

# Textbook of Plastic, Reconstructive, and Aesthetic Surgery

## Volume IV

### Reconstruction of Trunk, Genitalia, Lower limb, and Maxillofacial Trauma

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# 1

## Chest Wall Reconstruction

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**Table 1.3** Classification of infected sternotomy wounds by Pailorero and Arnold

Type	No. of patients
<b>Type 1</b> Occurs within first few days Serosanguineous discharge No skin cellulites Mediastinum is soft and pliable Osteomyelitis and costochondritis are absent Cultures are usually negative	11
<b>Type 2</b> Occurs within first few weeks Purulent discharge Skin cellulites++ Mediastinal suppuration++ Osteomyelitis frequent but costochondritis rare Cultures are positive	84
<b>Type 3</b> Occurs months to years later Chronic draining sinus track Skin cellulites localized near sinus track Mediastinitis rare Osteomyelitis, costochondritis, or retained foreign body always present Cultures are positive	5
<b>Total</b>	100

Type 1 presents during the first 3 days of coronary bypass grafting. They present with serosanguinous discharge. This is in contrast to type 2 which presents within 2 to 3 weeks of surgery wherein patients present with purulent discharge, skin cellulites, and positive cultures. Type 3 has late presentation—months to years after surgery and is associated with sternal osteomyelitis and costochondritis. They present with single or multiple discharging sinuses.

### Preoperative Evaluation and Patient Presentation

The patient can present with variety of scenarios. Patient with frank mediastinitis looks ill and complains of fever, chest pain, breathlessness, rib pain, and discharging sinus. On the other hand, patients may be asymptomatic except for small recurrent discharging sinus over sternum and may present to surgeon on OPD basis. The evaluation of such patients can be divided into clinical, radiological, pathological, and microbiological.

Clinically, one should ask detailed history of coronary artery bypass surgery. What were the vessels used for cardiac revascularization? If both left and right mammary vessels were used, it adds to devascularization of the sternum. History of comorbid conditions like smoking, diabetes

mellitus, prolonged postoperative ventilatory support, need for postoperative dialysis, prolonged operative time, and postoperative hemorrhage should be noted. Patient should also be examined for stability of the sternum and asked about history of sternal wire removal if any.

Radiological investigations include X-ray of the chest and 3D computerized tomography of chest cage. The CT scan provides valuable information about union of median sternotomy, status of mediastinitis, and costochondritis, presence of prior retrosternal collections if any (**Fig. 1.10**).

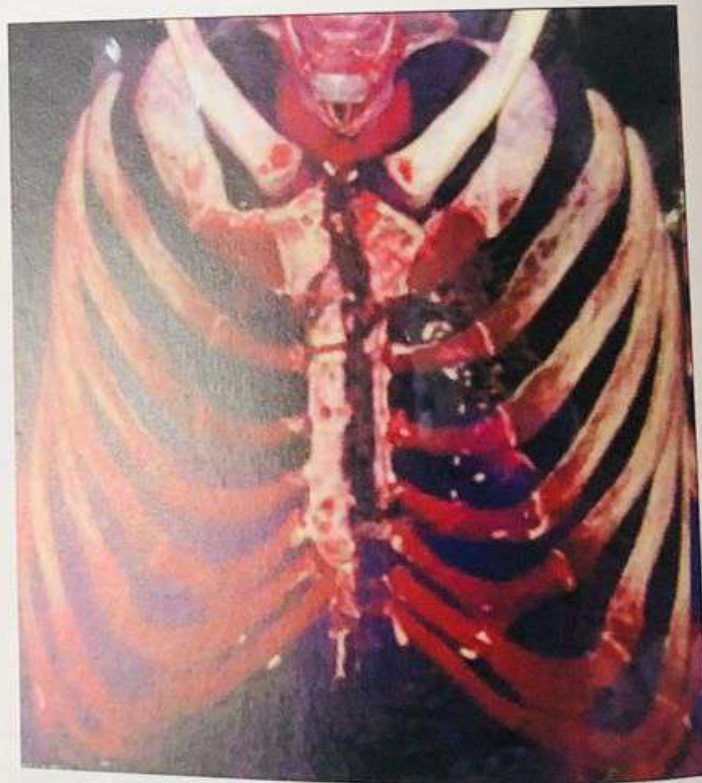
Pathologically, one needs to evaluate white blood cell (WBC) counts and C-reactive protein levels. Microbiologically, cultures should be sent from the depth of the discharging sinus.

### Surgical Treatment Options

The management of the patient should be multidisciplinary in approach. The cardiac surgeon, who did bypass procedure, plastic surgeon, intensivist, and paramedical support team are members of this team. A treatment algorithm can be followed depending on early or late presentation (**Flowchart 1.1**).

#### Debridement

It is widely accepted that adequate early debridement is the first step in treatment plan of sternal wound infections especially in patients with chronic discharging sinus. In ideal scenario, the primary surgeon should be present



**Fig. 1.10** Thoracic CT showing sternal osteomyelitis and destruction.

at pressures between 75 and 100 mm Hg on continuous mode. NPWT when used also helps in achieving sternal stability before closure, thus preventing paradoxical chest wall movements. This treatment modality is recommended to bridge the gap between debridement and definitive closure. Once a healthy granulating bed is achieved and patient is hemodynamically stable, the definitive wound closure should be scheduled.

#### Definitive Closure—Flap Options and Negative Pressure Wound Therapy

Definitive closure is planned as per the wound condition. In cases with approximable sternal edges, sternum is rewire and covered with muscle flap. In the cases, where sternal rewire is not feasible, muscle flaps or omental flaps are used with subcutaneous tissue and skin closure.

Numerous muscle flaps have been used in the treatment of sternal wound infections. The mainstay of treatment continues to be pectoralis major muscle flaps.

The muscle can be used on either of the pedicle. A turnover pectoralis major can be done provided internal mammary vessel is not used for bypass and internal mammary

perforators are not damaged during debridement. If both coronaries are used for cardiac revascularization, then the muscle can still be used on thoracoacromial pedicle after dividing its insertion to allow medial movement (Fig. 1.12). Don't be hesitant to take separate incision to divide its insertion if required (Fig. 1.13). The pectoralis muscle can be used unilaterally or bilaterally. Limitation of the pectoralis used on thoracoacromial pedicle is that it cannot cover lower one-third defect. In such cases, the pectoralis major muscle flap can be harvested with the fascia over the major abdominis muscle (Fig. 1.14) to fill the cavity in lower end of the defector omentum, or rectus abdominis muscle can be used along with pectoralis muscle. When used as double bilateral flaps, the pectoralis major muscles can be double breasted (Fig. 1.15). Double breasting not only obliterated the dead space but also gives some amount of stability to the sternum. Suction drains are placed both superficial and deep to the muscle flaps before skin closure. The subcutaneous tissue and skin are closed after refreshing the skin edges.

For a full-length larger defect, either a *rectus abdominis* muscle flap or a *pedicled omental flap* is used. The rectus abdominis muscle is usually based on its superior blood

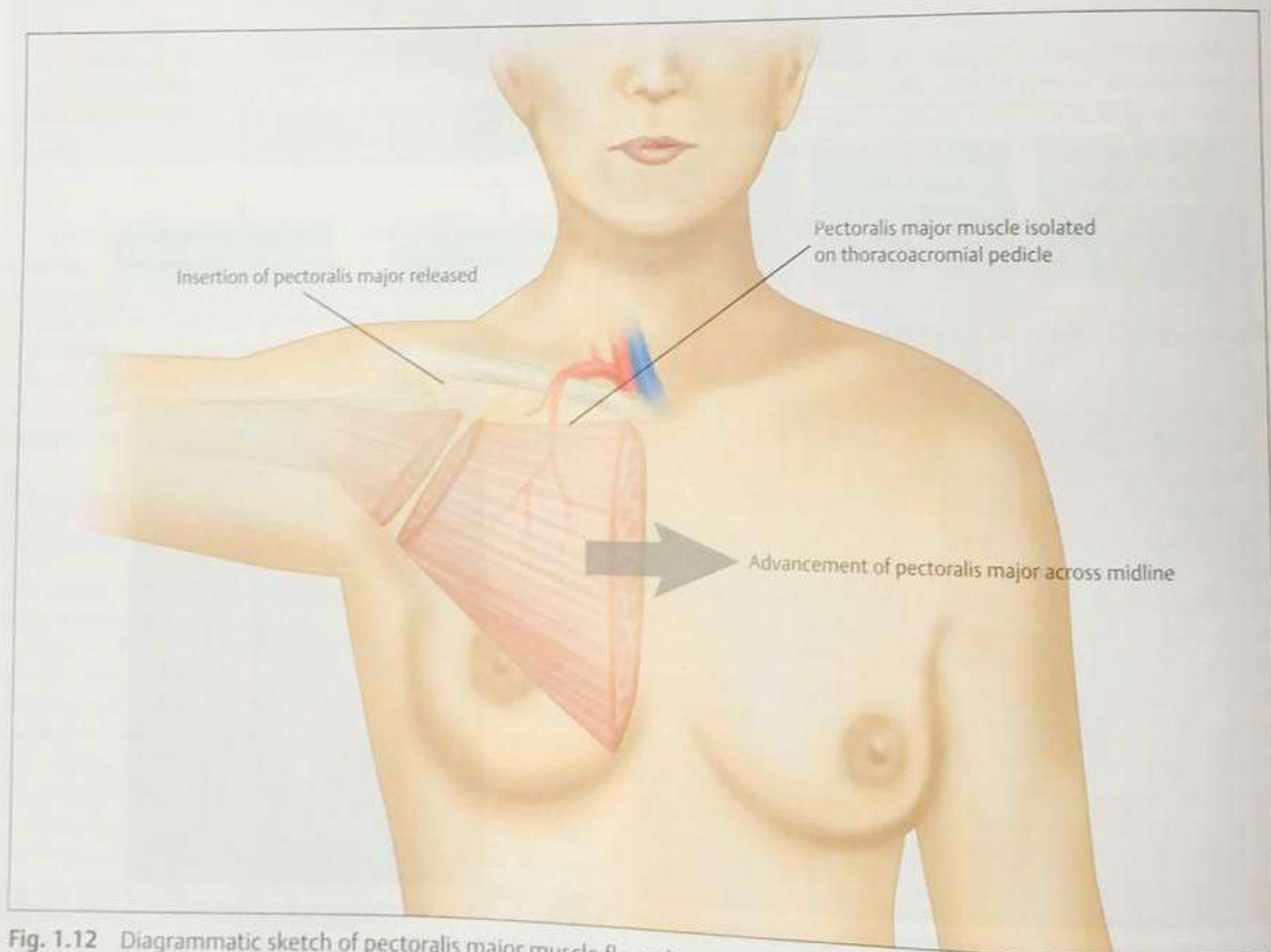


Fig. 1.12 Diagrammatic sketch of pectoralis major muscle flap advancement.