Techniques for skin abscess drainage

AUTHOR: Theresa Becker, DO
SECTION EDITORS: Anne M Stack, MD, Sheldon L Kaplan, MD, Allan B Wolfson, MD
DEPUTY EDITOR: Michael Ganetsky, MD

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Literature review current through: **Aug 2024.**
This topic last updated: **Jul 30, 2024.**

INTRODUCTION

The differential diagnosis and procedure for incision and drainage of skin abscesses will be reviewed here. The epidemiology, microbiology, treatment, and prevention of skin abscess are discussed separately.

- (See "Skin abscesses in adults: Treatment".)
- (See "Skin and soft tissue infections in children >28 days: Evaluation and management", section on 'Purulent/fluctuant SSTI'.)
- (See "Acute cellulitis and erysipelas in adults: Treatment".)

DEFINITIONS

Skin abscesses can be differentiated from folliculitis, furuncles, and carbuncles as follows:

- **Folliculitis** – Folliculitis is a superficial bacterial infection of the hair follicles with purulent material in the epidermis (picture 1).

- **Furuncle** – A furuncle is a well-circumscribed, painful, suppurative inflammatory nodule involving hair follicles that usually arises from preexisting folliculitis. A furuncle can occur at any site that contains hair follicles, especially in regions that are subject to friction and maceration (eg, face, neck, axillae, groin, thighs, and buttocks). The lesion may extend into the dermis and subcutaneous tissues and often serves as a nidus for cellulitis and skin abscess.

- **Carbuncle** – A carbuncle is a coalescence of several inflamed follicles into a single inflammatory mass with purulent drainage from multiple follicles (picture 2).

- **Skin abscess** – A skin abscess is a collection of pus within the dermis and deeper skin tissues. Skin abscesses manifest as painful, tender, fluctuant, and erythematous nodules frequently surmounted by a pustule and surrounded by a rim of erythematous swelling (picture 3).

DIFFERENTIAL DIAGNOSIS

Historical features and appearance usually help to distinguish skin abscesses from the other conditions in the differential diagnosis. As a rule, incision and drainage is **not** indicated for these diseases:

- **Vascular mass** – Abscesses located near major blood vessels must be differentiated from infected aneurysms, pseudoaneurysms, and vascular anomalies before incision and drainage is performed (picture 4). Incision into a vascular structure that mimics an abscess, particularly an artery or arteriovenous malformation, can lead to fatal hemorrhage [1,2]. (See "Overview of infected (mycotic) arterial aneurysm" and "Acquired arteriovenous fistula of the lower extremity" and "Arteriovenous malformations of the extremities" and "Venous malformations".)

  Identification of a vascular malformation can be made in several ways, including physical examination (eg, bruit or thrill may be present; distal pulses may be diminished) and Doppler ultrasound, the test of choice [1].

- **Myiasis** – Botfly myiasis is a skin infection caused by larvae of the botfly that should be suspected in travelers returning from Central or South America [3-5]. Patients typically note an apparent insect bite that, instead of healing, slowly enlarges over time to a nodule measuring 1 to 3 cm in diameter (picture 5 and picture 6). Patients may have a sensation of irritation, crawling, or episodic lancinating pain. Small amounts of serosanguineous fluid may drain from the lesion. (See "Skin lesions in the returning traveler", section on 'Myiasis'.)

- **Kerion** – Patients with the fungal infection tinea capitis may develop a boggy, tender, exudative scalp mass called a kerion. This is an allergic inflammatory response to the fungal infection and not a true cutaneous abscess (picture 7). Although antibiotic therapy for possible superinfection with *Staphylococcus aureus* may be indicated, incision and drainage should **not** be performed. (See "Tinea capitis".)

- **Herpetic whitlow** – Herpetic whitlow (herpes simplex virus [HSV] infection of the finger) occurs as a complication of primary oral or genital herpes infection via a break in the skin. In addition to erythema, swelling, and pain, herpetic whitlow is characterized by the presence of vesicular or pustular lesions (picture 8). Patients

may also experience fever, lymphadenitis, and epitrochlear or axillary lymphadenopathy. (See "Epidemiology, clinical manifestations, and diagnosis of herpes simplex virus type 1 infection", section on 'Cutaneous manifestations'.)

The diagnosis of herpetic whitlow is suspected by an exposure history as well as the presence of vesicles that, on Tzanck smear, reveal multinucleated giant cells. It is important to distinguish whitlow from felon; incision and drainage should not be performed in the former because it may lead to secondary bacterial infections that delay healing. (See "Epidemiology, clinical manifestations, and diagnosis of herpes simplex virus type 1 infection", section on 'Diagnosis' and "Paronychia", section on 'Diagnosis'.)

- **Hidradenitis suppurativa** – Hidradenitis suppurativa is a chronic relapsing inflammatory disease affecting the apocrine glands. It should be considered in any patient who presents with recurrent furunculosis of the groin, buttocks, and axillae (picture 9 and picture 10 and picture 11). Hidradenitis suppurativa may be associated with multiple and recurrent skin abscesses. (See "Hidradenitis suppurativa: Pathogenesis, clinical features, and diagnosis".)

- **Sexually transmitted infection** – Several sexually transmitted infections may present with one or more genital ulcers and matted suppurative inguinal lymph nodes including granuloma inguinale, chancroid, and lymphogranuloma venereum. Diagnosis may require specialized testing. (See "Approach to the patient with genital ulcers".)

- **Botryomycosis** – Botryomycosis, also known as bacterial pseudomycosis, is a chronic, suppurative infection characterized by a granulomatous inflammatory response to bacterial pathogens (picture 12). Its name came from the erroneous presumption that it was a fungal infection. The most common organism identified in botryomycosis lesions is *S. aureus*. (See "Botryomycosis".)

- **Sporotrichosis** – Lymphocutaneous sporotrichosis is the most common form of sporotrichosis seen in clinical practice. Days to weeks after cutaneous inoculation of the fungus, a papule develops at the site of inoculation. This primary lesion usually ulcerates but may remain nodular with overlying erythema; drainage from the lesion is not grossly purulent and has no odor (picture 13A-B). (See "Treatment of sporotrichosis" and "Clinical features and diagnosis of sporotrichosis", section on 'Nodular lymphangitis'.)

- **Cat scratch disease** – Cat scratch disease is typically a self-limited disease characterized by painful regional lymphadenopathy following a cat scratch. *Bartonella henselae* is the organism that causes this illness. Pustules may occur at the site of the scratch, and 25 to 30 percent of patients develop lymph nodes that suppurate. Incision

and drainage should be avoided due to scarring and fistula formation. (See "Microbiology, epidemiology, clinical manifestations, and diagnosis of cat scratch disease", section on 'Cutaneous manifestations' and "Microbiology, epidemiology, clinical manifestations, and diagnosis of cat scratch disease", section on 'Lymphadenopathy'.)

INDICATIONS

Approximately 2 percent of emergency department visits are for the evaluation of skin abscesses. Most lesions are caused by *Staphylococcus aureus*, and many of these patients require incision and drainage. (See "Cellulitis and skin abscess: Epidemiology, microbiology, clinical manifestations, and diagnosis", section on 'Microbiology'.)

Most patients with skin abscesses should undergo incision and drainage [6-9]. In patients with small abscesses that are spontaneously draining, the clinician may choose to observe for resolution.

Needle aspiration is insufficient for adequate abscess drainage. As an example, in an unblinded trial of incision and drainage versus ultrasound-guided needle aspiration of cutaneous abscesses in 101 adults, incision and drainage was much more likely to successfully resolve an abscess at seven days when compared with needle aspiration (80 versus 26 percent, respectively) [10].

Observed patients may be treated with oral antibiotics that have activity against methicillin-resistant *S. aureus* (MRSA), depending upon the clinical scenario and the local prevalence of MRSA. The role of antibiotics in skin abscesses and the management of abscesses infected with MRSA are discussed separately. (See "Acute cellulitis and erysipelas in adults: Treatment".)

Observed patients should apply warm compresses to the infected area several times per day to promote drainage.

CONTRAINDICATIONS

Although most patients with cutaneous abscesses may safely undergo incision and drainage in a monitored setting (eg, emergency department), they should first be assessed for possible contraindications, including the following (algorithm 1) [11]:

- **Abscess location** – The following abscesses have a high rate of complication or require anatomical expertise and should be drained by a surgeon:

- Perirectal abscesses.
- Anterior and lateral neck abscesses potentially arising from congenital cysts (eg, thyroglossal duct cyst, branchial cyst, cystic hygroma).
- Hand abscesses (excluding paronychias and felons).
- Abscesses adjacent to vital nerves or blood vessels (eg, facial nerve, carotid artery, femoral artery).
- Abscesses in the central triangle of the face formed by the corners of the mouth and the nasal bridge. These lesions pose a risk of septic phlebitis and intracranial extension through the cavernous sinus. They are treated with warm compresses, broad spectrum antibiotic therapy, and close follow-up with otolaryngology [12].
- Breast abscesses, particularly those near the areola and nipple. (See "Primary breast abscess".)

- **Abscess type** – Recurrent and multiple interconnected abscesses warrant removal in the operating room by a surgeon to assess and manage any fistulas (picture 11). Large abscesses (>5 cm by palpation or ultrasound) may be best managed by surgery.

  Mycotic abscesses should **not** be treated with incision and drainage. (See "Tuberculous lymphadenitis".)

- **Patient factors** – Individuals who may pose difficulty in airway or ventilatory management or present an aspiration risk have relative contraindications to abscess drainage under procedural sedation. (See "Procedural sedation in adults in the emergency department: General considerations, preparation, monitoring, and mitigating complications" and "Procedural sedation in children: Approach".)

Patients with an underlying bleeding disorder should undergo correction of their coagulopathy prior to the procedure.

The clinician should determine if the patient is allergic to lidocaine, epinephrine, or latex and avoid exposure during the procedure.

PREPARATION

Bedside ultrasonography — In a patient with a clinically evident abscess on physical examination, incision and drainage without bedside ultrasound (US) is a reasonable initial option. In a patient with a skin and soft tissue infection that has equivocal physical examination findings for an abscess, the extent of the abscess is not apparent by

examination, or adequate drainage cannot be achieved, we suggest bedside US (if equipment and a trained provider are available) to facilitate abscess drainage rather than physical examination alone.

When performed by a trained and experienced provider, bedside US has high diagnostic accuracy for the presence of skin and soft tissue abscess (image 1) versus cellulitis (image 2) and can identify abscess size, depth, and location. Bedside US can also determine the presence of multiple connected abscesses (a contraindication to simple incision and drainage, which does not provide adequate treatment of fistulas). In addition, it may occasionally identify abnormalities (eg, adjacent vessels or atypical findings suggesting an alternative diagnosis) that contraindicate simple incision and drainage in the emergency department (ED) [13,14]. (See 'Contraindications' above.)

Furthermore, even when the diagnosis of abscess is clinically apparent, limited evidence suggests that bedside US may reduce clinical failure. As an example, in a small trial of 107 adults undergoing abscess drainage in the ED, clinical failure rates 10 days after the procedure were lower in patients evaluated with physical examination and US compared with physical examination alone (4 versus 17 percent [risk difference 13 percent, 95% CI 0-19 percent, adjusted odds ratio 0.2, 95% CI 0.04-0.97]) [15]. This result warrants confirmation in a larger study.

In a meta-analysis of 14 studies (13 performed in EDs), bedside US use was associated with a correct change in management in 10 percent of patients (number needed to treat: 10) and an incorrect change in 0.7 percent of patients (number needed to harm: 142). Bedside US had a pooled sensitivity and specificity of 95 and 85 percent, respectively [16]. The gold standard in most studies was pus on incision and drainage. The greatest benefit for US was seen in children and patients with clinical findings that were equivocal for an abscess. In the largest prospective, observational study included in this meta-analysis (1200 adults with skin and soft tissue infections), US changed management in approximately 1 percent of patients when clinicians were certain about the presence or absence of an abscess, compared with 24 percent of patients when clinical findings were equivocal. Most changes were appropriate in both groups. [17]. Thus, bedside US appears to have the greatest benefit for patients with equivocal physical examination findings for abscess.

Endocarditis prophylaxis — In patients who are at risk for bacterial endocarditis (eg, patients with unrepaired cyanotic congenital heart disease, prosthetic valves, central line, or rheumatic heart disease), antibiotic prophylaxis with activity against staphylococci and beta-hemolytic streptococci is warranted prior to incision and drainage. (See "Infective endocarditis in children", section on 'Risk factors' and "Skin abscesses in adults: Treatment", section on 'Timing of antimicrobial administration' and "Prevention of endocarditis: Antibiotic prophylaxis and other measures".)

Patient counseling — Before beginning the procedure, explain in full the nature of the procedure and the possible risks and consequences. With children, explain the procedure in an age-appropriate manner and perform informed consent with the patient or caregiver.

Emphasize the following important features of incision and drainage:

- An abscess may be much larger than it appears on the surface. Thus, it may require a longer incision than the patient expects.
- Scarring should be expected, including the possibility of keloid formation.
- Recurrence is relatively common, particularly in patients with hidradenitis suppurativa or an infected sebaceous cyst.

Sedation and analgesia — Lack of adequate pain control is the most common limiting factor in achieving adequate incision and drainage [6,18]. Most patients can receive appropriate sedation and analgesia in the ED. Local anesthesia is sufficient for most simple abscesses in adolescents and adults. Young children and patients with large abscesses, especially those in the pilonidal region, frequently require parenteral sedation and analgesia in addition to local anesthesia to achieve adequate pain control and to permit successful completion of the procedure. (See "Procedural sedation in children: Approach" and "Procedural sedation in adults in the emergency department: General considerations, preparation, monitoring, and mitigating complications".)

Local anesthesia — To augment procedural sedation, use a regional block, if possible. Local infiltration is less effective than a regional block due to the lower pH of infected tissue, which reduces the proportion of anesthetic in the more active uncharged form. (See "Subcutaneous infiltration of local anesthetics".)

Alternatively, use a field block with a local anesthetic (eg, 1 or 2 percent lidocaine). The injection can be performed with one puncture if the needle is inserted into the dome of the abscess and the syringe is held parallel to the skin and rotated to distribute the anesthetic circumferentially.

Topical local anesthetics (eg, prilocaine-lidocaine, liposomal lidocaine, or tetracaine gel) may be applied prior to local injection or anesthetic blocks to further reduce the pain of the procedure. (See "Clinical use of topical anesthetics in children".)

Be careful to avoid injecting toxic doses of anesthetic. For lidocaine, the toxic dose is 4 mg/kg; for lidocaine with epinephrine, the toxic dose is 7 mg/kg. (See "Subcutaneous infiltration of local anesthetics".)

INCISION AND DRAINAGE TECHNIQUE

Equipment — Assemble the following materials for the procedure:

- Sterile gloves, drapes, and 4x4 inch gauze
- Goggles or other eye protection (eg, surgical mask with integrated visor)
- Antiseptic solution (eg, povidone-iodine or chlorhexidine solution)
- Local anesthetic (eg, 1 or 2 percent lidocaine)
- 3 to 10 mL syringe and needle of 25, 27, or 30 gauge
- Culture swab
- Number 11 blade and scalpel holder
- Curved hemostats
- Forceps
- Scissors
- Needleless 30 to 60 mL syringe with 19 gauge intravenous (IV) catheter or needleless irrigation device with splash protection (eg, Zerowet Splashield)
- Basin with sterile saline solution
- Packing material (eg, iodoform or plain gauze packing tape)
- Dressing of choice

Incision — After adequate analgesia is achieved, incise the skin with a number 11 scalpel blade. (See 'Sedation and analgesia' above and 'Local anesthesia' above.)

Make a simple linear incision through the total length of the abscess with the incision conforming to the natural folds of the skin. Avoid cruciate or elliptical incisions because they can cause unsightly scars. If the abscess is in a cosmetic area or an area of skin tension, a stab incision may be used to limit tissue injury and scarring.

Culture — Prior to the emergence of community-acquired methicillin-resistant *Staphylococcus aureus* (cMRSA) infection, cultures were not routinely obtained when performing incision and drainage of a simple abscess, and when obtained did not typically change the care of otherwise healthy patients.

Wound cultures are still **not** necessary in healthy patients who will **not** receive antibiotics after abscess drainage.

However, given the increased prevalence of cMRSA infection and developing resistance patterns, we suggest that specimens for Gram stain, culture, and susceptibility testing be obtained if the patient will be treated with antibiotics and meets one of the following criteria [19]:

- Severe, local infection (eg, extensive cellulitis, pilonidal cyst)
- Systemic signs of infection (eg, fever or hemodynamic instability)
- History of recurrent or multiple abscesses
- Failure of initial antibiotic treatment

- Extremes of age (young infants or older people)
- Immunocompromised

Wound culture may also be appropriate for otherwise healthy patients receiving antibiotics after abscess drainage who reside in regions where *S. aureus* antibiotic susceptibility is unknown or rapidly changing. (See "Skin and soft tissue infections in children >28 days: Evaluation and management", section on 'Laboratory evaluation' and "Methicillin-resistant Staphylococcus aureus (MRSA) in adults: Treatment of skin and soft tissue infections", section on 'Clinical approach'.)

For abscesses requiring incision and drainage, fluid for cultures may be obtained by swabbing purulent material. In selected patients, such as immunocompromised hosts or IV drug users, isolation of possible anaerobic organisms can be enhanced by needle aspiration with a syringe through appropriately cleaned (eg, with chlorhexidine) skin prior to incision and drainage [6,18]. (See "Microbiology specimen collection and transport", section on 'Specimen collection'.)

The role of antibiotics in patients undergoing cutaneous abscess drainage and antibiotic selection is discussed in greater detail separately. (See "Acute cellulitis and erysipelas in adults: Treatment".)

Probing and irrigation — After incision, probe the abscess cavity with a hemostat to break up loculations, identify foreign bodies, and ensure proper drainage. Do **not** probe with a gloved finger or scalpel. A gloved finger may be injured by a sharp foreign body, and a scalpel may cause tissue damage or create a false passage or fistula. Probing of the wound is painful and may require additional anesthesia.

Irrigate the abscess cavity copiously with isotonic saline solution until all visible pus is removed [20]. (See "Minor wound evaluation and preparation for closure", section on 'Irrigation'.)

Closure — After incision, drainage, probing, and irrigation, we suggest that abscesses be left open to heal by secondary intention (secondary closure).

In previously healthy adults without significant surrounding erythema >5 cm wide or signs of systemic infection, primary closure using nonabsorbable sutures and vertical mattress technique is an option (figure 1). However, available evidence is of low quality and does **not** indicate a clear benefit for primary closure of abscesses over healing by secondary intention [21,22]. If sutures are placed, close wound follow-up **must** be assured to evaluate for reaccumulation of pus. Also, primary closure should be **avoided** in patients with the following conditions:

- Immunocompromised (eg, diabetes mellitus, chronic immunosuppressive therapy, or HIV)
- Signs of systemic infection (eg, fever, chills, hypotension)
- Significant cellulitis (>5 cm of surrounding erythema)

Furthermore, studies evaluating primary closure have **not** been performed in children. Given the lack of clear benefit in adults and the potential anxiety and pain associated with suture removal, the available evidence does **not** support primary closure after skin abscess drainage in pediatric patients.

Closure by secondary intention is the traditional approach to abscess management and is based upon the principle of avoiding the placement of foreign bodies in contaminated wounds. Evidence for primary closure of abscesses is as follows:

- In one meta-analysis of seven trials (915 patients), primary vertical mattress closure of abscesses after drainage using nonabsorbable sutures had clinically significantly faster healing (8 versus 15 days) and fewer recurrences (8 versus 11 percent, although not statistically significant) than healing by secondary intention [21]. However, these studies differed from each other with respect to site and size of abscess, location of drainage (outpatient versus operating room), and use of antibiotics. Furthermore, most of these studies were performed before the advent of methicillin-resistant *S. aureus* and were judged to be of poor quality [21].

- In a more recent trial of 56 healthy adults undergoing incision and drainage for abscesses in the emergency department (ED), healing or treatment failure was not significantly different between primary or secondary closure (60 to 70 percent healing and approximately 30 percent treatment failures with both outcomes evaluated at seven days) [22]. However, 6 of 27 patients who underwent primary closure required suture removal by 48 hours because of reaccumulation of pus.

Packing or drain placement

Indications — After incision and drainage, we suggest packing any abscess cavity that meets any of the following criteria:

- Abscess >5 cm in diameter
- Abscess in an immunocompromised or diabetic patient

In contrast to abscesses >5 cm in diameter, small trials in immunocompetent children and adults suggest that packing of wounds ≤5 cm wide does **not** prevent the need for further drainage procedures and may be more painful in some patients [23-25].

Technique — After probing and irrigation, pack the cavity to prevent closure of the wound margins. Avoid packing the cavity too tightly because excessive pressure may cause tissue necrosis [6].

Sterile gauze, iodoform gauze, or silver-containing hydrofiber (eg, Aquacel Ag) packing strips may be used to fill the abscess cavity. A tail of about 1 cm of packing can serve as a wick for drainage and facilitate subsequent removal of the packing material [6,18]. The wound is left open and an absorbent dressing is placed over it. In an unblinded trial that compared silver-containing hydrofiber versus iodoform gauze packing in 92 adults receiving incision and drainage in an ED, silver-containing hydrofiber was associated with decreased pain at 48 to 72 hours and more rapid reduction in the abscess cavity size [26].

A Penrose drain or catheter may be preferred in patients with pilonidal abscesses and when follow-up is uncertain. In these circumstances, place a split Penrose drain or a balloon-tipped (eg, Foley) or flared-tipped (eg, Malecot) catheter into the cavity and secure it with an absorbable suture at the wound margin. Cut excess tubing approximately 2 cm above the skin surface. This technique is appropriate for any abscess, except ones located on the face [6]. Some experts do not routinely pack pilonidal abscesses after acute drainage to minimize follow-up visits. Packing pilonidal abscesses may not decrease the need for re-intervention and may be more painful for some patients. (See "Pilonidal disease".)

LOOP DRAINAGE TECHNIQUE

The loop drainage technique is an alternative to incision and drainage that may be less painful for the patient, avoids packing, and may reduce the need for follow-up [27-29]. This method also leaves less scarring and may prevent recurrence of the abscess, especially in children [27].

Prior to the procedure, identify the abscess, provide endocarditis prophylaxis, and ensure necessary sedation and analgesia as described separately. (See 'Preparation' above.)

- **Equipment**:
  - 1 or 2 percent lidocaine
  - Syringe and number 25 gauge needle
  - Antiseptic solution (eg, povidone-iodine or chlorhexidine solution)
  - Gauze
  - One-fourth inch Penrose drain, sterile rubber band or vessel loop
  - Sterile saline and syringe for irrigation
  - Number 11 blade
  - Small curved-tip hemostat

- **Technique** (figure 2) [29,30]:
  - After cleaning the skin surface, make a small incision over the abscess. Insert the curved hemostat and break up any adhesions.
  - After determining the edge of the abscess with the hemostat, tent the skin at this site and make another incision over the tip of the hemostat, no more than 4 cm from the first incision.
  - Compress the wound to express as much pus as possible. Culture if appropriate. (See 'Culture' above.)
  - Irrigate with sterile saline through the incision made over the abscess until the fluid is clear.
  - Place the edge of the drain (Penrose drain, sterile rubber band, or vessel loop) into one of the incision openings.
  - Place the curved hemostat into the other incision and pass it through the abscess cavity to grasp the drain, and then pull it through the hole.
  - Taking both free ends of the drain, tie a knot at least four times but with absolutely no tension on the skin.
  - Cover with gauze.

Ask the patient or caregiver to wiggle the drain back and forth daily to encourage further drainage of pus.

Once drainage has ceased (typically in 7 to 10 days), the drain can be removed by the patient or a health professional by holding one end and snipping the drain.

Limited evidence from a systematic review of one small trial and three observational studies (470 total patients) suggests that the failure rate of the loop drainage technique may be lower than for incision and drainage (4 versus 9 percent, respectively [OR 2.63; 95% CI 1.03-6.63]); however, the included studies had a moderate risk of bias) [27]. In the one trial included in this review, patients rated the loop drainage technique as less painful than incision and drainage [31]. In a subsequent small trial of 238 adults not included in the above review, the failure rate was also lower for patients undergoing loop drainage compared with those receiving incision and drainage although the difference was not significant [32]. Confidence in the findings of this study is limited by the large number of patients who were lost to follow-up.

ANTIBIOTIC THERAPY

Decisions about antibiotic therapy for skin abscesses are discussed separately and summarized in the algorithm (algorithm 1). (See "Skin abscesses in adults: Treatment", section on 'Antimicrobial therapy' and "Skin and soft tissue infections in children >28 days: Evaluation and management", section on 'Purulent/fluctuant SSTI'.)

TETANUS PROPHYLAXIS

Determine the patient's tetanus vaccination status and provide prophylaxis if indicated (table 1). (See "Tetanus-diphtheria toxoid vaccination in adults" and "Diphtheria, tetanus, and pertussis immunization in children 6 weeks through 6 years of age", section on 'Schedules' and "Diphtheria, tetanus, and pertussis immunization in children 7 through 18 years of age", section on 'Wound management'.)

DISCHARGE INSTRUCTIONS

At discharge, the clinician should instruct the patient or caretaker to seek medical attention if any of the following occur:

- Fever or chills
- Reaccumulation of pus in the area
- Increased pain or redness
- Red streaks
- Increased swelling

The patient should return for reexamination of the wound within 24 to 48 hours. Reevaluation can be performed by the patient's primary care clinician.

AFTERCARE

Further care depends upon initial abscess management.

Incision and drainage

Open wounds — Open wounds should be dressed with dry gauze until fully healed. The bandage is removed prior to soaking the wound (see below) and replaced with a fresh dressing after soaking is completed.

- **No packing or drain** – If the abscess is resolving, the patient may soak the wound several times a day in warm, soapy water and return for a final examination in 7 to 10 days or sooner if signs of systemic infection (eg, fever with expanding cellulitis) or abscess recurrence are present.

- **Packing placed** – If drainage has stopped by the time of the initial wound check, the clinician should remove the packing and instruct the patient to begin warm soaks several times per day until healing occurs.

  If purulent drainage persists, the clinician should remove the old packing and repack the cavity. Reevaluation of the wound should occur in 24 to 48 hours. As long as purulent drainage persists, the packing should be exchanged every 24 to 48 hours. This regimen is continued until the drainage stops and granulation tissue is present. At this point, no further packing is needed. Once packing is no longer needed, the patient may begin warm wet soaks several times per day until healing occurs, typically in 7 to 10 days [1,2,6].

- **Drain placed** – If drainage persists, leave the drain in place and redress the wound. If drainage has ceased for at least 24 hours, remove the securing suture (if still present), and pull the drain out approximately 1 cm. Attach a new safety pin proximal to the old one and then cut the excess tubing between the safety pins. Repeat this process every 24 to 48 hours until the drain is fully removed or has fallen out.

Sutured wounds — Management of sutured wounds varies based upon the presence of reaccumulated pus:

- If no reaccumulation has occurred, then the patient can be discharged with instructions to keep the wound clean and to return for suture removal at seven days from the date of initial incision and drainage. Patients can shower at this point but should avoid soaking the sutured wound.

- If reaccumulation has occurred, the sutures should be removed and the abscess irrigated to remove the pus. Small abscesses can be managed in the same manner as open wounds with no packing or drain as described above. Abscesses appropriate for packing (>5 cm in diameter or pilonidal abscesses) should undergo packing and further management as described above. In one trial of primary versus secondary closure of abscesses, 6 of the 27 healthy patients who received primary closure after incision and drainage of an abscess required suture removal by 48 hours because of reaccumulation of pus [22].

Loop drainage technique — Drainage after placement of a loop may persist for up to 7 to 10 days and is acceptable. The patient or caregiver should be encouraged to wiggle the loop daily to encourage drainage.

However, increased erythema surrounding the abscess or increased swelling of the affected area suggests extensive infection and warrants timely reevaluation to determine the need for formal incision and drainage and, depending upon the degree of illness, the need for intravenous (IV) antibiotics.

Once drainage has ceased, then the loop can be cut and removed.

COMPLICATIONS

Complications of incision and drainage are uncommon [6,18]. They typically result from either inadequate or overaggressive drainage:

- Inadequate drainage may result in local extension, leading to development of a larger abscess that may be followed by osteomyelitis, tenosynovitis, septic thrombophlebitis, necrotizing fasciitis, or fistula formation.
- Overaggressive drainage, especially with sharp dissection, may damage adjacent structures (eg, nerves and vessels) and may lead to bacteremia.

Complications are particularly likely to occur with incision and drainage of facial abscesses in the triangle formed by the bridge of the nose and the corners of the mouth. This approach poses a risk of septic phlebitis and intracranial extension through the cavernous sinus [12]. (See 'Contraindications' above.)

Infections involving the nose and perioral area can be complicated by orbital abscesses [33] or cavernous sinus thrombosis. Bacteremia leading to development of secondary infection at distant sites may result in considerable morbidity or even mortality.

ADDITIONAL RESOURCES

A high-quality instructional video of this procedure is available elsewhere [11].

SOCIETY GUIDELINE LINKS

Links to society and government-sponsored guidelines from selected countries and regions around the world are provided separately. (See "Society guideline links: Skin and soft tissue infections".)

SUMMARY AND RECOMMENDATIONS

- **Definitions** – Skin abscesses are collections of pus within the dermis and deeper skin tissues and manifest as painful, tender, fluctuant, and erythematous nodules frequently surmounted by a pustule and surrounded by a rim of erythematous swelling (picture 3). (See 'Definitions' above.)

- **Preparation** – Prior to performing incision and drainage, check for other skin conditions that can mimic abscesses such as vascular mass, myiasis, kerion, herpetic whitlow, hidradenitis suppurativa, regional lymphadenopathy, botryomycosis, and sporotrichosis. (See 'Differential diagnosis' above.)

  In a patient with a clinically evident abscess on physical examination, incision and drainage without bedside ultrasound (US) is a reasonable initial option. If US equipment and a trained provider are available, bedside US can be used to differentiate a skin abscess (image 1) from cellulitis (image 2). US may be particularly helpful if there are equivocal physical examination findings for an abscess, the extent of the abscess is not apparent by examination, or adequate drainage cannot be achieved. (See 'Bedside ultrasonography' above.)

- **Analgesia** – Most simple abscesses in adolescents and adults can be managed with local anesthesia. Young children and patients with large abscesses, especially those in the pilonidal region, frequently require parenteral sedation and analgesia in addition to local anesthesia to achieve adequate pain control and to allow for successful completion of the procedure. (See 'Sedation and analgesia' above.)

- **Techniques** – The procedure of incision and drainage is summarized in the table (table 2). A list of the necessary equipment is provided in the text. (See 'Incision and drainage technique' above.)

  The loop drainage technique (figure 2) is an alternative to traditional incision and drainage that may be less painful for the patient, avoids packing, and may reduce the need for follow-up. This method also leaves less scarring and may prevent recurrence of the abscess, especially in children. (See 'Loop drainage technique' above.)

- **Obtaining wound cultures** – Wound cultures are **not** necessary in healthy patients who will **not** receive antibiotics after abscess drainage. We obtain specimens for Gram stain, culture, and susceptibility testing if the patient will be treated with antibiotics and meets one of the following criteria (see 'Culture' above):

  - Severe, local infection (eg, extensive cellulitis, pilonidal cyst)
  - Systemic signs of infection (eg, fever or hemodynamic instability)
  - History of recurrent or multiple abscesses
  - Failure of initial antibiotic treatment
    Extremes of age (young infants or older adults)

- Immunocompromised
- Regions where *Staphylococcus aureus* antibiotic susceptibility is unknown or rapidly changing

- **Wound packing** – We suggest that patients with the following characteristics undergo packing of the abscess cavity after incision and drainage (**Grade 2C**):

  - Abscess >5 cm in diameter
  - Pilonidal abscess
  - Abscess in an immunocompromised patient

- **Wound closure** – We suggest that abscesses be left open to heal by secondary intention (secondary closure) (**Grade 2C**). (See 'Closure' above.)

- **Aftercare** – The patient should be instructed to follow up for re-examination of the wound within 24 to 48 hours. Decisions about antibiotic therapy for skin abscesses are discussed separately (see 'Discharge instructions' above and "Skin abscesses in adults: Treatment", section on 'Antimicrobial therapy'). As long as purulent drainage persists, the packing should be exchanged every 24 to 48 hours. (See 'Aftercare' above.)

ACKNOWLEDGMENT

The UpToDate editorial staff acknowledges Kathleen A Downey, MD and Rana Kronfol, MD, who contributed to earlier versions of this topic review.

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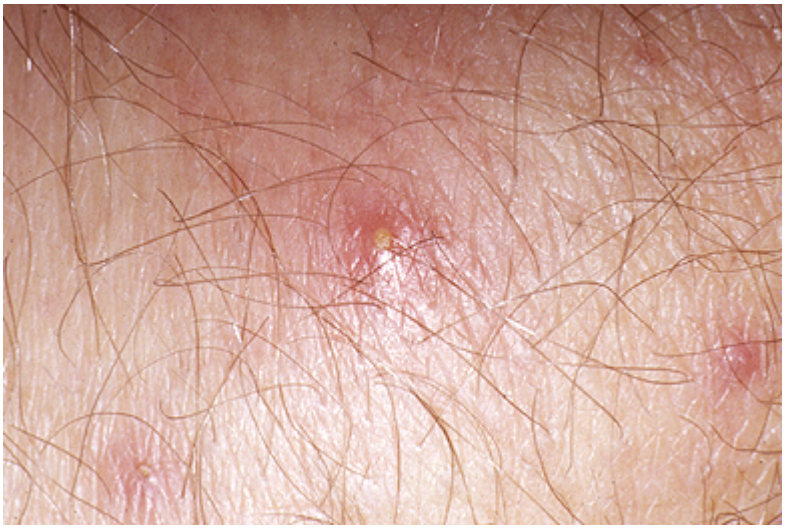
Topic 6336 Version 45.0

GRAPHICS

Scalp folliculitis



Pustules are evident on the scalp.

Courtesy of Beth G Goldstein, MD, and Adam O Goldstein, MD.

Graphic 62916 Version 3.0

Carbuncle

Carbuncle, which is a series of abscesses in the subcutaneous tissue that drain via hair follicles.

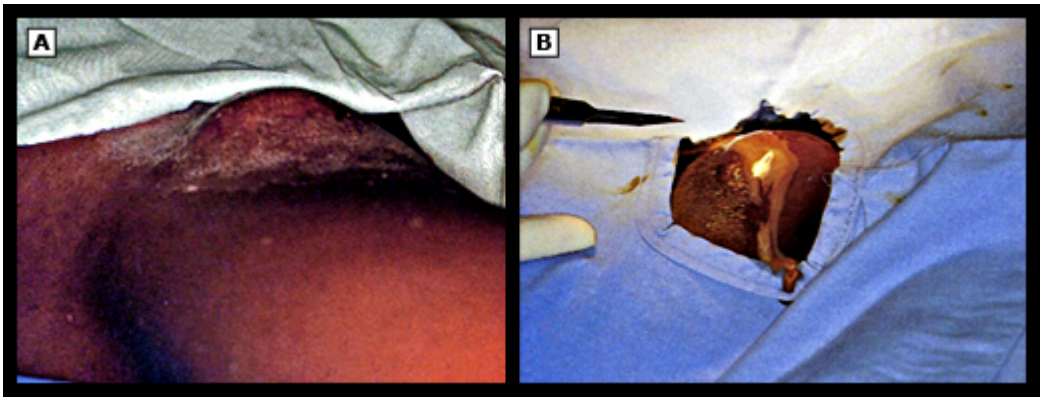
Graphic 70089 Version 3.0

Skin abscess

Courtesy of Larry M Baddour, MD.

Graphic 53261 Version 1.0

Groin abscess

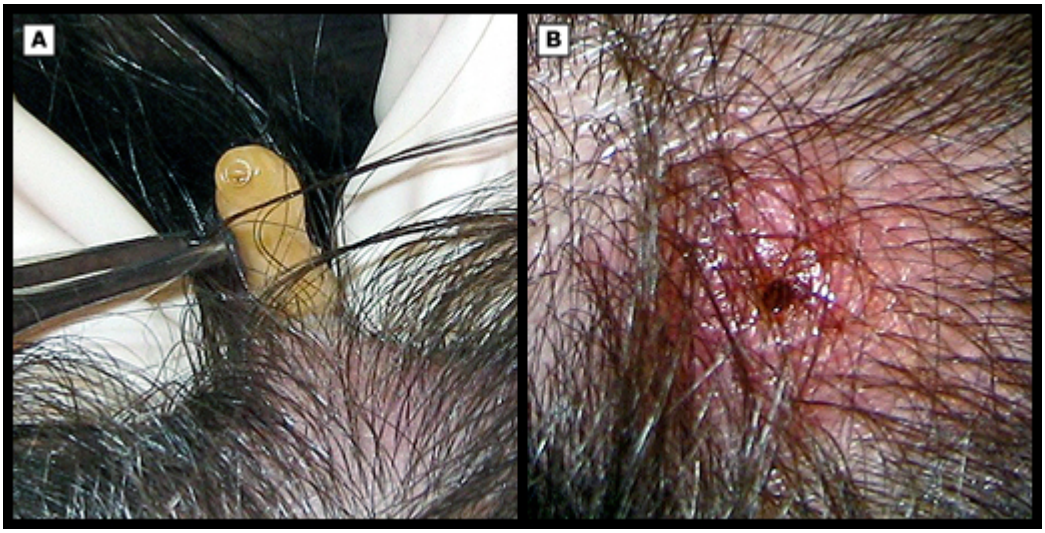


(A) A large abscess formed in the groin of the child, directly over the femoral vessels and nerve.

(B) A superficial incision produced an immediate return of pus.

Graphic 72536 Version 11.0

Botfly extraction from nodules



(A) Extraction of *Dermatobia hominis* larva from a nodule on the scalp. The lesion was anesthetized with lidocaine intralesionally and then gently extracted in toto.

(B) An additional lesion from the same patient contained another larva.

Courtesy of Peter Lio, MD.

Graphic 54606 Version 4.0

Dermatobia hominis larva

An extracted *Dermatobia hominis* larva.

Courtesy of Peter Lio, MD.

Graphic 62332 Version 3.0

Kerion

The photo shows kerion, a boggy, indurated erythematous plaque with pustules and exudate. Kerion is a form of immune response to the fungus that causes gray patch tinea capitis, *Microsporum canis*.

Courtesy of John T Crissey, MD.

Graphic 75029 Version 3.0

Herpetic whitlow

In addition to erythema, swelling, and pain, herpetic whitlow is characterized by the presence of vesicular or pustular lesions. Patients may also experience fever, lymphadenitis, and epitrochlear or axillary lymphadenopathy.

Graphic 75510 Version 6.0

Hidradenitis suppurativa

Comedones and bridged scars in a flexure.

Reproduced with permission from: Ridley CM, Neill SM (Eds), The Vulva, 2nd ed, Blackwell Science, Oxford, 1999, p.141.

Graphic 77990 Version 4.0

Moderate hidradenitis suppurativa

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Graphic 65884 Version 3.0

Severe hidradenitis suppurativa

Severe hidradenitis suppurativa on the vulva and surrounding skin.

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Graphic 65188 Version 5.0

Botryomycosis lesion

Lesion on the left knee.

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Graphic 76152 Version 2.0

Lymphocutaneous sporotrichosis

Lymphocutaneous sporotrichosis on the right lower extremity of a young man who overturned his dirt bike and inoculated soil in multiple places in his leg. Following a plastic surgery procedure before the diagnosis of sporotrichosis, new lesions developed at the edge of the skin graft and extended up into the thigh.

Courtesy of Carol A Kauffman, MD.

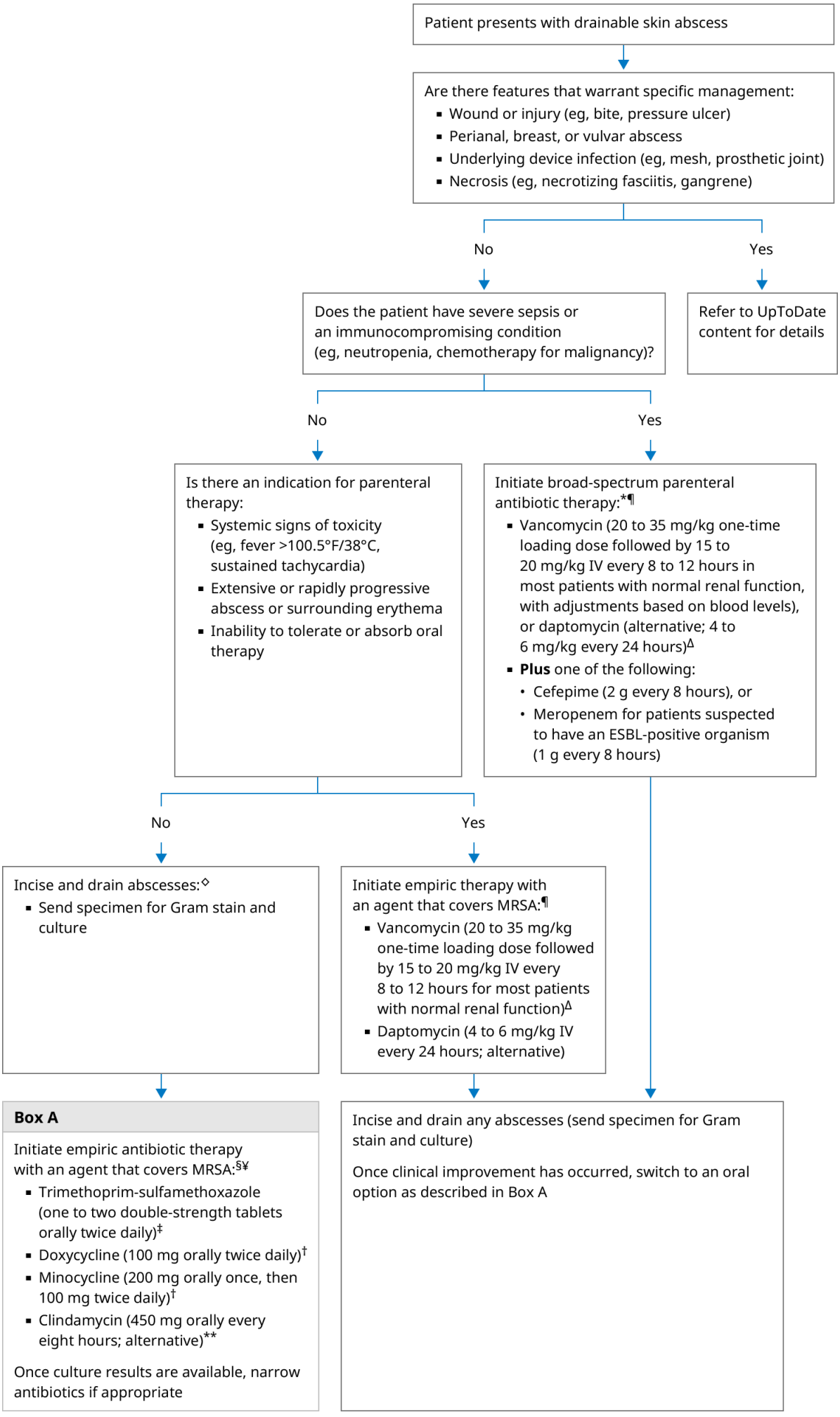
Graphic 65985 Version 3.0

Lymphocutaneous sporotrichosis on upper limb with ulcerative fungating lesions typically spreading upward

Reproduced with permission from: da Rosa AC, Scroferneker ML, Vettorato R, et al. Epidemiology of sporotrichosis: A study of 304 cases in Brazil. J Am Acad Dermatol 2005; 52:451. Copyright © 2005 Elsevier.

Graphic 50115 Version 4.0

Treatment of skin abscess in adults


Patient presents with drainable skin abscess
Are there features that warrant specific management:
▪ Wound or injury (eg, bite, pressure ulcer)
▪ Perianal, breast, or vulvar abscess
▪ Underlying device infection (eg, mesh, prosthetic joint)
▪ Necrosis (eg, necrotizing fasciitis, gangrene)
No
Yes
Refer to UpToDate content for details
Does the patient have severe sepsis or an immunocompromising condition (eg, neutropenia, chemotherapy for malignancy)?
No
Yes
Is there an indication for parenteral therapy:
▪ Systemic signs of toxicity (eg, fever >100.5°F/38°C, sustained tachycardia)
▪ Extensive or rapidly progressive abscess or surrounding erythema
▪ Inability to tolerate or absorb oral therapy
Initiate broad-spectrum parenteral antibiotic therapy:*¶
▪ Vancomycin (20 to 35 mg/kg one-time loading dose followed by 15 to 20 mg/kg IV every 8 to 12 hours in most patients with normal renal function, with adjustments based on blood levels), or daptomycin (alternative; 4 to 6 mg/kg every 24 hours)Δ
▪ Plus one of the following:
• Cefepime (2 g every 8 hours), or
• Meropenem for patients suspected to have an ESBL-positive organism (1 g every 8 hours)
No
Yes
Incise and drain abscesses:◇
▪ Send specimen for Gram stain and culture
Initiate empiric therapy with an agent that covers MRSA:¶
▪ Vancomycin (20 to 35 mg/kg one-time loading dose followed by 15 to 20 mg/kg IV every 8 to 12 hours for most patients with normal renal function)Δ
▪ Daptomycin (4 to 6 mg/kg IV every 24 hours; alternative)
Box A
Initiate empiric antibiotic therapy with an agent that covers MRSA:§¥
▪ Trimethoprim-sulfamethoxazole (one to two double-strength tablets orally twice daily)‡
▪ Doxycycline (100 mg orally twice daily)†
▪ Minocycline (200 mg orally once, then 100 mg twice daily)†
▪ Clindamycin (450 mg orally every eight hours; alternative)**
Once culture results are available, narrow antibiotics if appropriate
Incise and drain any abscesses (send specimen for Gram stain and culture)
Once clinical improvement has occurred, switch to an oral option as described in Box A

Dosing in this table is for adult patients with normal organ (eg, kidney, liver) function. Refer to drug monographs included within UpToDate for dose adjustments and additional information.

ESBL: extended-spectrum beta-lactamase; IV: intravenous; MRSA: methicillin-resistant Staphylococcus aureus.

* For patients with septic shock or an immunocompromising condition who cannot take any beta-lactam agents, we suggest IV vancomycin plus either levofloxacin (750 mg IV once daily) or aztreonam (2 g IV every 6 to 8 hours). The majority of patients with reported beta-lactam allergies can take a cephalosporin (refer to UpToDate content for details).

¶ Once culture and susceptibility data are available, narrow antibiotics to target the pathogen as appropriate.

Δ For further details about vancomycin dosing, refer to UpToDate content for details.

◇ Close observation without incision and drainage is acceptable for stable patients with small abscesses (<2 cm) that are spontaneously draining.

§ Some experts would forego antibiotic therapy in select patients (eg, healthy patients with a single abscess <2 cm in diameter, minimal surrounding cellulitis, and no significant comorbidities).

¥ Five days of antibiotic therapy is generally adequate; extension up to 14 days may be warranted for slow clinical response.

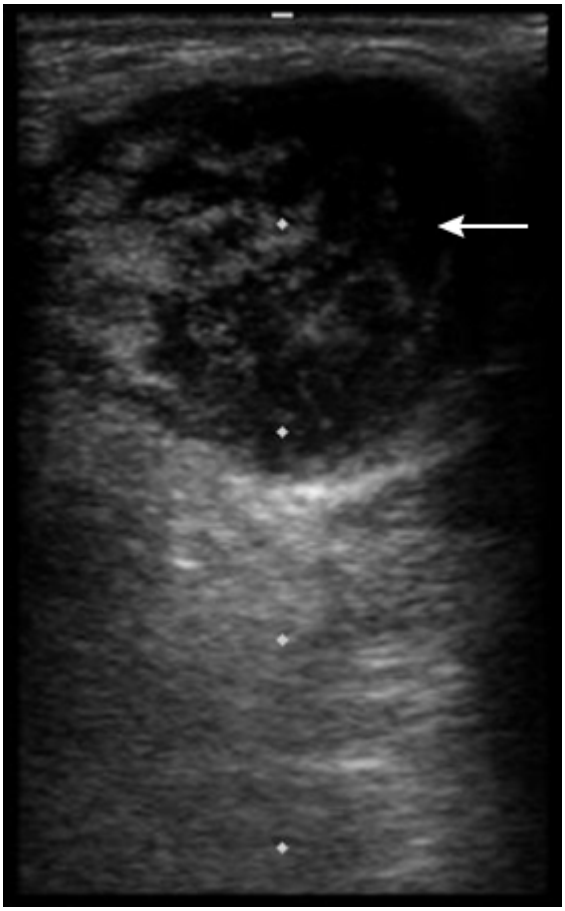
‡ For patients who weigh more than 70 kg and have normal renal function, we favor two double-strength tablets twice daily.

† For patients with risk factors for endocarditis, we add amoxicillin (875 mg orally twice daily) to doxycycline or minocycline for beta-hemolytic streptococcal coverage.

** We generally avoid clindamycin due to risk for C. difficile infection and staphylococcal resistance rates. Local resistance rates should be reviewed before prescribing.

Graphic 139108 Version 8.0

Ultrasonographic appearance of a cutaneous abscess

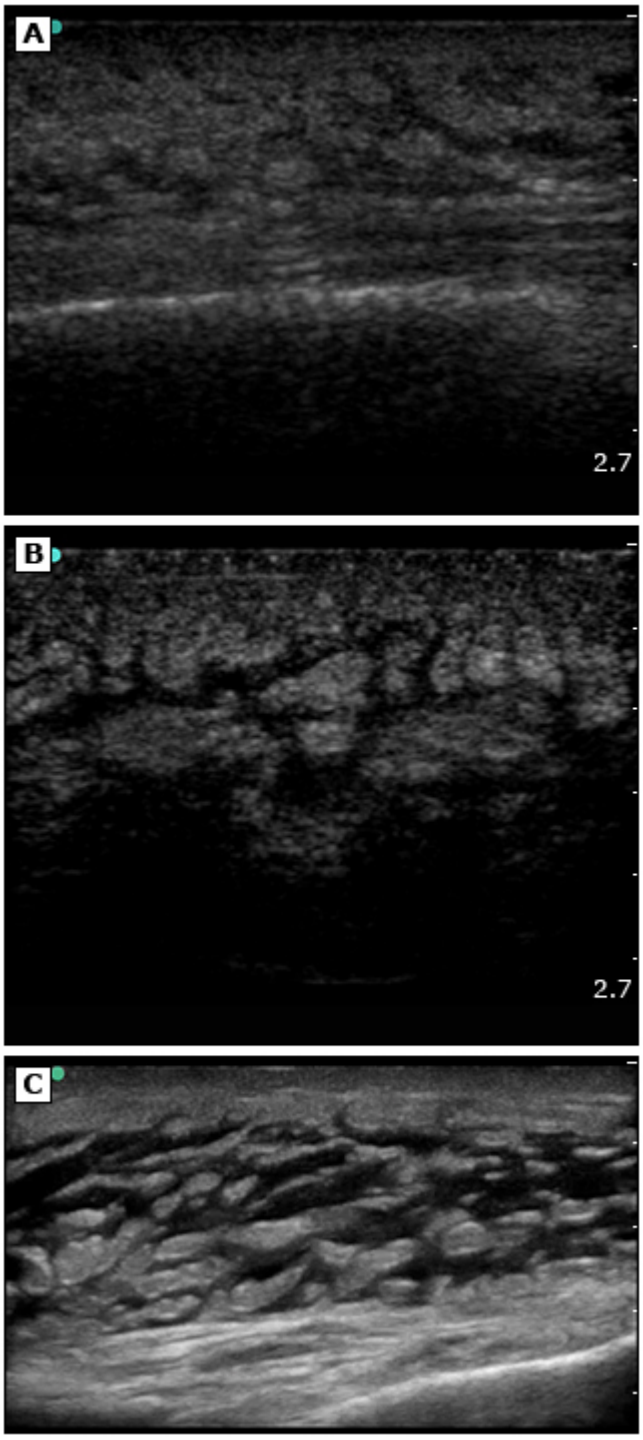


Ultrasound of a mature abscess that has an anechoic (black region [white arrow]) or hypoechoic, fluid-filled center.

Courtesy of Cynthia Gravel, MD.

Graphic 117838 Version 2.0

Ultrasonographic appearance of cellulitis

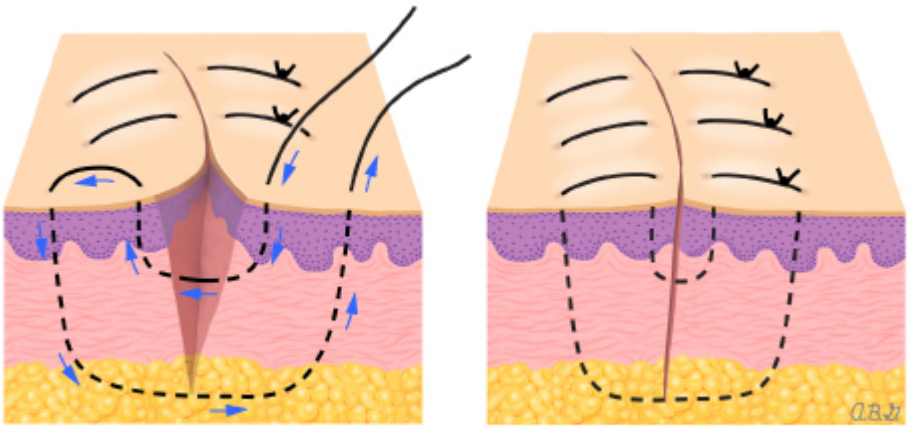


Ultrasound images demonstrate early (A) and late (B, C) cellulitis with inflamed skin with "cobblestone appearance" but no fluid collection.

Courtesy of Cynthia Gravel MD.

Graphic 117839 Version 2.0

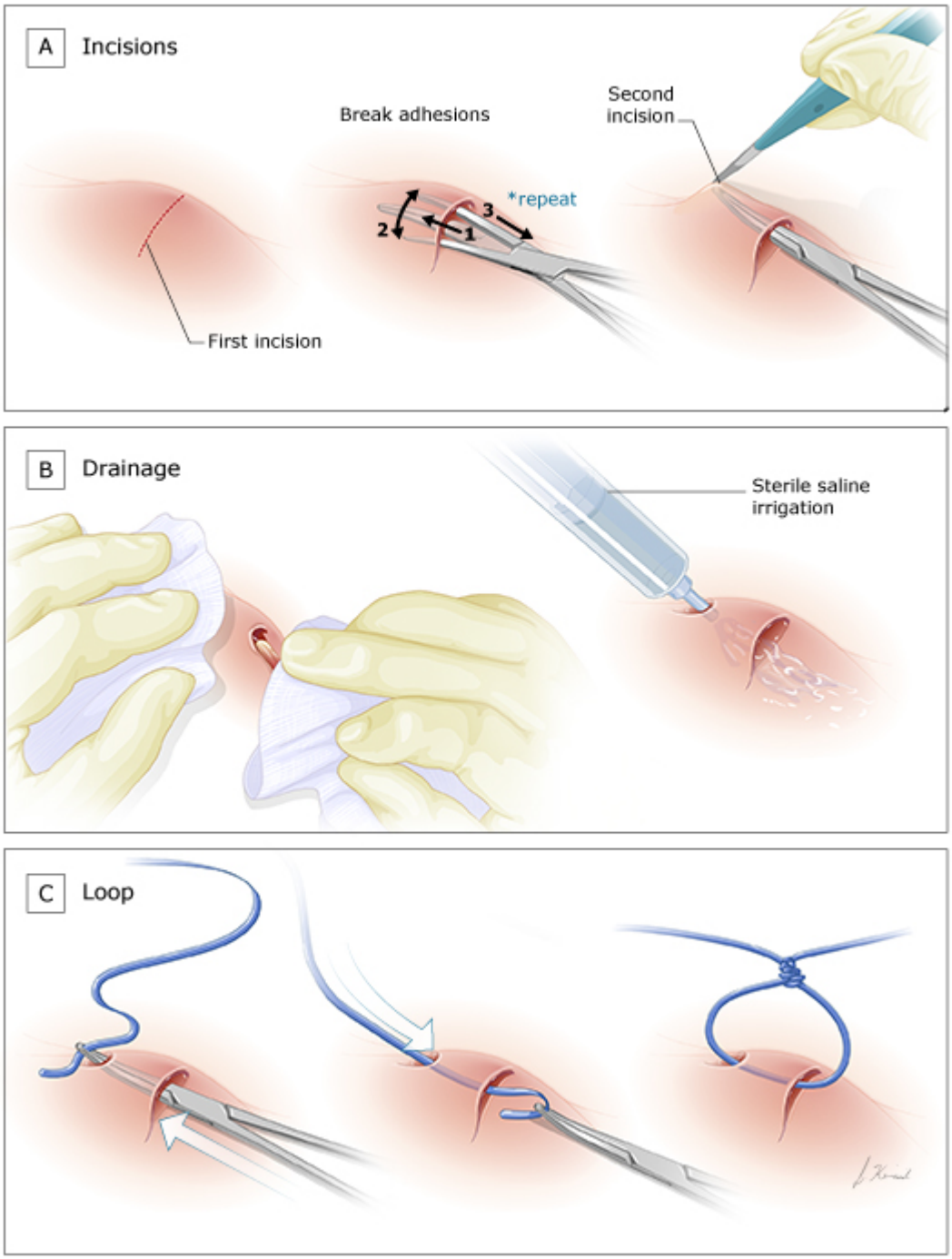
Vertical mattress stitch (shorthand method)



To place a vertical mattress suture using the shorthand method, the needle is initially inserted at the epidermal/dermal (near-near) edges as if performing a simple interrupted suture. This near-near portion of the suture loop everts the edges of the wound. The needle is then rotated 180° in the needle holder, and the direction of the suture loop is reversed (backhanded). The needle entrance is at a distance from the wound edge, crossing through the dermal tissue and exiting through the skin on the opposite side at an equal distance from the wound edge. This is the far-far portion. This stitch approximates the dermal structures.

Graphic 69848 Version 4.0

Loop drainage technique for cutaneous abscesses



Graphic 117797 Version 1.0

Wound management and tetanus prophylaxis

Previous doses of tetanus toxoid*	Clean and minor wound		All other wounds¶	
	Tetanus toxoid-containing vaccine[Δ]	Human tetanus immune globulin	Tetanus toxoid-containing vaccine[Δ]	Human tetanus immune globulin[◇]
<3 doses or unknown	Yes[§]	No	Yes[§]	Yes
≥3 doses	Only if last dose given ≥10 years ago	No	Only if last dose given ≥5 years ago[¥]	No

Appropriate tetanus prophylaxis should be administered as soon as possible following a wound but should be given even to patients who present late for medical attention. This is because the incubation period is quite variable; most cases occur within 8 days, but the incubation period can be as short as 3 days or as long as 21 days. For patients who have been vaccinated against tetanus previously but who are not up to date, there is likely to be little benefit in administering human tetanus immune globulin more than 1 week or so after the injury. However, for patients thought to be completely unvaccinated, human tetanus immune globulin should be given up to 21 days following the injury; Td or Tdap should be given concurrently to such patients.

DT: diphtheria-tetanus toxoids adsorbed; DTP/DTwP: diphtheria-tetanus whole-cell pertussis; DTaP: diphtheria-tetanus-acellular pertussis; Td: tetanus-diphtheria toxoids absorbed; Tdap: booster tetanus toxoid-reduced diphtheria toxoid-acellular pertussis; TT: tetanus toxoid.

* Tetanus toxoid may have been administered as DT, DTP/DTwP (no longer available in the United States), DTaP, Td, Tdap, or TT (no longer available in the United States).

¶ Such as, but not limited to, wounds contaminated with dirt, feces, soil, or saliva; puncture wounds; avulsions; or wounds resulting from missiles, crushing, burns, or frostbite.

Δ The preferred vaccine preparation depends upon the age and vaccination history of the patient:

- <7 years: DTaP.
- Underimmunized children ≥7 and <11 years who have not received Tdap previously: Tdap. Children who receive Tdap at age 7 through 9 years should receive another dose of Tdap at age 11 through 12 years.
- ≥11 years: A single dose of Tdap is preferred to Td for all individuals in this age group who have not previously received Tdap; otherwise, Td or Tdap can be administered without preference. Pregnant women should receive Tdap during each pregnancy.

◇ 250 units intramuscularly at a different site than tetanus toxoid; intravenous immune globulin should be administered if human tetanus immune globulin is not available. Persons with HIV infection or severe immunodeficiency who have contaminated wounds should also receive human tetanus immune globulin, regardless of their history of tetanus immunization.

§ The vaccine series should be continued through completion as necessary.

¥ Booster doses given more frequently than every 5 years are not needed and can increase adverse effects.

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Graphic 61087 Version 34.0

Procedure summary: Incision and drainage of skin abscess

Preparation
1. Explain the procedure to the patient and/or caretaker and obtain informed consent.
2. Provide prophylaxis for bacterial endocarditis, if indicated.
3. Provide procedural sedation and analgesia in addition to local anesthesia.
Incision and drainage
1. Identify the area of maximal fluctuance.
2. Using a scalpel with either an 11 or 15 blade, make a simple linear incision at the point of maxima fluctuance and through the length of the abscess; a stab incision may be used in a cosmetic area.
3. Obtain culture of drainage fluid, if indicated*.
4. Bluntly probe the abscess cavity with a curved hemostat to remove any identified foreign body and to break up loculations.
5. Copiously irrigate the abscess cavity with normal saline until all visible pus is removed.
6. Pack large abscesses (>5 cm in diameter) and pilonidal abscesses with sterile packing gauze or iodoform. Some physicians may choose to pack all abscesses that will accept packing strips.
7. We suggest that abscesses be left open to heal by secondary intention.
8. Provide antibiotic therapy to selected patients¶.
9. Provide tetanus prophylaxis, as indicated.
Follow-up
1. Schedule the patient for a wound check within 24 to 48 hours.
2. At the follow-up visit, remove packing (if present) in patients whose drainage has stopped and initiate warm wet soaks (mild saline solution or soapy water).
3. If drainage persists at the follow-up visit, remove the old packing material and repack with new packing strips. Continue evaluation every 24 to 48 hours with repacking until the drainage stops.
4. If the patient underwent primary closure, remove sutures if pus has reaccumulated. Otherwise, instruct the patient to keep the wound clean and arrange for suture removal seven days after initial incision and drainage.

* Refer to UpToDate topics on skin abscesses, furuncles, and carbuncles.

¶ We suggest that patients with multiple lesions, extensive surrounding cellulitis, immunosuppression, risk for MRSA or systemic signs of infection be managed with incision and drainage as well as antimicrobial therapy.

Graphic 71608 Version 7.0

Contributor Disclosures

Theresa Becker, DO No relevant financial relationship(s) with ineligible companies to disclose. **Anne M Stack, MD** No relevant financial relationship(s) with ineligible companies to disclose. **Sheldon L Kaplan, MD** Grant/Research/Clinical Trial Support: Pfizer [Streptococcus pneumoniae]. Other Financial Interest: Elsevier [Textbook honoraria – Pediatric infectious diseases]. All of the relevant financial relationships listed have been mitigated. **Allan B Wolfson, MD** No relevant financial relationship(s) with ineligible companies to disclose. **Michael Ganetsky, MD** No relevant financial relationship(s) with ineligible companies to disclose.

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