Eosinophilia with leukemoid reaction secondary to *Sarcoptes scabiei*

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INTRODUCTION

Scabies is a contagious parasitic skin infestation caused by *Sarcoptes scabiei* variety *hominis*. Clinical manifestations result from direct effects of mite infestation and hypersensitivity to their saliva and biologic products.[1] It typically presents with erythematous papules and burrows on digital web spaces and flexural surfaces. Atypical manifestations include nodules, urticarial plaques, keratotic papules, and bullae formation.[2] Crusted scabies is a rare, severe form occurring mostly in immunocompromised patients, presenting with localized or generalized scaly, hyperkeratotic, and fissured plaques.[3] Even though the association between hypereosinophilia and scabies is limited to anecdotic reports, a prospective study suggests that eosinophilia may be a distinctive finding in patients with crusted scabies.[4] We present the case of a 3-month-old infant presenting with generalized papules and pustules and eosinophilia, which resolved with precipitated sulfur ointment.

CASE DESCRIPTION

A 3-month-old infant was evaluated at the emergency department for persistent lesions on her body present for 6 weeks, associated with irritability. Birth and medical history were unremarkable. Physical examination showed generalized yellow to red-brown macules, papules, and pustules on the face, scalp, trunk, and extremities, including palms and soles (Fig 1). Painless, superficial, bilateral inguinal adenopathy was palpated. Three weeks before, the patient was treated with 2 courses of permethrin 5% cream applied to the whole body without improvement. Laboratory tests revealed a white blood cell count of 42.37 $\times$ 10^3 cells/μL with an eosinophil level of 36%; the absolute eosinophil count was 15,253 cells/μL. Chest radiography was unremarkable, with no evidence of hepatosplenomegaly on abdominal sonography.

Skin scraping from one of the pustular lesions revealed numerous scabies mites, eggs, and scybala. Given the atypical cutaneous lesions, significant leukocytosis, and bilateral inguinal adenopathy, a bone marrow and skin biopsy were performed. The former was normal. Skin biopsy showed mites in the subcorneal zone with a mixed inflammatory infiltrate in the papillary dermis with scattered eosinophils.

The patient was treated with precipitated sulfur 5% ointment in petrolatum for 3 consecutive nights and repeated one week later. Pustules and erythema resolved after 3 weeks, with subtle hyperpigmented macules on the trunk remaining, consistent with post-inflammatory hyperpigmentation (Fig 2). White blood cells, including eosinophils, returned to baseline levels after 2 months and remained normal upon re-evaluation after 4 months.

DISCUSSION

As seen in our patient, striking eosinophilia can be found with scabies and should prompt diagnostic consideration even in the absence of typical skin lesions. Our patient had no history of a primary skin disease; however, preceding disorders of desquamation or keratinization have been found to alter the classic course of scabies, wherein peripheral eosinophilia has served as a noteworthy sign leading to the suspicion of scabies.[5]

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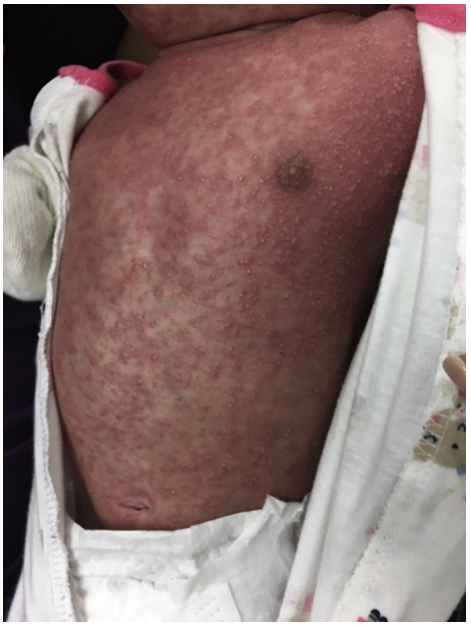

Fig 1. Scabies. The patient's trunk with generalized yellow to red-brown macules, papules, and pustules.

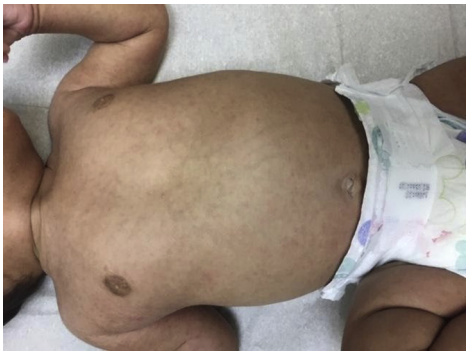

Fig 2. Post-inflammatory hypopigmentation. The patient's trunk with subtle hyperpigmented macules on the trunk remaining following treatment with precipitated sulfur 5% ointment in petrolatum.

The study of immunologic imbalance seen in crusted scabies has contributed to the understanding of the immunologic response against this infestation.[6,7] As seen in allergic reactions and parasitic infections, the immune system mounts an inflammatory response, which mediates the activation of major effector cells, including eosinophils, conferring protection against pathogens and allergens.[7] Such a response could also occur in scabies as an attempt to fight mites and biologic products. For instance, C3 and C4 complements were found to be present on skin biopsies and circulating in the serum of patients with scabies, suggesting the development of a localized and systemic immune reaction to the infestation.[8] However, the role of an eosinophilic leukemoid reaction in scabies has not been determined.

An elevated eosinophil count in scabies could be attributed to multiple factors, such as a weak immune system, prior use of topical steroids, or an immature immune system in newborns.[9] However, the possibility of an underlying immune disorder must be addressed, as abnormal leukocyte chemotaxis and eosinophil peroxidase deficiency have been reported in 2 infants with scabies and hypereosinophilia.[9] Fortunately, the eosinophilic leukemoid reaction seen in our patient subsided upon resolution of infestation. However, potential organ damage from prolonged hypereosinophilia warrants monitoring after clinical improvement to ensure normalization of the eosinophil count.

Although generally associated with immunocompromised states, people with no recognized immunodeficiency may still develop crusted scabies, as seen in our patient.[4] Eosinophilia reflects an active immunologic response to scabies. In these cases, a Th1 and Th2 imbalance favoring the latter may result in a non-protective and dysfunctional allergic response resulting in uncontrolled growth of the parasite.[8] Therefore, immunomodulation may play a greater role than true immunodeficiency.[8]

In the setting of atypical cutaneous lesions, leukocytosis, and inguinal lymphadenopathy, the differential diagnosis included Langerhans cell histiocytosis and leukemia cutis. Langerhans cell histiocytosis was excluded, since it typically presents with a proliferation of Langerhans cells in skin biopsy, whereas a normal bone marrow and peripheral blood smear findings essentially ruled out leukemia cutis.

Precipitated sulfur in petrolatum has been successfully used in patients with scabies and hypereosinophilia failing to respond to topical permethrin and oral ivermectin, achieving normal eosinophil count several months after treatment.[5] The topical use of sulfur ointment 2%-10% is considered a well-tolerated alternative for children with a favorable response, including infants under 2 months of age, especially in patients who do not tolerate or fail on conventional therapy, as in the present case.[10]

Scabies should remain in the differential diagnosis in an infant presenting with hypereosinophilia and atypical skin lesions, despite having completed appropriate treatment. An eosinophilic leukemoid reaction may represent an attempt of the immune system to react against mite infestation.[7,8] Physicians should consider precipitated sulfur as an alternative in children with atypical clinical manifestations who have failed to improve on conventional therapy.[5]

Conflicts of interest

None disclosed.

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