to be isolated from surrounding infected tissue to prevent reinfection of the graft. The omentum is regarded as the best tissue with which to cover and protect the graft from surrounding infectious tissue. However, the omentum is not always available for use. We describe here a new alternative technique for such situations, that is, the use of a pericardial fat flap for patients with a mycotic aneurysm of the descending thoracic aorta.

CLINICAL SUMMARY

A 69-year old man presented to the local hospital with persistent fever and a cough that lasted more than 3 months. His symptoms were not improved by daily intravenous antibiotics. A computed tomography (CT) scan revealed a 90-mm irregularly shaped thoracic aortic aneurysm. The aneurysm was located in the distal portion of the descending aorta. His descending thoracic aorta had been completely normal 2 years prior in a CT scan. He was cachexic 160 cm tall and weighed 45 kg due to persistent infection and liver cirrhosis. His white blood cell count and C-reactive protein were 18 900/m² and 18.5 mg/dl, respectively. His creatinine level was 1.7 mg/dl. His cardiac function was normal. After transfer to our hospital, he had back pain and haemoptysis. A follow-up CT scan showed the enlarged aneurysm penetrating his left lung. A diagnosis of ruptured mycotic aneurysm was made and emergency surgical graft placement was performed (Fig. 1A).

TECHNIQUE

Cardiopulmonary bypass was established via femoro-femoral cannulations.

Through the left seventh intercostal space, the proximal and distal aorta of the aneurysm was exposed and clamped. A large part of the aneurysm heavily adhered to the left lung. The aneurysm was opened, and pus formation around the aneurysmal sac penetrating the adhered lung was found. The aneurysm was replaced by a Dacron tube graft immersed with pyokatanin. The graft needed to be isolated from the surrounding infected tissue including the lung. Instead of the omentum, the pericardial fat pad was dissected from the pericardium and then used as a viable flap. The flap was rectangular with the superior end at the level of the thymus. The medial line of the flap was the back of the sternum and the lateral line followed the phrenic nerve without touching it. The inferior uncut boundary of the flap was at the diaphragm. The three edges of the flap thus defined were dissected away from the pericardium. The musculophrenic branch of the internal thoracic artery was preserved as the feeding artery of the flap. In this case, the musculophrenic branch was directly seen through the fat, and its pulsation was palpable. Again, the pericardium and phrenic nerve were left intact. The pericardial fat pad flap was wrapped around the graft and secured with absorbable stitches (Fig. 2).

Postoperative recovery was uneventful. The patient was discharged home after a 4-week course of intravenous antibiotics. Postoperative CT scan 5 months after the surgery showed the viable pericardial fat pad with musculophrenic artery around the graft (Fig. 1B). There was no sign of infection 2 years after surgery. We performed this pericardial fat flap technique on 2 further patients with graft replacement for mycotic thoracic aortic aneurysm and have had no recurrence of infection to date.

DISCUSSION

Contamination from surrounding tissues may occur after graft replacement for mycotic aneurysm. Transposition of viable, well-vascularized tissues should be used to fill surrounding dead space and isolate the graft to prevent reinfection. The omentum flap is a

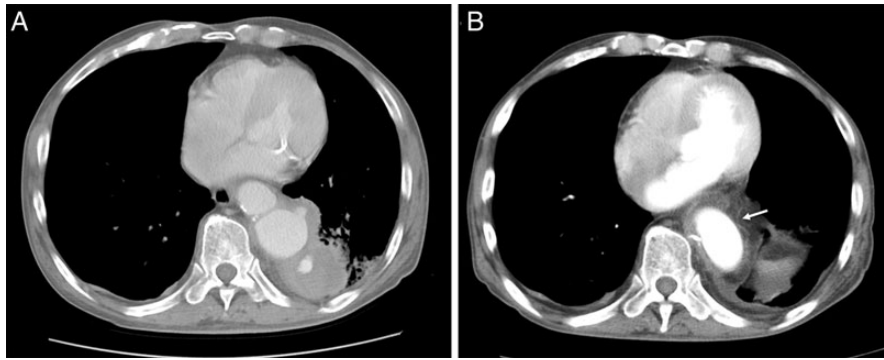


Figure 1: (A) Preoperative CT showed an irregularly shaped mycotic aneurysm. (B) Postoperative CT. Arrow indicates musculophrenic branch of the internal thoracic artery. CT: computed tomography.

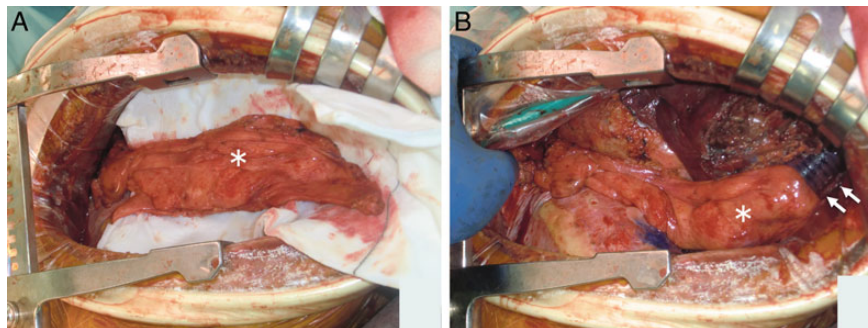


Figure 2: Intraoperative views. (A) The pericardial fat flap is completed. (B) The flap is moved around the artificial graft. Asterisk indicates the pericardial fat pad. Arrows indicate the artificial graft with pyokatanin.

highly effective soft tissue for such a use, because it provides a robust vascular and lymphatic supply [1]. However, the omentum flap may not be available in patients with hostile abdomen such as those with prior abdominal surgery or poor nutritional status. Our patient was very cachectic due to infection and liver cirrhosis. We thought the omentum harvesting might cause risks such as bleeding and postoperative ileus in this patient. Therefore, we used the pericardial fat flap as an alternative [1].

The pericardial fat flap was first used by Lyman Brewer III [2] in 1953. Since then, it has been used mainly in lung surgery. The most common indications include the prevention of broncho-pleural fistula or reduction of air following lung resections. In contrast, there are few reports of its use in the cardiovascular surgery field. Economopoulos *et al.* [3] have used pericardial fat flaps as a haemostatic supplement to control bleeding in difficult suturing areas in different cardiac surgeries. Melissano *et al.* [4] used it as a partition to prevent contact between anastomosis stiches and oesophagus in thoracic aortic surgery. To the best of our knowledge, this is the first time usage of the pericardial fat flap has been reported for mycotic aortic aneurysm. The advantages of the pericardial fat flap are as follows. Firstly, the pericardial fat flap is a viable soft tissue. Secondly, its location in the left pleural cavity is within easy reach of the graft replacing the thoracic aorta. Thirdly, the pericardial fat flap is easily dissected from the pericardium. Although it is unknown whether the pericardial fat flap has any anti-infection effect, it is at the least useful for covering a graft and filling dead space.

Blood supply is the most important factor for maintaining viable pedicled grafts. There are three blood supplies to the pericardial fat pad. They are the superior pericardial branch, the middle pericardial and musculophrenic branch originating from the internal thoracic artery [5]. Of them, the musculophrenic branch we used in this

case is the largest and easy to use as the feeding artery of the flap. It originates from the internal thoracic artery at the level of fifth intercostal and locates in the fat pad near the surface of the diaphragm. In this emergency case, we assessed the branch available by its gross appearance and pulsation; however, preoperative angiogram would be necessary to confirm sufficiency of the blood supply.

In summary, we used the pericardial fat flap perfused by the musculophrenic artery successfully as an alternative viable flap to the omentum. We believe that the pericardial fat flap is a suitable material for protecting artificial grafts from surrounding infectious tissue. Further experience in a prospective series is necessary to confirm its usefulness.

Conflict of interest: none declared.

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