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Omental Flap as Primary Surgical Treatment in Post-Operative Mediastinitis After Cardiac Surgery

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Introduction: A 43-year-old man developed a mediastinal abscess after a redo aortic valve along with an ascending aorta replacement and also a sub-aortic membrane resection. He was surgically revised: as there were no signs of involvement of the valve and vascular prosthesis, a pedunculated tract of the greater omentum was mobilized and positioned around the aortic prosthesis. During a 10-month follow-up, it has been revealed that the patient is doing well and has no recurrence of the infection. Use of the great omentum could be considered in the selected mediastinitis cases.

Case Presentation: A 43-year-old man was referred to our institution for a severe aortic regurgitation and an ascending aorta enlargement associated with a relapsing sub-aortic membrane, which had been treated in his childhood. He underwent a redo ascending aorta replacement and an aortic valve replacement (mechanical prosthesis) along with a resection of the relapsing sub-valvular membrane. Some weeks after he was admitted to another hospital for fever, arthromyalgias and chest pain. After a few days, he developed an inflammatory jugular swelling and underwent a chest CT scan showing a bulky anterior mediastinal abscess in the direct continuity with the sternum. A further chest CT scan showed a mediastinal para-aortic capsulated mass, 135 × 85 × 90 mm in dimension, well delimited over the surrounding plans. At the top of the lesion, a further fluid collection was appreciated, extending through the sternum over the subcutaneous tissues, 30 × 20 mm in dimension. Re-sternotomy was performed and the mediastinal mass was opened and drained. After an extension of the median sternotomy through the epigastrium, a pedunculated tract of the greater omentum was mobilized and positioned around the vascular prosthesis to fill the empty space left by the abscess.

Conclusions: The greater omentum is well known in cardiothoracic surgery for its valuable features such as plasticity, immune competence, good blood supply and neovascularization-potential. Dead space can be obliterated by omental flap because of its plasticity qualities. It contains a large number of immunologically active cells likely to be responsible for its anti-infective properties. We can affirm that use of the great omentum could be considered in selected post-operative mediastinitis cases after cardiac surgery.

Keywords: Mediastinitis; Omental Flap; Mediastinal Abscess

1. Introduction

A 43-year-old man developed a mediastinal abscess after a redo aortic valve along with an ascending aorta replacement and also a sub-aortic membrane resection. He was surgically revised: as there were no signs of involvement of the valve and vascular prosthesis, a pedunculated tract of the greater omentum was mobilized and positioned around the aortic prosthesis. After one month of antibiotic therapy, the patient was discharged in good general conditions. Early one month and six months CT scans were performed showing good omental flap engraftment. During a 10-month follow-up, it has been revealed that the patient is doing well and has no recurrence of the infection. Use of the great omentum could be considered in the selected mediastinitis cases.

2. Case Presentation

A 43-year-old man was referred to our institution for a severe aortic regurgitation and an ascending aorta enlargement associated with a relapsing sub-aortic membrane, which had been treated in his childhood. He underwent a redo ascending aorta replacement and an aortic valve replacement (mechanical prosthesis) along with a resection of the relapsing sub-valvular membrane. The valve prosthesis was surgically revised a few weeks later for a significant para-prosthetic leak. Also, the patient subsequently underwent a sub-xyfoid pericardiocentesis for a tamponade. Few months later, he underwent a pacemaker implant for a third degree AV block. Some weeks after the pacemaker implant, he was admitted to another hospital for fever, arthromyalgias and chest pain.

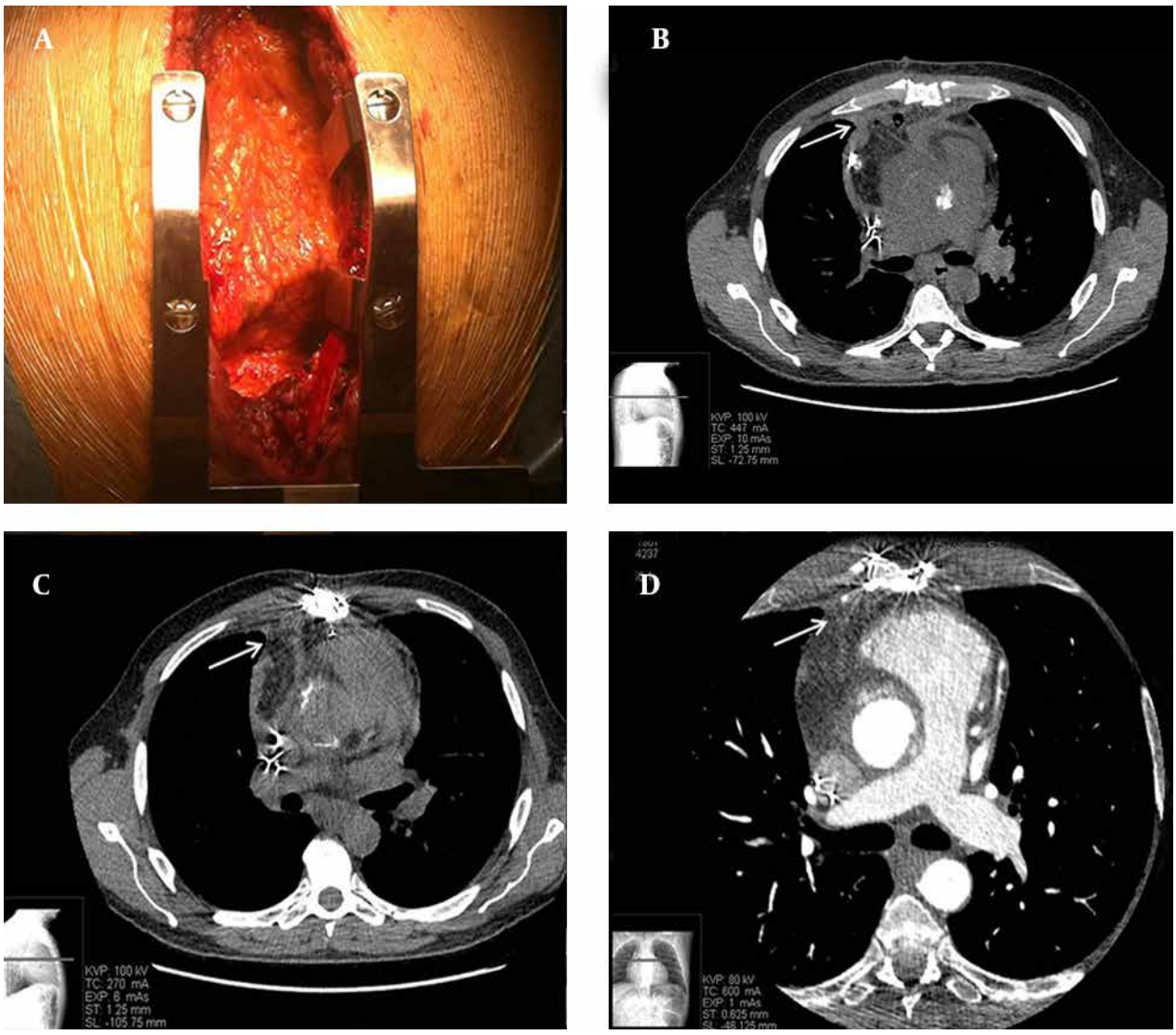
Implication for health policy/practice/research/medical education:
Omental flap as primary surgical treatment in postoperative mediastinitis after cardiac surgery, to fill the empty space left after drainage of infected materials with vascularized tissues to prevent recurrences of medistinitiis and to prevent the failure of cardiac procedure performed in the first operations. For us this is a useful technique to perform a good this kind of surgical procedure.

He was studied by trans-esophageal echocardiography with the finding of a hypo-dense periaortic area suggestive for a small abscess. After a few days, he developed an inflammatory jugular swelling and underwent a chest CT scan showing a bulky anterior mediastinal abscess in the direct continuity with the sternum. Blood cultures were positive for a methicillin-sensitive *S. aureus*. He was treated with antibiotic and then he was referred to our Unit. At physical examination, he showed a red pulsatile jugular swelling 40 × 50 × 30 mm in dimension. At a chest X-ray, a significant right mediastinal enlargement was noticed (Figure 1A). A further chest CT scan showed a mediastinal para-aortic capsulated mass, 135 × 85 × 90 mm in dimension, well delimited over the surrounding plans (Figure 1A-B). At the top of the lesion, a further fluid collection was appreciated, extending through the sternum over the subcutaneous tissues, 30 × 20 mm in dimension (Figure 1C). Trans-thoracic and trans-esophageal echocardiography showed a normal functioning of the aortic prosthesis without leaks, abscesses or vegetations. A redo was then scheduled. In the operating room, the right groin was exposed and the abscess was approached with a percutaneous puncture of the swelling: this maneuver demonstrated the abscessual nature of the collection. Re-sternotomy was performed and the mediastinal mass was opened and drained; a tissue sample for cultural exam was harvested and plenty of Betadine used for washing the abscessual cavity. Accurate direct examination revealed that the ascending aortic prosthesis was not involved by the infection. After an extension of the median sternotomy through the epigastrium, a pedunculated tract of the greater omentum was mobilized and positioned around the vascular prosthesis to fill the empty space left by the abscess (Figure 2A). The cultural tissue sample was positive for methicillin-sensitive *S. aureus*. An antibiotic therapy based on oral levofloxacin, rifampicin and endovenous vancomycin was administered for one month, and an effective anticoagulation with coumarols was difficult to reach even with high dosages of this drug (up to 20 mg/d) due to the Rifampicin related resistance. After a shift to an oral therapy with Levofloxacin and Tetracycline, the patient was discharged in good general conditions and he was asymptomatic. Early one month and six months CT scans were performed with the evidence of the good omental flap engraftment with progressive filling of the mediastinal empty space (Figure 2B-D). During a 10-month follow-up, it has been revealed that the patient is doing well and is in good general conditions.

Figure 1. A Significant Right Mediastinal Enlargement

A) Antero-posterior chest X-ray showing significant mediastinal enlargement; B and C) Chest CT scan showing in coronal and transversal view the mediastinal para-aortic capsulated mass, 135 × 85 × 90 mm in dimension, well delimited over the surrounding plans; D) A more cranial transversal section showing the extending fluid collection determining the subcutaneous jugular swelling.

Figure 2. Surgical Vision of the Omental Flap



A) Surgical vision of the omental flap covering the right ventricle and the ascending aortic prosthesis; B-D) Early one month and six months chest CT scan showing, at the same level, three transversal section of the omental flap over the heart. It's possible to appreciate the progressive filling of the empty space and the good engraftment of the omental flap.

3. Discussion

Post-cardiotomy mediastinitis is a serious complication that occurs in 1% to 2% of cardiothoracic surgery procedures and carries high morbidity and mortality (1). *Staphylococcus aureus* is a major cause of these infections and it has a worse prognosis than that of other etiologies (2). Aggressive primary treatment is advocated in order to reduce life-threatening consequences (3). The greater omentum is well known in cardiothoracic surgery for its valuable features such as plasticity, immune competence, good blood supply and neovascularization-potential. It is used most widely to fill so-called dead spaces at chronic empyema, mediastinitis and chest-wall defects after resection. In fact, to successfully treat a mediastinitis, adequate debridement, removal of all foreign bodies and obliteration of all mediastinal dead spaces are needed (4). Dead space can be obliterated by omental flap because of its plasticity qualities. It contains a large number of immunologically active cells likely to be responsible for its anti-infective properties. As it has extensive vascularization and neovascularization potential, the increased blood supply leads to a higher concentration of antibiotics at the infection site. By absorbing secretions, the omental flap eliminates substrates for bacterial growth (5).

Harvesting an omental flap can be performed easily and rapidly: the median sternotomy incision is extended inferiorly through the epigastrium. The greatest disadvantage of utilizing omentum is the need for a laparotomy which adds substantial surgical trauma. It may lead to the postoperative pain that may interfere with the patient's ventilatory dynamic and to the post-operative ileus (5). Moreover, omentoplasty is a relative contraindication for future cardiac interventions through median sternotomy because of omental adhesive properties that promote strong pericardial adherences and new vascular anastomosis with adjacent vessels.

In our case, we had to choose between the options of taking down and replacing the ascending aortic prosthesis or of being more conservative. On the other hand, a simple wash of the mediastinum appeared to be at high risk of relapse of the infection with its inauspicious consequences. As neither direct signs of erosion of the ascending aortic prosthesis nor sutures involvement were found at direct examination, we decided to use an omental flap, and in this challenging case we were able to achieve a good early and mid-term clinical outcome.

In conclusion we can affirm that use of the great omentum could be considered in selected post-operative mediastinitis cases after cardiac surgery.

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Authors' Contributions

All the authors had a role in the surgical activity and to create this research.

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