

Ear dermatitis

Original Article

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Abstract

Ear eczema is a chronic cutaneous inflammatory disease. There are a number of causes for ear eczema, although its etiology is not always clear. It can affect the entire ear, making it sometimes difficult to access and therefore a difficult to treat condition.

Auricular itchiness is the major symptom, but it can involve a wide range of other symptoms with considerable repercussions in the quality of life of these patients.

This work aims at a review of ear dermatitis and an update on the treatment.

Keywords: dermatitis, eczema, ear, allergens, treatment.

Introduction

The external ear, which includes the auricle and the external auditory canal (EAC), is a site that is frequently affected by skin disorders, which are exclusively local or systemic. Several skin diseases can cause inflammatory skin conditions in the ear and lead to a condition called ear dermatitis (ED).¹

The main types of dermatitis affecting the ear are atopic dermatitis, seborrheic dermatitis, and irritant and allergic contact dermatitis (ICD, ACD).

ED may present as an isolated acute episode or become chronic, evolving with outbreaks and remissions, with each exacerbation making the ear more susceptible to future episodes and perpetuating the vicious cycle of pruritus/itching. The EAC, concha, intertragic notch, fossa triangularis, helix and/or lobe, and retroauricular sulcus may be affected.²

Excessive humidity, mechanical trauma, or underlying skin conditions are the main risk factors for the onset of the acute condition, with the potential for subsequent bacterial or fungal superinfection, especially in swimmers, patients with a narrow EAC, and individuals with auditory prostheses. Humidity and even direct contact with water can cause edema of the cells that line the EAC. These cells eventually

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separate such that bacteria can penetrate the skin, where they find an environment conducive to their multiplication. Breakage of the barrier and bacterial invasion frequently occur after the canal is manipulated.

Pruritus, otalgia, heat, and the sensation of “ear fullness” may be associated with other symptoms such as tinnitus and/or hypoacusis/deafness in the most severe cases,² which are caused by the narrowing of the EAC as a result of infiltration and edema in the acute forms or by hypertrophy of the connective tissue in the chronic forms. These symptoms, particularly pruritus, have significant repercussions on the patient’s quality of life and often translate into irritability, discomfort, trouble concentrating, and nocturnal awakening.^{1,2}

In both the acute and chronic forms of the condition, objective examination shows erythema, edema, scaling, depigmentation, and abrasion.²

A major challenge to the treatment of ED is the EAC’s narrow anatomy. Additionally, the auricle is an irregular plate featuring elevations and depressions, sites that are difficult access for the application of topical medication. Moreover, the skin covering the cartilaginous canal has sebaceous glands, ceruminous glands, and hair follicles that favor the onset of ED. The chronic and recurrent nature of ED⁴ and the loss of quality of life among these patients makes early guidance from specialists and audiologists all the more important.

The aim of the present study was to review the main causes of ED and the most common differential diagnoses and update patient treatment and guidance.

Ear Dermatitis

Atopic Dermatitis

Atopic dermatitis (AD), also known as atopic eczema, is the most common chronic inflammatory skin disease. It affects people of all ages, but the onset of the disease occurs most commonly in children less than 5 years of age.⁵

The prevalence of AD in the general population is estimated at 2%-5% and at approximately

15% among children and adolescents.

There are no data on the involvement of the ear alone because such cases are rare; however, the retroauricular area (infra-auricular fissures) is often affected in ED, especially in infants, as are the face, scalp, neck, and the extensor surfaces of the extremities. Lesions in older children and adults are located on flexural surfaces such as the neck and the antecubital and popliteal fossae.⁶

The lesions are small, well-circumscribed erythematous papules, and lichenification and hyperpigmentation may occur.

A study showed that 81.8% of 137 patients with AD exhibited current or previous infra-auricular fissures.⁷

AD is one of the first manifestations of “atopic march,” which may later be associated with rhinoconjunctivitis, allergic asthma, and/or food allergy. Classically, there is a family history of immunoallergic disease. In most cases, it has a favorable course but tends to be more severe when it persists into adulthood.⁸

Its pathophysiology is complex, involving genetic factors (e.g., mutations in the filaggrin gene) and environmental factors (allergens, changes in the skin flora, higher predisposition

Figure 1
Ear eczema



for colonization by *S. aureus*). It is based on a dysfunction of innate and adaptive immunity with Th2-predominant inflammation, characterized by the overexpression of several cytokines, including interleukins IL-4 and IL-13, which play central roles in the pathophysiology of the disease.⁸

AD makes the ear more vulnerable to future sensitization by contact.⁸

Seborrheic Dermatitis

Seborrheic dermatitis is a skin inflammation that is common in areas with a higher concentration of sebaceous glands. Its etiology remains debatable, but it is widely accepted that the yeast *Pityrosporum ovale* plays a fundamental role. Seborrheic dermatitis affects approximately 3%–5% of the population, with peaks of incidence during childhood and old age. Occasionally, only the external ear is involved, with the scaphoid fossa, the concha, and the EAC being the most affected sites.⁹

Differential diagnosis with psoriasis can be difficult. Seborrheic dermatitis manifests with bilateral and symmetrically distributed flat, yellow, greasy lesions that have indistinct margins. Other frequently involved areas that help with diagnosis are the scalp, eyebrows, eyelids, nasolabial folds, and chest.

Contact Dermatitis

Common causes of ear dermatitis are ACD and ICD. ACD has been diagnosed in one third of patients who suffered from external otitis.¹⁰ ICD is caused by chemical substances or physical agents that damage the ear's skin surface faster than the skin can repair the damage. It may occur on first contact with the irritant and does not require previous sensitization.¹¹

ACD occurs after repeated exposure to an allergen, involves the sensitization of the immune system to a specific allergen, and usually occurs through contact with products in daily use. The lesions may extend to distant sites.¹¹ It is impossible to histologically distinguish ICD from ACD.

The lesions in both forms are frequently

Figure 2
Seborrheic dermatitis of the ear



erythematous, edematous, and exudative, with vesicles and secondary infection.

The allergens most often involved in ACD of the ear can be grouped into allergens belonging to the following groups:

Cosmetics

The allergens most commonly involved in ear ACD in the cosmetics group are glyceryl monothioglycolate and paraphenylenediamine (PPD) found in hair dyes and perming products,¹² parabens used as preservatives in cosmetics, lanolin, and balsam of Peru.¹²

Medications

Topical medications were shown to be the most important allergens in ED, especially neomycin sulfate.¹³ Allergy to neomycin occurs in 35% of patients treated chronically. Cross-reactivity with other aminoglycosides, including tobramycin and gentamicin, is common.¹³ Topical anesthetics derived from caine mix (in the form of drops) and propylene glycol, an emollient vehicle for several topical medications, are often involved.¹³

Metals

Metals are the most common cause of ACD. Nickel is undoubtedly the most frequently involved metal. The prevalence of ACD to nickel is approximately 8%–19% in adults and 8%–10% in children and adolescents, with a strong predominance in females because they are the group that wears makeup and jewelry more often, especially earrings in the specific case of ED.¹⁴

Cobalt is a metal used in the production of blue pigments and in jewelry in alloys with other metals, especially nickel. Allergy to cobalt is therefore often associated with allergy to nickel.¹⁴ Chromium is widely used as an element in steel alloys because it provides superior resistance to corrosion. It is therefore often associated with occupational dermatitis. However, it may also be present in some makeup products, mobile phones, and detergents.¹⁵

In the last 10 years, several case reports of ear ACD associated with mobile phones have been published. In 2003, M. Seishima et al. reported the first case of ACD caused by a mobile phone containing chromium.¹⁶

Aeroallergens

Aeroallergens may be the origin and cause of ED worsening, especially house dust mites, storage mites, and fungi. The condition worsens at night, when the patient is lying in bed, because pillows, blankets, and mattresses are favorite places for mites due to the conditions of humidity and temperature that favor the growth and proliferation of these arachnids. However, pollen from cultivated and wild grasses and dog and cat epithelium may also be responsible for triggering and worsening symptoms.²

Other Allergens

Other objects such as stethoscopes, auditory prostheses, earphones, glasses, and facial masks may be the cause of contact ED, as they may contain methacrylates, hydroquinone, benzoyl peroxide, epoxy resin, acetate, and titanium.^{17,18}

All the abovementioned allergens can affect the ear through contamination; that is, they can be applied to one part of the body and contaminate the ear by transference (via objects, hands, air), thereby causing symptoms.

Figures 3 and 4
Irritant contact dermatitis of the ear



Differential Diagnoses

Acute dermatitis is clinically very similar, which often prevents a diagnosis and leads physicians to neglect ED.

The main differential diagnoses of ED are psoriasis, asteatotic eczema, lupus erythematosus, acne, and psychocutaneous diseases.

Psoriasis

Psoriasis is a chronic pruriginous inflammatory disease of multifactorial origin with an important genetic component. It affects 2%–5% of the population, and the ear is involved in approximately 18% of cases. Peak incidence occurs during adolescence, and incidence is the same in both sexes.¹⁹

Psoriasis of the external ear occurs in the concha, EAC, and periauricular areas, forming circumscribed plaques covered by grayish adherent scales that show spots of bleeding when removed (“sign of bloody dew” or Auspitz sign), with intense pruritus, which may be useful to establish the diagnosis in some cases.¹⁹ Definitive diagnosis is made by biopsy, which shows typical histological findings.¹⁹

Psoriasis of the ear may not show all the specific classic findings; instead only non-specific erythema and scaly skin may be observable. Therefore, the remaining physical examination and personal and family history are essential.

Asteatotic Eczema

This type of eczema mainly affects the elderly. The exposed ear is vulnerable to climatic changes, such as extreme temperatures, wind, and humidity, which causes the skin to dry, scale, and itch.

Lupus Erythematosus

This is a multisystemic autoimmune disease with prominent skin manifestations. Ear involvement occurs in the discoid form, with the remaining clinical presentation being characterized by epidermic atrophy with erythema, telangiectasias, and hypopigmentation. Obstruction of hair follicles by debris may

Figure 5
Psoriasis



occur, causing swelling in the lobe and concha.²⁰

Acne

Acne vulgaris is a common chronic dermatosis among adolescents. The most affected ages are between 10 years and 24 years, but all ages can be affected. It is a disorder of the pilosebaceous follicle whose main factors are sebaceous hyperproduction, follicular hyperkeratinization, increased colonization by *Propionibacterium acnes*, and dermis inflammation that can affect the ear. It is clinically characterized by pustules or inflammatory nodules.²¹

Psychocutaneous Diseases

These are rare diseases that may affect the external ear in patients with psychiatric disorders. They include primary pruritus (PP), neurodermatitis, delusional parasitosis, and factitial dermatitis.

PP is a sensation of auricular pain and pruritus in the absence of local or systemic disease. The diagnosis is made by exclusion, and the risk of secondary infection due to local trauma caused by scratching should be considered.

Continuous scarification of the skin caused by repeated scratching leads to local erythema with lichenification, which is characteristic of neurodermatitis.²² Patients with obsessive-compulsive disorder are the most affected by these conditions and, in addition to receiving topical treatment, they should be submitted to psychiatric evaluation. In “delusional parasitosis,” which is usually a hallucinatory disorder, patients are convinced that there is a “bug” crawling over the ear, and they report a sensation of intense itching.²² Scabies and liver or renal diseases that present with pruritus need to be excluded, and the patient should be referred to psychiatric evaluation.

In rare cases, patients voluntarily cause lesions on their own skin through mechanical trauma or the use of chemical or caustic agents. When the appearance of the lesion does not suggest typical dermatitis and the patient appears to have psychological problems, factitial dermatitis should be suspected.²²

Diagnosis

Anamnesis is the first step in the approach to the diagnosis. A detailed history of the patient's current disease, occupation, leisure activities, domestic tasks, and past medical history are essential elements, as well as relevant family history, namely the suspicion of psoriasis or AD.¹²

Although the clinical history may suggest the cause of the ED, its sensitivity and specificity for the establishment of a diagnosis is moderate.¹² An evaluation using instruments and systems allows for the assessment of whether there is systemic involvement, in addition to a strictly dermatological disease.

Objective examination is crucial to establish the probability of the diagnostic hypotheses because it entails not only inspection of the external ear and otoscopy, but also evaluation of the lesions that may affect other areas of the body, thus aiding in the diagnosis, as previously mentioned in the description of the different diseases that affect the ear.

With regard to complementary diagnostic tests, skin prick testing (SPT) with extracts of

allergens is used when there is a suspicion of dermatitis triggered or worsened by exposure to house dust mites or storage mites, pollen from cultivation or wild grasses, pollen from trees or plants, or fungi or dog and cat epithelium. If the SPT is negative and there remains strong clinical suspicion, the next step is to measure the levels of immunoglobulin E, specific to each mentioned group.

When suspicion suggests a non-immediate allergic reaction to contact with an allergen, epicutaneous tests with a standard battery or specific batteries (e.g., hairdresser, baker, metals, resins) are considered the gold standard in the diagnosis of ACD, interpreted at 48 h, 72 h, or 96 h. They are indicated for all patients with chronic eczematous disease or lichenified dermatitis in which ACD is suspected.¹²

Treatment

ED is a difficult disease to treat, regardless of the etiology, because the topical application of medication is extremely difficult, not only due to the anatomy of the EAC (narrow and not very aerated, with a large number of sebaceous glands and production of cerumen), but also because it is difficult for the patient to identify the factor that triggered the disease. For these reasons, ED often has a chronic nature, with recurrent exacerbations and infections.

Educating the patient regarding the prevention of risk factors is paramount to avoid ED relapse.

Successful treatment requires the avoidance of triggers and/or irritant substances, as well as water and applicators with cotton tips, pen caps, or the handles of other types of objects. Scratching with the nails/fingers or with objects should also be avoided because this increases the risk of lesions and, consequently, of contamination and infection. If necessary, the patient should see a specialist to periodically remove the cerumen. However, excessive cleaning removes the wax lining the EAC, which is a protective barrier that maintains an optimal pH. The ear should be hydrated, with sweet almond oil, for example,

using a dropper, to maintain the integrity of the skin barrier and reduce the risk of relapse. Important measures include wearing ear plugs and a cap while playing water sports to keep the ears dry.

It is also advisable to avoid the closure of the EAC for long periods with earphones, plugs, or other devices. Limiting playing sports that expose the ear to water is recommended. If exposure occurs, apply drops with a mixture of isopropyl alcohol 95% and anhydrous glycerin 5% after contact with water, and dry the ear with a hairdryer.

Contact with known allergens should be avoided. Depending on the allergen(s), reading the composition of frequently used objects/products (both during occupational and leisure exposure) and clothes and textiles is recommended. Jewelry containing metals is usually the main cause.

With regard to pharmacological treatment, a diluted solution of aluminum acetate (Bürow solution) may be applied as often as required to control symptoms; it has astringent and antiseptic properties and is a viable alternative to the use of corticosteroids.²

Topical application of calcineurin inhibitors, namely pimecrolimus 1% and tacrolimus 0.03% or 0.1%, has been approved for the treatment of eczema; their advantage is that they can be used for long periods of time, that is, up to 8 consecutive weeks, twice daily.²³

To control the symptoms of pruritus, second-generation antihistamines that have high specificity, an affinity for peripheral H1 receptors, and lower central nervous system (CNS) penetration can be prescribed, as these will produce reduced sedative effects; however, the mechanisms that trigger pruritus in dermatitis are not dependent on histamine but rather on other interleukins, such as IL-4 and IL-23; therefore, antihistamines have low efficacy in alleviating the symptoms.²⁴

Dermocorticoids should be used if the abovementioned options fail in the treatment of dermatitis. Hydrocortisone 1% ointment or the more potent betamethasone 0.1% ointment can reduce inflammation and

pruritus if applied twice daily until the symptoms improve. Refractory and severe cases can be treated with an oral corticosteroid for a short period or on a gradual reduction regimen (e.g., prednisolone 0.5–1 mg/kg/day) for a longer period.²⁵

If acute external otitis is present, thorough debridement of the auditory canal and topical antibiotics may be necessary (e.g., a combination of ciprofloxacin 0.3% and dexamethasone 0.1%).

In cases of atopic dermatitis with generalized and severe involvement of sites other than the ear, dupilumab may be an option when alternative therapies are ineffective. Dupilumab is a fully human monoclonal antibody that inhibits IL-4/IL-13 signaling, thereby significantly decreasing pruritus and improving the integrity of the skin barrier.⁸

Conclusion

ED is a chronic recurrent disease associated with significant loss of patient quality of life. Complaints should be taken seriously, and if controlling symptoms is not possible, patients should be referred to a specialist to be studied, diagnosed, and receive appropriate early therapeutic guidance. As in cases of other types of dermatitis, the preferred route of treatment is topical, and the main aim is to maintain the skin barrier intact and with the least humidity to avoid relapse.

Anamnesis should not be discarded because it is fundamental to establish the potential diagnosis of allergen contact. Industrial advancements in areas such as cosmetics, technology, and textiles have exposed the ear to more sources of allergens.

Conflicts of Interest

The authors declare that there is no conflict of interests regarding the publication of this paper.

Data Confidentiality

The authors declare having followed the protocols in use at their working center regarding patients' data publication.

Protection of humans and animals

The authors declare that the procedures were followed according to the regulations established by the Clinical Research and Ethics Committee and to the 2013 Helsinki Declaration of the World Medical Association.

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