

Distal sternectomy for post-sternotomy chronic osteomyelitis

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Abstract: Sternal chronic osteomyelitis following median sternotomy is a severe complication of open cardiac surgery, presenting as purulent draining sinus tracts in patients with a closed sternal wound. First-line treatments are repeated curettages, conservative debridements, aggressive antibiotic therapy and the application of negative pressure to wound to accelerate the wound-healing process and promote granulation tissue formation, by using the vacuum-assisted closure device. Recalcitrant infections may require sternectomy and resection of all infected costal cartilages for complete eradication of the infection. Here we report a case of recalcitrant post sternotomy osteomyelitis treated by distal sternectomy and reconstruction by absorbable mesh.

Keywords: Sternal osteomyelitis; sternectomy; absorbable mesh

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Introduction

Sternal chronic osteomyelitis following median sternotomy is a severe complication of open cardiac surgery, presenting as purulent draining sinus tracts in patients with a closed sternal wound (1). Its incidence ranges from 1% to 5% but its mortality rate may rise up to 80%, depending on the severity of the infection (2). Fistulas may occur usually after some weeks, months or even years following sternotomy and this is one of the reasons that underestimate their real incidence (3). First-line treatments are repeated curettages, conservative debridements and aggressive antibiotic therapy; moreover, the application of negative pressure to wound can accelerate the wound-healing process and promote granulation tissue formation, by using the vacuum-assisted closure device (VAC) (4).

However, these methods present a high failure rate and the eradication of the infection may require partial or total sternectomy followed by a chest reconstruction and muscle flaps (5). This procedure, however, is associated with a high

morbidity and mortality rate; an adequate reconstruction of the sternum and stabilization of the whole chest wall is of paramount importance, in particular when prolonged post-operative mechanical ventilation is needed. Synthetic rigid prosthetic materials are contraindicated because of the infected surgical field and muscular reconstruction can be accomplished by using pectoralis major muscle flaps, rectus abdominis, latissimus dorsi or transposed omentum (6).

Case presentation

A 57-year-old male patient was admitted at our department for a post-sternotomy sterno-cutaneous fistula (*Figure 1*).

He has been submitted seven months earlier to emergency surgery for cardiac perforation during an epicardial transcatheter ablation of ventricular tachycardia, complicated by multifactorial shock and *Staphylococcus Epidermidis* sepsis.

Despite surgical toilette, removal of underlying sternal wires, treatment by VAC and appropriate antibiotic therapy, the wound did not show any healing.

In vitro-labeled leukocyte imaging revealed a chronic osteomyelitis of the distal third of the sternum (Figure 2).

The patient underwent distal sternectomy and resection of all infected costal cartilages for complete eradication of

the infection; thoraco-abdominal wall integrity was restored by an absorbable polyglactin mesh (Vicryl mesh™) fixed by absorbable interrupted stitches to the surrounding healthy cartilaginous and soft tissue structures, to prevent laparocele or visceral herniation (Figure 3).

Post-operative course did not disclose any major complications.

Discussion

Post-operative infection of sternal wound significantly increases the morbidity and mortality associated with cardiothoracic surgery (8). Major risk factors for developing deep sternal wound infections are diabetes mellitus, intensive care unit (ICU) stay longer than 5 days, need for re-do sternotomy, higher body mass index and the use of the internal mammary vessels for coronary artery bypass grafts (9). The main tasks for successful treatment of chronic osteomyelitis are removing the infected bone and the steel wires because of the presence of biofilms in the foreign materials as well as an adequate antibiotic therapy; however, recalcitrant infections may require sternectomy and resection of all infected costal cartilages for complete eradication of the infection.

Being performed after one or several previous cardiac



Figure 1 Sterno-cutaneous fistula: pre-operative view.

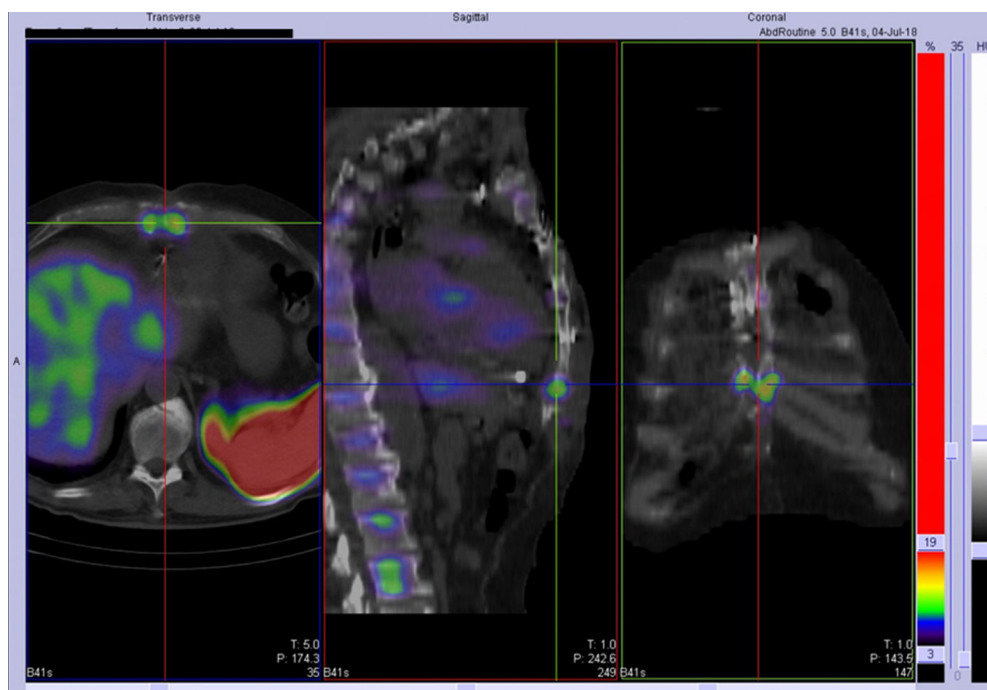


Figure 2 *In vitro*-labeled leukocyte imaging disclosing a chronic osteomyelitis of the distal third of the sternum.



Figure 3 Distal sternectomy for post-sternotomy chronic osteomyelitis (7).

Available online: <http://www.asvide.com/article/view/27130>

procedures, in infected surgical fields with subsequently complex chest wall reconstructions, this type of sternal resection can be technically demanding, often requiring multidisciplinary approach involving cardiac, thoracic and plastic surgeons.

Preoperative sinograms may show communication among cartilaginous-cutaneous tracts or between these tracts and the mediastinum as well as computed tomography (CT) scan may contain information about the location or presence of bypass grafts and prosthetic material; it is extremely important to exactly know the type of procedures received by the patient and previous operative reports may offer useful data. *In vitro*-labeled leukocyte imaging is the nuclear medicine test of choice for diagnosing complicating osteomyelitis. Leukocytes accumulate in bone marrow as well as in infection. Performing complementary bone marrow imaging with ^{99m}Tc -sulfur colloid facilitates the differentiation between osteomyelitis and normal marrow and improves test overall accuracy (10). Reconstruction techniques after total or partial sternectomy for osteomyelitis have been described since the early 1970s and 1980s like transposing pedicled omentum to the mediastinum, pectoralis major rotation flaps and pectoralis myocutaneous advancement flaps (6).

As our patients was previously submitted to median laparotomy with initial laparocoele, after distal sternectomy we fixed an absorbable polyglactin mesh (Vicryl meshTM) by absorbable interrupted stitches to the surrounding healthy cartilaginous and soft tissue structures, to prevent laparocoele or visceral herniation. We avoided rigid non-absorbable prostheses because of the infected field and to avoid significant limitation of thoraco-abdominal flexion.

In conclusion, distal sternectomy may be advocated as rescue treatment for post sternotomy recalcitrant osteomyelitis; if needed, absorbable soft mesh can be considered for thoraco-abdominal reconstruction and stabilization.

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Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/jovs.2018.09.03>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in studies involving human participants were in accordance with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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