Journal of Plastic, Reconstructive & Aesthetic Surgery (2007) 60, 372–378

JPRAS
An International Journal of Surgical Reconstruction
www.JPRASurg.com

Choice of flap for the management of deep sternal wound infection – an anatomical classification☆

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Received 9 January 2006; accepted 15 October 2006

KEYWORDS
Sternotomy;
Dehiscence;
Deep sternal wound infection

Summary *Background:* Infection of a median sternotomy wound is a rare albeit potentially fatal complication because of the risk of mediastinitis and deep sternal wound infection. Current treatment of deep sternal wound infection comprises antibiotics, debridement and transposition of muscle or omental flaps to fill the anterior mediastinal dead space.
Methods: A retrospective analysis of the deep sternal wound infections treated in our unit over a nine-year period was performed.
Results: Out of the 11 903 consecutive coronary artery bypass graft procedures performed, 27 patients were referred to plastic surgery for management of deep sternal wound infection with flaps. Wounds were classified based on their location on the sternum as type A (upper ½), B (lower ½) or C (whole of sternum). Five patients had type A wounds, 12 type B wounds and 10 type C wounds. The mean age was 68 years and the M:F ratio was 20:7.

We describe guidelines for the choice of flap for sternal wound reconstruction, according to the anatomical site of the wound dehiscence.

Julian et al. first described median sternotomy in 1957 for use in cardiac surgery.[1] It allows good access to the mediastinum, but carries the risk of sternal wound dehiscence, deep sternal wound infection and mediastinitis. Deep sternal wound infection is a rare but devastating complication, which carries a 50% mortality risk in early series.[2] In more recent series the incidence has reduced to 0.4–5.1%.[3]

Pairolero and Arnold based their classification of sternal wounds on the timing of presentation of infection.[4] They divided the presentation of infected sternotomy wounds into three categories. Type I wounds occur in the first few days postoperatively and are characterised by serosanguinous drainage only without cellulitis, osteomyelitis or costochondritis (Fig. 1a). These wounds are usually dealt with by cardiothoracic surgeons and respond well to intravenous antibiotics, wound debridement with or without

☆ This paper was presented at the British Association of Plastic Surgeons Summer Scientific Meeting, Newport, 2 July 2003. There are no financial interests associated with this paper and no sources of funding.
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doi:10.1016/j.bjps.2006.10.005

Figure 1 (a) Pairolero and Arnold type I wound with serosanguinous drainage only without cellulitis, osteomyelitis or costochondritis. (b) Type II wound with purulent drainage, cellulitis, mediastinal suppuration and positive cultures. (c) Type III wound with chronic draining sinus tracts.

resuturing of the sternum. Direct closure with suction drainage of the mediastinum is usually the only treatment required. The suction is sufficient to obliterate the dead space in the mediastinum.

Type II wounds occur within the first few weeks and are characterised by purulent drainage, cellulitis, mediastinal suppuration, and positive cultures (Fig. 1b). Frequently there is associated fulminating mediastinitis and osteomyelitis, although costochondritis is rare. Patients in this group are best treated by drainage, debridement and immediate or delayed flap closure with obliteration of the dead space. Type III wounds occur months to years later and are characterised by the presence of chronic draining sinus tracts, localised cellulitis, osteomyelitis, costochondritis, or retained foreign body but mediastinitis is rare (Fig. 1c). Debridement, extensive resection of the sternum and costal cartilages followed by flap obliteration of the mediastinum are required. Type II and III wounds are usually referred to plastic surgeons for reconstruction. The key in treating type II and III patients is the obliteration of the dead space within the mediastinum.

The Pairolero and Arnold classification scheme does not indicate the type of reconstruction necessary for the management of deep sternal wound infection and dehiscence.