SKIN

BRIEF ARTICLE

Eosinophilic Annular Erythema of Childhood: A Rare Case

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ABSTRACT

Eosinophilic annular erythema (EAE) of childhood is a rare and recurrent skin condition, with only a few cases described in the literature. The etiology of EAE in children remains unclear. Clinical presentation shows a persistent, non-pruritic, urticarial annular lesions that enlarge in a centrifugal pattern. Biopsy is required for diagnosis which characteristically shows a perivascular eosinophilic infiltrate concentrated in the dermis. Although there is considerable overlap between EAE and Annular Erythema of Infancy (AEI), some proposed differences include age of onset, duration of lesions, presence of mucin deposition of histopathology, and time to resolution. This case report describes a rare case of EAE of childhood in a newborn with associated neonatal eosinophilic pustulosis and laboratory abnormalities.

INTRODUCTION

Eosinophilic annular erythema (EAE) of childhood is a rare and recurrent skin condition, with few cases described in the literature. The trunk and proximal extremities are mostly commonly affected.[1–3] EAE of childhood is characterized by the appearance of persistent, non-pruritic, urticarial annular lesions that enlarge in a centrifugal pattern.[1,2,4,5] Histopathology is often required for diagnosis, with lesions exhibiting a perivascular eosinophilic infiltrate concentrated in the dermis.[1–3] This case report describes a rare case of EAE of childhood in a newborn with associated neonatal eosinophilic pustulosis and laboratory abnormalities.

CASE REPORT

The patient is a three-week-old male who was seen in the hospital for a generalized eruption distributed on the trunk and extremities, which developed four days following birth. The lesions were initially described as bright red targetoid plaques. After a few days, the lesions improved for a short period before recurring. Due to worsening of the rash along with concomitant diarrhea with streaks of blood and concerns for dehydration, the patient was admitted for further work-up and supportive care. Upon dermatologic exam, the patient had generalized annular erythematous plaques with elevated borders and without scaling (Figure 1-2). The mother stated the lesions come and go and change

in shape and distribution. In addition to the lesions on the trunk and extremities, multiple pustules over an eczematous base appeared on the bilateral cheeks and forehead. No lesions were noted on volar or mucosal surfaces. Per the mother, the patient did not appear irritable.

Figure 1. Annular erythematous plaques with elevated borders on the abdomen.

The pregnancy was full term without history of autoimmune disease. The patient's vitals remained stable throughout the hospital course. Laboratory work-up showed consistent hypereosinophilia, peaking at 7,560 µl (36%) and elevated total immunoglobulin E (IgE). Subsequent allergic, immunologic, hematologic, gastrointestinal, and cardiac work-up was unremarkable.

The clinical differential for the lesions on the trunk and extremities included eosinophilic dermatosis, EAE of childhood, annular erythema of infancy (AEI), neonatal eosinophilic pustulosis, erythema annularis centrifugum (EAC), and neonatal lupus. A 3-0 punch biopsy was performed on the right lower extremity. Histology showed mild spongiosis without parakeratosis and eosinophils interstitially and perivascularly in the dermis (Figure 3a-c). PAS stain was negative for fungi. There was no evidence of vasculitis or other significant inflammatory infiltrate. The histological differential included hypersensitivity reaction and allergic reaction.

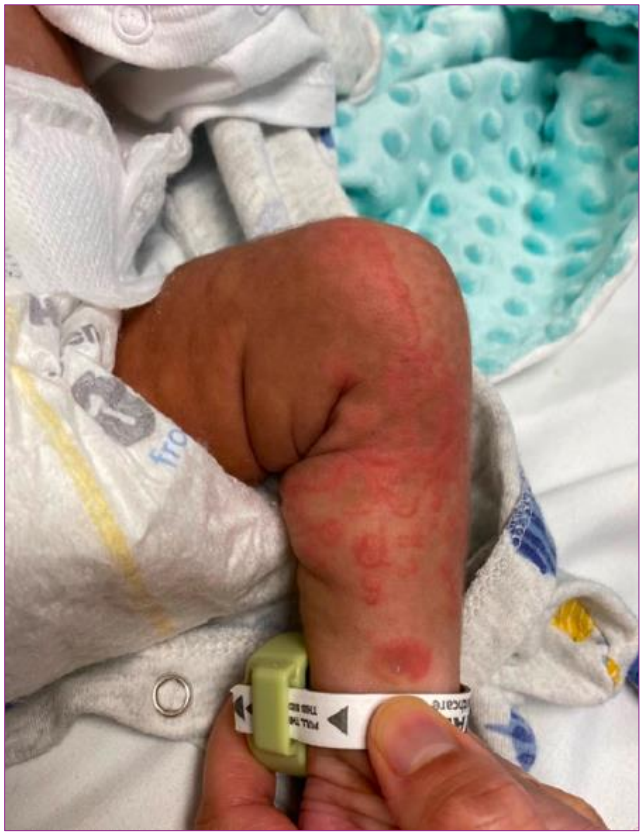

Figure 2. Annular erythematous plaques with elevated borders on the left lower extremity.

Based on clinical presentation and histologic description, the patient was diagnosed with EAE of childhood in addition to the clinical diagnosis of neonatal eosinophilic pustulosis. He was started on triamcinolone 0.1% cream twice daily for lesions on the trunk and extremities and topical

clindamycin 1% twice daily to pustular lesions on the face. At one-week outpatient follow-up, lesions on both the face and body had improved. Treatment was transitioned to hydrocortisone 2.5% cream twice daily to new lesions on the body.

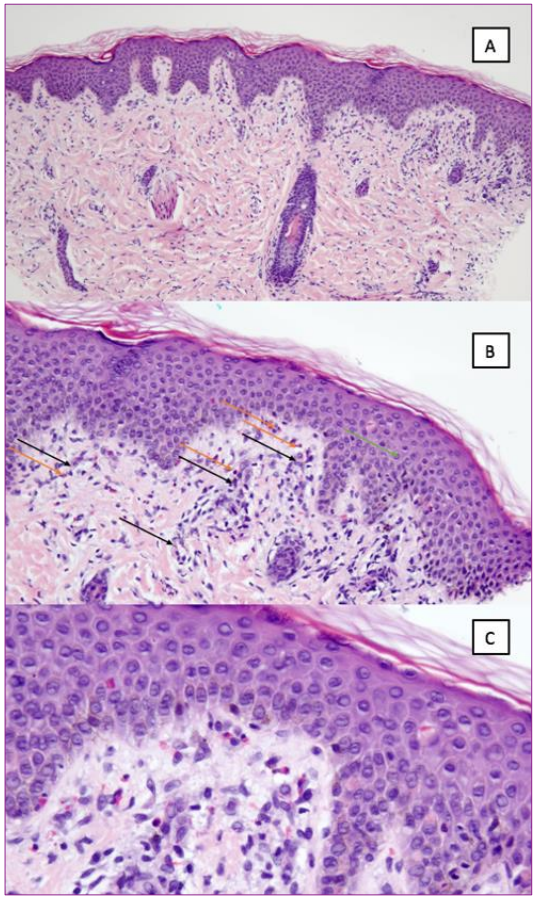

Figure 3. Punch biopsy of the right lower extremity (**3a** view at 100x, **3b** view at 200x, **3c** view at 400x). Mild spongiosis without parakeratosis is present. No interface dermatitis is identified. 3b highlight dermal interstitial and perivascular eosinophils (orange arrow) with some lymphohistiocytic infiltrate as well (black arrow).

DISCUSSION

EAE of childhood is an extremely rare condition. There is considerable overlap between EAE of childhood and AEI, with some reports using the term interchangeably in children younger than one year as well as others describing EAE as a variant of AEI.[1,2,5] Some proposed differences include age of onset, duration of lesions, presence of mucin deposition on histopathology, and time to resolution (**Table 1**).[1,4–6] Although there are features of AEI in our patient clinically, histopathology favored EAE. The biopsy demonstrated a predominant eosinophilic perivascular infiltrate, typical of EAE, vs. the perivascular interstitial lymphohistiocytic infiltrate with some eosinophils seen in AEI. Furthermore, while early documented cases of AEI were not typically associated with laboratory abnormalities, some cases of EAE have been found to be associated with peripheral eosinophilia, as in our patient.[3,7]

EAE has also been described as an annular variant of Well's Syndrome (WS), or eosinophilic cellulitis. WS, however, is thought to be histopathologically characterized by a diffuse inflammatory infiltrate rather than perivascular inflammatory infiltrate, eosinophilic degranulation, the presence of flame figures (deposits of major basic protein and degenerated collagen) with surrounding granulomatous reaction, and vasculitis.[1,2,4,5] Additionally, resolution of WS lesions is associated with hyperpigmentation and/or residual atrophy, which is not typical for EAE.[1] Neonatal lupus may also be included in the differential diagnosis, as it can present with subacute cutaneous lupus erythematosus-like annular erythematous plaques.[8] However, these lesions are located in sun exposed areas (i.e. the face), have fine scaling, and are often associated with systemic findings such as congenital heart block, hepatobiliary involvement, and cytopenias. Additionally, histopathology would show vacuolar interface changes, which were not seen on biopsy in our

patient. Finally, EAC is another migratory annular erythema that can rarely occur in newborns, but prominent eosinophils are not noted on biopsy.[4–6]

The etiology of EAE is unclear. It has been previously suggested that EAE may be due to a hypersensitivity reaction, though no antigen has been identified. In children, EAE has been diagnosed in association with asthma, though often no evidence for underlying disease is found.[1] In early documented cases of AEI, associated intestinal candida colonization and oral candidiasis was also reported.[7,9]

Laboratory abnormalities can occur, though they are not required for diagnosis. Peripheral eosinophilia has been reported in some cases;[3] however, elevated IgE levels have not been previously reported. Interestingly, patients with neonatal eosinophilic pustolosis frequently present with peripheral eosinophilia.[10] Further, infants with hyperimmunoglobulin E (hyper-IgE) syndrome can present with a crusting pustular eruption on the face and scalp similar to that of neonatal eosinophilic pustulosis, which would be associated with elevated IgE levels and persistent eosinophilia.[11] However, our patient lacked

Table 1. Comparison of eosinophilic annular erythema (EAE), annular erythema of infancy (AEI), Well's Syndrome (WS), and erythema annularis centrifugum (EAC)

Disease Entity	EAE	AEI	WS	EAC
Clinical Picture	-Persistent, urticarial annular lesions -Enlarge centrifugally pattern -Predominantly on trunk and extremities -Asymptomatic	-Slowly expanding annular urticarial plaques -Lesions can be on face, trunk, extremities -Asymptomatic	-Recurrent erythematous, indurated plaques resembling cellulitis -Painful or pruritic -MC on extremities -Malaise, +/- fever	-Firm pink papule that progresses to erythematous annular plaques -Migrate centrifugally rapidly -Trailing scale in superficial lesions vs indurated border in deep lesions
Age of Onset	Any age	<1 year of age	Any age	Any age with peak in 5th decade
Duration	-Lesions last weeks to months, recurrence can occur	-Lesions last a few days with new lesions for a several months	- Lesions last 1-2 months	-Lesions last days to months
Laboratory Findings	-Eosinophilia	-Normal	-Eosinophilia	-Malignancy Screening Tests
Histopathology Keys	-Perivascular lymphohistiocytic and eosinophilic infiltrate in the dermis -Mucin often present	-Perivascular lymphohistiocytic infiltrate with scarcer eosinophils	- Diffuse eosinophilic and histiocytic infiltrate in interstitial dermis - Flame figures	-Superficial and deep perivascular lymphohistiocytic infiltrate or "coat-sleeve infiltrate"

other findings of hyper-IgE syndrome, such as coarse facial features, recurrent skin and sinopulmonary infections, severe eczema, and mucocutaneous candidiasis.

EAE may resolve spontaneously, be treated in the case of persistent lesions, or be recalcitrant to several therapies.[2] Due to its rarity, there are no established treatment recommendations, and previous treatments are based on the limited case reports with varying levels of success. Previous reports have attempted topical and/or systemic steroids, hydroxychloroquine, chloroquine, cyclosporine, dapsone, indomethacin, tofacitinib, dupilumab, and UVB.[1–4] Recurrence has been noted in several reports. In our patient, topical mid-potency steroids appeared to resolve the lesions.

To our knowledge, this is the earliest reported case of EAE in a newborn and among few cases of EAE reported in the pediatric population. Our case is significant for its association with neonatal eosinophilic pustulosis, peripheral eosinophilia, and elevated IgE. Overall, this report provides new information to the limited knowledge surrounding this rare condition.

Conflict of Interest Disclosures: None

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