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Title

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Journal

Western Journal of Emergency Medicine: Integrating Emergency Care with Population Health, 4(2)

ISSN

1936-900X

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Publication Date

2003

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ORIGINAL RESEARCH

Cellulitis From Insect Bites: A Case Series

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INTRODUCTION

Cellulitis is an acute infection of the skin that is commonly seen in emergency departments (EDs).¹ The infection results from an inoculation of bacteria through one of many means including a breakdown in the skin barrier from an abrasion, laceration, puncture wound, crush injury, or burn. In addition, ongoing infection from abscesses, ulcers, and folliculitis may spread beyond a self-limited capsule to surrounding skin acutely and rapidly. In some cases, no insult to the skin or tissue can be identified and it has been hypothesized that blood-borne bacteria may seed subcutaneous tissue resulting in cellulitis.²

Cellulitis, as a result of an insect bite, has been described and may initially be confused with an early allergic reaction to the insect sting or bite.^{1,3} The following seven cases were treated by the authors during the summer of 2002. They are presented to illustrate the association between insect bites and cellulitis and to alert providers to the possibility of mistaking an acute localized allergic reaction with cellulitis

CASES

The cases described below are summarized in Table #1.

Case #1: A 52 year-old male was stung by a bee on the left anterior thigh while riding a road bike. The bee sting was witnessed and occurred through thin, tightly-fitting bike shorts. The patient was unable to brush off the bee for fear of losing control of his bi-

cycle at high speed. Pain, erythema, and warmth developed within a few minutes of the sting. He cleaned the wound with Betadine solution within 30 minutes. There was complete resolution of all symptoms within eight hours. Twenty-four hours later new erythema was noted which spread rapidly. Forty-eight hours after the sting, a 10 cm diameter area of tender, slightly raised plaque of erythema developed. The patient was subsequently evaluated by one of the authors. The patient's vital signs were as follows: blood pressure 130/80 mm Hg, pulse 100 beats per minute, temperature 37.5°C, and respiratory rate 16 breaths per minute. He was prescribed cefuroxime axetil one gram by mouth QID for the first day followed by 500 mg by mouth QID for an additional six days. The infection stopped spreading within six hours of the first dose of antibiotics. Resolution of the cellulitis occurred after five days.

Case #2: A 41 year-old male was stung by a bee on the lateral aspect of the left lower leg just below the knee. The patient felt a sharp sting and had been envenomated by the time he brushed it away. He cleaned the wound with soap and water immediately after the sting. The initial erythema and pain at the sting site resolved completely within 12 hours. Forty-eight hours after the sting he developed pain and erythema at the site. The patient presented for evaluation four days after the sting. The patient's vital signs on presentation to the ED were as follows: blood pressure of 173/96 mm Hg, pulse 79 beats per minute, respiratory rate 16 breaths per minute, and temperature 36°C. On examination, he had an area of erythema, edema, and tenderness approximately 5 by 5 cm around the bite site. He had full range of motion of his knee and no inguinal nodes. He was treated with one gram of cefazolin intravenously and discharged home with a prescription for cefalexin 500 mg by mouth QID for one week. Complete resolution occurred at day seven.

Case #3: A 20 year-old male was stung by a bee on the lateral aspect of the right lower leg. He developed erythema and pain immediately around the sting site, which then resolved. Twenty-four hours later he developed new erythema and pain, and on day three

presented to the ED for evaluation. His vital signs were as follows: blood pressure 124/56 mm Hg, pulse 93 beats per minute, respiratory rate 14 breaths per minute, and temperature 36.6°C. At that time he was found to have a 4 by 5 cm red area of cellulitis that was tender to palpation. There was no inguinal lymphadenopathy. He was given a loading dose of cefazolin, one gram intravenously, then prescribed cephalexin 500 mg orally QID. He was called three days later and stated he had 90% resolution of signs and symptoms. He was lost to follow-up thereafter.

Case #4: A 52 year-old male was stung by a bee on the right ankle while doing gardening work. Although the patient could not precisely recall times, the initial pain and erythema resolved. The next day he had increased edema and erythema, which progressed proximally from the ankle to the lower leg. When he presented to the ED his blood pressure was 122/81 mm Hg, pulse was 88 beats per minute, and temperature was 38°C. He had an ecchymotic area 3 cm in diameter around the site, with edema extending to the lateral ankle. Erythema extended 20 cm proximal to a level just below the knee. Because the hospital was filled and no beds were available, he was observed in the ED for 18 hours during which time he received three doses of intravenous cefazolin one gram each. He improved over this time period and was discharged on clindamycin 600 mg BID orally and had complete resolution of his symptoms by day seven.

Case #5: A 39 year-old male was bitten by a spider while eating. He felt a sharp sting underneath the table and pulled back to find a spider scampering off his leg. He developed initial local erythema and pain which he said resolved by the next morning. Two days after being bitten, he developed increased pain and edema which persisted. On day three he presented to the ED. His vital signs were as follows: blood pressure 112/74 mm Hg, pulse 83 beats per minute, respirations 16 breaths per minute, and temperature 36.5°C. On physical examination he had a 6 by 10 cm area of erythema on his left upper thigh. He had left inguinal lymphadenopathy but good range of motion of his hip joint. He was given a prescription for cephalexin 500 mg by mouth QID for seven days and discharged.

When he was called back for re-examination at day five, there was complete resolution of symptoms.

Case #6: A 47 year-old male was bitten on the right hand by a spider while working outdoors. He developed initial pain and erythema which he stated nearly completely resolved. However, 24 hours after his sting, he noted pain in the hand. The pain progressed, and the erythema involving the entire dorsum of the hand. He presented to a physician and was started on amoxicillin-clavulanate 500 mg by mouth TID. Despite this regimen, the erythema, edema, and pain of his hand increased, and he developed a 2 cm diameter abscess. He presented to the ED six days after his sting. The patient's vital signs on presentation to the ED were as follows: blood pressure 124/86 mm Hg, pulse 102 beats per minute, respiratory rate 14 breaths per minute, and temperature 38°C. A hand service consultation was obtained, and the patient was started on cefazolin intravenously. The abscess was incised and drained in the operating room. The wound culture showed no growth. He was admitted to the hand service for two days and treated with intravenous cefazolin and discharged on oral cephalexin. His symptoms resolved ten days after ED presentation (16 days after bite).

Case #7: A 37 year-old male was gardening at dusk and bitten by a mosquito on the lateral aspect of the upper right arm. There was immediate edema and erythema, followed by intense pruritis at the site. These symptoms subsided later that evening, but returned the following day. The patient denied cleaning the wound or applying topical antibacterial or steroid creams after the bite. At day three he developed an ulceration at the bite site with increased pain, edema, and erythema and he presented to the ED. His vital signs were as follows: temperature 37.1°C, pulse 64 beats per minute, respiratory rate 12 breaths per minute, and blood pressure 124/67 mm Hg. Examination of the wound revealed a 2 by 2 cm ulceration with surrounding erythema, and an obvious "honey crust" adherent film. The wound was cleansed with Betadine and peroxide solutions, then aggressively debrided with a 20-blade scalpel. Bacitracin ointment was applied with a large occlusive dressing. The patient was started on cephalexin 500 mg by mouth QID

for seven days for treatment of presumptive gram-positive cellulitis with secondary impetigo. On follow-up the patient reported the wound healed slowly, with complete resolution after ten days.

DISCUSSION

Stings and envenomation by insects commonly result in a localized allergic reaction characterized by pain, erythema, pruritis and, in some cases, ecchymosis and/or edema.⁴ When these patients present acutely to the ED, a diagnosis of acute allergic reaction may be made and patients are commonly treated with antihistamines. In severe cases, patients with systemic allergic reactions may also receive steroids, and in life threatening situations epinephrine.

In those patients who sustain insect bites, but present to the ED twenty-four hours after the bite the differential diagnosis should be expanded. These patients could be experiencing an extended, localized allergic reaction or could be developing an infection secondary to the sting/bite or both. When patients are developing cellulitis as a result of a bite, they may mistakenly be diagnosed only as having an allergic reaction and therefore risk progression of infection to a more serious level. In this case series, the patients all had complete or near-complete resolution of their allergic symptoms prior to developing signs and symptoms of cellulitis. The association of insect bites and cellulitis has been previously described. In one retrospective case series, 5% of patients diagnosed with cellulitis had an associated arthropod bite.¹ However, the exact type of insect was not described.

The microorganisms responsible for cellulitis in our seven cases were not identified. Furthermore, and most importantly, it is unknown whether the cellulitis developed as a result of inoculation of preexisting bacteria on the skin into the wound or as a result of exogenous bacteria inoculated into the wound from an insect that served either as a reservoir or vector for pathogenic bacteria. In one published case a patient developed *Nocardia brasiliensis* as a result of injection of the bacteria by the insect bite.⁵ Other studies suggest that pathogenic bacteria may be harbored by insects. Insects have been described as carrying a number of bacteria including *Salmonella*, *Shigella*, and *E.-coli*.^{6,7} *E.-coli* has in fact been rarely reported to cause cellulitis.⁸ Evans et al report a case of compartment syndrome as a complication of cellulitis due to an insect bite.⁹

Most cellulitis seen in the ED is attributed to an infection from Streptococcal group A or *Staphylococcus* species, although other bacteria including *Pasteurella*, *Vibrio species*, *Eikenella corrodens* are known to cause cellulitis.^{2,10-13} Six of the seven patients we report here responded well to initial treatment with a first- or second-generation cephalosporin. All cases except one case were managed as outpatients. The one patient who failed outpatient treatment had received amoxicillin-clavulanate for three days. From an empiric microbiologic standpoint, this was an acceptable regimen, and it is unclear why outpatient treatment failed. Although multiple agents can be used to treat cellulitis including flouroquinolones, macrolides and clindamycin, the majority of patients who receive ED treatment generally receive a first-generation

TABLE #1

CASE	AGE	SEX	INSECT	CLINICAL	ANTIBIOTIC	OUTCOME(post ED visit)
1	52	M	Bee	L thigh 10 cm diameter	Cefuroxime axetil PO	Resolution in 5 days
2	41	M	Bee	L lower leg 5 cm diameter	Cefazolin (in ED)Cephalexin PO	Resolution 7 days
3	20	M	Bee	R lower leg 4-5 x 4 cm	Cefazolin IV (in ED)Cephalexin	90% resolution 3 days
4	52	M	Bee	R ankle to R knee	Cefazolin IV (in ED)Clindamycin PO	Resolution 4-7 days
5	39	M	Spider	L thigh 6 x 10 cm	Cephalexin PO	Resolution 5 days
6	47	M	Spider	R hand to wrist joint	Amoxicillin-clavulanate PO(failed nitial outpatient Rx)Cefazolin IV (admitted)Cephalexin PO (Discharge)	Abscess formed day 3; I&D/admit, Resolved day 16
7	37	M	Mosquito	R arm 2cm ulcerer	Cephalexin PO Bacitracin topical	Resolution day 10

cephalosporin.^{2,13,14} This was true in our case series. In the authors' experience, some microbiologists and infectious disease experts argue that outpatient therapy with oral cefalexin is a poor choice because of the low absorption rate from the gastrointestinal tract and higher minimum inhibitory concentrations (MIC) needed to kill or inhibit bacterial growth compared to other antibiotics. However, in the authors' experience and per discussions with numerous emergency physicians nationally, cephalexin has been successfully used in the primary treatment most common skin infections.

CONCLUSION

In summary, we have presented seven cases of cellulitis associated with insect bites. Emergency physicians must be careful to differentiate between a continuing localized allergic reaction and the development of infection by a bacterial agent. We could not determine if the insects served as vectors of the pathogenic bacterial agent or whether the agent was present on the skin tissue prior to the bite.

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