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SHORT REPORT

Pericardial Fat Pad and Thoracic Aortic Surgery

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Pericardial fat pads have been successfully used for many years by thoracic and cardiac surgeons for a number of applications. We recently used a pedicled and well-vascularized pericardial fat pad in a patient who underwent replacement of a distal aortic arch aneurysm with a Dacron tube graft, in order to avoid contact between the anastomoses and the oesophagus in an effort to reduce the risk of subsequent infection and fistula formation. This simple technique may provide a source of vital tissue that may be useful for protecting anastomoses after thoracic aortic surgery, particularly in cases requiring re-operation. To our knowledge the use of pericardial fat pads has not been previously reported in the English literature for this purpose.

Clinical Case

A 65 year-old man was admitted to our Institution with a 7 cm saccular aneurysm of the distal aortic arch. There was no previous history of trauma. He underwent open surgical treatment using a left posterolateral thoracotomy through the 4th intercostal space. Space for proximal clamping between the left common carotid and the left subclavian artery was provided by dissection of the distal aortic arch from the left common carotid artery, with identification of the vagus and recurrent laryngeal nerves and cutting the ligamentum arteriosum. The distal clamp was placed on the descending aorta below the aneurysm. Circulatory assistance was provided by a pumped bypass from the left atrium to the distal thoracic aorta. The aneurysm was opened and the aorta transected. A Dacron tube graft was sutured in standard fashion. The procedure was uneventful. However, due to the anatomical location of the graft, we noted that the anastomoses lay immediately over the oesophagus (Fig. 1). In order to separate the suture lines from the oesophagus, we fashioned a pericardial fat pad. Accurate dissection was carried out using diathermy, to ensure good haemostasis, from the anterior inferior aspect of the pericardial fat and dissecting it away from the pericardium until a flap of sufficient length was obtained. The phrenic nerve was identified and spared. The blood supply from the internal thoracic artery was also accurately preserved. A detailed description of the surgical technique for pericardial fat pads is given by TM Anderson.[1] It should be noted that during the harvesting of the fat pad, the pericardium is left intact. The flap was then mobilized so it could be passed underneath the graft (Fig. 2), wrapped around it and secured with re-absorbable stitches so that both suture lines were separated from the surrounding structures (Fig. 3). The chest was drained and closed in standard fashion. The postoperative course was uneventful and the patient was discharged in good clinical condition on the sixth postoperative day.

Discussion

Surgical flaps have been used in the chest by thoracic and cardiac surgeons for a number of indications. This simple technique may provide a source of vital tissue that may be useful to protect the anastomoses after thoracic aortic surgery, particularly in redo cases. To our knowledge, the use of pericardial fat pads has not been previously reported in the English literature for this purpose.

The reported case shows that pericardial fat may

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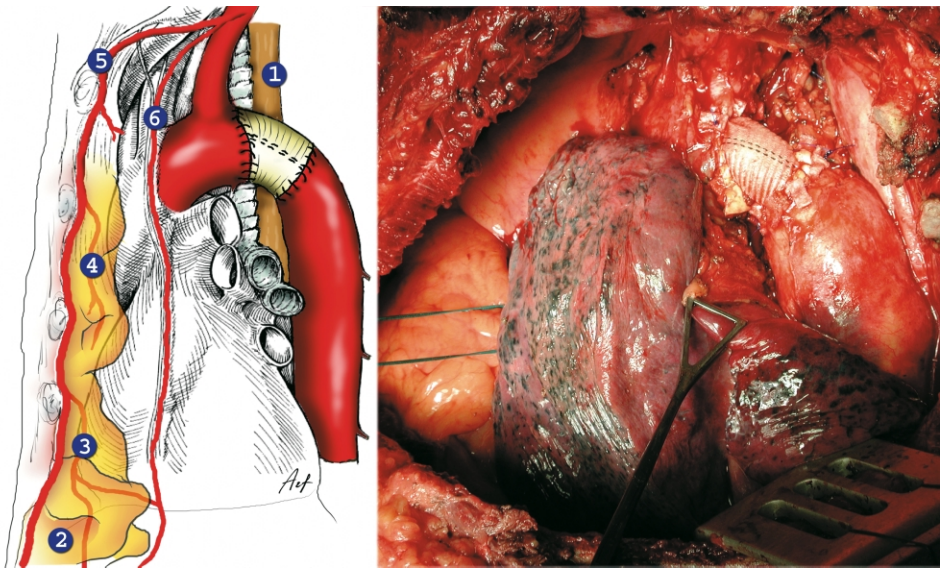

Fig. 1. Schematic drawing and intraoperative picture after graft substitution of a saccular aneurysm of the distal aortic arch. The suture lines lie over the oesophagus (1). Pericardial fat (2) is visible on the left side of the picture, its vascularization, which is depicted in the drawing, comes from the middle pericardial (3) and superior pericardial (4) branches of the internal thoracic artery (5). The phrenic nerve that runs together with the pericardiophrenic vessels (6) is identified and spared.

indeed be used to protect the proximal anastomoses in distal aortic arch replacement. In this case, due to the shortness of the resected aortic segment, the distal anastomosis was also covered by the pad. When longer segments of the descending aorta are replaced, the body of the graft is usually easily covered by the aortic aneurysm wall. If the distal anastomoses needs to be protected, a different pad incorporating the inferior and middle pericardial branches and the muscolophrenic branches of the internal thoracic artery could be used. In very thin patients, pericardial fat may be very scarce and this technique may not be feasible.

Surgical flaps are well-vascularized portions of vital tissue that are transposed from their normal location to promote healing and prevent complications. These flaps include: pericardial fat flaps; greater omental flaps; intercostal muscle flaps; serratus anterior flaps; greater pectoral and latissimus dorsi muscle flaps; pleural, thymic or mediastinal fat flaps. The peri-

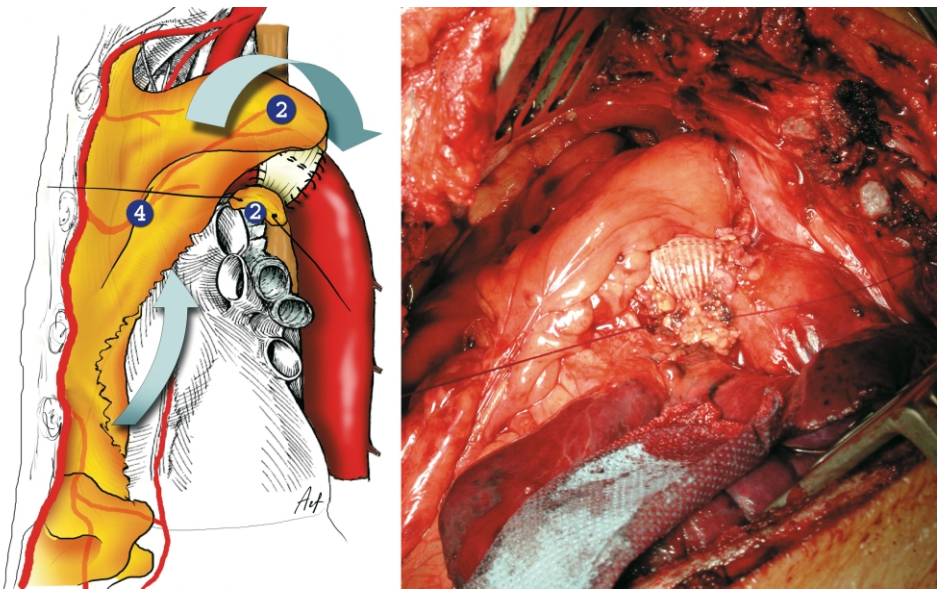

Fig. 2. Schematic drawing and intraoperative picture after development of a pedicled pericardial fat pad and its mobilization around the graft between the oesophagus and the suture lines.

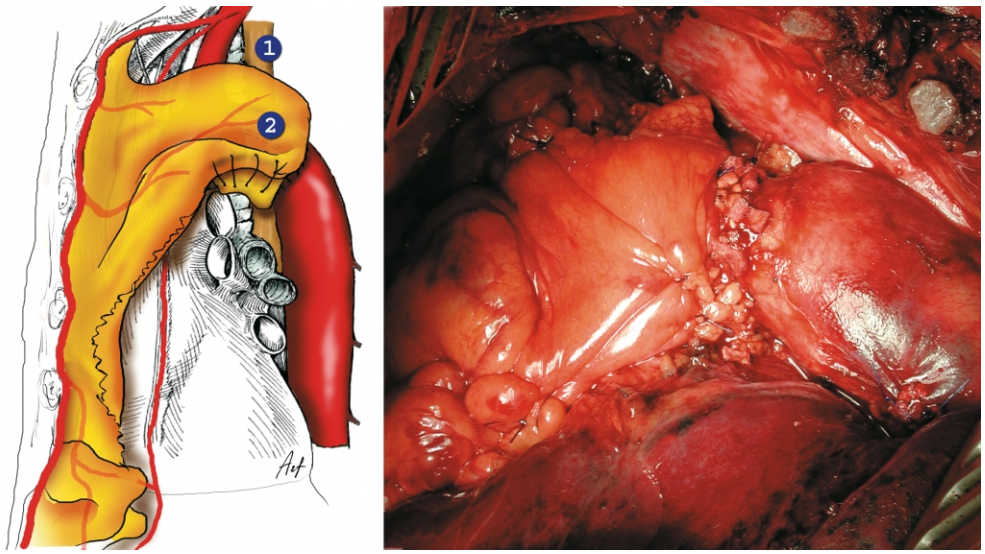

Fig. 3. Schematic drawing and intraoperative picture after complete wrapping of the pericardial fat pad around the graft. The pad is secured with absorbable stitches. Its vascularization is checked before closing the chest.

cardial fat pad, first used by Lyman Brewer III[2,3] in the early fifties, has been preferred by several authors. The most common indications include the prevention of broncho-pleural fistula[4] after pneumonectomy, lobectomy or more complex sleeve resections, especially following radiotherapy[5] or chemotherapy, lung transplantation,[6] or even to reduce air leakage following lung resections[7] or to control bleeding in difficult suturing areas following cardiac surgery.[8]

Graft infection and aorto-oesophageal fistula are among the most serious postoperative problems and often lead to fatal complications in thoracic aortic surgery. Redo surgery often gives unsatisfactory results even with the newest techniques and in the most expert hands.[9] It should be emphasised that fistulae are now relatively uncommon, especially since total transection of the aorta is generally performed[10] and the posterior stitches are not passed blindly as was the case when the inclusion technique was employed and the aorta was cut only anteriorly. However, there are several instances in which protection of the anastomoses would be desirable, such as when the distal aortic arch is in close relationship to the oesophagus posteriorly and when the anastomoses themselves are not protected by the redundant aneurysm wall that is usually wrapped around the graft. Moreover, in secondary surgery after graft replacement for infection or aorto-oesophageal or aorto-bronchial fistula, the pericardial fat pad could provide a valuable protection.

The key to success in the transposition of any surgical flap is to preserve its vascularization in order to avoid tissue necrosis and provide an adequate blood supply. Anterior mediastinal vessels and the superior pericardial branch of the internal thoracic artery provide the blood supply to an anterior superior pericardial fat pad such as the one described in our case. On the other hand, an antero-inferior pericardial pad is based on the middle pericardial and muscolophrenic branches of the internal thoracic artery.[2]

It should be noted that this additional procedure should be thoroughly described in patient records as the flap will produce an unusual opacity around the graft on future CT scans that may be difficult to interpret without previous knowledge of the procedure.[11]

In conclusion, pericardial fat pads have been successfully used for many years by other specialists seeking a flap of viable tissue to protect their suture lines from dehiscence, infection, fistula formation and other complications. We believe that this concept may be potentially useful also to vascular surgeons both for the prevention of complications and for their treatment in redo cases. The technical feasibility has been shown in our case report. However, efficacy of the technique needs to be confirmed in a prospective series of patients followed up over time.

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