Nonpseudomonal Ecthyma Gangrenosum Associated With Methicillin-Resistant *Staphylococcus aureus* Infection: A Case Report and Review of the Literature

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Ecthyma gangrenosum (EG) is a skin infection that is classically associated with Pseudomonas aeruginosa *septicemia in immunocompromised patients. Other bacterial, viral, and fungal pathogens also have been implicated in EG. Both bacteremic and nonbacteremic forms of EG have been described. We describe a case of EG associated with methicillin-resistant* Staphylococcus aureus *(MRSA) in a 35-year-old woman with acute lymphoblastic leukemia (ALL) and review the literature.*

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Ecthyma gangrenosum (EG) is characteristically described as a hemorrhagic bulla surrounded by erythema that evolves into a gangrenous ulcer with a central dark eschar surrounded by an erythematous halo. *Pseudomonas aeruginosa* is the pathogen most frequently associated with EG, a well-recognized cutaneous manifestation of pseudomonal septicemia in immunocompromised patients; however, other bacterial, viral, and fungal pathogens have been noted to cause clinically similar lesions.[1] We report a patient with T-cell acute lymphoblastic leukemia (ALL) who developed multiple EG lesions due to methicillin-resistant *Staphylococcus aureus* (MRSA).

Case Report

A 35-year-old woman with a prior diagnosis of T-cell ALL received 2 rounds of hyper-CVAD (fractionated cyclophosphamide, vincristine, Adriamycin® [doxorubicin hydrochloride], dexamethasone) chemotherapy and intrathecal methotrexate; she was admitted to our hospital for pancytopenia and fever. At the time of her ALL diagnosis, she was in her first trimester of pregnancy and had subsequently undergone an uncomplicated dilation and evacuation 1 month prior to presentation to our hospital. On admission her white blood cell count was $0.4\times10^3/\mu L$ (reference range, 4.0–$11.0\times10^3/\mu L$) with an absolute neutrophil count of $0.08\times10^3/\mu L$ (reference range, 1.8–$7.5\times10^3/\mu L$) and her platelet count was $7\times10^3/\mu L$ (reference range, 150–$400\times10^3/\mu L$). Chest radiograph showed no active disease. Because of a reported penicillin allergy, she was empirically started on fluconazole, acyclovir, tobramycin, and levofloxacin. The peripherally inserted central catheter site in her right arm was nontender and nonerythematous.

During her first day of admission she developed tender hemorrhagic bullae on her buttocks, bilateral upper thighs, and lower abdomen. At night a progressive area of erythema surrounding the hemorrhagic bullae on the left buttock was noted (Figure 1) and vancomycin hydrochloride was initiated. The peripherally inserted central catheter was removed the following day. The patient also had small purple papules with surrounding erythema on the lower abdomen, bilateral upper thighs, right dorsal wrist, and left third distal finger. The clinical differential diagnosis included EG, deep fungal infection,

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staphylococcal or streptococcal infection, and herpes simplex virus infection.

A punch biopsy from the edge of a hemorrhagic bulla on her left buttock was obtained for histologic evaluation and tissue culture. The biopsy revealed numerous bacteria in the dermis as well as virtual absence of inflammatory infiltrate, epidermal edema and necrosis, and dermal hemorrhage (Figure 2). Gram stain of the tissue demonstrated gram-positive cocci in clusters. The tissue culture grew MRSA. Periodic acid–Schiff stain was negative. Blood cultures remained negative throughout her hospitalization. After improvement on vancomycin hydrochloride as well as treatment with warm compresses and topical mupirocin, the patient was discharged home.

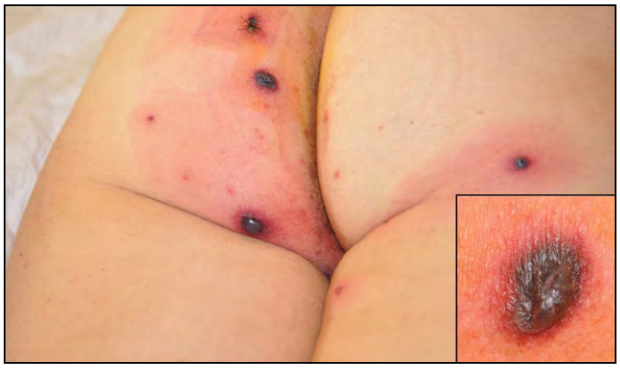

Figure 1. Hemorrhagic bullae with a surrounding area of erythema predominantly on the left medial buttock. The inset shows a bulla.

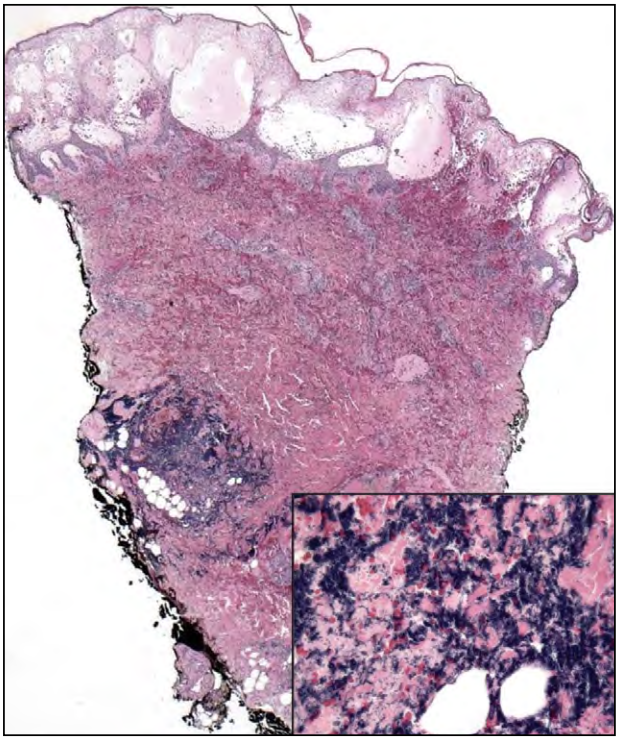

Figure 2. Punch biopsy from the left buttock showed numerous bacteria in the dermis, paucity of inflammation, and a hemorrhagic bulla (H&E). The inset shows clumps of bacteria.

Comment

Ecthyma gangrenosum most commonly is associated with *P aeruginosa*, but reports have demonstrated various other pathogenic etiologies for EG.[1] Both bacteremic and nonbacteremic types of EG have been described.[2-5] Most lesions occur in the gluteal and perineal regions (57%) but also can involve the extremities (30%), trunk (6%), and face (6%).[6]

In contrast to the previously reported case of nonpseudomonal EG associated with MRSA,[7] our patient's blood cultures were negative, which suggests that she had a nonbacteremic form of EG. Patients with EG who present without bacteremia tend to have a better prognosis, with a mortality rate of 16% compared to 38% to 96% for patients with bacteremia.[2] Moreover, nonbacteremic EG has been reported in patients with leukemia, but *P aeruginosa* was the pathogen in each of these cases.[2,4,5]

Nonbacteremic EG is considered to result from direct inoculation of the organism at a prior site of trauma.[2,3] Our patient had a finger stick on her left third distal finger and an intravenous catheter placed near the lesion on her right wrist, but the other lesions were not associated with trauma. The presence of multiple lesions in various anatomic locations suggests the possibility of a low-grade or transient bacteremia that was undetectable in cultures. The prompt addition of vancomycin hydrochloride at the first sign of worsening infection (ie, continued spread of erythema despite empiric coverage) may have prevented MRSA septicemia in this patient. However, in the absence of positive blood cultures, bacteremia cannot be considered the cause of spread.

In addition to the consideration of opportunistic pathogens in a patient with neutropenic fever, clinical suspicion for nonopportunistic pathogens (eg, *S aureus*, *Streptococcus pyogenes*) should remain high. Skin infections caused by these pathogens may uncharacteristically present in immunocompromised patients, as in the case of our patient. Furthermore, community-acquired MRSA has emerged as an increasingly prevalent cause of skin infections. Because MRSA no longer is a strict nosocomial pathogen, it should be considered in a patient without traditional risk factors, such as hospital admission or residence in a long-term care facility.[8]

Conclusion

Multiple cases of nonpseudomonal EG in immunocompromised patients have been reported.[1] Although

P aeruginosa still is the most common etiology for EG, other opportunistic and nonopportunistic pathogens should be considered in the differential diagnosis and also when beginning empiric coverage.

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