CLINICAL DECISIONS
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Management of Skin and Soft-Tissue Infection

This interactive feature addresses the diagnosis or management of a clinical case. A case vignette is followed by specific clinical options, none of which can be considered either correct or incorrect. In short essays, experts in the field then argue for each of the options. In the online version of this feature, available at www.nejm.org, readers can participate in forming community opinion by choosing one of the options and, if they like, providing their reasons.

CASE VIGNETTE

A 20-year-old college basketball player presents to the emergency department with a 2-day history of a red, painful area on his right buttock. He reports that there was no specific trauma to this area but that he had participated in several basketball games over the past several weeks at various schools throughout the United States. He believes he may have had a low-grade fever the night before but did not take his temperature. He has no chronic medical conditions and is taking no medications. He did receive amoxicillin for 1 week within the past year for a sinus infection but otherwise has not received any antimicrobial therapy. He has no known allergies to medication. A physical examination was notable for an oral temperature of 37.7°C, a pulse of 78 beats per minute, a blood pressure of 110/70 mm Hg, respirations of 12 per minute, and an erythematous, warm, tender, 5-by-3-cm area on the right buttock, with a firm, tender central area approximately 2 cm in diameter and without drainage. He does not like to take medications, but he is concerned that he will not be at full strength for his next basketball game in 1 week's time.

In addition to close follow-up, which one of the following initial treatment options, any of which could be considered correct, would you find most appropriate for this patient? Base your choice on the published literature, your past experience, recent guidelines, and other sources of information, as appropriate.

1. **Incision and drainage alone.**
2. **Incision and drainage plus an oral antimicrobial agent active against methicillin-susceptible *Staphylococcus aureus* (MSSA), such as dicloxacillin or cephalexin.**
3. **Incision and drainage plus an oral antimicrobial agent active against methicillin-resistant *S. aureus* (MRSA), such as trimethoprim–sulfamethoxazole or clindamycin.**

To aid in your decision making, each of these approaches to treatment is defended by an expert in the management of infectious diseases in the following short essays. Given your knowledge of the condition and the points made by the experts, which treatment approach would you choose? Make your choice on our Web site (www.nejm.org).

TREATMENT OPTION 1

Incision and Drainage Alone

Henry F. Chambers, M.D.

This is a case of an uncomplicated cutaneous abscess, probably due to infection with *S. aureus*, in a college athlete. On physical examination, the center of the lesion is indurated, not fluctuant, maybe because the abscess is not fully mature or because overlying inflammation and tissue edema are obscuring a deeper abscess. The absence of purulent drainage, which if present would favor the diagnosis of abscess, is not helpful in ruling out the diagnosis. Needle aspiration or ultrasonography is useful in locating the collection of pus not evident on inspection or palpation. Surrounding cellulitis is common, and given the focal nature of this lesion, it can be effectively treated with incision and drainage alone. Prescribing a course of antimicrobial therapy, although a common practice, is unnecessary and may be associated with side effects, either in direct relation to the use of the medication or through facilitation of resistant organisms. Antibiotics have not been shown to improve outcomes in patients with un-

complicated abscesses, as compared with incision and drainage alone.

The fact that antibiotics are not necessary in treating uncomplicated staphylococcal skin infections was suggested by the results of a trial published in 1957 comparing intramuscular penicillin with oral penicillin for a variety of skin infections, 80% of which were boils, abscesses, or carbuncles.[1] Clinical isolates of *S. aureus* from 66 of the 239 patients were penicillin-resistant, yet these patients fared just as well as those infected with susceptible strains. The following year, Anderson reported results for 320 patients with *S. aureus* infections in the hand that were treated with the use of surgical drainage.[2] The outcome was the same for those not treated with penicillin and those treated with penicillin. These findings have been confirmed in randomized trials comparing no antibiotic therapy and therapy with cloxacillin,[3] clindamycin,[4] or cephradine.[5]

Should the treatment recommendations be different for this athlete if his infection is caused by a community-associated strain of MRSA? Although there are no specific risk factors for MRSA in this case, community-associated MRSA strains are widespread and prevalent throughout the United States.[6] Regardless of susceptibility, antibiotics are not needed in this healthy man with an uncomplicated first abscess, no coexisting medical conditions, and no systemic signs of infection. According to three observational studies[6-8] and one randomized trial,[9] the outcome for MRSA infection of the skin and soft tissues is independent of whether the antibiotic prescribed is active or not, and outcome of MRSA infections treated with an inactive agent is the same as that for MSSA infection treated with an active antibiotic. One retrospective study[10] suggesting a benefit of antibiotics is not applicable to this particular case. The patient population studied had a high rate of coexisting medical conditions; 34% of patients had health care–associated infections, and 34% were hospitalized.

A randomized, double-blind trial[11] comparing placebo to cephalexin in 166 patients undergoing surgical drainage of uncomplicated abscesses provides the strongest evidence yet that antibiotics are not needed. A total of 68% of cultures yielded *S. aureus* strains, 88% of which were MRSA, and 94% of the MRSA strains were positive for Panton–Valentine leukocidin. In all, 90.5% of placebo recipients had a clinical cure, as compared with 84.1% of cephalexin recipients — an absolute difference of 6.4% (95% confidence interval, −4.2 to 17.0), favoring the placebo.

I anticipate an excellent outcome in our college athlete with the use of incision and drainage alone. I would not want to expose him to potential side effects from the use of antibiotics, although they are uncommon, without a reasonable likelihood of benefit.

Dr. Chambers reports receiving grant support from Cubist and Johnson and Johnson. No other potential conflict of interest relevant to this article was reported.

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TREATMENT OPTION 2

Incision and Drainage plus Anti-MSSA Therapy

Robert C. Moellering, Jr., M.D.

There are three major issues to consider in determining whether or not incision and drainage plus therapy with an oral antistaphylococcal agent such as dicloxacillin or an oral first-generation cephalosporin such as cephalexin should be used in this patient. The issues to be considered are the following:

1. What is the potential benefit of antimicrobial therapy after successful incision and drainage in this patient?
2. What is the probable cause of the infection of the buttock in this patient?
3. What are the probable patterns of susceptibility of the pathogens causing this infection in the geographic area in which it occurred?

It has been clearly shown that many localized small abscesses and furuncles will respond favorably to local incision and drainage alone and do not require antimicrobial therapy. Indeed, a recent study of such infections in the San Francisco area showed that cephalexin was no better than placebo for treating such infections.[11] It should be noted, however, that the majority of these infections were due to community-associated MRSA, and in essence the study had a double-placebo design, since cephalexin is not active against community-associated MRSA.

However, in patients with a sizable area of sur-

rounding cellulitis or with skin and soft-tissue infections in which there is cellulitis without a drainable focus, most clinicians would add antimicrobial agents to the therapeutic regimen.[12,13] Antimicrobial drugs are used in these patients to provide more rapid resolution of symptoms, to prevent further spread of the infection, and to prevent bacteremia with dissemination to other parts of the body. The prevalence of bacteremia in uncomplicated skin and skin-structure infections is generally less than 5%.[12,14] However, certain factors have been shown to be associated with bacteremia, including the absence of previous antimicrobial therapy, acute and abrupt onset of cellulitis, illness of less than 2 days' duration, presence of two or more coexisting conditions, and involvement of a proximal limb.[15]

Most uncomplicated skin and soft-tissue infections in immunocompetent hosts are caused by group A streptococci or MSSA.[12,13] Group A and other β-hemolytic streptococci remain universally susceptible to penicillins and cephalosporins (including penicillin G), the antistaphylococcal penicillins, and the oral cephalosporins. These agents are also more active against group A streptococci than the tetracyclines or trimethoprim–sulfamethoxazole, which are frequently used for presumed community-associated MRSA infections.[16,17]

During the past decade, community-associated MRSA has become increasingly frequent in the United States, and in certain communities, as many as 60 to 75% of *S. aureus* isolates are now resistant to methicillin.[18,19] Such isolates are also being seen with increasing frequency in Australia and in parts of Europe, but in many parts of the world their prevalence is low or nonexistent. In communities without a high prevalence of community-associated MRSA, initial treatment of skin and soft-tissue infection with incision and drainage and use of an oral antistaphylococcal penicillin or cephalosporin is perfectly reasonable, is desirable given the potential for streptococcal infection, and is consistent with current therapeutic guidelines.[12,13] Given the rapid spread of community-associated MRSA, it is imperative to obtain material for culture and susceptibility testing when possible and to keep track of local variations in the prevalence of MRSA in the community.

The patient in the vignette does not have evidence of fever or clinically significant systemic reaction to the infection on his buttock and is not known to have had exposure to community-associated MRSA. Nonetheless, given the amount of the surrounding cellulitis, it is perfectly reasonable to add an antimicrobial agent to the therapeutic regimen. Unless the cultures are positive for MRSA, use of either dicloxacillin or cephalexin is appropriate.

Dr. Moellering reports receiving consulting or advisory fees from Pfizer, Cubist, Astellas, Forest, and Wyeth. No other potential conflict of interest relevant to this article was reported.

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TREATMENT OPTION 3

Incision and Drainage plus Anti-MRSA Therapy

Paul Kamitsuka, M.D., D.T.M.H.

First, although decisions regarding the choice of empirical antibiotics should be made on the basis of local resistance data when possible, the likelihood that our patient has a community-associated MRSA infection is considerable. He is an athlete with exposure to skin flora through physical contact in geographic locales across the United States. In a study of acute skin and soft-tissue infections in patients presenting to emergency departments in 11 U.S. cities, 59% of the infections were due to community-associated MRSA (range, 15 to 74).[6] Nonetheless, it is advisable to obtain a sample for culture at the time of incision and drainage, not only to focus current treatment but also to have susceptibility data in case the infection recurs and eradication of community-associated MRSA is needed.

Second, although it has long been accepted that most MRSA soft-tissue abscesses may be treated with incision and drainage alone,[13] recent data suggest that antibiotics may play a more important role in treating abscesses due to community-associated MRSA. Unlike traditional MRSA strains,[20] community-associated MRSA strains often produce Panton–Valentine leukocidin, a pore-forming cytotoxin associated with increased tissue destruction. In a retrospective cohort study of 492 adults with 531 independent episodes of skin and soft-tissue infections with community-associated MRSA, most of whom underwent incision and drainage, therapy was successful in

95% of those receiving an active antibiotic as compared with 87% of those who did not.[10] Use of an inactive antimicrobial agent was an independent predictor of treatment failure on logistic-regression analysis (adjusted odds ratio, 2.80; 95% confidence interval, 1.26 to 6.22; P=0.01). Szumowski et al.[21] found, in a retrospective review of 399 sequential cases of culture-confirmed *S. aureus* skin and soft-tissue infections, including 227 cases of MRSA infection, use of an antibiotic to which the isolate was sensitive was associated with an increased likelihood of clinical resolution (odds ratio, 5.91, as compared with no such use), after adjustment for incision and drainage and human immunodeficiency virus status. Finally, in a prospective observational study of a pediatric population, Lee et al.[8] found that an infected site more than 5 cm in diameter treated by means of incision and drainage was less likely to respond in the absence of effective antibiotic therapy than with such therapy. Our patient's abscess is 5 cm in diameter.

A third consideration is whether providing effective antibiotics will decrease the risk of persistent carriage and thereby prevent recurrent infection as well as spread of community-associated MRSA to others. The answer to this question awaits further study, although in the absence of hard data clinicians often find themselves attempting to break the cycle of recurrent infection with the combined use of systemic antibiotics and topical antiseptics. Recurrent skin and soft-tissue infection is a vexing characteristic of community-associated MRSA, with estimates of recurrence ranging from 10%[22] to 23.8%.[21] Although some of these recurrences may be due to infection with a different community-associated MRSA strain, others result from persistent cutaneous carriage of the original strain after resolution of the initial infection. The spread of community-associated MRSA to household contacts is also problematic. Zafar et al.[23] found that 20% of household contacts of patients with community-associated MRSA skin and soft-tissue infections carried MRSA, with half the MRSA strains related to the patient's infective isolate. A previous study reported household MRSA-carriage rates of 14.5%.[24] Anecdotal evidence suggests that more than 60% of households of children hospitalized with community-associated MRSA infections include one or more family members who had a putative MRSA infection in the previous 6 months.[22] The likelihood of clinical infection after colonization by community-associated MRSA appears to be considerable. Ellis et al.,[25] in a prospective observational study of soldiers, found that soft-tissue infections developed over a period of 8 to 10 weeks in 9 of 24 (38%) of those with community-associated MRSA in their nares, as compared with only 8 of 229 (3%) of those with nasal carriage of MSSA (P<0.001).

For our athlete, eager to resolve his infection before next week's game, the provision of an antibiotic effective against community-associated MRSA, perhaps with the use of 2% chlorhexidine for bathing, appears to be prudent.

No potential conflict of interest relevant to this article was reported.

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