Ecthyma gangrenosum associated with *Proteus* bacteremia

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ABSTRACT

Ecthyma gangrenosum is an exceedingly rare dermatologic complication of bacteremia or fungemia in immunocompromised patients. The lesions may be single or multiple and may occur anywhere on the body. We present a case of ecthyma gangrenosum with atypical organisms and risk factors resulting in delayed diagnosis of both the condition and the underlying infectious process that caused it. Despite the atypical findings, the diagnosis was confirmed by biopsy and tissue culture.

KEYWORDS Ecthyma gangrenosum; necrotic ulcerations; *Proteus mirabilis*; sepsis

Ecthyma gangrenosum, an exceedingly rare dermatologic complication of bacteremia or fungemia in immunocompromised patients, is classically caused by *Pseudomonas aeruginosa* in patients with neutropenia. The lesions are described as necrotic ulcerations with gray-black eschar surrounded by an erythematous halo. Lesions frequently herald life-threatening sepsis and require early recognition and aggressive management with antibiotics to facilitate good clinical outcomes.

CASE DESCRIPTION

A 51-year-old woman with multiple medical comorbidities including morbid obesity with a body mass index of 84 kg/m², hepatitis C cirrhosis, urinary retention requiring a chronic indwelling catheter, and bilateral nonobstructing renal calculi presented from her nursing home with altered mental status, tachycardia, hypotension, and urinalysis findings consistent with urinary tract infection. She had a prolonged history of recurrent multidrug-resistant urinary tract infections with previous *Proteus mirabilis* bacteremia, likely secondary to her infected renal calculi; however, she was not an operative candidate due to her multiple comorbidities. Several weeks prior to admission, she was treated empirically with ciprofloxacin and intramuscular gentamicin for presumed urinary tract infection by nursing home staff, but her clinical status continued to worsen

and she developed necrotic ulcers on bilateral upper extremities near her gentamicin injection sites (*Figure 1*). Nursing home staff had attributed these ulcerations to a localized allergic response to gentamicin.

The patient was admitted and antibiotic therapy was initiated with meropenem and linezolid. Initial urine and blood cultures grew *Proteus mirabilis*. Dermatology was consulted for further evaluation of her necrotic skin ulcers and a punch biopsy illustrated acute inflammation and necrosis with Gram-negative bacterial organisms (*Figure 2*). Body tissue cultures from the ulcer sites grew both *Proteus mirabilis* and *Enterococcus faecalis*, and pathology was consistent with a diagnosis of ecthyma gangrenosum. A transesophageal echocardiogram illustrated no focal vegetation. Two weeks of intravenous meropenem were given as definitive therapy. Urology was consulted for possible percutaneous nephrolithotomy; however, she was again deemed a poor operative candidate. Sepsis recurred without additional ulcerations, and the patient was ultimately transitioned to palliative care.

DISCUSSION

Ecthyma gangrenosum is a dermatologic finding classically associated with *Pseudomonas aeruginosa* bacteremia in immunocompromised patients.^{1–3} Patients develop this

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Figure 1. Necrotic ulcerations on the left upper extremity with a classic gray-black eschar surrounded by erythematous halos, consistent with ecthyma gangrenosum.

rare finding when organisms colonize the media and adventitia of arteries or veins, leading to local necrosis and ulceration of the epidermis and dermis.⁴ Although most reports involve coinfection with *Pseudomonas*, ecthyma gangrenosum has been associated with other bacterial organisms such as *Staphylococcus aureus*, *Escherichia coli*, *Klebsiella pneumoniae*, fungal organisms including *Candida* and *Aspergillus*, and viral infection with herpes simplex virus.⁵ Though cases describing *Proteus vulgaris* causing ecthyma gangrenosum exist, this is believed to be the first case of ecthyma gangrenosum caused by *Proteus mirabilis*.⁶ The presence of polymicrobial lesions without bacteremia has been previously described, highlighting the importance of broad-spectrum antibiotic therapy when the diagnosis is suspected until definitive body tissue cultures may be obtained by punch biopsy.⁷ In this case, initial lack of adequate empiric antibiotic coverage for *Enterococcus* potentially contributed to this patient's poor outcome.

Nearly all documented cases of ecthyma gangrenosum involve severely immunocompromised patients, such as those with HIV/AIDS, with acute leukemia, or undergoing chemotherapy.^{1,3,4} This patient had no evidence of these classic conditions, but she did have liver cirrhosis, which has been previously associated with impaired immunologic response to bacterial infections.⁸ The patient's extreme morbid obesity also likely contributed to her susceptibility to severe infection and ultimate mortality.

Finally, in this case, the condition was initially misdiagnosed as an allergic reaction to intramuscular gentamicin injections, and an important sign of occult bacteremia was missed for several weeks. A high degree of suspicion is necessary to facilitate early recognition of this condition,

Figure 2. Results of the punch biopsy of the patient's right shoulder. (a) Hematoxylin and eosin stain showing abundant acute inflammation and necrosis indicative of an abscess formation within the dermis and subcutaneous tissue (40× magnification). (b) Gram stain showing Gram-negative bacterial organisms consistent with *Proteus mirabilis* infiltrating the tissue (400× magnification).

which hails a serious underlying infection. This case highlights the necessity of maintaining a broad differential diagnosis in the setting of unusual or atypical clinical presentations.

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