ISSN: 0091-5154

INDIAN JOURNAL OF DERMATOLOGY ® 1955

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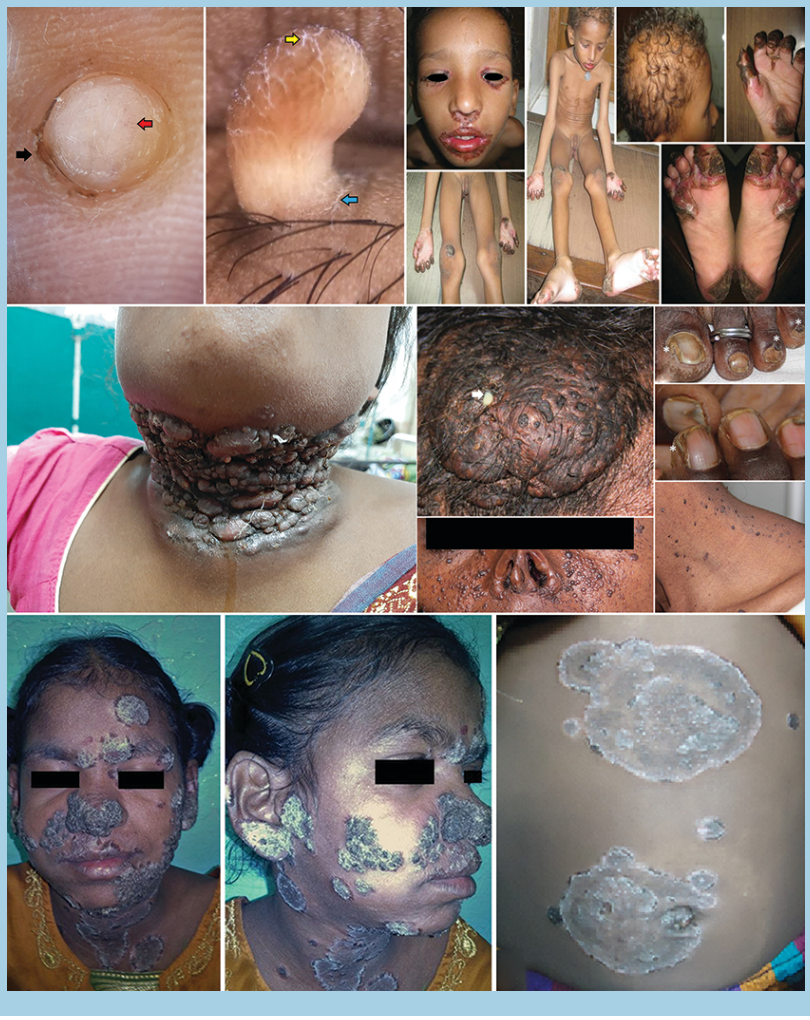
Asian Academy Of Dermatology And Venereology

IJD Indian Journal of Dermatology

Volume 67 Issue 3 May-June 2022



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Impact factor: 1.757

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Official Publication of Indian Association of Dermatologists, Venereologists and Leprologists, West Bengal State Branch

REVIEW ARTICLE

Uncommon Non-Infectious Annular Dermatoses

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Abstract

Several cutaneous diseases can present with annular lesions, making a distinction by physical appearance alone challenging. They can be distinguished into infectious and non-infectious, and common and uncommon annular dermatoses. Common non-infectious diseases include granuloma annulare, urticaria, and subacute lupus erythematosus. In addition, there are rare non-infectious non-neoplastic annular dermatoses whose nosographic attribution is established, including annually recurring erythema annulare centrifugum (EAC) and annular erythema in Sjögren syndrome and others whose nosographic positioning is still debated. They are neutrophilic figurate erythema, palpable migratory arciform erythema, eosinophilic annular erythema, and annular lichenoid dermatitis of youth. Their etiopathogenesis is largely unknown, although immune-mediated mechanisms are likely involved. It is difficult to establish if they are variants of reaction patterns or separate clinic-pathological entities. In fact, EAC and annually recurring EAC may represent different aspects of the same disease. Palpable migratory arciform erythema is hardly distinguishable from EAC deep type, Jessner-Kanof disease, and lupus tumidus. Neutrophilic figurate erythema and eosinophilic figurate erythema are clinically very similar and differing only in the relative proportion of eosinophils and neutrophils.

Key Words: *Annular lichenoid dermatitis of youth and annular erythema in Sjögren syndrome, eosinophilic annular erythema, erythema annulare centrifugum, neutrophilic figurate erythema, palpable migratory arciform erythema*

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Introduction

Several dermatoses can present with annular lesions, characterized by a ring-like configuration, with the profile being truly annular, arciform, figurate, or polycyclic. Annular dermatoses can be distinguished into infectious and non-infectious, and common and uncommon annular diseases.[1] Non-infectious diseases can be further differentiated into inflammatory and neoplastic or cancer-associated [Table 1]. The following is a narrative review about the uncommon non-infectious and non-neoplastic dermatoses with a constant annular configuration. They include erythema annulare centrifugum (EAC), annular erythema in Sjögren syndrome, and other rare variants whose distinction and diagnosis may be challenging. These disorders are usually identified as "erythema", but the use of this term is debated,[2] as it literally just means a change in skin color (redness) but not the process behind it. Moreover, skin redness is evident in white skin, but it may not manifest in darker skin types. Therefore, we prefer to avoid this term in our description and rather use "dermatosis" while leaving "erythema" in the original disease description.[2] The prevalence of these diseases is unknown. Most information is based on case series. They are all benign disorders, but their nosographic positioning, etiopathogenesis, and treatments are still debated or unknown. They all enter each other in differential diagnosis, and a thoughtful clinic-pathological correlation is essential.

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Quick Response Code:

Website: www.e-ijd.org

DOI: 10.4103/ijd.ijd_743_21

Erythema annulare centrifugum

EAC is clinically characterized by the presence of annular erythematous lesions that enlarge centrifugally with central clearing.[3,4] A fine scale may be present inside the advancing edge, defined trailing scale. The lesions, in most of the cases, involve the extremities, in particular, thighs and legs, and less frequently, the trunk.[3,4] The peak incidence is mid-adult life, with no gender difference. EAC superficial type is clinically characterized by the presence of lesions with non-indurated borders

How to cite this article: Maurelli M, Colato C, Gisondi P, Girolomoni G. Uncommon non-infectious annular dermatoses. Indian J Dermatol 2022;67:313.

Received: August, 2021. **Accepted:** March, 2022.

Table 1: Principal annular dermatoses

Common	Uncommon
Inflammatory	
Granuloma annulare	Erythema annulare centrifugum
Interstitial granulomatous dermatitis	Annually recurring erythema annulare centrifugum
Subacute lupus erythematosus	Palpable migratory arciform erythema
Lichen planus	Neutrophilic figurate erythema
Linear IgA dermatosis	Eosinophilic annular erythema
Bullous pemphigoid	Annular lichenoid dermatitis of youth
Epidermolysis bullosa acquisita	Erythema marginatum
Pemphigus IgA and herpetiformis	Annular erythema in Sjögren syndrome
Sneddon Wilkinson disease	
Pityriasis rosea	
Psoriasis	
Sarcoidosis	
Atopic dermatitis	
Seborrheic dermatitis	
Urticaria	
Purpura annularis telangiectodes of Majocchi	
Erythema multiforme	
Neoplastic or associated with neoplasia	
Porokeratosis	Erythema giratum repens
Mycosis fungoides	Necrolytic migratory erythema
B cell lymphoma	
Infectious	
Tinea	
Syphilis	
Erythema chronicum migrans	
Hansen's disease	

that are scaly and itchy [Figure 1a]. Histopathologically, a superficial perivascular lymphohistiocytic infiltrate of variable intensity, with occasional eosinophils and edema of the papillary dermis, is observed. The epidermis often shows areas of mild spongiosis surmounted by focal parakeratosis [Fig. 1c]. In contrast, the deep type presents with indurated borders, and it is non-scaly and usually not itchy. Histopathologically shows a 'coat-sleeve' perivascular lymphohistiocytic infiltrate of variable intensity in the reticular dermis. No epidermal changes are present.[3] In the majority of the cases, EAC is idiopathic. In a minority of the cases, EAC is thought to be the result of a hypersensitivity reaction to some external or internal causative factors, such as insect bites, infectious diseases, hormonal disturbances, drugs, and neoplasms (lymphoproliferative disorders). Other fewer associations include Crohn's disease, pregnancy, autoimmune endocrinopathies, and hypereosinophilic

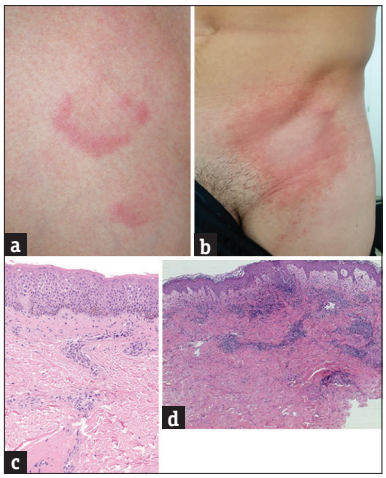

Figure 1: (a and c) Erythema annulare centrifugum. Male, 34-year-old. Erythematous annular plaque localized at left tight. (b and d) Annually recurring erythema annulare centrifugum. Male, 29-year-old. Erythematous annular plaque, presenting for three consecutive years, always in spring. (c and d) A moderate superficial perivascular lympho-histiocytic infiltrate, with occasional eosinophils, and edema of the papillary dermis (c, Hematoxylin & eosin, H and E, x100; d, H and E, x200)

syndrome.[3-5] The treatment of EAC is based on topical corticosteroids and a brief course of systemic corticosteroids. In the case of EAC associated with an underlying disorder, the treatment of the other disease leads to a faster disappearance and resolution of the lesions.[3,4]

Annually recurring erythema annulare centrifugum

Annually recurring erythema annulare centrifugum (AR-EAC) is a rare EAC variant characterized by the appearance of annular plaques usually localized at the extremities and recurring strikingly in the same period of the year.[6-8] Only 14 cases have been described in the literature and have been recently reviewed.[9] Patient age ranged from 16 to 83 years, with a mean age of 47 years and a disease duration of 1–30 years. In most cases, AR-EAC has been observed in females, with an M:F = 1:2.4. This variant has the same clinical and histopathological features as the superficial type of EAC [Figure 1b and d]. The peculiarity is that the relapses are always at the same time of the year, more commonly in summer or spring. AR-EAC has not been associated with any underlying disorder or other causative factors.[7-9] Lesions tend to resolve spontaneously without leaving skin marks. The treatment is based on topical corticosteroids. A brief course of systemic corticosteroids may speed up the disappearance of the lesions.

Palpable migratory arciform erythema

Palpable migratory arciform erythema (PMAE) is a very rare disease, with only 15 cases reported. PMAE was first described by Clark *et al.*[10] in 1974 as a unique entity in the set of lymphocytic infiltrations of the skin. Its nosological classification is still controversial; over time,

it has been considered a distinct skin disease, a subtype of T-cell pseudolymphoma, a rare variant of Jessner-Kanof disease, or a variant of EAC.[10-13] Alternative term used to identify this entity is erythema migrans arciforme et palpable.[12] PMAE usually affects adult individuals with a slight male predisposition (M:F = 1.5:1), with a mean age of onset of 49 years. Most cases have been reported in Europe. PMAE is usually located at the upper trunk, with the back, neck, arms, and thighs being additional sites.[11,12,14] The lesions are usually asymptomatic, but itchy or burning sensations have been reported in some patients. Clinically, PMAE is characterized by multiple annular erythematous lesions with sharply elevated borders that rapidly enlarge with centrifugal arciform progression and central clearing, sometimes growing to a diameter of 20 cm or more [Figure 2a]. The lesions are strictly dynamic and change within days or weeks, with the occurrence of new lesions and/or spontaneous regression of existing ones. This distinctive clinical evolution justifies the term 'migratory'.[10,11] Serological screening for Borrelia, Treponema pallidum, and viral infections as well as testing for antinuclear antibodies, are always negative.[14] The histological findings show a moderate to abundant perivascular, and periadnexal lymphocytic infiltrate throughout the reticular dermis, with no epidermal involvement and lack of plasma cells [Figure 2c]. No interstitial infiltrates, or mucin deposition is found. Lymphocytes are predominantly T cells (CD4 > CD8+) with a small B cell and histiocytic component. CD1a + cells are absent and CD30 + cells are very rare.[11,12] Direct immunofluorescence analysis is always negative.[11,14] TCR-ϒ gene rearrangement study usually demonstrates policlonality. Only one case revealed a clonal TCR-ϒ gene rearrangement.[14] The etiology is unknown. Although a good response to antibiotic treatment was observed in most of the reported cases, evidence of infection was never found. An iatrogenic etiology was suggested for two patients taking diclofenac for fibromyalgia, but the lesions recurred a few weeks after drug withdrawal. Based on current knowledge, an inflammatory/reactive process triggered by various stimuli seems to be the most likely mechanism.[14] The clinical differential diagnosis includes Jessner-Kanof, lupus erythematosus tumidus (LET), deep EAC, erythema chronicum migrans, and granuloma annulare.[14] PMAE typically presents with a chronic course and often tends to recur after weeks despite the treatment attempts. Complete spontaneous regression of the lesions has only been described in isolated cases after years of persistence.[11,14] Treatments include topical steroids, penicillin, and cephalosporins. Psoralen plus ultraviolet A (PUVA) photochemotherapy or UVA-1 phototherapy has been used with variable results. Recently, low-dose hydroxychloroquine has been indicated as a possible treatment for steroid-refractory or relapsing PMAE.[14]

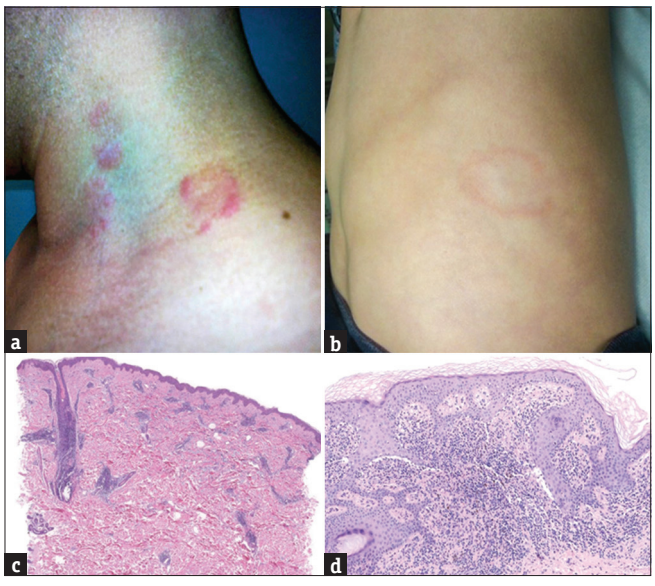

Figure 2: (a) Palpable annular erythema. Male, 41-year-old. Erythematous annular plaques at the neck. (b) Annular lichenoid dermatitis of youth. Male, 12-year-old. Annular thin plaque on the flank with an erythematous-brown edge and hypopigmented center. (c) Palpable annular erythema. A moderate perivascular and periadnexal lympho-histiocytic infiltrate, throughout the reticular dermis, with no epidermal involvement and lack of plasma cells (H&E, x100). (d) Annular lichenoid dermatitis of youth. Lichenoid lymphocytic infiltrate in the superficial dermis restricted to the tips of elongated and squared rete ridges with vacuolization of the epidermal basal cell layer. Scattered melanophages in the dermis (H&E, x100)

Neutrophilic figurate erythema

Neutrophilic figurate erythema (NFE) is a rare benign inflammatory dermatosis characterized by annular or polycyclic indurated erythematous plaques and histologically by an inflammatory infiltrate, with numerous neutrophils and nuclear debris, without signs of vasculitis.[15-17] Only five cases in pediatric patients have been reported with a female prevalence (M:F = 1:4). The age ranged from 9 months to 2 years.[16] About twenty cases have been described in adults, again with a female prevalence (M:F = 1:2.5).[15] Lesions are annular or polycyclic plaques with raised firm erythematous borders and trailing scales [Figure 3a]. Blisters and purpuric lesions have also been reported.[17] They are asymptomatic or mildly pruritic.[15-17] In adults, NFE usually manifests as a single lesion, whereas in infants, the lesions are typically multiple. Lesions are mainly localized on the trunk.[15] Histopathologically, lesions show normal epidermis with no or very limited spongiosis or parakeratosis. The dermis is dominated by superficial and deep perivascular and interstitial infiltrate with numerous neutrophils and nuclear dust [Figure 3c]. Focal extravasated erythrocytes have been described, but not the signs of vasculitis. Lymphocytes, histiocytes, rare plasma cells, and eosinophils may be present.[15-17] Histologically, the picture may be similar to neutrophilic urticarial dermatosis, but in the case of NFE, lesions are long-lasting. The prognosis is benign, with lesions persisting for weeks or months. The treatment is

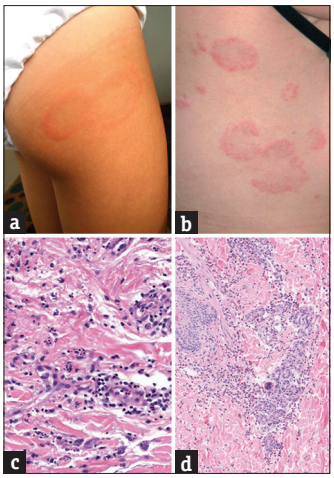

Figure 3: (a) Neutrophilic figurate erythema. Female, 7-year-old. Annular-polycyclic plaques at tights, with central clearing and with raised, firm erythematous border and trailing scales (b) Eosinophilic annular erythema. Female, 52-year-old. Annular-polycyclic plaques localized at the trunk, with central clearing and elevated erythematous border. (c) Neutrophilic figurate erythema. Inflammatory infiltrates with numerous neutrophils and nuclear debris, lymphocytes and histiocytes, rare plasma cells, and eosinophils (H&E, x100). (d) Eosinophilic annular erythema. A dense superficial and deep perivascular and interstitial lymphohistiocytic infiltrate composed of abundant eosinophils and scattered neutrophils (H&E, x100)

based on topical and systemic steroids, dapsone, and colchicine.

Eosinophilic annular erythema

Eosinophilic annular erythema (EAE) is a rare, benign skin disorder that was first described by Peterson and Jarrat in 1981 as a variant of annular erythema of infancy[18] and by Kahofer *et al.*[19] in 2000 as recurrent annular erythema with marked tissue eosinophilia and absence of 'flame figures'. It is still a matter of debate whether EAE represents an annular variant of Wells syndrome or a separate entity.[20,21] About forty cases of EAE in adults and fewer than ten cases in children have been reported. Among adult patients, there is a slight female preponderance with an age range of 20–85 years.[22] Lesions mainly affect the trunk and extremities, and rarely the face, axilla, groins, palms, and soles.[21] They are usually asymptomatic.[21,22] EAE begins as solitary or multiple recurring erythematous nodules or papules that evolve into annular, polycyclic, or gyrate plaques with central clearing and elevated erythematous border [Fig. 3b]. The plaques may vary in size from 1 to 30 cm and heal without sequelae or rarely with hyperpigmentation.[21,22] A single case of bullous EAE has been reported.[23] Laboratory tests usually are non-contributory, although in some cases may show peripheral eosinophilia. It has been associated with various systemic diseases, including neoplasms, autoimmune diseases, and infections.[21,22] Histologically, EAE is characterized by a dense superficial and deep perivascular and interstitial lymphohistiocytic infiltrate with abundant eosinophils and few neutrophils [Fig. 3d]. Basal vacuolar degeneration and dermal mucin deposition have been described in a few cases. Classically, the inflammatory infiltrate is mainly perivascular; 'flame figures', composed of deposits of eosinophil major basic protein on degenerated collagen fibers, or granulomatous reaction are absent, but they may be present in the long-lasting lesions.[20,21] Direct immunofluorescence is negative.[23] The etiology is still not understood. EAE is considered a hypersensitive reaction to unidentified triggers that provoke the release of IL-5 and increased eosinophilic chemotaxis. IL-4 and IL-13 released by activated eosinophils are important for pathogenesis.[22,24] The main differential diagnoses of EAE are Wells syndrome, insect bite reactions, bullous pemphigoid, and other annular dermatoses. EAE has a chronic relapsing-remitting course.[25] Generally, EAE is resistant to multiple treatments. Systemic steroids and antimalarials are the usual first-line option. Other therapeutic options include dapsone, indomethacin, cyclosporine, nicotinamide, and ultraviolet B phototherapy.[22] Recently, dupilumab and mepolizumab have been suggested as new therapeutic options.[22,24]

Annular lichenoid dermatitis of youth

Annular lichenoid dermatitis of youth (ALDY) was first described by Annessi *et al.*[26] in 2003 in 23 Italian children and adolescents. Since then, about 60 additional cases have been reported.[27] It is still a debated entity, but increasing evidence supports the hypothesis that ALDY is a reactive lichenoid dermatosis.[28] ALDY mainly occurs in children and young people at a mean age of 11 years, and with male prevalence (M:F = 1.6:1), but adults may also be affected.[26,29-31] Most patients are from Italy and Western Europe, especially from the Mediterranean area[26,27,29,30] with anecdotal reports from America, Japan, and Iran.[27,32] The clinical picture is characterized by solitary or multiple annular brownish-red patches with raised borders and hypopigmented centers without scaling or skin atrophy [Figure 2b]. Lesions typically occur on the flanks and groins and less commonly on the axillae or the neck. Lesions may or may not be distributed in a bilateral and symmetrical fashion.[26,30] The condition is mostly asymptomatic with occasional mild pruritus. The histological hallmark of ALDY is an interface dermatitis affecting selectively the tips of the rete ridges with massive apoptosis of keratinocytes limited to this area and thus configuring a squared base [Figure 2d]. The infiltrate is composed of small lymphocytes, few histiocytes, and scattered melanophages. T-cells are mostly CD4 + T-cells in the dermis, and mainly CD8 + T-cells in the epidermis, as in other lichenoid dermatoses.[26,28] No epidermotropism is observed, and molecular studies have been consistently negative for monoclonal T-cell receptor rearrangement.[30] The etiopathogenesis of this condition is unknown, although immunohistochemical findings suggest a

T-cell-mediated cytotoxic reaction against keratinocytes, in analogy with other lichenoid dermatoses.[29,30] The clinical appearance of ALDY can simulate inflammatory morphea, vitiligo, annular erythema, granuloma annulare, or mycosis fungoides, whereas histopathological differential diagnosis includes primarily inflammatory vitiligo and mycosis fungoides.[26,28,30,33] ALDY may resolve spontaneously,[26,27,30] but in most cases runs a chronic course with relapses. Therapeutic options include topical and systemic corticosteroids, topical calcineurin inhibitors, and phototherapy. Most patients respond well to corticosteroids, but recurrence after discontinuation is frequent.[26,27,30] Recently, cyclosporine has been successfully used in a resistant case.[34]

Annular erythema in Sjögren syndrome

Sjögren syndrome (SS) is a chronic autoimmune disease that primarily involves the exocrine glands (salivary and lacrimal glands), causing the typical sicca syndrome, but extra-glandular manifestations are also common. SS can present either alone (primary SS) or in the context of an underlying connective tissue disease, most commonly rheumatoid arthritis or systemic lupus erythematosus (secondary SS). Almost one-third of primary SS patients experience a systemic disease with variable extent and severity, and approximately 5% of patients ultimately develop B-cell lymphoma. Nearly half of SS patients were reported to have skin involvement. The most frequent cutaneous manifestations include skin xerosis, hypergammaglobulinemic purpura, and urticarial vasculitis.[35] Annular erythema, although rarely found in Caucasians, has been recognized as a specific presentation of SS with positive serum anti-Ro/La antibodies in the Asian population. Annular erythema in Sjögren syndrome (AESS) was first described in 1989 by Teramoto *et al*. AESS is characterized by distinct annular erythema with wide, elevated, and indurate borders, similar to a doughnut ring, and central pallor; typically associated with positive serum anti-Ro/La antibodies.[35-37] AESS generally occurs in the Asian population, in particular, in 94% of the Japanese cases,[35,38] and mainly in females (M:F = 1:5), with an age range of 7 to 78 years and a mean age of 36.35 years. Three clinical types of AESS have been described: type I is isolated donut-ring-like erythema mimicking Sweet syndrome, with an elevated border (85% of cases); type II, subacute cutaneous lupus erythematosus-like marginally scaled polycyclic erythema; and type III, papular insect bite-like erythema.[35] Histologically, AESS is characterized by a coat-sleeve infiltration pattern of lymphocytes around the blood vessels with nuclear debris associated with a dense eccrine gland lymphocyte infiltration (lymphocytic hidradenitis). The typical epidermal changes of cutaneous lupus are usually lacking.[37,38] The treatment may consist of a brief course of low-dose systemic corticosteroids, in addition to topical steroids.[36]

Discussion

Rare annular erythemas constitute a heterogeneous group of disorders whose diagnosis may be challenging and requires careful attention to subtle clinical and pathological features. It is difficult if not impossible, to reach a diagnosis solely based on the clinical picture. Assessing the composition and the distribution of the infiltrate histologically facilitates disease classification and the differential diagnosis from potential mimickers. We propose a practical approach to classify the annular eruptions according to the type of inflammatory pattern, namely lymphocytic, eosinophilic, or neutrophilic [Figure 4]. The lymphocytic group includes the majority of entities and can be subdivided into superficial, superficial and deep perivascular or lichenoid patterns with possible periadnexal involvement. In pattern 1, the superficial EAC and its variant AR-EAC represent the prototype. The most important histopathological differential diagnoses are other spongiotic dermatitises such as pityriasis rosea, allergic contact dermatitis, and atopic eczema. As a rule, eczematous dermatitis shows a more pronounced and diffuse spongiotic pattern.[39] When a perieccrine duct inflammation is present, erythema papulatum centrifugum (EPC) should be considered in the diagnostic flow.[40] The major difference between EPC and superficial EAC is the clinical features of the annular border. The second pattern with superficial and deep perivascular infiltrate includes the deep type of EAC, which is less distinctive clinically. The differential diagnoses include primarily LET and erythema chronicum migrans. In the opinion of some authors, most cases of deep EAC may represent annular LET.[38,39] In erythema chronicum migrans, the infiltrate generally has an interstitial component with plasma cells and eosinophils. When perifollicular inflammation is found in association with superficial and deep perivascular infiltrate, PMAE diagnosis should be considered if the clinical presentation is consistent. The differential diagnosis with Jessner-Kanof and LET may be difficult. To make the topic even more intriguing, we recently reported a case of AR-EAC deep type with periadnexal involvement.[9] The immunophenotyping studies revealed a moderate number of CD123 + plasmacytoid dendritic cells, which are well documented in Jessner-Kanof and LET but not in EAC, with the caveat that only one case has been evaluated.[41,42] In conclusion, there is significant clinical and histological overlap between PMAE, Jessner-Kanof, LET, and EAC deep type. When dense perieccrine gland lymphocytic infiltration is present, in the absence of interface vacuolar changes (lupus) or dermal fibrosis (morphea), AESS has to be suspected.[41,43] The lichenoid pattern includes primarily ALDY, where recent evidence supports the hypothesis that it is related to lichen planus.[13,28] The histology of ALDY is quite unique, showing a lichenoid lymphocytic infiltrate restricted to

Table 2: Main characteristics of rare annular dermatoses

	Erythema annulare centrifugum	Annually recurring erythema annulare centrifugum	Palpable migratory arciform erythema	Neutrophilic figurate erythema	Eosinophilic annular erythema	Annular lichenoid dermatitis of youth	Annular erythema in Sjögren syndrome
Age Gender	V decade of life M:F=1:1	47 years M:F=1:2.4	49 years M:F=1.5:1	pediatric patients: 9 months-2 years M:F=1:4 adults: 41 years M:F=1:2.5	20-85 years M:F=1:1.14	11 years M:F=1.6:1	36 years M:F=1:5
Most common localizations	thighs, hips	extremities	upper trunk	trunk	trunk, extremities	flanks, groin	face, neck, upper extremities
Duration	days-months	days-weeks, recurring	days-weeks	weeks-months	relapsing-remitting	relapsing-remitting	relapsing-remitting
Inflammatory infiltrate	Occasional mild spongiosis (superficial type), perivascular histiocytes, lymphocytes and rare eosinophils superficial or deep		Deep dermal perivascular and periadnexal lymphocytes and histiocytes	Superficial and deep perivascular and interstitial infiltrate with numerous neutrophils and nuclear dust, rare eosinophils	Superficial and deep perivascular and interstitial lymphohistiocytic infiltrate with abundant eosinophils and few neutrophils	Lichenoid infiltrate at the tip of rete ridges. Lymphocytes, few histiocytes, scattered melanophages	Perivascular lymphocytes with nuclear debris. Lymphocytic hidradenitis

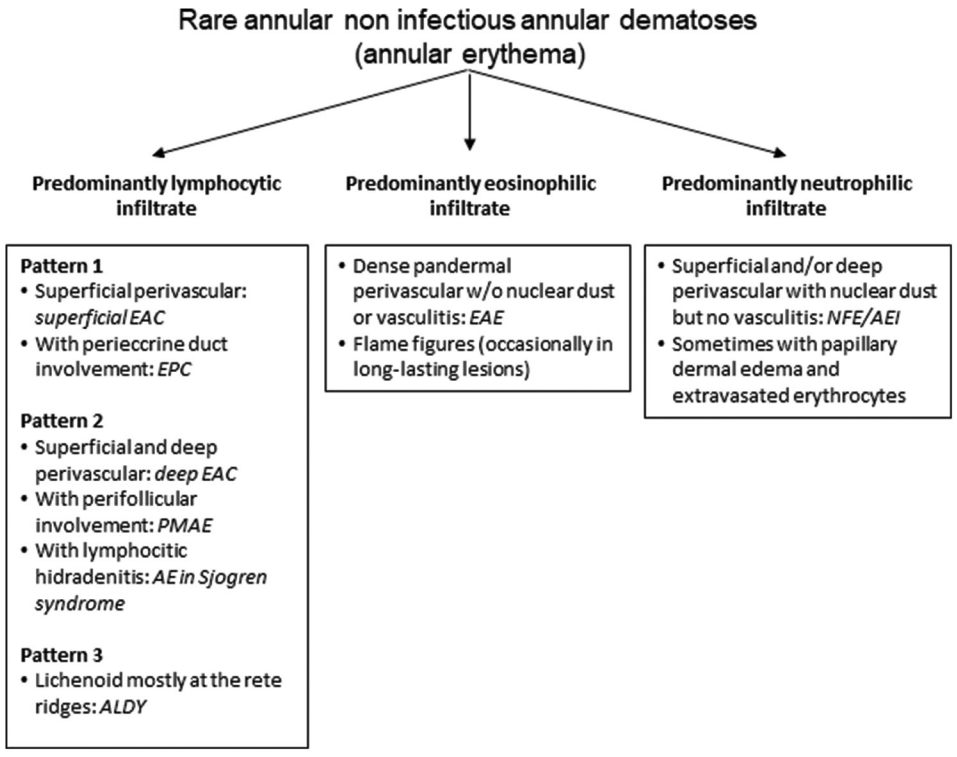

Figure 4: Flow-chart for the histopathological approach to annular non-infectious inflammatory dermatoses

the tips of elongated and squared rete ridges. However, annular erythema may be a pattern of presentation of mycosis fungoides,[44] and the 'youth' CD8 + mycosis fungoides remains the challenge.[45] The eosinophilic group includes EAE that should be differentiated primarily from Wells syndrome, although some authors include EAE in the spectrum of Wells syndrome. Other minor differential diagnostic considerations are acute annular urticaria and necrotizing eosinophilic vasculitis.[20] The neutrophilic group includes NFE, that is differing from EAE only in the relative proportion of eosinophils and neutrophils, which, however, are both

present in each of these disorders.[46] Histologically, NFE can be misinterpreted as a mild form of Sweet syndrome or an early stage of leukocytoclastic vasculitis if there is no detailed clinical information. Other differential diagnoses to consider are neutrophilic urticaria and neutrophilic urticarial dermatosis. Finally, it is important to exclude the possibility of (non-bullous) lupus erythematosus.[17]

Classification and nosographic attribution of skin diseases change according to the availability of new information and details, which modify disease interpretation. There are periods of lumping alternating with time of splitting skin diseases. In the case of annular skin diseases, we witnessed in the last few decades the description of new rare entities differing only slightly (splitting), also because describing a new entity may be rewarding. We propose now to lump some of these diseases differing only marginally based on the clinical and histological features [Table 2]. EAC and AR-EAC may easily represent different aspects of the same disease, as also EAC is reported to frequently recur even if not with the striking timing of AR-EAC.[3] Some authors consider EAC a clinical reaction pattern that does not represent a specific clinic-pathological entity.[41] PMAE is hardly distinguishable from EAC deep type and Jessner-Kanof disease as well as LET. EAE and NFE may be very similar clinically and histologically. As a long etiopathogenesis remains unknown, it will be difficult to establish whether the annular erythemas are variants of reaction patterns or separate clinical-pathological entities. The diagnosis of rare annular dermatoses poses a challenge and relies on effective collaboration between the clinician and the pathologist.

Acknowledgements

The authors declare no conflicts of interest, no funding for this manuscript, and any other acknowledgements.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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