Allergic Contact Dermatitis Secondary to Latex Headset in Popular Bluetooth Device

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Abstract

We offer a case of latex-induced allergic contact dermatitis caused by a popular Bluetooth headset device and discuss salient features of patient history, physical exam, and treatment. After diagnosis is made, we provide commentary on the condition and elaborate on its diagnosis through patch testing, treatment protocols, and relevance to today’s tech-savvy society.

Introduction

Joseph Jadassohn first described allergic contact dermatitis in 1895.2 Since then, it has become one of the most commonly seen and costly medical conditions. In 2005, treating contact dermatis cost approximately $1.4 billion annually and resulted in a loss of around $500 million due to missed workdays and low productivity.10 For many years, specific allergens known to cause allergic contact dermatitis have been described in detail in numerous journals and texts. Furthermore, allergic contact dermatitis related to modern technology devices like cell phones and computers has been discussed in medical literature and case reports.10 Our case report reveals a patient with allergic contact dermatitis secondary to latex in a popular Bluetooth headset. Our patient is unique because literature searches failed to reveal any prior cases of allergic contact dermatitis specific to Bluetooth headsets. Furthermore, our case is relevant because the Bluetooth industry is growing rapidly, and similar cases will likely become more common in the near future.

Case Report

A 44-year-old African American female presented with a pruritic rash on her neck for two months. She reported no prior treatment of the rash. The patient denied photosensitivity, insulin resistance, or use of perfumes. However, the patient admitted to a recent habit of wearing a Bluetooth device around her neck. The neck strap of the device was made with rubber material. Past medical and surgical history was unremarkable.

Background

Allergic contact dermatitis (ACD) makes up at least 20% of new-incident contact dermatitides.5 Allergic contact dermatitis can affect individuals from all backgrounds. The National Ambulatory Medical Care Survey conducted in 1995 estimated 8.4 million outpatient visits to American physicians for contact dermatitis; this was the second most frequent dermatologic diagnosis.2 There are approximately 3,000 different chemicals that have been documented as specific causes of ACD.2 However, about 25 chemicals appear to be responsible for as many as half the cases of ACD.2

Allergic contact dermatitis is a pruritic, cutaneous inflammatory reaction caused by contact with a specific exogenous antigen to which the person has developed sensitization. ACD is a type 4 hypersensitivity reaction made up of two phases: sensitization and elicitation. Sensitization is the process by which the immune system is primed to react against the allergen on the next exposure. The sensitization phase of ACD can last from 10 to 15 days.5 The elicitation phase follows and describes the proinflammatory state that results from re-exposure to the sensitized allergen.

The classic histological finding for acute ACD is spongiosis, incontinuidad epidermal vesicles, and superficial perivascular infiltrate. The pathology of acute lesions is extremely valuable since subacute and chronic lesions can produce non-diagnostic patterns that are often confusing. Acanthosis, hyperkeratosis, and mild superficial infiltrate are features in the subacute and chronic setting. Pathologic diagnosis of ACD should correlate with clinical findings.5

The physical expression of ACD will differ depending on what stage of the disease is present. Acute-phase ACD is identified by lesions marked with edema, erythema, and vesicle formation. Acute dermatitides usually subside within three to four weeks.1 However, if a patient has repeated exposure to the allergen, chronic ACD will develop. Chronic ACD presents with scaling, fissuring, and lichenification.1

When trying to discover the causative allergen of ACD, recognizing the anatomic distribution of dermatitis has proven valuable. The neck region is a very common site for ACD. Cosmetics, nail polish ingredients, perfumes, and metal allergens in jewelry have all been implicated as common causes of ACD in the cervical region. If the diagnosis of ACD is questionable, or the specific causative agent is unknown, patch testing should be considered.

Patch Testing

Patch testing is an underutilized diagnostic tool in the field of dermatology.2 When patch testing is indicated, it should be performed with a large number of common allergens as well as occupational and personal-care products relevant to the patient.

Proper patch testing requires three visits: one to apply the allergens; another to remove the tests, read, and grade the results after 48 hours; and the last for a final, delayed reading around...
72 hours to one week after the application of initial patch.4 The second reading is important to catch the delayed reactions common in elderly patients. The Finn method and TRUE are the two most common methods in use today. The Finn Chamber method is set up by placing a small amount of allergen into individual aluminum wells affixed to a strip of paper tape. The Finn Method allows screening for hundreds of allergens and is usually performed after the TRUE method. The TRUE test method requires no advanced preparation because the allergens have already been incorporated into the back of the paper tape strips. The TRUE test is limited because there are only 28 screening allergens available.5 For both tests, the strips are applied to the patient’s upper back. Topical steroids and systemic steroids should both be avoided for at least one week before beginning a patch test.5 Antihistamines do not affect the outcome of the test. The classic positive patch test reaction shows spreading erythema, edema, and closely set vesicles that persist after the removal of the patch after two to seven days. False negative tests can occur when there is not a sufficient amount of the allergen to elicit a reaction.

**Therapy**

The definitive treatment for controlling ACD is avoidance of the allergen implicated. If the allergen is unknown, the provider should begin treatment and further evaluate with patch testing.

Topical treatment should be the initial treatment, while all moisturizers, lotions, and topical medications except plain petroleum for dryness should be discontinued. The topical corticosteroid should be used twice a day for two to three weeks.5 Unfortunately, topical corticosteroids have been increasingly recognized as allergens themselves. An allergy to topical corticosteroids should be considered when one has persistent eruption of worsening lesions. The strength of topical steroid should be tailored to anatomic treatment area. For example, high-potency steroids should be used on hands and feet; medium potency for the arms, legs, and trunk; and low potency for the face.

Also, corticosteroid ointments are preferred over cream form due to additives in creams that may be allergenic. Second-line treatments for ACD are topical immune modifiers like tacrolimus and pimecrolimus.3 The immunomodulators are especially effective for ACD in areas of the face and eyelids. If the ACD is severe or generalized throughout the body, a three-week tapering course of oral corticosteroids is necessary. A more rapid taper can result in rapid rebound dermatitis.6 Another effective treatment option for refractory ACD is phototherapy. Numerous studies have shown the effectiveness of oral psoralen photochemotherapy (PUVA) and shortwave ultraviolet (UVB) in the treatment of chronic ACD. Systemic antihistamines such as hydroxyzine or diphenhydramine are useful for pruritus.5

**Discussion**

With almost universal availability of technology devices, ACD to modern electronic devices has become increasingly common. Modern devices such as personal laptop computers, cellular phones, and video consoles have been linked to many different dermatologic conditions. There have been numerous case reports verifying ACD to nickel and chromium in cell phones and other modern devices.10 Interestingly, our case report demonstrating ACD to latex in a popular Bluetooth headset is a newly documented finding according to literature resources. A literature search on Pubmed, MEDLINE, EMBASE, and Ovid MEDLINE failed to demonstrate any literature connecting Bluetooth devices to latex-induced ACD. However, it is likely that this specific case of ACD will become a more frequent finding as the use of modern technology devices rapidly increases. In 2010, the Strategy Analytics North American Automatic Market forecasted that 85% of all mobile phones would be Bluetooth enabled by 2015, with that number growing to 90% by 2016.4 Furthermore, ABI Technology Research Company predicts over 3 billion Bluetooth-enabled devices will ship in 2014, and in 2018 there will be over 10 billion enabled devices in the market.7

While the risk of latex allergy in the general population is low at 1% to 2%, the risk of developing an allergy to latex is higher in people with increased latex exposure, such as health-care workers. Health-care workers have a three times higher risk of developing latex allergy than the general population. Also, patients with spina bifida have a 20% to 67% chance of latex allergy. Research has shown that latex-glove ACD is caused by a delayed-type hypersensitivity reaction to rubber accelerators (e.g., thiurams, carbamates, mercapto compounds) and antioxidants (not latex proteins). More specifically, the latex allergy to gloves was caused by thiurams in 72% of cases, carbamates in 25% of cases, and mercapto compounds in 3% of cases.4

In the future, we will likely see Bluetooth devices being used for many different applications, including sensors that monitor activity levels and medical wellness devices that monitor health-care statistics.7 It is essential that physicians investigate the possibility of ACD related to Bluetooth devices and ask patients about possible usage of Bluetooth devices. As a preventative measure, companies are developing protective coverings that can be attached to the latex area of the Bluetooth headset strap to protect patients from this allergen.5 Awareness of this diagnosis is essential, because the longer the individual has dermatitis the longer it is believed it will take the dermatitis to resolve once the causative agent is identified. Knowledge of potential latex allergy to Bluetooth neck straps and familiarity with prophylactic and effective treatments can help diagnose and treat patients with ACD to latex in Bluetooth devices.

**References**


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