

Utility of Omentoplasty for Poststernotomy Mediastinitis Secondary to Myocardial Revascularization Surgery

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Acute poststernotomy mediastinitis is a serious complication of cardiac surgery and is associated with high mortality. Conservative treatment with local debridement, irrigating-suction systems, and specific antibiotic therapy is sometimes inadequate.

Omentoplasty is occasionally used for reconstruction and the treatment of various chest diseases. This useful procedure is most often indicated for suppurative processes and radionecrosis, to complement myoplasty, or to cover a chest wall prosthesis. When used to treat poststernotomy mediastinitis secondary to cardiac surgery, omentoplasty improves control of infection and prognosis.

We describe 2 cases of poststernotomy mediastinitis secondary to cardiac revascularization surgery in which omentoplasty was an effective treatment. Excellent control of infection was achieved.

Key words: Omentoplasty. Poststernotomy mediastinitis. Hanuman syndrome. Cardiac surgery.

Utilidad de la omentoplastia en el tratamiento de la esternomediastinitis secundaria a cirugía de revascularización miocárdica

La esternomediastinitis aguda es una complicación grave que puede aparecer tras intervenciones de cirugía cardíaca y que presenta una elevada mortalidad. El tratamiento conservador mediante curas locales, sistemas de drenaje-lavado y uso de antibióticos específicos es a veces insuficiente.

La omentoplastia, ocasionalmente utilizada en la reconstrucción y tratamiento de diferentes enfermedades torácicas, es un procedimiento útil, que tiene su mayor indicación en procesos supurativos, radionecrosis, complemento a mioplastias y protección de prótesis de pared torácica. Su utilización en el tratamiento de la esternomediastinitis secundaria a cirugía cardíaca ayuda al control de la infección y mejora la evolución de los pacientes.

Presentamos 2 casos de esternomediastinitis secundaria a cirugía de revascularización miocárdica en los que la omentoplastia ha sido un tratamiento efectivo, consiguiendo excelentes resultados en el control de la infección.

Palabras clave: Omentoplastia. Esternomediastinitis. Síndrome de Hanuman. Cirugía cardíaca.

Introduction

Poststernotomy mediastinitis is a serious postoperative complication of cardiac surgery that has an incidence of 0.4% to 5.1% of all surgeries.¹ Antibiotic prophylaxis, antiseptic measures, skeletonized harvesting of internal mammary artery grafts for myocardial revascularization surgery, and improved preoperative preparation have helped decrease its incidence. Erythema, purulent bleeding, wound dehiscence, sternal instability, fever, and leukocytosis will indicate the clinical diagnosis. Surgical debridement of the wound with or without sternal reopening, specific antibiotic therapy, irrigating-suction systems, and careful local debridement have become standard treatments,

although long periods are usually needed before clinical improvement can be observed.

However, these measures are insufficient in certain cases and vascularized grafts in the anterior mediastinum are needed to supplement traditional treatment. Early, aggressive surgical treatment noticeably improves clinical course. The utility of myoplasty is determined by the condition and vitality of the adjacent muscles. The greater omentum, because of its versatile anatomy and immunogenic and angiogenic properties,² is particularly useful when myoplasty is not a good option, offering excellent results in the control of mediastinal infection.

Case Descriptions

Patient 1

A 79-year-old man with a history of type 2 diabetes mellitus, mild stenosis of both internal carotid arteries, and hip replacement was admitted for scheduled surgery for ischemic heart disease

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Figure 1. Poststernotomy mediastinitis: purulent material and sternal necrotic fragments with open sternum (Hanuman syndrome).

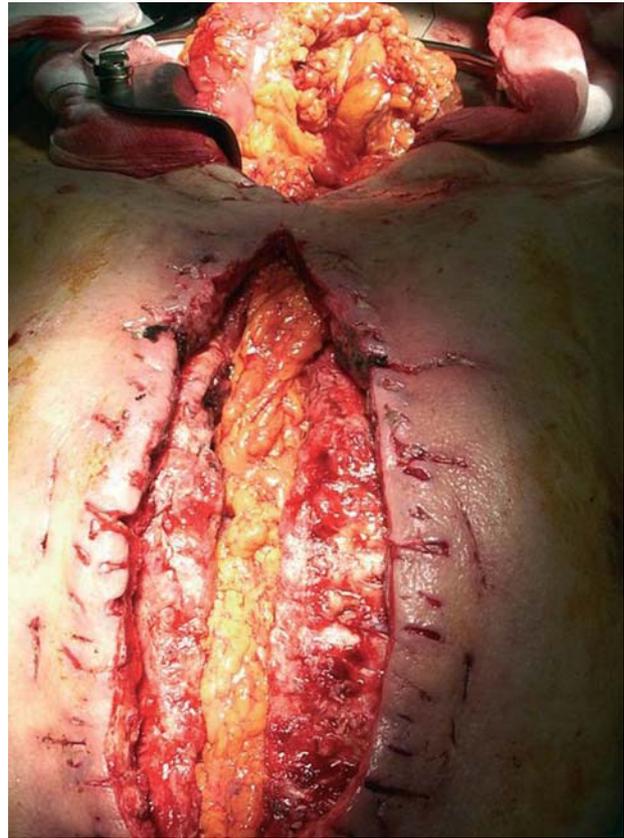


Figure 2. Omentoplasty in the anterior mediastinum with tunneling via supraumbilical midline laparotomy.

consisting of severe coronary disease involving the main artery and 2 vessels. Myocardial revascularization surgery was performed by coronary bypass to the middle left anterior descending artery with a left internal mammary artery graft, and to the first obtuse marginal artery with a saphenous vein graft. The postoperative period was complicated by mediastinitis caused by *Enterococcus faecalis* with sternal dehiscence and respiratory failure that required sternal resuture plus irrigating-suction on 2 occasions, broad-spectrum antibiotic therapy, and frequent debridement of the wound. Clinical progress was not favorable, with sternal osteitis and recurrent mediastinitis (Figure 1), with the sternum left open from that time (Hanuman syndrome).

Because progress was poor, 40 days after the first procedure, surgery was repeated for definitive treatment of the infection, with the first operation based on the Friedrich technique, extensive debridement of the muscle and anterior mediastinum, removal of necrotic sternal fragments, and a new irrigating-suction system. In a second procedure 5 days later, once the suppurative infectious process had diminished noticeably, the patient underwent omentoplasty of the anterior mediastinum (release of the greater omentum, sparing both vascular pedicles and short gastric vessels, with tunneling to the anterior mediastinum via upper midline laparotomy) (Figure 2), plus sternal osteosynthesis with Borrelly sliding-staple splints and primary closure of the remaining surfaces. Subsequent progress was satisfactory and the infectious symptoms disappeared. The patient was discharged 22 days after the omentoplasty, with no further complications. At the time of writing, he is at home, with satisfactory activity for his age and no signs of recurrent infection.

Patient 2

A 44-year-old man with a history of smoking, dyslipidemia, and 2 previous angioplasties in the anterior descending and right coronary arteries due to ischemic heart disease was admitted for scheduled surgery for severe triple-vessel disease (middle segment of the anterior descending artery, and the proximal circumflex, and right posterolateral coronary arteries) with angina at rest. Myocardial revascularization was performed by coronary bypass grafting to the middle segment of the anterior descending artery using the left internal mammary artery, to the first obtuse marginal artery using the right internal mammary artery anastomosed to the left mammary artery (Tector technique), and to the right coronary artery using saphenous vein.

Postoperative recovery was complicated by moderate respiratory failure, sepsis, surgical wound infection, and mediastinitis (blood cultures and exudate of the surgical wound were positive for methicillin-resistant *Staphylococcus aureus*). Good progress was obtained with antibiotic therapy (cefepime, amikacin, teicoplanin, and rifampin) and local debridement, with the wound kept open at all times until it could be closed in a second procedure. The patient was discharged home 50 days later, with medical follow-up at home and periodic check-ups; the wound was then healing, with no clinical signs or laboratory findings to indicate infection.

During outpatient follow-up, we observed persistent exudate which failed to remit despite local debridement and which became purulent and was accompanied by sternal osteitis. At 2½ months from hospital discharge, the patient was admitted to our department for surgical treatment of recurrent and persistent

poststernotomy mediastinitis. Inferior partial sternectomy was accomplished by en-block resection of chondrocostal cartilage and extensive debridement plus omentoplasty (using the same technique as in the previous case); the sternal defect was then covered by primary closure of the surfaces. Subsequent progress was satisfactory, with no new signs of infection observed in the short or long term.

Discussion

The utility of the greater omentum has been extensively reported in the literature on the treatment of abdominal and extra-abdominal infectious processes or conditions requiring reconstructive repair.¹ After Senn and Graham³ described its intra-abdominal utility in the reinforcement of intestinal anastomosis and perforated duodenal ulcers in the late 19th century, and O'Shaughnessy⁴ and Thompson and Pollock⁵ observed benefit in heart surgery and the treatment of bronchopleural fistula in the mid-20th century, indications for its use have progressively increased because of good outcomes obtained.⁶

Mediastinitis secondary to heart surgery, particularly myocardial revascularization with internal mammary artery grafting, is a major complication, with mortality reaching nearly 50% in some series.⁷ Its treatment has been and continues to be under constant review. New therapeutic options, such as hyperbaric oxygen⁸ and new biomaterials⁹ have come forth in recent years. Antibiotic therapy, irrigating-suction systems, extensive debridement, or resection of necrotic bone and cartilage are the procedures used most often. However, the poor course of certain patients (those with poorly controlled diabetes, immunosuppression, advanced age, vasculopathy, etc.) requires the creation of flaps using muscle, the greater omentum, or both, in an effort to achieve better infection control by obliterating the cavity and providing richly vascularized viable tissue, thus lowering the rates of mortality, reoperation, major complications, and recurrence, as well as shortening the hospital stay and prolonging long-term survival.^{5,10}

Myoplasty with the greater pectoral muscle is the technique most often used by most surgeons, but may not be appropriate for patients with axillary radiation (because of compromise of the thoracoacromial vascular pedicle), with low muscle mass, or with infection found to be widespread or mainly in the lower mediastinum. The functional limitations are not usually great and are well tolerated. Other free or pedicled broad dorsal or abdominal rectus muscle flaps should be considered second choice, mainly due to the high incidence of local complications, which occur in 48% of patients¹¹; these complications generally require additional operations for repair.

The use of the greater omentum is a good alternative to myoplasty and is considered the technique of choice in the cases mentioned above. Its rich vascularization, versatility, and angiogenic and immunogenic capacity make it an ideal flap for these situations, keeping it viable even in highly infected fields. Krabatsch et al¹² have described long-term vessel patency and the development of anastomoses with surrounding tissues. López-Monjardin et al¹³ observed

lower mortality and fewer septic complications when they compared omentoplasty to myoplasty with a greater pectoral muscle flap for the treatment of mediastinitis.

One of the drawbacks of omentoplasty is that the abdominal cavity is opened, with complications appearing in up to 18.5% of cases, although they are usually not life-threatening (involving mainly gastrointestinal and abdominal wall complications, such as ileus, hernia, or abdominal wall infection).³ There is virtually no risk of the infection spreading to the abdominal cavity.⁵ A laparoscopic approach (not employed in our department as a standard technique) may decrease the onset of such complications and is a promising technique in selected patients.¹⁴

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