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CASE REPORT

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A surgical site abscess caused by an ant bite on foot 7 years after mastectomy: A case report

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Key Clinical Message

Abscess at a previous surgical site induced by an insect bite has rarely been reported. Here we report a case of abscess at the breast surgical site, which occurred 7 years after mastectomy following an ant bite.

Abstract

Surgical site abscess generally occurs following operation within 30 days. However, surgical site abscess induced by an insect bite, which occurs several years after surgery, has rarely been reported. Here, we report a 65-year-old female patient with a history of breast cancer presenting with an abscess at the site of her mastectomy and ipsilateral arm lymphedema. Her left foot was bitten by an ant 25 days earlier and itchy red bumps with whiteheads were raised. After antibiotic treatment and abscess incision and drainage, the abscess healed, but the ipsilateral arm lymphedema persisted. This unique case demonstrates that surgical procedures can alter the susceptibility of tissues to allergic or infectious cues long after the operation.

KEYWORDS

abscess, ant bite, mastectomy, surgical site infection

1 | INTRODUCTION

Abscess at surgical sites often occurs within 30 days after surgery.[1–3] Clinical manifestations of surgical site abscess include pain, swelling and fever.[4–6] Abscess following operation may occur in various anatomical sites where the specific surgical procedures performed.[7] *Staphylococcus aureus* is the most common pathogenic bacteria that induces skin and soft tissue abscess.[1,8,9] Most abscesses after surgery can heal after treatment with antibiotics and drainage.[3–6]

Insect bite can induce tissue damage by carrying allergen and bacteria or by destructing skin barrier for secondary bacterial infection.[10,11] Tissue damage induced by insect bite can be local or systemic, such as erythematous eruption, serum sickness and generalized dermatitis.[11–14] Local allergic reactions can be treated with corticosteroids and oral antihistamines.[11] Systemic allergic reactions are often managed with glucocorticoid, epinephrine, and antibiotics when there is a concurrent infection.[11,13] Most insect bite reactions resolve spontaneously within 7–10 days. However, some symptoms persist long for severe cases.[15,16] Here we describe a rare case of an abscess at the breast surgical site and ipsilateral arm lymphedema 7 years after mastectomy following an ant bite.

Zhihan Liu, Zhihao Wei, and Shuying Ye contributed equally to this work.

2 | CASE HISTORY

A 65-year-old Chinese woman with breast cancer history presented to the breast tumor department of Sun-Yat Sen Memorial Hospital on September 15, 2021, with a red bump under the incision of mastectomy and ipsilateral arm lymphedema. On August 21, 2021, her left foot was bitten by an ant when walking on a lawn and three to four itchy red bumps with whiteheads raised on her left ankle (Figure 1A). The skin lesions became scabs following application of hydrocortisone cream.

On August 28, 2021, she experienced dizziness, vomiting, and diarrhea. She denied consuming any contaminated food. These symptoms were alleviated with the use of antidiarrheal agents. However, a local red bump, nearly 4 cm in diameter, emerged at the surgical site of the mastectomy, with pain and increased skin temperature (Figure 1B), and later diagnosed as an abscess. She also developed swelling and redness of her left arm.

Seven years earlier, she was diagnosed with invasive ductal carcinoma of the left breast and underwent a left mastectomy and axillary lymph node dissection. The tumor measured 25 × 21 mm with 7 of the 15 axillary lymph nodes involved. The tumor was estrogen and progesterone receptor-positive and human epidermal growth factor receptor 2 (HER2) negative. She received adjuvant chemotherapy (6 cycles of 1000 mg cyclophosphamide, 150 mg doxorubicin, and 130 mg docetaxel) followed by 5 weeks of radiotherapy (a total dose of 50 Gy in 25 fractions). Subsequently, the patient was administered an aromatase inhibitor.

3 | METHODS (INVESTIGATIONS AND TREATMENT)

When the patient visited the outpatient clinic, approximately 5 mL of purulent bloody fluid was aspirated from the abscess and some a fluid was sent for culture. A conventional method, which was streak plate technique, was used to get cultures of bacteria.[17,18] Gram's staining revealed a predominantly gram-positive cocci characteristic of coccus. Biochemical tests revealed that the aspirated fluid was coagulase positive. Methods for antimicrobial susceptibility testing (AST) include phenotypic methods, molecular-base methods and mass spectrometry.[19] Phenotypic AST can be further categorized into either minimal inhibitory concentration (MIC) or non-MIC methods.[20] Here, we used a non-MIC disk diffusion method as previously described.[20] In brief, the sample was streaked in agar plates. Then, a disk with fixed concentration of antimicrobials was placed onto the plate. After incubation for 16-20 h, the diameters of the zone with inhibition of bacterial growth were measured in millimeters. In this case, culture examination revealed a beta-lactamase-producing form of *S. aureus*, which was resistant to penicillin G, amoxicillin, oxacillin, cefazolin, cefprozil, cefuroxime sodium, cefaclor, erythromycin, and clarithromycin. The pathogen was sensitive to ceftazidime, ceftriaxone, imipenem, levofloxacin, gentamicin, linezolid, vancomycin, daptomycin, rifampin, azithromycin, tigecycline, moxifloxacin, clindamycin, trimethoprim-sulfamethoxazole, and teicoplanin. Therefore, the patient received intravenous ceftriaxone with a dose of 1 g bid for a total of 3 days. However, the infection was not eliminated by the antibiotic treatment. Then she underwent abscess incision and drainage.

4 | OUTCOME AND FOLLOW-UP

The patients was finally diagnosed with surgical site abscess. Following abscess incision and drainage, the abscess healed after 2 months, but the ipsilateral arm lymphedema persisted. The patient had no recurrent or metastatic disease after mastectomy during the follow-up.

5 | DISCUSSION

Insect bite can cause various types of tissue damage.[11] Common clinical manifestations of insect bite include local and systemic lesions. Local manifestations include

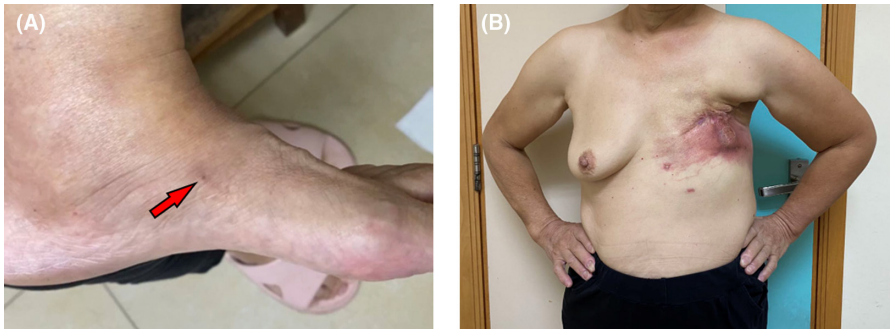

FIGURE 1 The ant bite lesion and the abscess at the surgical site of mastectomy. (A) The ant bite lesion on left foot (red arrow). (B) The abscess under the incision of mastectomy.

erythematous and edematous eruptions, papules and urticaria at the bite site.[11] Systemic reactions include serum sickness, generalized dermatitis, arthralgia, abnormal renal function, and vasculitis.[12–14] Notably, some rare cases represent as lymphadenopathy after insect bite. Slevogt et al.[21] reported a case with tender nodules along the lymphatic chain and painful lymphadenopathy in the groin after an insect bite. Interestingly, the case we reported had arm lymphedema following an ant bite.

Moreover, the patient had dizziness, vomiting, and diarrhea. The majority of insect-induced systemic allergic reactions occur after the bite by Hymenoptera, which can generate toxin as allergen or serve as vectors for bacteria and virus.[11,22] Bacteria isolated from ants include *S. aureus*, which is the pathogen found in the abscess of this case.[10] *S. aureus* is a gram-positive, cocci-shaped pathogen.[23,24] *S. aureus* can grow in up to 10% salt, and their colonies are often golden or yellow.[25] *S. aureus* can grow aerobically or anaerobically (facultative) between 18°C and 40°C.[25] Biochemical features of S. aureus include catalase and coagulase positive and novobiocin sensitive.[25] *S. aureus* can be distinguished from other staphylococcal species on the basis of the gold pigmentation of colonies and positive results of coagulase, mannitol-fermentation, and deoxyribonuclease tests.[26] *S. aureus* can release toxins, enzymes, adhesins and surface proteins that contribute to the pathogenesis of infection.[25–27] By producing various extracellular secretions including multi-hemolytic toxins, enterotoxins and plasma coagulase, *S. aureus* can cause suppurative inflammation.[24,28] Leukocytes are the primary host defense against *S. aureus* infection which can induce abscess formation.[26] Genomes of *S. aureus* are broadly divided into highly conserved core component and accessory component which consist of mobile genetic elements (MGEs).[27] Clinical presentations of S. aureus-induced invasive diseases such as skin and soft tissue infections (SSTIs) range from superficial infections with local symptoms to monomicrobial necrotizing fasciitis.[29] Severe cases might progress to multiorgan dysfunction, disseminated intravascular coagulation (DIC), lactic acidosis, and even death.[26] Toxins of *S. aureus* can cause Staphylococcal scalded skin syndrome (SSSS) characterized by diffuse skin pain and erythema as well as superficial blistering and desquamation.[30] Food contaminated with staphylococcal toxins induce gastrointestinal symptoms.[31] Staphylococcal toxins may even lead to toxic shock syndrome (TSS) with high fever, erythematous rash with subsequent desquamation, hypotension, and multiorgan damage.[26,31] Therefore, dizziness, vomiting, and diarrhea of this patient might be caused by infection with S.aureus carried by the ant or allergic reaction.

Another condition with a similar manifestation of this case is delayed breast cellulitis (DBC). DBC manifests as diffused breast erythema, edema, tenderness, and mild warmth, which often occur at least 3 months following breast surgery.[32–34] DBC can be induced by poor lymphatic drainage.[32–34] Unlike our case, most DBC cases have aseptic inflammation and happen after breast-conserving surgery.[32–34] Therefore, DBC was not considered as the primary diagnosis for this case.

Disruption or malfunction of lymphatic vessels can result in lymphedema.[35] Primary lymphedema results from abnormal development of the lymphatic system.[35] Secondary lymphedema is much more common than primary lymphedema.[36] Secondary lymphedema is induced by damage or obstruction of lymphatics, which can be caused by infection, trauma, obesity, invasive surgery, or malignancies.[35,36] Upper extremity lymphedema is the most common secondary lymphedema in patients with breast cancer.[36] Contributing factors include axillary dissection, radiotherapy, pathological nodal status, obesity, and large tumor.[37,38] Upper extremity lymphedema after breast cancer surgery commonly occurs 12 to 30 months after surgery. Axillary lymph node dissection is associated with early-onset (≤12 months) of lymphedema. Regional lymph node radiation emerges as a significant risk factor for lymphedema development only for patients experiencing late-onset (>12 months) lymphedema.[39] SSTIs induced by *S. aureus* can also lead to secondary lymphedema.[40] A study showed that the impairment of lymphatic vessel contraction and lymph flow caused by Methicillin-resistant *S. aureus* persists long after the infection was controlled.[41] In this case, the left arm lymphedema of the patient occurred 7 years after breast cancer treatment, which was a very long period post axillary dissection and radiotherapy. Therefore, we consider that the lymphedema may result from the infection of *S. aureus* rather than the surgery or radiation.

Abscess at the surgical site can be caused by the entry of bacteria through a break in the skin barrier.[1–3] However, abscess induced by an insect bite occurs at a previous surgical site has rarely been reported. This case demonstrates that surgical site abscess can be induced by insect bite even several years after operation.

AUTHOR CONTRIBUTIONS

Zhihan Liu: Data curation; resources; writing – original draft; methodology. **Zhihao Wei:** Resources; writing – original draft. **Shuying Ye:** Data curation; resources. **Shicheng Su:** Conceptualization; funding acquisition; writing – original draft; methodology. **Yiwen Lu:** Conceptualization; funding acquisition; supervision; writing – original draft.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

ETHICS STATEMENT

This study protocol was reviewed and approved by Internal Review and Ethics Boards of the Sun Yat-Sen Memorial Hospital. The patient signed informed consent.

CONSENT

This study followed CARE guidelines and methodology. Written informed consent was obtained from the patient to publish this report in accordance with the journal's patient consent policy.

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