Acute Chest Wall Infections

Surgical Site Infections, Necrotizing Soft Tissue Infections, and Sternoclavicular Joint Infection

Paul Schipper, MD*, Brandon H. Tieu, MD

KEYWORDS

• Surgical site infections • SSI • Wound infection • Necrotizing soft tissue infection
• Necrotizing fasciitis • Sternoclavicular joint infection • Sternoclavicular pyoarthrosis

KEY POINTS

- Posterolateral thoracotomy surgical site infections are uncommon and in most cases can be treated with a vacuum dressing.
- Sternoclavicular joint (SCJ) infections are uncommon and best treated with joint resection.
- There are several options for wound management and soft tissue coverage of a SCJ after resection.
- Necrotizing soft tissue infections of the chest occur most often after chest tube placement for an infectious etiology; favorable outcomes require a high index of suspicion and emergent surgical debridement.
- The signs and symptoms of a necrotizing soft tissue can be mimicked by more common postoperative sequelae, including postthoracotomy pain, subcutaneous emphysema, and soft tissue hematoma.

Acute infections of the chest wall are uncommon and those requiring surgical intervention are prone to misdiagnosis, overdiagnosis, and delayed diagnosis. This review discusses 3 distinct but related acute chest wall infections, and their pathology, diagnosis, and treatment: (1) surgical site infection (SSI) or wound infection of an anterior, lateral, or posterior thoracotomy, (2) necrotizing soft tissue infections of the thorax including necrotizing fasciitis, and (3) sternoclavicular joint (SCJ) infections or sternoclavicular pyoarthrosis. Infection and treatment of a median sternotomy wound is covered extensively in the literature and is not discussed in this review.

POSTOPERATIVE SURGICAL SITE INFECTION OF ANTERIOR, LATERAL, OR POSTERIOR THORACOTOMY

Whereas the treatment of thoracic SSIs, with a few exceptions discussed below, has not changed considerably in many years, the definition, tracking, risk stratification, and efforts at prevention of SSIs have become far more sophisticated. The General Thoracic Society of Thoracic Surgeons (STS) Database version 2.3 currently defines a SSI according to the Centers for Disease Control and Prevention definition, outlined in **Box 1**. Using these definitions, thoracic surgeons

Section of General Thoracic Surgery, Division of Cardiothoracic Surgery, Department of Surgery, Oregon Health and Sciences University, 3181 SW Sam Jackson Park Road L353, Portland, OR 97239, USA
* Corresponding author.
E-mail address: schippep@ohsu.edu

Thorac Surg Clin 27 (2017) 73–86
http://dx.doi.org/10.1016/j.thorsurg.2017.01.001

Box 1
Definitions of surgical site infections according to Centers for Disease Control and Prevention and the National Healthcare Safety Network and used by Society of Thoracic Surgeons General Thoracic Database

Superficial incisional SSI

Infection occurs within 30 days after the operative procedure *and* involves only skin and subcutaneous tissue of the incision *and* patient has at least 1 of the following:

1. Purulent drainage from the superficial incision;
2. Organisms isolated from an aseptically obtained culture of fluid or tissue from the superficial incision;
3. At least 1 of the following signs or symptoms of infection: pain or tenderness, localized swelling, redness, or heat, and superficial incision is deliberately opened by surgeon and is culture positive or not cultured (a culture-negative finding does not meet this criterion); and/or
4. Diagnosis of superficial incisional SSI by the surgeon or attending physician.

Deep incisional SSI

Infection occurs within 30 days after the operative procedure if no implant is left in place or within 1 year if implant is in place and infection seems to be related to the operative procedure *and* involves deep soft tissues (eg, fascial and muscle layers) of the incision *and* patient has at least 1 of the following:

1. Purulent drainage from the deep incision but not from the organ/space component of the surgical site;
2. A deep incision spontaneously dehisces or is deliberately opened by a surgeon and is culture positive or not cultured when the patient has at least 1 of the following signs or symptoms: fever (>38°C), or localized pain or tenderness (a culture-negative finding does not meet this criterion);
3. An abscess or other evidence of infection involving the deep incision is found on direct examination, during reoperation, or by histopathologic or radiologic examination; and/or
4. Diagnosis of a deep incisional SSI by a surgeon or attending physician.

Organ/space SSI

An organ/space SSI involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure. An organ/space SSI must meet the following criterion:

Infection occurs within 30 days after the operative procedure if no implant is left in place or within 1 year if implant is in place and the infection seems to be related to the operative procedure *and* infection involves any part of the body, excluding the skin incision, fascia, or muscle layers, that is opened or manipulated during the operative procedure *and* patient has at least 1 of the following:

1. Purulent drainage from a drain that is placed through a stab wound into the organ/space;
2. Organisms isolated from an aseptically obtained culture of fluid or tissue in the organ/space;
3. An abscess or other evidence of infection involving the organ/space that is found on direct examination, during reoperation, or by histopathologic or radiologic examination; and/or
4. Diagnosis of an organ/space SSI by a surgeon or attending physician.

Abbreviation: SSI, surgical site infection.

Adapted from Horan TC, Andrus M, Dudeck MA. CDC/NHSN surveillance definition of health care-associated infection and criteria for specific types of infections in the acute care setting. Am J Infect Control 2008;36:313–4; with permission.

reporting to the STS database between January 2013 and December 2015 report a relatively low rate of SSI related to common thoracic procedures (Table 1).

Risk factors for a SSI include extremes of age, poor nutritional status, diabetes, smoking, obesity, coexistent infections at remote body site, colonization of skin or gastrointestinal tract with microorganisms, altered immune response, duration of hospital preoperative stay, duration of surgical scrub, quality of skin antisepsis for surgical team, preoperative shaving, preoperative skin preparation, duration of operation, appropriate antimicrobial prophylaxis, operating room ventilation, instrument