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STATEMENT OF FINANCIAL DISCLOSURE

To reveal any potential bias in this publication, and in accordance with Accreditation Council for Continuing Medical Education guidelines, Dr. Wise (editor) reports he is on the speakers bureau for the Medicines Company. Dr. Thornton (author), Dr. Hellmich (author), Dr. Bullard-Berent (peer reviewer), Ms. Coplin (executive editor), and Ms. Mark (executive editor) report no financial relationships relevant to this field of study.

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Current Management of Abscesses

Introduction

Abscesses are common skin and soft tissue infections (SSTI), and their incidence has continued to rise substantially over the years.¹⁻⁴ Despite the high prevalence of abscesses in current care, the management of abscesses varies widely between care providers.⁵ This article reviews the current management options for simple cutaneous abscesses in patients, including review of the epidemiology, differential diagnosis, diagnostic studies, and changing practice of wound cultures and antibiotic therapy. In addition, this article outlines the essential steps of abscess management, informing practitioners of current best practice options as evidenced by current literature or expert opinion.

Definition/Epidemiology

An abscess is a localized collection of pus resulting from the disintegration of tissue in the dermis and deeper skin tissues. The overlying epidermis is normal, but the dermis contains inflammatory cells and broken down tissue. In contrast, erysipelas is an infection of the upper dermis, and cellulitis is an inflammation and infection of loose connective tissue limited to the dermis and spares the epidermis.⁶ (See Figure 1.) Abscesses are thought to begin as a superficial cellulitis that leads to cell liquefaction and debris collection in the dermis with subsequent loculation leading to abscess formation.⁶ SSTIs including abscesses are common presentations in the emergency department (ED), accounting for more than 200,000 ED visits annually and about 2% of all ED visits.² The incidence of pediatric abscesses has risen considerably in the past 20 years; Lopez et al found that hospitalizations secondary to SSTIs doubled from 1997-2009.⁷ SSTIs, especially in children, most frequently are caused by *Staphylococcus aureus* or *Streptococcus pyogenes*, together accounting for more than 90% of cases.⁸ *Staphylococcus* and *Streptococcus* are also the primary cause of cutaneous abscesses, but enteric bacteria and anaerobic and Gram-negative organisms are not uncommon depending on the anatomic location. Along with the increase of incidence of cutaneous abscesses, the incidence of methicillin-resistant *S. aureus* (MRSA) is also increasing.^{3,9} The incidence of community-acquired

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EXECUTIVE SUMMARY

- Skin and soft tissue infections most frequently are caused by *Staphylococcus aureus* or *Streptococcus pyogenes*, together accounting for more than 90% of cases.
- Community-acquired methicillin-resistant *S. aureus* (CA-MRSA) varies by location, race, and age, and is the most common offending agent in many communities, even in patients with no apparent risk factors.

MRSA (CA-MRSA) varies by location, race, and age, and is the most common offending agent in many communities, even in patients with no apparent risk factors.^{1,10-12}

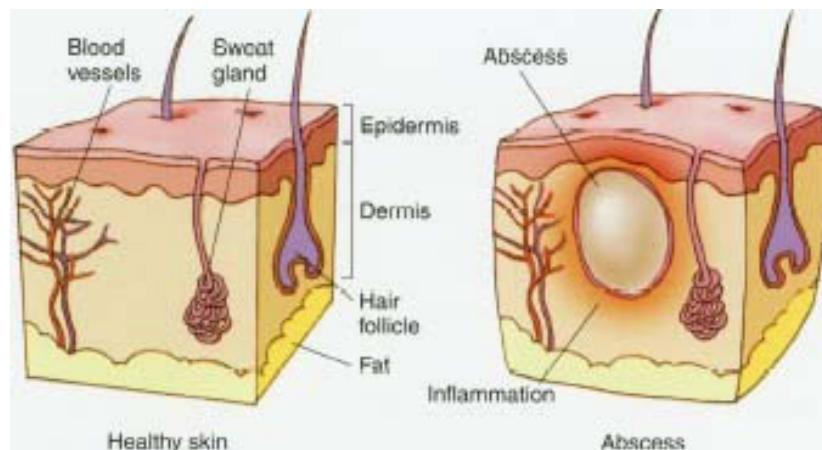
Clinical Features

Skin abscesses typically manifest as erythematous, tender areas with surrounding edema, fluctuance, and induration that may or may not have a pustule. (See Figure 2.) Signs of systemic illness are rare with simple abscesses and should prompt a more thorough diagnostic evaluation, including the possibility of bacteremia. Abscesses can be difficult to differentiate from other SSTIs. Marin et al found that the reliability of diagnosis based on clinical exam alone was poor and was not a reliable determinant for the management of abscesses in children.¹³ Other adjuncts, such as ultrasound, should be used to aid in diagnosis. Differential diagnosis for a simple abscess includes cellulitis, erysipelas, folliculitis, carbuncles, hidradenitis suppurativa, sebaceous cysts, sporotrichosis, and other soft tissue disorders. However, abscesses often occur in healthy patients with no apparent risk factors. Patients at increased risk include immunocompromised patients, intravenous drug users, those living in close contact with people with skin infections, those in crowded living conditions, and those with any skin barrier breakdown such as cuts or insect bites.^{6,14} A history of any skin breakdown or puncture, such as bites, preceding the infection should be elicited, as it may indicate the source of infection and require more targeted therapy.

Diagnostic Studies

Diagnosis is based primarily on history and physical exam; however, as

Figure 1. Skin Abscess Diagram



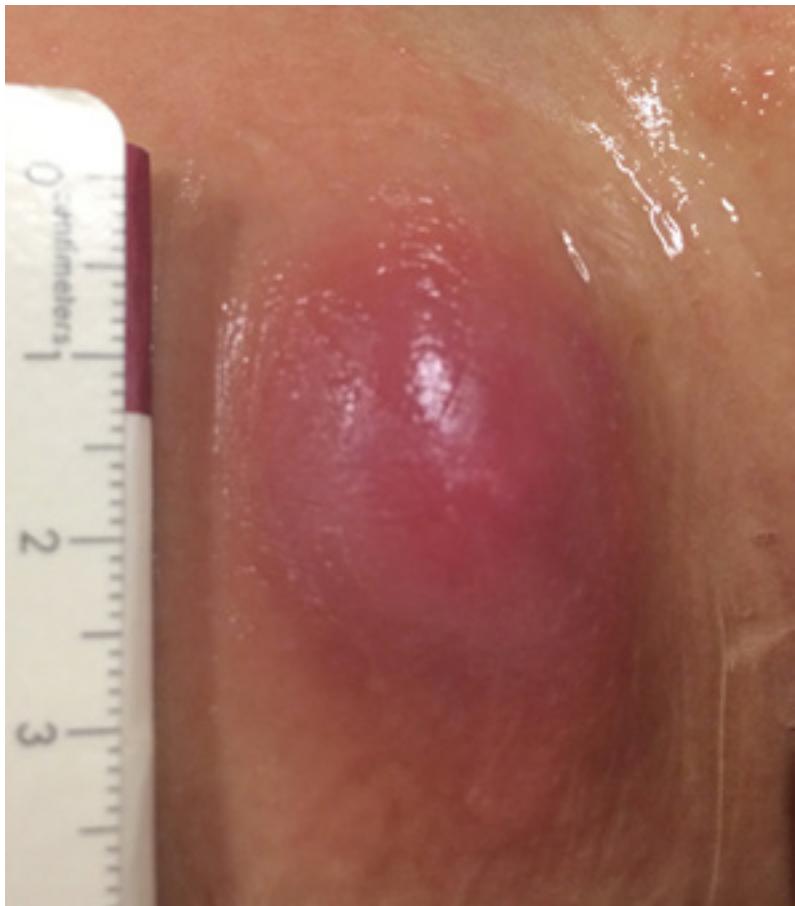
Source: Human Diseases and Conditions Forum. Abscesses. Advameg, Inc. Available at: <http://www.humanillnesses.com/original/A-As/Abscess.html>. Accessed Apr. 1, 2016.

mentioned above, exam alone is often unreliable and adjuncts can be used to ensure the correct diagnosis. Bedside ultrasound is a quick, inexpensive imaging study that can improve the accuracy of diagnosis.¹⁵⁻¹⁸ An abscess will be represented by a hypoechoic or anechoic area of fluid collection. (See Figure 3.) Ultrasound can also be helpful prior to incision and drainage (I&D) to identify the best place for incision to ensure that the entire abscess will be drained. Ultrasound after I&D also can be used to ensure that the entire abscess was drained and there are no remaining loculations with persistent fluid collections. With the continued advancement of ultrasound use in the ED, it is becoming best practice to evaluate and confirm abscesses with ultrasound.

When MRSA first emerged as a problem in the 1990s, it was considered reasonable to obtain culture and sensitivities to help guide treatment.

Now studies have shown that abscess cultures and sensitivities are less relevant in simple uncomplicated skin abscess, even those with MRSA.¹⁹ The 2014 Infectious Diseases Society of America (IDSA) guidelines recommend culture with sensitivities of purulent moderate abscesses defined as having associated signs of systemic illness. Simple or mild abscesses do not necessarily need a culture with sensitivities.⁴ The American College of Emergency Physicians (ACEP) "Choosing Wisely" campaign recommends against obtaining wound cultures after incision and drainage of uncomplicated skin and soft tissue abscesses with adequate follow-up because the results generally will not alter treatment.²⁰ Culture and sensitivities can be helpful if there is abscess recurrence or antibiotic failure; however, routine collection is not necessary and should be collected only when results may alter the treatment plan.

Figure 2. Subcutaneous Abscess



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Laboratory studies and blood cultures are not typically recommended or required for simple abscess evaluation. If the patient has signs of systemic illness or is immunocompromised, a thorough laboratory evaluation including blood cultures should be considered on a case-by-case basis.

Management

Surveys of physicians have found that the management of simple cutaneous abscesses varies widely and is based mostly on personal experience and anecdotal evidence.²¹ Historically, there have been three major options for the management of the simple abscess: I&D alone, I&D plus antibiotics against methicillin-sensitive *S. aureus* (MSSA), or I&D plus antibiotics with coverage for MRSA. Physician preference for

these three options can be quite split when presented with a case in which all of these options may be reasonable.⁵ Needle aspiration is also an option, but is used infrequently and generally is not recommended for simple cutaneous skin and soft tissue abscesses. It is also quite common for the clinician to be faced with early abscess-like SSTI with erythema, induration, no fluctuance, and an ultrasound that is negative for a fluid collection. In cases of a suspected evolving abscess — often referred to as “not ripe abscess” — supportive care, including warm compresses, analgesia, and close follow-up, is recommended.

Antibiotics Are Not Necessary

I&D alone has been shown in several studies to have similar results to

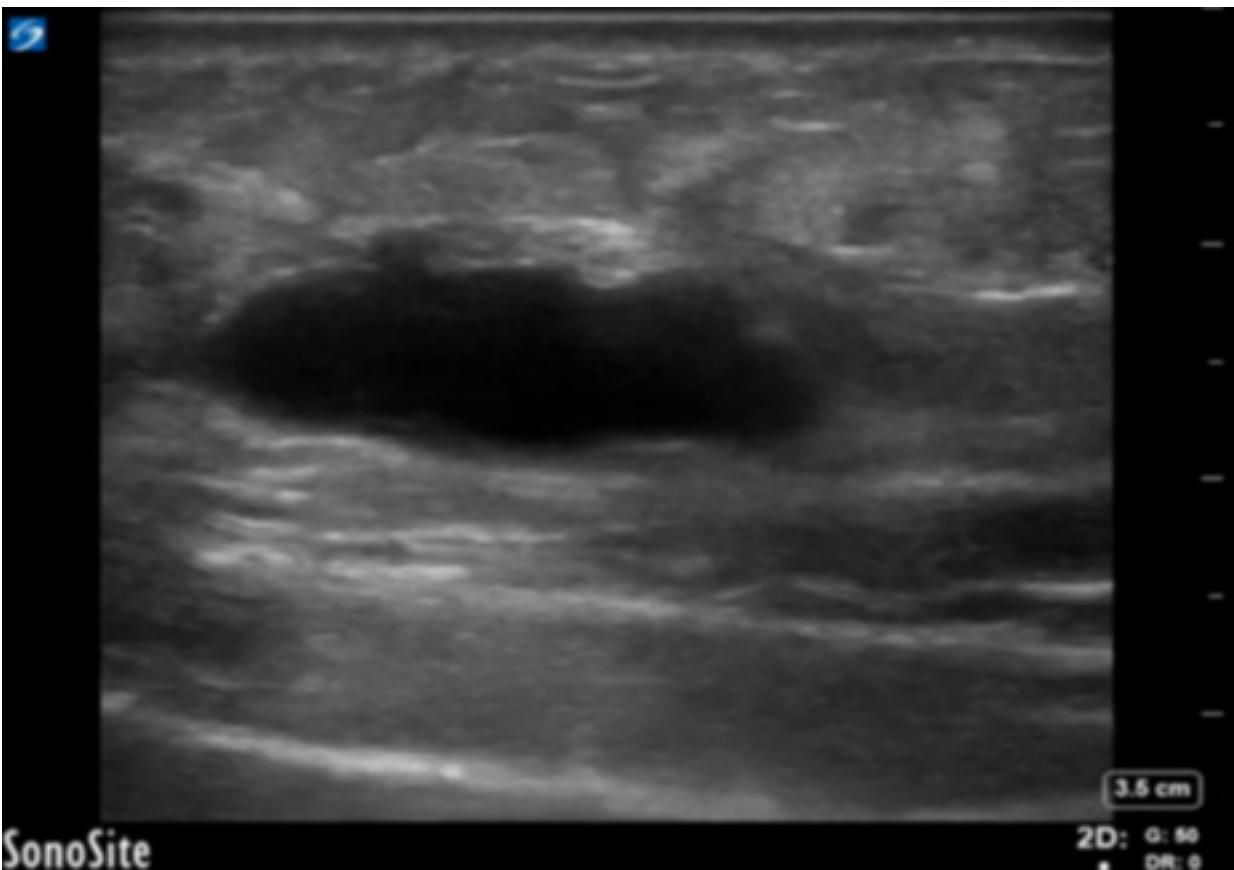
I&D with antibiotics.²²⁻²⁵ In immunocompetent patients without other significant comorbidities and a single, simple cutaneous abscess that has not been previously treated, it is standard of care to treat with I&D alone. I&D plus MSSA and/or MRSA coverage is commonly used but has not been shown to have a benefit over I&D alone. MRSA is the most common cause of abscess in some communities. Despite this, studies have shown that no antibiotics and cephalosporins that only cover MSSA are equally effective treatment plans with the same cure rates as antibiotic coverage for MRSA.^{25,26} If a patient has a high-risk cardiac lesion, follow recommendations outlined by the American Heart Association for pre-procedure antibiotic prophylaxis.²⁷

The IDSA 2014 guidelines for the management of SSTI abscesses⁴ recommend I&D, Gram stain and culture of exudate, and use of antibiotics based only on the signs of systemic infection (fever, tachypnea, tachycardia, leukocytosis). (See Figure 4.) Recurrent abscesses should be treated similarly; however, recurrence should prompt evaluation for an underlying condition, and treatment should be directed based on culture and sensitivity results. As already discussed above, the ACEP “Choosing Wisely” campaign also has concluded that antibiotics are not necessary for simple abscesses in healthy individuals, and cultures should be obtained only if results will alter management. Antibiotics are indicated only for patients with severe or extensive disease, rapid progression in the presence of cellulitis, signs and symptoms of systemic illness (temperature > 38° C), tachycardia, tachypnea, abnormal white blood cells (WBCs), associated comorbidities or immunosuppression, extremes of age, abscess in areas difficult to drain, associated septic phlebitis, or prior lack of response to incision and drainage.²² (See Table 1.) Figure 4 outlines a basic algorithm to follow for treatment of a simple cutaneous abscess.

Incision and Drainage

I&D is the ultimate definitive treatment for any simple skin and soft tissue abscess. After clinical diagnosis

Figure 3. Hypoechoic Fluid Collection on Ultrasound



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suggests an abscess, bedside ultrasound is recommended to confirm the fluid collection, determine its size and nature (e.g., loculations), and locate any possible surrounding vascular structures or foreign bodies. Several factors should be addressed when determining whether a particular abscess is amenable to drainage in the ED. The pre-procedure plan should evaluate pain and sedation needs, identify availability of adequate resources to perform the procedure appropriately in the allotted time, and ensure that there are no significant contraindications to performing the procedure in the ED, such as abscesses that are extremely large or deep, in sensitive areas, or in close proximity to blood vessels or nerves. If all of these issues cannot be addressed, then surgical consultation may be necessary. Table 2 outlines the essential steps of I&D; certain details may need to be

tailored to specific needs of the patient on a case-by-case basis.

Factors to Consider for I&D

Pain control during I&D is a major issue, as this is a very painful procedure. One study identified abscess I&D as the second most painful ED procedure — second only to nasal intubation.²⁹ Local anesthetics often are not adequate for pain control. Depending on the location, a regional block may be helpful. A regional block proximal to the abscess avoids the limiting effects of the acidic nature of the abscess and may negate the need for repeat dosing of anesthetic as the procedure progresses.

In children, procedural sedation should be considered in addition to local/regional anesthetics. Appropriate sedation will ensure pain and anxiety

control, facilitating proper exploration and drainage of the abscess by the practitioner performing the procedure. A frank discussion with parents and/or patients regarding all of the possible treatment options is recommended, as well as utilizing shared decision-making to come up with the best plan of action for each individual patient. At a minimum, oral analgesia is recommended.

Packing/Irrigation

Irrigation of the wound after I&D generally is recommended to help remove debris from the wound; however, there is little evidence to support this practice. Packing the wound after I&D is highly variable among physicians, although the majority of practitioners still pack the wound.²¹ Packing is believed to ensure that the wound stays open to allow adequate drainage and

Table 1. Indications for Antibiotics

Severe or extensive disease
Rapid progression with cellulitis
Signs of systemic illness: <ul style="list-style-type: none"> • Fever • Tachycardia • Tachypnea • Leukocytosis
Associated comorbidities or immunosuppression
Extremes of age
Abscess difficult to drain
Associated septic phlebitis
Prior treatment failure

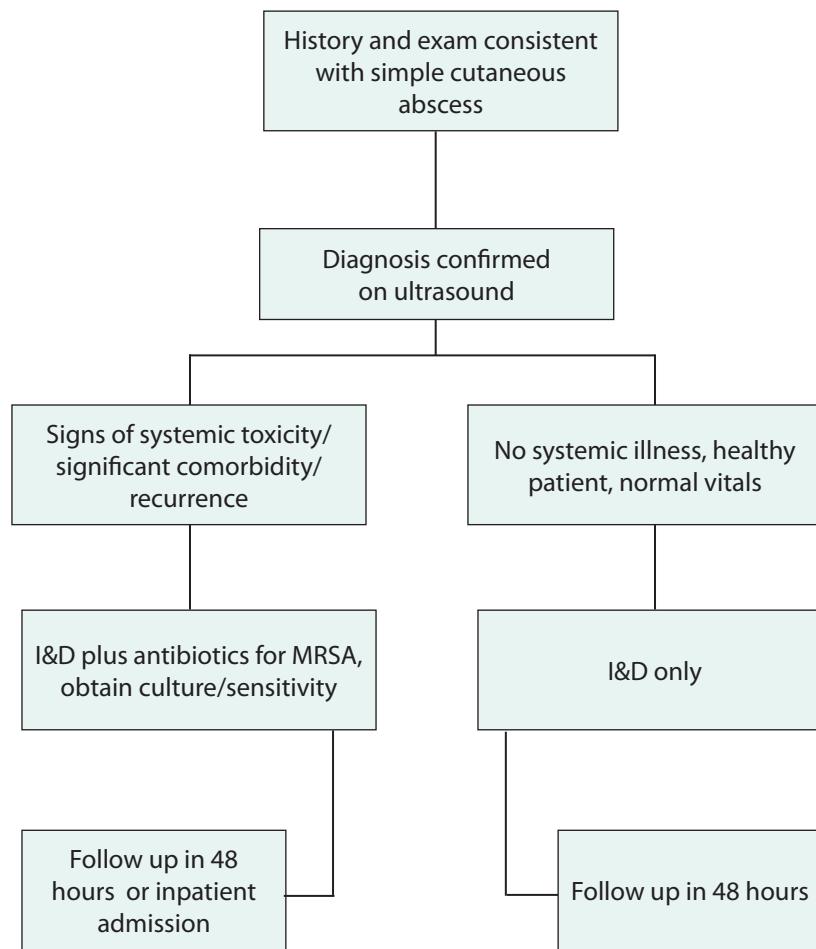
healing by secondary intention. Several studies have shown that the practice of wound packing is unnecessary, with no increase in recurrence without packing, and may actually increase pain.³⁰⁻³² Packing should be considered for problematic cases, such as pilonidal abscesses and abscesses > 5 cm. If packing is placed, it can be assessed for removal in 24 to 48 hours. Packed wounds that are still draining at 48 hours can be repacked and re-evaluated again in 48 hours. If the wound has stopped draining after 48 hours, the packing can be removed and the wound allowed to heal by secondary intention with routine follow-up.

Healing

Secondary intention — the process of leaving the wound open and allowing it to heal naturally — is common

practice in the management of abscesses after I&D. Allowing the wound to heal by secondary intention facilitates ongoing drainage and is thought to decrease the risk of abscess re-accumulation, but it increases the risk of scarring and the time for wound closure compared to primary closure. Some studies have shown that primary closure with sutures has similar failure and recurrence rates compared to healing by secondary intention and would provide better cosmetic results.^{33,34} Primary closure should be considered for very large abscesses and those abscesses in locations that are cosmetically sensitive. Further research is needed with larger randomized, controlled studies before primary closure after I&D can be recommended routinely over healing by secondary intention.

Figure 4. Simple Cutaneous Abscess Management Algorithm



Other Techniques

Although conventional I&D is the most common and widely accepted technique for drainage of a simple abscess, other techniques have been proposed and have the potential to be less invasive and less painful with quicker healing times. The loop technique has been shown in multiple studies to be an effective technique with similar outcomes to conventional I&D.^{35,36} This technique involves making a small stab incision on each side of the abscess, followed by wound exploration, irrigation, and drainage. Afterward, a vessel loop drain is introduced through one incision and pulled out the other, tied to itself, and left in place until drainage stops and the loop can be removed. (*See Figure 5.*) This is a promising technique that has been shown to be effective in small studies and is standard of practice in some places. Appropriate follow-up with a provider comfortable with assessing and removing the drain would be important prior to considering this technique.

Another technique is ultrasound-guided needle aspiration of an abscess, which is potentially less invasive and painful with decreased cosmetic concerns. However, prospective studies have shown that this technique is not reliable for obtaining any purulent material despite ultrasound guidance and, in general, is not a recommended treatment option.³⁷

Expert Consultation

Most cutaneous abscesses can be managed in an office or ED setting; however, surgical consultation may be necessary in certain cases. Consider consultation for abscesses that are very large, complex, or in sensitive areas such as the hands, face, or breasts. Ultrasound should be used to ensure that there are no critical structures such as vessels or nerves around the abscess that may complicate drainage in the ED. Pilonidal abscesses often are drained in the ED for symptomatic pain relief but recurrent episodes may need referral to surgery for excision of sinus tracts. (*See Figure 6.*) Abscesses in the rectal area should be evaluated for fistula and may require surgical consultation. Provider

Table 2. Incision and Drainage Guideline for Simple Cutaneous Abscess²⁸

1. Assemble required equipment including personal protective equipment, cleansing agent, local anesthetic, syringe and needle, gauze, scalpel, hemostat, saline, and materials for dressing.
2. Obtain informed consent and discuss risks and benefits with the patient or family member(s).
3. Ensure tetanus immunization is up to date.
4. Treat with prophylactic antibiotics if high-risk cardiac lesions.
5. Wear personal protective equipment including face mask with eye shield, gown, and gloves. The procedure is not sterile; however, protect yourself from bodily fluids as contents of abscesses can sometimes be under considerable pressure.
6. Clean the identified area thoroughly with chlorhexidine or similar agent.
7. Administer systemic analgesia/anxiolysis/sedation.
8. Inject local anesthetic generously to include the subcutaneous areas around the abscess as well as deeper tissues. Consider a regional block, if applicable.
9. Make a linear incision parallel to Langer or tension lines, if possible, to improve wound healing and scar formation using the scalpel. Incision should be large and deep enough to explore the entire abscess and allow spontaneous drainage of purulent material. Gentle pressure around the abscess can be applied to expel as much purulent material as possible.
10. Consider wound culture.
11. Insert hemostat into the abscess and bluntly dissect any loculations. Consider bedside ultrasound to ensure adequate drainage.
12. Irrigate the wound with normal saline.
13. Consider packing wound depending on size.
14. Consider post-procedure antibiotics.
15. Dress the wound.
16. Review final disposition.

comfort level with the procedure, as well as discussion with the patient or family, always should be used to guide treatment.

Antibiotics

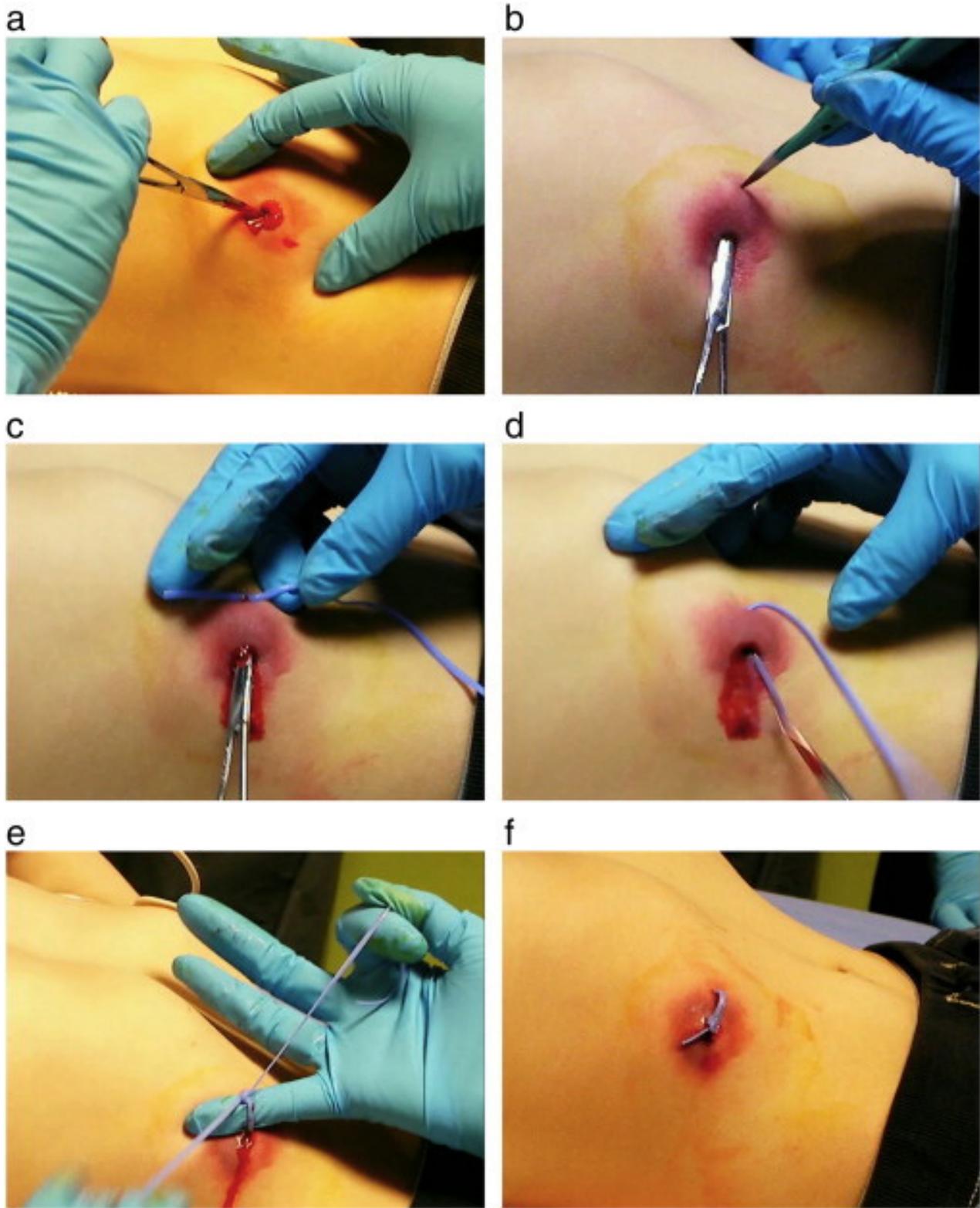
As discussed, antibiotics are generally not required for the management of a simple cutaneous abscess. Antibiotics should be considered only for patients with severe or extensive disease, rapid progression in the presence of cellulitis, signs and symptoms of systemic illness (temperature > 38° C), tachycardia, tachypnea, abnormal WBCs, associated comorbidities or immunosuppression, extremes of age, abscess in areas difficult

to drain, associated septic phlebitis, or prior lack of response to incision and drainage. If antibiotics are prescribed, an antibiotic with activity against MRSA should be used empirically, then tailored according to culture sensitivity results. (*See Table 3.*) Local antibiotic resistance should also be considered when choosing antibiotics.

Disposition

Typically in healthy individuals, outpatient treatment with primary care follow-up is sufficient. If antibiotic coverage is deemed necessary for a simple, uncomplicated skin and soft tissue abscess, outpatient oral antibiotics are

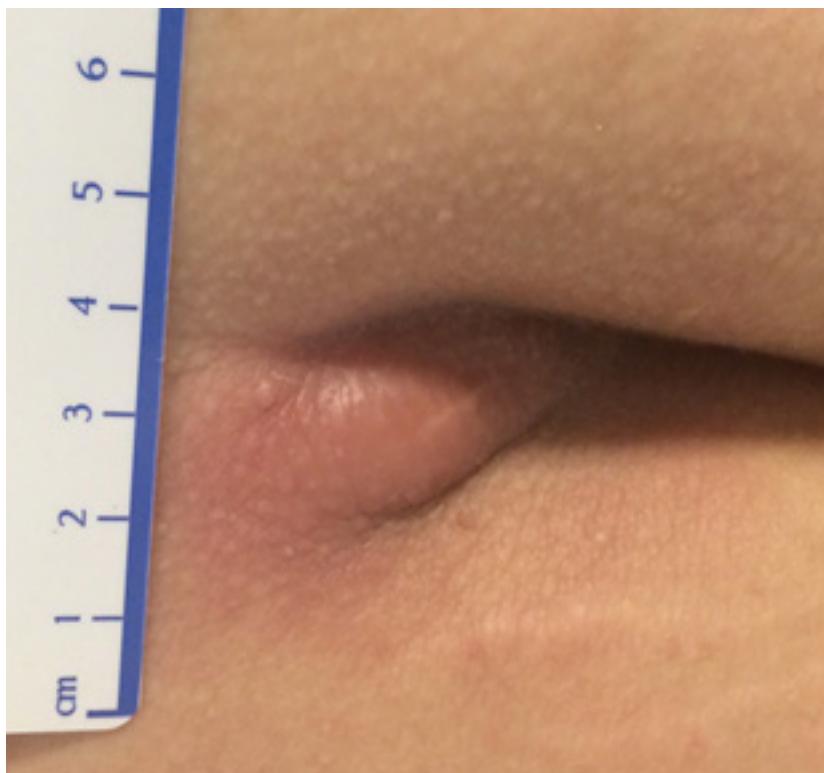
Figure 5. Loop Technique³⁵



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Table 3. Antibiotics with MRSA Coverage

Antibiotic	Dose	Comments
TMP/SMX	4-6 mg/kg/dose (TMP component) 2 times a day PO 1-2 DS tab PO BID adult dose	Does not cover Streptococcus. First-line oral therapy is not recommended for women in the third trimester of pregnancy and for children < 2 months of age.
Doxycycline	2 mg/kg/dose 2 times a day PO Max: 100 mg/dose	Not recommended for children younger than 8 years
Clindamycin	10-13 mg/kg/dose PO/IV every 6-8 hours, not to exceed 40 mg/kg/day	Check local resistance rates; use only if local resistance < 10-15%. The medication has a bad taste; adherence may be difficult.
Vancomycin	15 mg/kg/dose 4 times daily IV	IV treatment choice
Linezolid	< 5 years: 10 mg/kg/dose 3 times daily IV/PO > 5 years: 10 mg/kg/dose 2 times daily IV/PO not to exceed 600 mg/dose	May cause myelosuppression

Figure 6. Pilonidal Abscess

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usually adequate. Patients should follow up with their primary care physician within 48 hours to ensure appropriate

response. If packing was placed, it can be evaluated for removal or removal and replacement at that time. If symptoms

are resolving and no packing is in place, the patient can follow up in approximately one week for final exam to ensure resolution. Patients should be given instructions for frequent soaking of the abscess in warm soapy water. Patients should also be counseled on adequate pain control as an outpatient. Nonsteroidal anti-inflammatory drugs or acetaminophen may be sufficient for smaller abscesses; however, short-term narcotic prescriptions may be necessary for larger abscesses in painful areas. Patients with systemic disease or underlying comorbidities may require parenteral antibiotics and admission to the hospital. Decolonization may be considered for recurrent MRSA infections, but the success of durable MRSA eradication is controversial. These regimens often include applying mupirocin ointment to the nares and/or chlorhexidine scrubs or dilute bleach baths.^{38,39}

Summary

In summary, abscesses are a very common presentation in the ED. MRSA is the most common isolate of these abscesses, regardless of risk factors. History and physical exam combined with ultrasound should be used to diagnose abscesses. I&D is the ultimate treatment with careful attention to pain and anxiety control during the

procedure. Antibiotics should be used only in the setting of systemic illness or with patients who have other medical comorbidities and should cover MRSA. Follow up should be obtained within 48 hours to ensure appropriate resolution of the abscess.

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CME/CE Questions

1. Which of the following is *true* about the epidemiology of simple cutaneous abscesses?
 - A. The incidence of abscesses has decreased over the past two decades.
 - B. Purulent abscesses are generally caused by *Streptococcus pyogenes*.
 - C. The incidence of community-acquired MRSA varies widely by location, race, and age.
 - D. Gram-negative and anaerobes are common causes of abscesses in children.
2. Which of the following is considered best practice in confirming the diagnosis of abscesses?
 - A. Use of ultrasound
 - B. Use of needle aspiration
 - C. History and physical exam alone
 - D. Ultrasound-guided needle aspiration
3. In which situation is obtaining wound cultures and sensitivities recommended?
 - A. Recurrence of abscess
 - B. Antibiotic failure
 - C. Systemic illness in immunocompromised patient
 - D. All of the above

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7. A 4-year-old previously healthy boy presents with a simple cutaneous fluctuant, tender, erythematous buttocks abscess. His mother says he is very fearful of needles. The exam and ultrasound confirms the diagnosis of a 9 mm simple abscess. Your shared decision-making with the mom includes which of the following options?
- A. Papoose board and a “quick” I&D
B. Needle aspiration
C. Procedural sedation
D. Antibiotics, and recheck in 2 days
8. A 6-month-old presents with a fever and large recurrent perirectal abscess. What is the best management option?
- A. Oral antibiotics, recheck in 48 hours
B. Procedural sedation and drainage in ED, then admission, IV antibiotics
C. Procedural sedation and drainage in ED, home on oral antibiotics, close follow-up
D. Consultation with a pediatric surgeon
9. The loop technique has been shown in multiple studies to be:
- A. an effective technique with similar outcomes to conventional I&D.
B. a difficult technique to perform.
C. a procedure with prolonged healing time.
D. a procedure with increased risk of infection.

PRIMARY CARE REPORTS

CME Objectives

Upon completion of this educational activity, participants should be able to:

- Summarize recent, significant studies related to the practice of primary care medicine;
- Evaluate the credibility of published data and recommendations related to primary care medicine;
- Discuss the advantages and disadvantages of new diagnostic and therapeutic procedures in the primary care setting.

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