

Hyper IgE, Dermatitis and *Staphylococcus aureus* in an HIV-Positive Man

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Introduction

A variety of mucocutaneous disorders are seen in patients infected with Human immunodeficiency virus (HIV) [1]. While some of these conditions like Kaposi's sarcoma are considered acquired immunodeficiency syndrome (AIDS)-defining illnesses, most HIV patients suffer from common infectious and inflammatory skin disorders like folliculitis and psoriasis [2]. Psoriasis in HIV patients presents more severely and is associated with a worse outcome [3]. The skin cytokine expression in HIV patients is altered [4] and elevated levels of IgE, a hallmark of atopic disorders, were observed in HIV-infected adults and children [5-7]. Studies have shown that HIV glycoproteins can act as viral superantigens and contribute to the release of IgE and histamine, leading to a shift of the T cell response towards the Th2 phenotype [8]. The skewing towards Th2 cytokines is thought to predispose HIV-infected patients to atopic dermatitis and account for the increased incidence of atopic dermatitis observed in HIV patients [2].

Case Report

A 54-year old male with a history of HIV infection was referred to our clinic for evaluation of exfoliative erythema with possible Sezary syndrome. The patient was diagnosed with HIV in 1991 and was treated initially with zidovudine then switched to highly active anti-retroviral therapy (HAART) in 1995. He discontinued his HAART medications in 2010-2012 and developed *Pneumocystis jirovecii* pneumonia, which prompted him to restart his HAART medications in 2012. After restarting HAART in 2012, he developed an erythematous rash and intense pruritus, which was attributed to the immune reconstitution inflammatory syndrome. The rash persisted, leading to multiple courses of oral and intramuscular steroid treatments with flares in between courses.

On our initial evaluation, the patient exhibited diffuse erythroderma and had a confluence of greasy scales on his scalp and body. He had multiple fissures over his feet and pustules on the plantar surfaces of his distal toes bilaterally. Laboratory testing revealed an elevated white blood cell count (14,300 cells/ μ L) with 40% eosinophils (5710 cells/ μ L). Of note, his HIV load was undetectable and his absolute CD4 count was 185 cells/ μ L. A skin biopsy demonstrated epidermal spongiosis and a dermal lymphohistiocytic infiltrate with eosinophils and mast cells that was consistent with a hypersensitivity reaction. Cultures of his legs and feet grew *Staphylococcus aureus*. Susceptibility testing revealed sensitivity to oxacillin, tetracyclines, rifampin, linezolid, daptomycin and vancomycin but resistance to trimethoprim/sulfamethoxazole, clindamycin, fluoroquinolones, and erythromycin.

The patient was treated with 500 mg dicloxacillin twice a day, daily triamcinolone wet wraps and bleach baths. He returned for follow-up after two weeks, and his erythroderma had resolved. However, he

developed a symmetrical, pink morbilliform rash on his trunk and upper extremities. His eosinophil count remained elevated at 2010 cells/ μ L. Consistent with a Th2-dominant phenotype, his IgE level was elevated at 5041 IU/mL. His antibiotic therapy was discontinued out of concern for a drug rash, but his symptoms of erythroderma and pruritus worsened again. He was found to have persistent colonization with *S. aureus* and dicloxacillin was restarted. The patient experienced symptom relief on this therapy without return of a morbilliform eruption, and was significantly improved 2 weeks after restarting dicloxacillin. He continues to improve at 5 weeks since restarting dicloxacillin, at which time his eosinophilia has improved to 8.5% (730 cells/ μ L).

Discussion

Some patients with HIV/AIDS experience a hyperimmunoglobulinemia E (hyper-IgE)-like syndrome with hypereosinophilia and elevated serum IgE and accompanied by atopy and frequent cold staph abscesses [9]. This case highlights the difficulty of treating erythroderma and pruritus in an HIV-infected patient with this hyper-IgE-like syndrome. The list of differential diagnoses for this patient's initial presentation of erythroderma is wide but improvement after dicloxacillin treatment for 5 weeks suggests that hypersensitivity to *S. aureus* colonization is a contributing factor. Not only did the patient's symptoms decrease after treatment with dicloxacillin, his eosinophilia and IgE level decreased as well. Our patient had a CD4 count below 200 cells/ μ L and IgE levels greater than 5000 IU/mL, which is consistent with a previous report that demonstrated that high IgE levels are most likely seen in AIDS patients with low CD4 counts [6]. It is possible that *S. aureus* can act as a superantigen and trigger IgE release. While many antibiotic regimens are effective against *S. aureus*, HIV-infected patients develop cutaneous drug reactions more readily than the normal population [1]. The most common drug-related eruption is a morbilliform rash, as seen in our patient, while urticarial reactions have also been described frequently. The increased incidence of adverse cutaneous drug reactions makes it more difficult to provide optimal therapy for HIV-infected persons.

Although this patient improved with treatment of *S. aureus* alone, the elevated IgE level seen in his peripheral blood raises the question of whether treatment with omalizumab, a recombinant monoclonal antibody that binds to free IgE, will be effective in alleviating the recurrent symptoms in this patient [10]. Omalizumab generally has a well-tolerated safety profile and has been used successfully to treat chronic urticaria and asthma [10,11]. Adverse events have been observed at higher dosages (300 mg) and rare incidences of anaphylaxis have been documented [12]. There is no description of omalizumab usage in HIV-infected persons in the literature although *in vitro* studies have demonstrated that omalizumab inhibits HIV replication in mast cells [13]. In HIV-infected persons with high levels

of IgE and chronic contact dermatitis refractory to standard therapy, combining antibiotics and a low dose of omalizumab may potentially be effective in controlling their symptoms.

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