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Case Report

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Dust mite and alternaria alternata associated erythrodermic atopic dermatitis in an 8-year-old: A case report

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Abstract

Introduction: Erythroderma is a life-threatening condition which presents with redness, pruritus, erosions and painful fissures. These lesions are much more prone to infection. Atopic dermatitis is a chronic inflammatory condition of the skin characterized by itching, recurrent lesions, family history and lichenification.

Case: Presenting a case of an 8-year-old girl with erythrodermic atopic dermatitis with a history of multiple hospitalizations for the same. Diagnosed with help of component-resolved diagnosis with multiple allergies, and treated with help of immunosuppressant, monoclonal anti-immunoglobulin E antibody, and allergen-specific immunotherapy. Conclusion: Proper diagnosis of cause and treatment of atopic dermatitis is as important as the symptomatic care to inhibit the progression of allergy into atopic march.

Keywords: Erythrodermic atopic dermatitis; House dust mite; Immunotherapy.

Introduction

Atopic Dermatitis (AD) is an inflammatory chronic skin condition usually associated with a family history of atopy such as AD, allergic rhinitis, asthma etc. Erythroderma presents as redness, lichenification, and scaling of the skin, with intense pruritus which leads to erosion and painful fissures which if left untreated can become a life-threatening condition [1]. The predisposed areas affected are eyelids, face, neck, dorsa of feet and hands, flexors, wrist joint and or in severe condition can become generalized [2]. These lesions are very prone to get colonized by Staphylococcus aureus which worsens the skin inflammation by forming a vicious circle of releasing continuous exotoxins and stimulating the T cells and macrophages further [3].

The exact cause of this condition is yet not completely understood. The correlation between the genetic and environmental conditions, with the immunological reaction, gives an idea about their strong interaction [4].

It is very important to recognize the cause of the condition and to treat it promptly and effectively.

The diagnosis of erythrodermic atopic dermatitis is made based on clinical criteria proposed by Hanifin and Rajka in which 3 of the 4 mentioned features should be presented. Pruritus, lichenification, chronically relapsing course and atopic history. Minor characteristic features present are Immediate (type I) skin reaction, elevated serum IgE level, early age of onset, cutaneous infection, cheilitis, recurrent conjunctivitis etc [5].

Allergy associated with dust mites and food products is quite common but less common with fungus or moulds at a young age. Elevated IgE levels and Skin prick test is the most common tests to determine sensitivity to allergens. 85% of cases show elevated IgE levels [6].

In some cases of erythroderma, a skin prick test is not possible due to the unavailability of unaffected skin so Component-Resolved Diagnosis (CRD) or molecular diagnosis of allergy determines total serum IgE against purified native and recombinant allergenic molecules. The evolving DNA technology has made it possible the introduction of individual allergic molecules for laboratory diagnosis of allergies [7,8].

Treatment of allergen-induced Erythrodermic Atopic Dermatitis is complex and requires combination therapy. Short-term control of acute symptoms followed by long-term stabilisation of condition and flare-up prevention with minimal side effects [9].

Here, we present a case of an 8-year-old girl, who presented with an erythematous skin lesion on the face, flexors, feet, and ankle with intense pruritus, and painful erosions resulting from scratching, with a family history of atopy. A molecular diagnosis was made with CRD and successful treatment was carried out with anti-IgE therapy.

Case report

We present a case of an 8-year-girl presented with a complaint of erythematous rashes on typical locations from 2 years with waxing and waning pattern. Clinical examination was carried out after taking proper consent from the patient and parents.

Presentation of an erythematous skin lesion on the face, flexors, feet and ankle with intense pruritus and erosions which resulted from scratching followed by painful fissures (Figure 1).

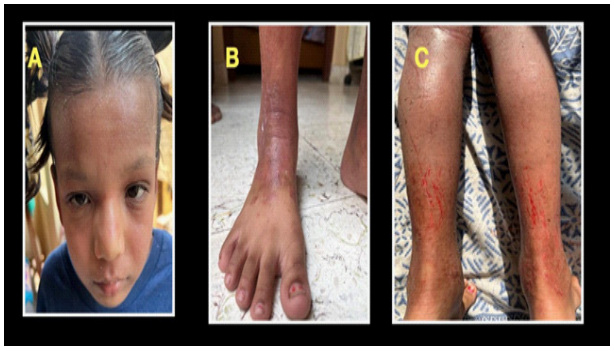

Figure 1: Clinical picture presenting erythematous skin lesion on the face, flexors, feet and ankle with erosions which resulted from scratching followed by fissures formation.

The patient took multiple treatments from dermatologists, paediatricians, and Ayurvedic and homoeopathic physicians and also had a history of hospitalisation for the same. But lesions re-occurred after a few months. The patient was not able to attend school for 6 months due to the same.

A family history of atopy was present. Mother had asthma and dust mite allergy from her childhood and was under medication for the same. Further, given the history of staying in the downtown area in a very old vintage home.

On basis of Hanifin and Rajka 3 out of the 4 clinical criteria proposed, pruritus, recurrent relapse and history of atopy was meeting the criteria. Based on that a provisional diagnosis of atopic dermatitis was made.

Differential diagnosis, in this case, included other conditions that could lead to the exfoliative erythrodermic syndrome: Erythrodermic psoriasis, lymphoma, leukaemia and cutaneous drug reaction, pityriasis rubra pilaris and pemphigus foliaceus.

After proper consent and consultation, blood samples were sent to the lab. The absolute eosinophilic count was 3000 (normal range 0 to 500 cells per microliter), the total IgE count was 27,505 (normal range 150 and 300 UI/ml), and total immunoglobulin levels were within the normal limits as per age. Skin biopsy reports suggested of Atopic dermatitis.

As there was an increased probability of staphylococcal infection in such erosive rashes admission was advised, to which the parents were resistive as they already had been hospitalised before and early relapse within weeks and months was observed by them.

The patient was given symptomatic and supportive treatment to relieve the acute symptoms with ointments and steroids, and antibiotics to reduce the chances of infection.

In this case, a skin prick test was not advisable due to the erythematous condition of the skin. Molecular diagnosis by Component Resolve Diagnosis (CRD) was prescribed which came out to be strongly positive for House Dust Mites/Dermatophagoidespteronyssinus (DP), Dermatophagoidesfarinae (American house dust mite), Alternariaalternata (AA), Malassezia furfur (MF), moderately positive for chickpea lentil, peas, wheat, sesame and mildly positive for casein. Avoidance of food allergens was advised along with cyclosporine (immunosuppressant), Ketotifen (H1 receptor blocker and mast cell stabilizer) for controlling the symptoms prescribed. Inj. Omalizumab 150 mcg (Monoclonal anti-immunoglobulin E antibody) monthly and immunotherapy for dust mite was started initially to stop the progression of allergy and the atopic march.

The patient was advised to change the residence place where the fungus was present. The patient was kept under continuous regular follow-ups. The patient returned after a week with a complete resolution of all symptoms and rashes (Figure 2). The patient returned to her routine activities after the resolution.

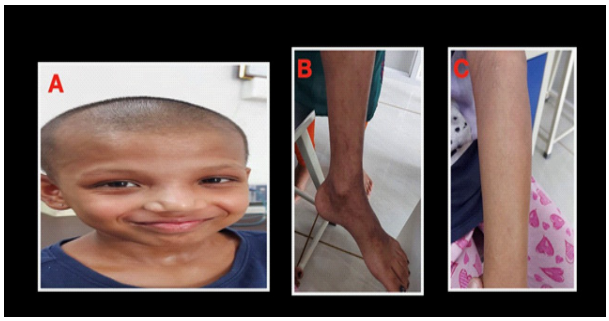

Figure 2: Clinical picture presenting complete resolution of erythematous skin lesion on the face, flexors, feet and ankle.

Discussion

Erythroderma is a possible life-threatening condition. There is an increase in heat dissipation and fluid loss due to capillary dilatation. There is a high risk of secondary skin infection with S. Aureus even sepsis. Treatment comprises supportive care such as fluid and electrolyte infusion, and systemic antibiotic administration [1,10].

Due to the denial of the patient's parents admission was not an option. But patient's parents were keen on the treatment and, agreed to cooperation with regular follow-ups telephonically and physically, treatment was initiated after taking proper consent.

The blood findings of increased IgE and Absolute eosinophilic count was the key component after the clinical criteria which helped in early diagnosis and planning the strategy of treatment. A skin biopsy confirmed the lesion type.

For confirmation, component-resolved diagnosis was the game changer. This molecular diagnosis of allergy is based on the specific IgE determinant concentration against individual allergic molecules, which allows the detection of sensitisation against the individual element of the allergic sources, even for those which are lacking in the allergen extract [11]. In CRD allergens are divided on basis of source (eg. inhalant, nutritive, contact, Hymenoptera venom), and the basis of protein molecules (storage proteins, profiling, a calcium-binding protein, serum albumin etc) [8]. In the case presented allergens were inhalant, nutritive type with protein type of tropomyosin, defence-like proteins and storage proteins.

CRD can be used in two ways singleplex and Multiplex-microarray assays. The technique used in the case presented was multiplex assay as multiple allergens-specific IgE was required to be determined [8,11].

Dermatophagoides pteronyssinus (DP, European house dust mite) and Dermatophagoides farinae (DF, American house dust mite) DP DF, are most commonly found in warm and moist areas. Most commonly found in beds. The optimum temperature for them is 20-30 degrees, 60-80% humidity and chitin, cellulose and moles to feed and survive. Currently, 23 House Dust Mites allergens are known (Colloff, 2009) [12,13].

Alternaria alternata is a typical outdoor fungus but is also seen routinely in humid areas of house and bathroom walls and very the potential to cause allergy.

Malassezia furfur (Pityrosporum ovale in hyphal form) is a type of yeast that is naturally found on the skin surfaces of humans and some other mammals and is also a known allergen [14].

In the case presented dust mites, Alternaria alternata and Malassezia furfur were strongly positive and chickpeas, wheat, and peas were moderately positive. Avoidance of food items was advised along with immunosuppressants and mast cell stabilisers to control the symptoms and anti-IgE therapy in form of omalizumab to stop further progression of the condition. Dupilumab is another potent anti-IgE which is a powerful T cell modulator. Its unavailability and high costs are some constraints to its use in patients.

Further sublingual and oral combination immunotherapy for dust mites was initiated. Its successful management has been discussed in various studies and case reports [15]. The patient was advised to change the residence place and care for cleaning humid places was also advised.

In these challenging cases of allergies, no one treatment works. It's a holistic approach to modulating the immunological response of the body to give our patients better quality of life.

Conclusion

Proper history taking, diagnostic testing and treatment planning are the keys to treating atopic dermatitis with the erythema. Monoclonal anti-immunoglobulin E antibody is the need of the hour for preventing further progression of allergy to the atopic march.

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