

Evidence-based approach to abscess management

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ABSTRACT

OBJECTIVE To provide family physicians with an overview of the evidence for managing superficial cutaneous abscesses.

SOURCES OF INFORMATION PubMed (from 1950), EMBASE (from 1974), The Cochrane Library (from 1966), and Google (from 1998) were searched as were reference lists of identified articles. Summary sites, such as ACP Journal Club and InfoPOEMs, and background resources were also reviewed.

MAIN MESSAGE There are many areas of debate regarding abscess management, including pain control, necessity of culture and sensitivity testing, empiric treatment with antibiotics, and open versus primary closure of wounds. Usefulness of cultures and empiric antibiotic treatment has risen to the forefront with the increasing incidence of community-acquired, methicillin-resistant *Staphylococcus aureus*.

CONCLUSION In immunocompetent patients with no confounding risk factors, incision and drainage under local anesthetic is generally sufficient for abscess management. There is no compelling evidence for routine cultures or empiric treatment with antibiotics. Further research is required.

RÉSUMÉ

OBJECTIF Présenter au médecin de famille un aperçu des données probantes concernant le traitement des abcès cutanés superficiels.

SOURCES DE L'INFORMATION On a consulté PubMed (à partir de 1950), Embase (à partir de 1974), la Cochrane Library (à partir de 1966) et Google (à partir de 1998) ainsi que les bibliographies des articles repérés. On a également passé en revue des documents condensés tels le Journal Club de l'ACP et les InfoPOEMs en plus de documents généraux.

PRINCIPAL MESSAGE Plusieurs aspects du traitement des abcès sont sujets à controverse, notamment le contrôle de la douleur, la nécessité des cultures et des tests de sensibilité, l'antibiothérapie empirique et le choix entre une plaie laissée ouverte ou une suture primitive. L'utilité d'une antibiothérapie empirique est devenue un sujet d'actualité, compte tenu de l'incidence accrue des infections à staphylocoque doré résistant à la méthicilline contractées dans le milieu naturel.

CONCLUSION Chez un patient immunodéficient sans facteurs de risque de confusion, l'incision avec drainage sous anesthésie locale est généralement suffisante comme traitement des abcès. Il n'y a pas de preuve convaincante en faveur d'une culture ou d'une antibiothérapie empirique. D'autres études seront nécessaires.

This article has been peer reviewed.

Cet article a fait l'objet d'une révision par des pairs.

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Case

Ms J.S. is a healthy 24-year-old university student who comes to your office complaining of localized pain and swelling over the medial aspect of her left forearm. She reports that she had a scratch injury to this area a few days before. She is otherwise healthy with no current medications or recent hospitalizations. On examination, you find a 2-cm localized area of tenderness and swelling. The central area is fluctuant, surrounded by an area of erythema and induration. She is diagnosed with a superficial cutaneous abscess, and you recommend incision and drainage. Ms J.S. is anxious about the procedure and is unsure whether she can return for reassessment because of a heavy examination schedule. She wonders whether she can take antibiotics instead. This leads to questions of what the best-evidence practice is for managing superficial cutaneous abscesses.

The incidence of cutaneous abscess in general practice is believed to be high but is not well reported. In selected populations, such as patients visiting university clinics¹ or intravenous drug users,² it varies from 2.5% to 21.5%, respectively. Incision and drainage (I&D) is universally accepted as the treatment of choice for cutaneous abscesses.^{1,3-5} Controversies exist with regard to the use of anesthesia, necessity of swabs for culture and sensitivity testing, empiric treatment with antibiotics, and open versus primary closure of wounds.⁵ Issues of culturing a sample of the abscess exudate and empiric treatment with antibiotics have recently risen to the forefront with the increasing incidence of community-acquired, methicillin-resistant *Staphylococcus aureus* (CA-MRSA).

Sources of information

PubMed (from 1950), EMBASE (from 1974), The Cochrane Library (from 1966), and Google (from 1998) were searched up to September 2006 using the terms *abscess*, *incision and drainage*, *soft tissue infections*, and *MRSA*. The reference lists of identified articles were also searched. In addition, summary sites such as ACP Journal Club and InfoPOEMs and background resources such as UpToDate and textbooks were reviewed. Higher level evidence was given higher priority for inclusion.

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Main message

Pain control. At the time of writing, no randomized controlled trials existed that looked at optimal pain control for I&D of superficial cutaneous abscesses. One observational study⁶ found that, in most cases, patients rated I&D as the second most painful procedure in the emergency department despite the use of local anesthetic. This study⁶ raises the question of the effectiveness of local anesthetic, although most patients reported they would prefer anesthetic for similar procedures in the future. Without higher levels of evidence, many textbooks advocate using local anesthetic^{4,7} along the linear course of the proposed incision, around the perimeter of the abscess, or both (level III evidence).⁵ Local anesthetic has been reported to work poorly in the acidic milieu of an abscess. Therefore, some recommend introducing local anesthetic into the perimeter of the tissue around the abscess.⁴ Some physicians might find using vapocoolant sprays helpful. While one study⁸ shows minor benefit in pain reduction for pediatric immunizations, there is no evidence for using sprays in managing abscesses. In certain circumstances (ie, small abscesses) some physicians might avoid anesthetic use; however, most pain occurs during breaking of loculations, not during the incision. Patient comfort during this part of the procedure will help ensure the wound is examined thoroughly.⁵ Some emergency department studies (examining other aspects of abscess management) report using intravenous opiates or benzodiazepines,¹ ketamine,⁹ nitrous oxide,¹⁰ or general anesthetic¹¹ for pain management. Obviously, these alternatives are not available to office-based physicians.

Levels of evidence

Level I: At least one properly conducted randomized controlled trial, systematic review, or meta-analysis

Level II: Other comparison trials, non-randomized, cohort, case-control, or epidemiologic studies, and preferably more than one study

Level III: Expert opinion or consensus statements

Surgical management. Most authors advocate surgical drainage of abscesses,^{1,3-5} and many cohort studies^{12,13} support this approach (level II evidence). Unfortunately, no evidence beyond expert opinion for the specific components of surgical management following I&D is available. For example, one author⁷ suggests changing packing every 24 hours or less, while another author⁴ suggests changing intervals could be as long as 7 days. However, lack of evidence for practices such as breaking loculations, syringing the wound with sterile saline, and packing large abscesses does not equate to lack of benefit. Without evidence against these procedures and strong support for them, they should continue to be incorporated into practice as appropriate.

To culture or not to culture. Aspiration might be helpful in differentiating abscess from cellulitis and might provide a better sample for culture and sensitivity testing than swabbing the surgical wound.^{1,5} However, the original study¹ looking at the benefits of aspiration did not include a comparator group, and it is not possible to say whether aspiration before I&D provides meaningful benefit. Routine sampling for culture and sensitivity testing is debated in the literature. Evidence shows that routine cultures do not change management¹⁴ or outcome for patients presenting with abscesses (level II evidence).¹⁵ Some physicians advocate routine cultures in order to help define local resistance patterns¹⁶ or to determine appropriate antibiotic treatment.¹⁷ Other studies advocate routine swabbing for abscesses because, in some individuals, atypical organisms grow that would not be expected from their clinical histories.^{14,17} The implicated cost of this could be high. Recently, a number of studies have demonstrated that most patients improve even when the bacterial pathogen is resistant to the empirically prescribed antibiotic (level II evidence).^{12,13,17,18} Without further evidence, routine swabbing is not recommended in immunocompetent individuals with no other risk factors.^{1,19}

Empiric treatment with antibiotics. Although there are many opinions that often conflict, large, well-designed randomized trials of antibiotic benefit in abscess management are lacking. Some authors have always encouraged routine empiric treatment with "simple" antibiotics based on the most likely bacterial pathogens.²⁰ Interestingly, research dating back almost 30 years does not support this recommendation (level I and II evidence).^{1,21,22} One observational study of 135 abscesses following I&D did not find the addition of antibiotics affected outcomes (level II evidence).²¹ A randomized controlled trial confirmed these findings when it reported no difference in clinical improvement between placebo and antibiotic groups following I&D (level I evidence).²²

More recently, in a large community prospective study of skin and soft-tissue infection, 57% of CA-MRSA infections were resistant to the empirically prescribed antibiotic (level II evidence). Fortunately, neither susceptibility nor resistance to antibiotics prescribed had any effect on patient outcomes.¹² In a similar study, Fridkin and colleagues¹⁷ found that, even when initial antimicrobial therapy was ineffective (particularly due to CA-MRSA), there was no increased rate of follow-up visits to health care providers, subsequent I&Ds, or subsequent changes in antimicrobial therapy (level II evidence).¹⁷ In an immunocompetent pediatric population with I&D for abscesses smaller than 5 cm, children receiving no antibiotics or antibiotics to which the pathogen was resistant fared as well as those receiving effective antibiotics (level II evidence).¹³ Other data show that most patients receiving I&D followed by antibiotic treatment

Rise of community-acquired, methicillin-resistant *Staphylococcus aureus*

Before 2000, community-acquired, methicillin-resistant *Staphylococcus aureus* (CA-MRSA) infections were infrequently seen, accounting for no more than 3% of skin or soft-tissue infections submitted to Minnesota laboratories (level II evidence).²⁷ Over the next 5 years, some communities had a rapid rise in reported CA-MRSA (level II evidence),^{28,29} and now a large study (level II evidence) from 11 American cities has found it is the most common pathogen cultured from abscesses.¹² Additionally, an increased virulence has been observed with CA-MRSA over methicillin-sensitive *Staphylococcus aureus*.³⁰ This might, in part, be attributed to the Panton-Valentine leukocidin virulence factor of CA-MRSA, which creates pores in the leukocyte cell membrane and mediates tissue necrosis.

In addition to spontaneous skin and soft-tissue lesions,³¹⁻³³ CA-MRSA has increasingly been reported as a cause in many cases of necrotizing pneumonia, sepsis,³³⁻³⁶ and even death.³⁷

Various studies have attempted to quantify risk factors for CA-MRSA colonization, but many findings are inconsistent. For example, one study³⁸ (level II evidence) found living with a child younger than 16 years old was associated with a lower prevalence of CA-MRSA, while another study¹⁷ (level II evidence) found CA-MRSA prevalence increases among persons younger than 2 years old.¹⁷ Ethnicity might be related indirectly, as some studies (level II evidence) have variably found higher rates among blacks,^{17,39} Pacific Islanders,⁴⁰ Natives,^{41,42} and Alaskan Natives.³² In Canada, Natives and marginalized populations might also be at higher risk (level II evidence).^{43,44}

In the largest study to date¹² (level II evidence), the only factor that was significantly associated with isolation of CA-MRSA as compared with methicillin-sensitive *Staphylococcus aureus* was the presence of an abscess (odds ratio=2.3; 95% confidence interval=1.2 to 4.4).¹² Regardless, the authors concluded that the presence or absence of any factor was not sufficient to reliably guide decisions of empiric antibiotic use.¹²

Agents generally reported as effective against CA-MRSA include trimethoprim-sulfamethoxazole, tetracycline, and clindamycin.^{43,45} Concerns in the United States have led some authors to suggest using a combination of trimethoprim-sulfamethoxazole and cephalexin empirically for moderate to severe skin infections (level III evidence).⁴⁶ While the incidence of CA-MRSA in Canada remains uncertain, it is definitely on the rise and will play an increasing role in the outpatient management of cutaneous infections.

for CA-MRSA skin infection had equivalent clinical outcomes whether the antibiotic prescribed was effective or not (level II evidence—retrospective analysis).¹⁸

In addition, The Cochrane Library has identified at least 60 trials that compared one antimicrobial agent with another in managing soft-tissue infections, including abscesses treated with I&D. Although too extensive to summarize here, the take-home message is equivalence among the agents studied (eg, cefaclor = cefprozil,²³ cefaclor = azithromycin,²⁴ azithromycin = dicloxacillin²⁵). Interestingly, only one study²² included a placebo arm, and it, too, was equivalent to the antibiotic.²²

Although it appears that antibiotics are commonly prescribed after I&D,^{16,18,26} evidence suggests that there is no benefit to this practice and does not support using oral antibiotics after surgical drainage. This raises concerns that routine prescribing and overuse of antibiotics might promote resistance. Perhaps a large, rigorous, randomized controlled trial will be done to show physicians whether this practice could be doing more harm than good.

Current research focuses primarily on immunocompetent patients without complications. Empiric antibiotic therapy might be considered for those who are immunocompromised or present with a large surrounding area of cellulitis, systemic toxicity, or lymphangitis.⁵

Free drainage versus primary closure. Primary closure following I&D was first advocated in 1951.⁵ Many British trials have evaluated primary suture of the cavity following I&D (level I and II evidence).^{11,47-49} Large mattress sutures are usually advocated in order to obliterate the abscess cavity.^{11,50} This has the potential to elicit more pain, and a number of the studies were performed using general anesthetic,^{11,49,50} which is not practical in an office setting. Some investigations have reported an improved outcome with regard to duration and quality of healing with primary closure (level I and II evidence).^{11,47,50,51} However, others reported failure to achieve primary healing and abscess recurrence (level I evidence).^{48,49} At present, there is a lack of convincing evidence to support primary closure of abscesses, and using general anesthetic precludes its application in the office setting.

Case resolution

Ms J.S. is an immunocompetent woman who is not a member of a marginalized population. She is anxious about the procedure and requests local anesthetic. She is prepped using sterile technique, and lidocaine 1% is injected around the entire perimeter of the abscess approximately 1 cm away from the erythematous border. The abscess is incised along the maximal diameter with a scalpel. A pair of curved hemostats is used to gently probe the cavity to break down any loculations. The wound is then irrigated with saline

EDITOR'S KEY POINTS

- Incision and drainage is the treatment of choice for cutaneous abscesses. Despite lack of evidence, most experts recommend irrigation, breaking of loculations, and packing following incision and drainage. Primary closure is not recommended.
- Evidence does not support using oral antibiotics after surgical drainage. Routine swabbing for culture in immunocompetent individuals is not recommended.

POINTS DE REPÈRE DU RÉDACTEUR

- L'incision avec drainage est le traitement de choix pour les abcès cutanés. Malgré le peu de données probantes, la plupart des experts recommandent l'incision et le drainage, suivis de l'irrigation, la destruction des cloisonnements et le méchage. La suture primitive n'est pas recommandée.
- Il n'y a pas de preuve en faveur d'une antibiothérapie après un drainage chirurgical. L'écouvillonnage pour culture chez les sujets immunodéficients n'est pas recommandé.

and carefully packed with a single piece of iodoform gauze, leaving 2 cm outside to allow removal. A dry dressing is applied. She returns for reassessment in 48 hours, and the packing is removed. Her wound heals in 7 days with no complications.

Conclusion

In immunocompetent patients without confounding risk factors, I&D under local anesthetic is generally sufficient for abscess management. No compelling evidence for routine cultures or empiric treatment with antibiotics is available. Despite this, many physicians prescribe empiric antibiotics, a practice that contributes to antibiotic resistance. Further studies are required, particularly with the emergence of more virulent pathogens that might present a greater challenge to the competent immune system. ❁

Competing interests

None declared

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