Case Report

Fatal Oculocutaneous Ecthyma Gangrenosum in Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome: Case Report and Review of the Literature

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Abstract

Ecthyma gangrenosum (EG) is a rare, infective skin disease, predominantly but not exclusively caused by *Pseudomonas aeruginosa*. It is often seen in individuals with immunosuppression, although it has also been reported among previously healthy individuals. It was initially thought to be pathognomonic of *P. aeruginosa* septicemia, but this assertion was discarded following several reports on EG without bacteremia and EG with varied bacterial and fungal etiologies. There are scant reports of its association with human immunodeficiency virus (HIV) infection, while ocular involvement is extremely rare. An extensive search of the literature also found no report on EG, nor its relationship with HIV/acquired immunodeficiency syndrome (AIDS) from Sub-Saharan Africa. We hereby present a fatal case of multiple EG lesions in a 44-year-old Nigerian female with AIDS in the absence of bacteremia and review the literature of its association with HIV/AIDS and its concurrent orbital involvement.

Keywords: Acquired immunodeficiency syndrome, ecthyma gangrenosum, human immunodeficiency virus, panophthalmitis, *Pseudomonas aeruginosa*

Introduction

Ecthyma gangrenosum is a rare ulcerocutaneous infection previously thought to be solely caused by pseudomonas aeruginosa septicaemia, often with associated neutropenia.(1) It is common in individuals with suppressed immunity of varied aetiologies, including but not limited to haematologic disorders (malignancies and bone marrow suppression); lymphoproliferative disorders; and autoimmune diseases such as rheumathoid arthritis and systemic lupus erythematosus.(2–5) Pseudomonas aeruginosa remains the most common cause of EG, but it is also known to be caused by a variety of pathogens, can occur with normal neutrophil counts, and affects both immunocompetent adults and children.(5) Although HIV/AIDS can cause profound immunosuppression, only a handful of articles report on EG in association with HIV/AIDS, and none with concomitant panophthalmitis. This article reports on a case of a woman with AIDS who developed oculocutaneous ecthyma gangrenosum with a fatal outcome.

Case Report

A 44-year-old woman admitted via the emergency department with a 3-month history of multiple ulcers and a 3-day history of rapidly progressive swelling and loss of vision in the right eye with associated fever. She had been diagnosed with human immunodeficiency virus (HIV)-infection 5 years previously, was placed on antiretroviral medications, but defaulted 3 months before presentation.

Before her contact with our team, she had been admitted on account of multiple expanding ulcers with purulent discharge and managed as a case of pyomyositis. After a 3-week stay in the hospital, she requested discharge as some ulcers had healed, while others were improving. Her CD4 +count was 67 cells/mm^3.

She returned after 2 weeks on noticing the expansion of previously healing ulcers and the development of rapidly evolving new lesions. Concurrently, there was right ocular

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pain, swelling, and discharge, with progressively worsening visual loss.

Skin lesions were located on thighs, upper limbs, buttocks, perineum, and right eyelid, often beginning as discrete painful papules or pustules, with rapid progression (within 5–7 days) to pus formation, discharge, and eventual ulceration [Figures 1 and 2].

Examination revealed multiple ulcers on the aforementioned locations in various stages of evolution. The largest on the left thigh measured 6 cm × 10 cm, had an irregular undermined edge, with slough and islands of necrotic eschar on the ulcer floor. Ophthalmologic assessment of the right eye revealed upper lid edema with mild erythema and an overlying crusted and necrotic lesion on the nasal aspect. The conjunctiva, cornea, and sclera were all necrotic. A clinical diagnosis of ecthyma gangrenosum (EG) was entertained by the dermatologists, while panophthalmitis of the right eye was the presumptive diagnosis made by the ophthalmologists. She was commenced on intravenous levofloxacin, and her right eye was eviscerated and sent for histology. Intraoperative findings were extensive scleral necrosis, melted cornea, but relatively clear vitreous.

The white cell count was 4.5 × 10^9/L with 46% neutrophils (normal 4–11 × 10^9/L), while hematocrit was 20% (normal 36%–45%). Blood culture was negative; wound biopsy revealed an ulcerated epithelium with vascular congestion and areas of dermal hemorrhage and necrosis. There were also chronic inflammatory cells with features of hemorrhagic vasculitis. Culture of the specimen yielded growth of *Pseudomonas aeruginosa* sensitive only to cefepime, with intermediate sensitivity to ceftazidime, but resistant to levofloxacin, ciprofloxacin, and gentamicin. A concurrent definitive diagnosis of EG was eventually entertained by both dermatologists and ophthalmologists. Levofloxacin was discontinued and cefepime prescribed. The patient was, however, unable to procure the requisite medications, with a progressive deterioration in her clinical status, and eventual demise after 71 days of admission.

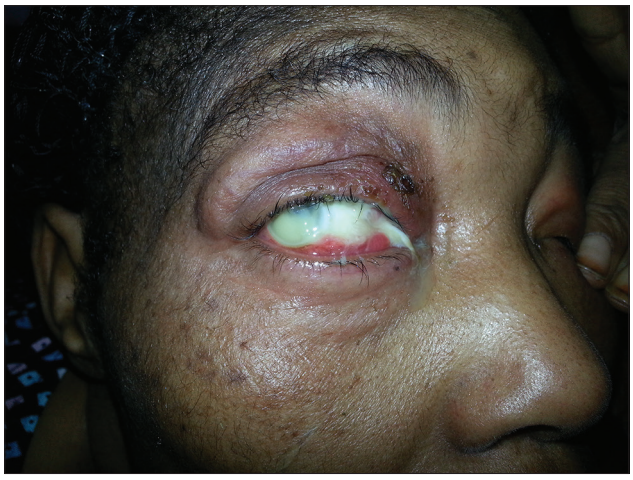

Figure 1: Right eye shows upper lid edema, mild erythema, and necrotic lesion on the nasal aspect of the right eye. The conjunctiva, cornea, and sclera appear necrotic

Discussion

The pathogenic effect of *Bacillus pyocyaneus* (now known as *P. aeruginosa*) in humans was fully elucidated in 1897 by Barker.[1] He mentioned its myriad organ system affection, and described the varied forms of cutaneous and subcutaneous manifestations, one of which himself and colleague (Fowler) referred to as "gangrenous processes". This is suggestive of the morphologic characteristic of EG. This and subsequent reports set the stage for EG to be considered a pathognomonic cutaneous sign of *P. aeruginosa* septicemia, mostly occurring in immunocompromised patients who were also neutropenic.[2] Following these initial findings, several authors have documented the presence of EG without bacteremia,[3-5] EG without neutropenia,[6-8] and EG in immunocompetent individuals.[9-13] Like in our index patient, *P. aeruginosa* is often the causative agent of most cases of EG; however, many other infective agents have been implicated, including other Gram-negative/Gram-positive bacterial and fungal organisms;[14-19] in some rare cases, more than one organism have been detected.[20,21]

Immunosuppressive states remain the most common risk factor for the development of EG, among which malignancies, particularly hematological malignancies, and lymphoproliferative disorders preponderate. This is clearly evident in a number of case series reported.[2,4,14,20] However, reports of EG in HIV/acquired immunodeficiency syndrome (AIDS) have been relatively few. The first of such was by Sangeorzan *et al*.[22] who reported two patients with skin lesions caused by *P. aeruginosa*, one of which was EG. The following year, el Baze[23] published a case series of 19 immunosuppressed patients with *P. aeruginosa*-induced dermatoses, ten of which were EG and only one was associated with HIV/AIDS. Inclusive of our index patient, there are a total of 16 reports of EG in association with HIV/AIDS to date [Table 1].[7,22-33] In all but three cases,[29,30,32] the causative agent was *P. aeruginosa*, and only a quarter of those with *P. aeruginosa*-related EG had bacteremia at time of presentation. Ninety percent of the stated CD4+ counts were ≤100 cells/ml, indicating that EG is indeed a disease of advanced HIV/AIDS. The mortality rate in this series of

Figure 2: Multiple ulcers in different stages of evolution with some showing slough and islands of necrosis

patients was 12.5% (inclusive of our index case) and both had widespread lesions in multiple sites in the absence of bacteremia. This is significantly lower than the mortality rate of 80% quoted by Kim *et al*.[7]

A much rare finding in our patient was the orbital involvement – panophthalmitis, which coexisted with the skin manifestation. To the best of our knowledge, only once, such an association has been reported.[34] A similar report involved the concurrent presentation of EG with orbital cellulitis and endophthalmitis – a less extensive involvement of the orbital tissues than panophthalmitis.[35] More commonly observed are reports of periorbital EG, which was also present on the right eyelid of our patient.[36-38]

The fatal outcome in our patient was subsequent to the observed drug resistance to the commonly used, available, and affordable antibiotics, with eventual progression of the infection occasioned by her inability to procure the requisite, but expensive antibiotics to which the infection showed sensitivity. A high prevalence of antibiotic resistance exists in Nigeria and is responsible for the increased mortality observed in the management of communicable diseases.[39] As stated by Greene *et al*.,[2] multiple EG lesions and delay in initiating the appropriate therapy are some of the factors that correlate with poorer outcome, which were present in our patient.

Conclusion

EG remains a potentially fatal communicable disease, especially in developing countries where the dearth of reports results in a low level of awareness, a low index of suspicion, and delay in instituting the requisite therapy. Although EG may be an uncommon cutaneous manifestation of HIV/AIDS, it should be included in the differential diagnosis of ulcerative communicable disorders in advanced HIV/AIDS. Multiple lesions of EG, even without bacteremia, may be associated with increased mortality.

Table 1: Demographic, clinical, and laboratory data of patients with human immunodeficiency virus/acquired immunodeficiency syndrome and ecthyma gangrenosum

Age (years)	Sex	Body location	Duration of HIV diagnosis	CD4 count (cells/mm^3)	Neutropenia	Wound culture done	Presence of bacteremia	Organism cultured	Outcome	Author(s)
35	Male	Face	NS	17	No	Yes	Yes	*P. aeruginosa*	Survived	Kim *et al*., 1999[7]
19	Female	NS	NS	NS	Yes	NS	Yes	*P. aeruginosa*	Survived	Cao *et al*., 2011[28]
40	Male	Trunk, LL	15 years	4	NS	No	No	MRSA	Survived	Ungprasert *et al*., 2013[29]
33	Male	Trunk, buttocks	5 days	6	Yes	Yes	No	*P. aeruginosa*	Survived	Ferguson *et al*., 2017[33]
31	Male	Face	NS	11	Yes	Yes	No	*P. aeruginosa*	Survived	Khan *et al*., 2000[27]
45	Female	LL	NS	70	No	Yes	Yes	*P. aeruginosa*	Survived	Khan *et al*., 2000[27]
45	Male	Buttocks	NS	NS	Yes	Yes	No	*P. aeruginosa*	survived	Berger *et al*., 1995[25]
36	Male	Genitalia	NS	NS	Yes	Yes	No	*P. aeruginosa*	Survived	Berger *et al*., 1995[25]
62	Female	Neck, perineum, LL	12 years	43	Yes	Yes	No	MSSA	Survived	Buffière-Morgado *et al*., 2015[32]
22	Male	LL, genitalia	4 years	NS	Yes	Yes	No	*P. aeruginosa*	Survived	Nelson *et al*., 1991[24]
61	Male	LL	5 months	8	No	No	No	NTM	Survived	Techatawepisarn *et al*., 2013[30]
35	Male	LL	NS	NS	NS	Yes	No	*P. aeruginosa*	Survived	Sangeorzan *et al*., 1990[22]
37	Female	UL	10 years	783	No	Yes	No	*P. aeruginosa*	Survived	Chiappe *et al*., 2016[31]
28	Female	Perineum, trunk, face	NS	NS	No	Yes	No	*P. aeruginosa*	Died	El Baze *et al*., 1991[23]
37	Male	Buttocks	NS	100	Yes	Yes	No	*P. aeruginosa*	Survived	Tornero *et al*., 1999[26]
44	Female	Eye, genitalia, perineum, buttocks	5 years	67	No	Yes	No	*P. aeruginosa*	Died	Present paper

NS: Not stated, LL: Lower limb, UL: Upper limb, *P. aeruginosa: Pseudomonas aeruginosa*, MRSA: Methicillin-resistant *Staphylococcus aureus,* MSSA: Methicillin-sensitive *Staphylococcus aureus*, NTM: Nontuberculous mycobacterium, HIV: Human immunodeficiency virus

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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