Case report

Ecthyma gangrenosum secondary to MRSA in a young patient with chronic kidney disease

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A B S T R A C T

Ecthyma gangrenosum (EG) is a well-recognized dermatological condition classically associated with Pseudomonas aeruginosa infection, however, the association with other bacteria, especially gram positive, is rare. There are only a few reported cases of EG caused by staphylococcal infection. Here, we report a case in a young patient with chronic kidney disease (CKD) presenting with EG secondary to Methicillin Resistant Staphylococcus aureus.

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Introduction

Ecthyma gangrenosum (EG) is a dermatological disease with characteristic lesions consistent of vesicles which rapidly evolves to pustules and necrotic ulcers with tender erythematous borders, it is typically associated with Pseudomonas aeruginosa blood stream infection in immunocompromised individuals.

We report a case of EG secondary to Methicillin Resistant Staphylococcus aureus (MRSA).

Case presentation

A 19 years-old man presented to our emergency department complaining of bilateral flank pain for one week and multiple skin ulcers for three weeks. The pain was stabbing in nature involving both flanks, associated with dysuria and fever. His pain was progressive and started to interfere with his daily activities. He also complained of multiple painless skin ulcers that started three weeks before as small pustules with erythematous margins that increased in size rapidly then ruptured into deep ulcers. It first appeared on his abdomen then spread to his right thigh over the next three weeks. He is known to have chronic kidney disease (CKD) secondary to Idiopathic Type II Renal Tubular Acidosis (RTA).

He had no history of trauma or any animal/insect bites at site of lesions, no previous similar skin lesions in the past nor any history of skin and soft tissue infections. He is not on any immunosuppressive medications or steroids and has no history of injection drug use. He lives in an urban city with no animal contact, he is not sexually active, and has no hot tub exposure. He is in a good socioeconomic status, no family history of similar presentation.

Vital signs upon presentation showed tachycardia with heart rate of 114 bpm, temperature was 36.7 °C, blood pressure of 118/75 mmHg, and respiratory rate of 15 bpm. No flank tenderness was appreciated upon examination. Local examination of lesions showed multiple pustules with erythematous margins with no tenderness. On his abdomen and right thigh, there were around 20 lesions with different sizes, the biggest was 1 × 2 cm, they were ranging from pustules to grade 2 ulcers with pus discharge [Fig. 1A].

Laboratory findings were significant for leukocytosis of 22 × 10³/µL, hemoglobin of 11.7 g/dL and a platelet count of 649 × 10⁹/L, normal range [150–450 × 10⁹/L]. Creatinine 770 mmol L with a baseline of around 450 mmol. His urine culture grew Escherichia coli susceptible to cefuroxime, deep swab for bacterial culture from all twenty lesions grew Methicillin Resistant Staphylococcus aureus (MRSA) that was susceptible to vancomycin and linezolid. Multiple sets of blood cultures did not grow any organism. MRSA screening was positive in axilla and negative in anterior nares and groin. HIV serology was negative. Skin biopsy showed complete ulceration of epidermis and dermis with granulation tissue, ulcerated area showed multiple neutrophils with numerous bacterial colonies of cocci [Fig. 2A & B].

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His skin lesions were classic for EG. His risk factor was CKD which has an impact on the immune state. Additionally, the evolving changes of his lesion were classical for EG. Further, the histopathology revealed that the epidermis was completely ulcerated with numerous inflammatory cells especially neutrophils mixed with bacterial colonies of numerous cocci.

He was treated initially with one day of cefepime 2 g IV every 8 h then changed to cefuroxime 500 mg Q12 h for 7 days for his UTI. For EG due to MRSA he was started on linezolid 600 mg PO Q12 h for 4 weeks, with daily wound care and dressing, no debridement was required.

He was discharged on linezolid and seen as follow up in clinic, at 2- and 4-weeks post discharge, lesions showed progressive improvement till all lesions were completely healed (Fig. 1b). At 6 months follow up, he had no relapse of disease.

Discussion

Ecthyma gangrenosum (EG) is a rare dermatological condition, well-recognized for Pseudomonas aerogonosa infection with or without septicemia, it has a high risk of mortality in cases where the infection is systemic. EG is classically described as a painless
macule that is round, indurated that progresses into an ulcer with a central necrotic black eschar with surrounding erythema. It extends through the epidermis and deep into the dermis and appears as a “punched-out” ulcer [1]. The exact pathogenesis is not well understood, however, it is believed to be due to perivascular bacterial invasion of the media and adventitia of arteries and veins with secondary ischemic necrosis [2]. It can also be associated with a wide range of gram-negative bacteria that have been reported as causative agents [3]. Association with gram-positive organisms are rare, with few cases reported in the literature Table 1. EG secondary to MRSA has been reported in the literature with underlying immunodeficiency as a main risk factor. Predisposing factors includes neutropenia, malignancy, and HIV. Upon further review of cases reported, MRSA was more commonly associated with EG compared to methicillin-susceptible Staphylococcus aureus (MSSA). There are no written guidelines for treating such cases, however, they were managed as skin and soft tissue infections and duration of treatment was based on clinical response. Prognosis is generally favorable if detected early and treated with MRSA targeted therapy [4]. We report the sixth case of EG due to MRSA and the first in a patient with CKD due to RTA, that was successfully treated with medical therapy alone.

**Declaration of Competing Interest**

The authors report no declarations of interest.

**Acknowledgment**

The authors have no acknowledgment

**References**

[1] Greene SL, Su WP, Muller SA. Ecthyma gangrenosum: report of clinical and bacteriologic aspects of eight cases. J Am Acad Dermatol 1984;11:781–7.

[2] Walls AC, Frangos JE, Goralknick E. Ecthyma gangrenosum in a 67-year-old man with chronic lymphocytic leukemia. J Emerg Med 2012;43:339–41.

[3] Reich H, Fadeyi DW, Naik NS, Honig PJ, Yan AC. Nonpseudomonal ecthyma gangrenosum. J Am Acad Dermatol 2004;50:S114–7.

[4] Nakai N, Takenaka H, Kishimoto S. Ecthyma gangrenosum without pseudomonal septicemia in a kidney transplant recipient. J Dermatol 2008;35:585–9.

[5] Sen H, Inangil G, Sahin L, Dere K, Ozkan S, Dagli G. Ecthyma gangrenosum-like lesions associated with methicillin-resistant Staphylococcus aureus infection. Int J Infect Dis 2009;13:e173–5.

[6] Ungprasert P, Permpalung N, Kue APP, Ammannagari N, Chongnarungsin D. A rare case of ecthyma gangrenosum associated with methicillin-resistant Staphylococcus aureus infection. J Infect Chemother 2013;19(4):761–3.

[7] Dassan M, Kauras H, Irukulla P, Kupfer Y, Seneviratne C. A case of ecthyma gangrenosum caused by MRSA. Chest J 2015;148(4):280a–280b.

[8] Ivanaviciene J, Circh L, Grant-Kels JM, Kerr PE, Finch J. Ecthyma gangrenosum secondary to methicillin-sensitive Staphylococcus aureus. Int J Women’s Dermatol 2016;2:389–92. doi: http://dx.doi.org/10.1016/j.jwdd.2016.05.004 Published 2016 Jul 22.

[9] Muralidhar RGS, Muralidhar V. Non-pseudomonal ecthyma gangrenosum caused by methicillin-resistant Staphylococcus aureus (MRSA) in a chronic alcoholic patient. BMJ Case Rep 2017;2017;220983. doi: http://dx.doi.org/10.1136/bcr-2017-220983 Aug 3;2017.

**Table 1**

| Author | Nakai et al. (2008) [4] | Sen et al. (2009) [5] | Ungprasert et al. (2013) [6] | Dassan et al. (2015) [7] | J. Ivanaviciene et al. (2016) [8] | Santhaseelan et al. (2017) [9] |
|--------|------------------------|-----------------------|---------------------------|--------------------------|-------------------------------|-------------------------------|
| Medical condition | 40-year-old kidney transplant recipient on immunosuppressive therapy | 69-year-old male with COPD | 40-year-old HIV patient | 41-year-old male with Acute Lymphoblastic Leukemia on chemotherapy | 54-year-old African American female with metastatic gastric adenocarcinoma on chemotherapy | 47-year-old chronic alcoholic man |
| MRSA vs MSSA | MRSA (−) Culture: MRSA and Pseudomonas aeruginosa | MRSA (+) Culture: MRSA | MRSA (−) Culture: MRSA | MRSA (+) Culture: MRSA | MSSA (−) Culture: MSSA | MRSA (−) Culture: MRSA |
| Blood culture | | | | | | |
| Lesion culture and sensitivity | high dose gentamicin 30 mg/kg for 1 week | ampicillin/subactam 1 g IV Q6hrs meropenem 1 g IV Q8hrs teicoplanin 400 mg IV daily | Vancomycin as in-patient Linezolid PO for 1 month | Vancomycin for 2 weeks | oxacillin IV for 2 weeks | Ceftriaxone Amikacin Imipenem Surgical debridement |
| Treatment and duration | | | | | | |
| Outcome | Disappeared with no recurrence | Improved, lost to follow-up | Disappeared, no follow-up mentioned | Disappeared with no recurrence | disappeared after 4 weeks |

**CRediT authorship contribution statement**

**Mazin Barry:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing - original draft, Writing - review & editing. **Ali Alhijji:** Methodology, Validation, Visualization, Writing - original draft, Writing - review & editing. **Abdulaziz Alsubaie:** Validation, Visualization, Writing - original draft, Writing - review & editing.