Orbital ecthyma gangrenosum in multiple myeloma

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ABSTRACT

Ecthyma gangrenosum is a rare and highly lethal cutaneous infection classically associated with *Pseudomonas aeruginosa* bacteremia. We report a 58-year-old man with multiple myeloma receiving chemotherapy who presented with 2 days of painless left periorbital swelling that rapidly progressed to a blackish eschar. His absolute neutrophil count was $0.10/\text{mm}^3$; platelet count, $14,000/\text{mm}^3$; and hemoglobin, 6 g/dL. Computed tomography showed diffuse left periorbital cellulitis. Blood cultures grew pan-sensitive *Pseudomonas aeruginosa*, and the patient died from sepsis and multiorgan failure.

KEYWORDS Black eschar; ecthyma gangrenosum; *Pseudomonas* bacteremia; sepsis

Ecthyma gangrenosum (EG) is a rare skin infection classically associated with *Pseudomonas aeruginosa* bacteremia and typically seen in critically ill neutropenic patients.¹ EG is seen in approximately 2% of cases with *P. aeruginosa* bacteremia, with no specific gender predilection.² Most EG lesions involve the anogenital region; facial involvement is rare. We report a case of orbital EG in a 58-year-old man with neutropenia who presented with periorbital swelling.

CASE DESCRIPTION

A 58-year-old man presented with 2 days of painless left periorbital swelling that rapidly progressed to a black eschar. He also had blurry vision in his left eye and a large ecchymotic patch over his scalp. He had known multiple myeloma refractory to therapy despite two autologous stem cell transplants. One week earlier, he had started a new regimen consisting of dexamethasone, cyclophosphamide, etoposide, and cisplatin. He was also known to have heart failure and atrial fibrillation, for which he was taking rivaroxaban. On admission his temperature was 38.3°C , his heart rate was 120 beats a minute, and his blood pressure was 80/60 mm Hg. The left eye lid was markedly swollen with bluish-black discoloration, and he was unable to open it (*Figure 1a*). His vision was intact, but the visual field was obscured by the swelling. A large ecchymosis was noted over the scalp with skin breakdown and mild oozing (*Figure 1b*). He also

had a 2×3 -cm ecchymotic patch beneath his left nipple (*Figure 1c*). Laboratory studies are shown in *Table 1*. Computed tomography of the orbit showed diffuse left periorbital cellulitis without any fluid collection. Chest x-ray was normal.

The patient was admitted with a diagnosis of neutropenic fever and septic shock. He received fluid resuscitation and was started on vancomycin, cefepime, and soon levofloxacin. Hypotension persisted despite fluid resuscitation, and he was started on intravenous norepinephrine. On hospital day 2, blood cultures grew pan-sensitive *Pseudomonas aeruginosa*. He deteriorated with worsening renal failure and shock and died.

DISCUSSION

EG is an uncommon cutaneous manifestation of *P. aeruginosa* bacteremia. Infants and elderly patients are especially susceptible, possibly because of their weaker immune systems.³ Other risk factors include hematologic malignancies, recent chemotherapy, immunodeficiency syndromes, immunosuppressive therapy, burns, neutropenia, and diabetes mellitus. Previously, EG was considered pathognomonic of *Pseudomonas* infection, but it has also been reported in other bacterial infections with group A *Streptococcus*, methicillin-resistant *Staphylococcus aureus*, *Escherichia coli*, *Aeromonas hydrophila*, *Serratia marcescens*, and even atypical mycobacteria.^{4,5} Moreover, fungal

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Figure 1. (a) Markedly swollen left eyelid with bluish-black discoloration. (b) Large ecchymotic plaque over the scalp. (c) Ecchymotic plaque beneath the left nipple.

Table 1. The patient's laboratory results

Test	Patient values	Reference value
White blood cell count ($\times 10^3 \mu\text{L}$)	0.14	3.5–10.5
Absolute neutrophil count ($\times 10^3 \mu\text{L}$)	0.10	1.5–8
Hemoglobin (g/dL)	6	11.6–15.4
Platelet count ($\times 10^3/\mu\text{L}$)	14	140–390
Blood urea nitrogen (mg/dL)	34	9–25
Serum creatinine (mg/dL)	1.8	0.6–1.2
Prothrombin time (seconds)	24	11–13.5
International normalized ratio	2.3	≤ 1.1
Partial thromboplastin time (seconds)	45.9	25–35
Erythrocyte sedimentation rate (mm/h)	98	2–25
C-reactive protein (mg/L)	23.1	0–0.5
Procalcitonin (ng/mL)	21	0.1–0.49

infections such as with *Fusarium* or *Candida* species have been associated with EG.⁶

In classic bacteremic EG, two pathogenetic mechanisms have been proposed. Bacteremia can occur after a primary infection of the urogenital, gastrointestinal, or respiratory tract with secondary hematogenous dissemination to the skin. Alternatively, bacteremia can occur after direct inoculation of the skin, as seen in folliculitis or a secondary infection after a burn. Very rarely, EG can occur at the primary inoculation site without bacteremia.⁷ EG usually begins as a small indurated painless vesicle that rapidly progresses to a black necrotic eschar, and this transformation may occur in as little as 12 hours. EG predominantly affects the gluteal and perineal regions (57%) or the extremities (30%). Facial EG is rare, accounting for 6% of cases.⁸ The tissue destruction seen in EG is mediated by several bacterial toxins that include exotoxin A, phospholipase C, pyocyanin, and elastase.⁹ The black eschar represents a necrotizing vasculitis from bacterial invasion of the media and adventitia.^{5,7}

EG is diagnosed based on the characteristic clinical appearance of the lesions in the appropriate clinical setting,

and blood cultures should be ordered promptly. A negative blood culture does not rule out EG and thus cultures of exudates or skin biopsy tissue can be done to identify the pathogen. Because EG can be caused by different pathogens, establishing a microbiological diagnosis is essential to guide appropriate antimicrobial therapy. In severely neutropenic patients with sepsis or shock, combination therapy (antipseudomonal beta-lactam and an aminoglycoside or a quinolone) is preferred and can be later de-escalated to a single agent based on organism susceptibility.¹⁰ Rapidly spreading EG lesions refractory to antibiotic therapy need surgical debridement.⁸ EG patients with severe neutropenia may benefit from administration of a granulocyte colony-stimulating factor to hasten recovery.¹¹ The mortality rate in nonbacteremic cases is <15%, whereas in septicemic cases the mortality rate can be as high as 96%.¹²

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