

Toothpaste Hypersensitivity – A Case Report

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Abstract

A 39-year-old healthy female with mild atopic dermatitis was referred due to mouth lip dermatitis. By wide Prick- and Epicutaneous tests, toothpaste-containing sodium lauryl sulfate (SLS) caused a positive reaction, but whether toxic or allergic, remains not be determined. Change to SLS-free toothpastes removed the lip dermatitis within a few weeks and by the follow-up for 24 years, the patient has been symptom-free.

Introduction

Sodium lauryl sulfate (SLS) is an anionic surfactant/detergent that is widely used for decades usually in concentrations of 0.5-2%, but up to 5%, in house cleaning and dishwashing products, cosmetic products, hand soaps, shampoos etc. SLS is widely used for decades also in toothpastes in 1-5% concentrations [1]. However, numerous SLS-free toothpastes are easily available from the market.

SLS is widely utilized model for studying acute and cumulative irritation for decades and has proved highly practical and informative for such studies [2]. Due to the property as detergent, SLS (also known as sodium dodecyl sulfate (SDS)) is used in the research laboratories in separation of proteins from a mixed sample by SDS-polyacrylamide gel electrophoresis.

Case Report

A healthy 39-year-old female had mouth lip dermatitis for 6 months. She had repeated HSV infections in lips, and continuous topical acyclovir (crem Zovirax) was used, but a worsening was found when topical acyclovir cream Zovirax (contains 0.75% SLS) was used. However, no worsening when Zovirax ointment (does not contain SLS) was used. The lip dermatitis was treated with 0.5% hydrocortisone cream and emollients.

In September-October 2000, wide Prick-tests for basic set, food stuff, grains, spices, and vegetables were negative.

Wide epicutaneous tests for basic set, set of ingredients of topical preparations and set of preservatives all were negative. All patient's own cosmetic products were tested negative.

Acyclovir crem and 50% propylene glycol were positive in epicutaneous tests. These were omitted and treated and was treated with 0.5% hydrocortisone and emollients.

SLS 1% aqueous solution was interpreted positive. Propylene glycol as 30% and as diluted series were negative.

At follow-up in October 2024, the patient has been symptom-free when omitted SLS-containing toothpastes. She had also omitted propylene glycol-containing products to be sure.

Discussion

Sodium lauryl sulfate was most likely to cause her lip dermatitis, based on test reaction in epicutaneous test, difference in Zovirax crem vs. Zovirax ointment, and finally total elimination of SLS-containing toothpaste use as followed for 24 years. By data taking retrospectively in our clinic for 30 years, only one another SLS-test was performed and interpreted positive, but this patient was lost from follow-up.

SLS is considered as irritant [2,3], though SLS-based products may still have potential to cause allergic reactions [3]. Similarly, another more common preservative is formaldehyde, mostly causing irritant reactions, but allergic reactions to some patients.

Patch testing with SLS can be used. The evaluation of the SLS test can be performed visually, or with bioengineering methods. Among these, the transepidermal water loss is the most appropriate method, but measurements by laser Doppler flowmetry, colorimetry or corneometry may yield additional relevant data. Various factors such as age, area of testing or climatic conditions may also influence the SLS test [4] and the experience of the examiner [5]. We had no possibilities to use any those these measurement modalities mentioned above.

A study by Mazur et al. [6] consisted of 46 organic toothpastes that included 156 ingredients; 139 (89.1%) were classified as active and 17 (10.9%) as inactive. Overall, 32 (20.5%) ingredients were associated with known adverse events. Product selection may help users to avoid potential adverse effects that can be caused by ingredients such as polymers (e.g., polyethylene glycol) and carbomers, detergent agents (e.g., sodium lauryl sulfate), and triclosan.

A review by Kasi et al. [7] revealed that possible harmful effects of SLS were reported as mucosal desquamation, irritation or inflammation of oral mucosa or the dorsal part of the tongue, ulcerations, and toxic reactions in the oral cavity. However, our patient did not experience any of these side effects, but only lip dermatitis.

The earlier interpretation of 50% propylene glycol was later determined to cause positive-looking, likely irritant, test results, and were later re-analyzed by 30% propylene glycol concentration with diluted series with negative results.

SLS is widely considered causing irritant dermatitis only. Whether this hypersensitivity reaction in this patient was allergic or toxic, remains undetermined. The patient was not willing to conduct further examinations when she has been satisfied with her symptom-free situation and the mechanism of the hypersensitivity reaction is not relevant to know.

Ethical Approval

The patient has given her consent to publish this case report.

Conflict of Interests

Authors declare no conflicts of interests.

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