Recurrent post-sternotomy mediastinitis
Tuesday, 30 November 2004

Representative case report
A 55-year-old man presented to us with pyorrhea from the sternotomy site of 11 months duration. His past medical history was significant for a coronary artery bypass grafting (CABG) operation that was performed 2 years earlier [using the left internal mammary artery (IMA) and a saphenous vein graft]. A superficial sternal wound infection developed a few days postoperatively. The patient received anti-bacterial treatment (amoxicillin-clavulanic acid per os) for 3 months and wound care that did not lead to any clinical improvement. Subsequently, he underwent a second operation with extended sternal wound debridement, which included partial sternectomy. Seven months after the second operation he developed signs of inflammation in the sternotomy site as well as purulent discharge. He received several combinations of antimicrobial agents including rifampin and ciprofloxacin per os for 4 months, which did not lead to control of the infection. The patient was admitted to our hospital for the management of recurrent mediastinitis.

His past medical history was also significant for a spinal column operation due to protrusion of a lumbar intervertebral disk 3 years earlier. In addition, ulcerative colitis was diagnosed 15 years earlier for which the patient had not received any medications for five years prior to his admission to our hospital.

Physical examination on admission showed a fistula of the median sternotomy site with purulent discharge (Figure 1) and local signs of inflammation (redness, tenderness, swelling and increased temperature). Palpation of the upper chest revealed swelling in the area of the suprasternal notch (Figure 2). The patient was afebrile and had normal blood pressure, pulse rate, and respiratory rate.

Routine laboratory tests including a complete blood count, hematocrit, hemoglobin, blood urea, serum creatinine, blood glucose, liver function tests, and urinalysis did not show abnormal findings except for an increased platelet count (617,000/mm3). C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) were elevated (CRP = 1.43 mg/dl with normal values < 0.50 mg/dl, and ESR = 34 mm/first hour with normal values 0-20 mm). A computed tomography scan of the thorax showed a big cavity in the mediastinum that was in direct contact with the aorta and the trachea (Figure 3). Pseudomonas aeruginosa, Enterococcus faecalis and Staphylococcus aureus were isolated from cultures of 3 different samples of the discharge.

What is the best therapeutic approach?

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Management
Combined medical and surgical management led to the cure of infection. Specifically, the patient initially received a 15-day course of intravenous treatment with vancomycin (1 gr every 12 hours), netilmicin (150 mg every 12 hours) and piperacillin-tazobactam (4.5 g every 6 hours). Then, complete debridement of the infected and necrotic tissues was performed the 15th day of his hospitalization. The same antimicrobial treatment continued post-operatively. Seven days after the debridement, the patient underwent a Plastic Surgery reconstruction of the affected area using bilateral pectoralis major flaps (Figure 4). He was discharged 35 days after his admission (when the intravenous antimicrobial treatment was discontinued). No recurrence was noted during 13 months of follow up.

Teaching Points
- Mediastinitis following median sternotomy represents a serious complication after CABG or valve replacement. It occurs in 0.6-3% of CABG operations and leads to high morbidity and mortality, prolonged hospitalization, and increased hospital expenses.
- Obesity, diabetes, use of bilateral internal mammary arteries, prolonged mechanical ventilation support, coexistence of leg wound infection, and the need for repeated blood transfusions are associated with risk factors for postoperative mediastinitis.
- There is considerable confusion in the literature regarding the terminology of the various types of post-sternotomy mediastinitis. Most clinicians find practical and clinically meaningful the classification of post-sternotomy mediastinitis into 5 subtypes: type I (mediastinitis presenting within 2 weeks after operation in the absence of risk factors), type II (mediastinitis presenting at 2 to 6 weeks after operation in the absence of risk factors), type III (mediastinitis type I or II in the presence of one or more risk factors), type IV or recurrent mediastinitis (mediastinitis type I, II or III after one or more failed surgical interventions with intent to treat deep sternal wound infection), and type V mediastinitis (mediastinitis presenting for the first time more than 6 weeks after operation). The term "chronic mediastinitis" refers to cases of mediastinitis type of IV or V. Although there is considerable amount of data about several aspects of type I, II and III mediastinitis including incidence, risk factors, clinical manifestations, diagnostic modalities, and therapeutic interventions, there is only limited data about recurrent (type IV) mediastinitis.
- Post sternotomy mediastinitis recurs in 5%-20% of cases after the initial treatment.
- Numerous therapeutic approaches have been developed for the treatment of post-sternotomy mediastinitis including wound debridement, sternectomy or sternum rewiring, catheter irrigation with antibiotics or modified irrigation fluids, vacuum assisted closure therapy, and use of muscle flaps or omentum flap. Previous therapeutic approaches that were used in our patient's management for two years (wound debridement with partial sternectomy and antibiotics given for prolonged period per os) did not result in wound closure. The treatment of choice for patients with type IV (recurrent) or type V mediastinitis is complete debridement of the infected and necrotic tissues and then transposition of the great omentum, latissimus dorsi, major pectoralis, or rectus abdominis muscle flaps. The use of flap reconstruction lowers the mortality from 20%- 40% to approximately 5%. Intravenous antimicrobial therapy should be given according to culture results.
- Other therapeutic approaches such as antibiotic irrigation or vacuum-assisted closure therapy are related to high rates of failure.
- The high rates of treatment failure are attributed to the intense mediastinal fibrosis that does not allow the obliteration of the "dead" space of the mediastinal cavity. Obliteration of this dead restrosternal space is considered a prerequisite for successful treatment of mediastinitis. In contrary, the use of omentum or muscle flaps fills the mediastinal "dead" space and prevents the spreading of infection on the aorta, heart, grafts, or prosthetic material. In addition, omentum or muscle flap closure provides the infected tissues with the essential blood supply and the intravenous antibiotics given (especially to patients with internal mammary arteries grafts whose sternal blood flow has been shown to drop up to 90% after IMA harvest).
- Although a small proportion of patients treated with muscle flap transposition complain of chest pain or discomfort, shoulder weakness and / or loss of total strength of thorax muscles, and may develop hematoma, seroma, or abdominal hernias, it is certain that this technique leads to early wound closure with sufficient chest stability and respiratory function. Our patient's infection was cured within a few weeks after a recurrent wound infection for almost 2 years.

References


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