Could sodium lauryl sulfate be an irritant factor in oral mucosal desquamation?

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ABSTRACT

**Introduction:** Oral mucosal desquamation (OMD) is an irritative reaction caused by products containing sodium lauryl sulfate (SLS), an anionic detergent that causes a stronger denaturation effect in intercellular structure epithelium.

**Case Series:** Describing four cases of OMD induced by dentifrices, as an endeavor to make the condition better known, improving its diagnosis by clinicians based on minimal intervention.

**Conclusion:** Oral mucosal desquamation should be considered as a differential diagnosis of the desquamative lesions of the mouth. Clinical signs and symptomatology should disappear in one week after discontinuation potentially involved products.

**Keywords:** Dentifrice, Detergents, Mouth mucosa, Sodium lauryl sulfate

INTRODUCTION

Oral mucosal desquamation has a wide variety of terms used to designate this clinical condition, such as desquamative stomatitis, oral epitheliolysis, oral mucosa peeling, oral slough, and shedding oral mucosa [1]. The first report was in the 1970s and has a relationship between the oral mucosa desquamation and dentifrices [1] containing SLS, detergent and surfactant encountered in many hygiene products, such as toothpaste, oral rinses, and shampoos [2]. It may cause sensitivity of the oral region, like a burning sensation, besides the desquamation of the epithelium. Its diagnosis is achieved based on anamnesis and clinical examination, and as differential diagnosis, candidosis, oral lichen planus, and benign pemphigoid of mucous membranes are included [3].

Most commercially available dentifrices contain SLS in a range of 0.5–2.0% [4]. In symptomatic cases, the patient’s complaints are associated with the use of SLS products even at a concentration as low as 0.25%, with occurrence due to the dose-response effect [1]. Consequently, the clinician faces several difficulties in detecting the risk population [5].
Herein, four cases of OMD are presented, and its differential diagnosis, histopathological features and treatment are emphasized.

CASE SERIES

Case 1
A 32-year-old woman complaining of burning sensation after brushing her teeth during the last two years was evaluated. She had no health problems and did not smoke nor drink alcohol. The patient also reported blister and desquamation of the buccal mucosa. On the clinical evaluation, an easily detaching grayish membrane of the buccal mucosa was observed (Figure 1A). Furthermore, the gingiva presented reddish and scaling-off appearance. The main diagnosis hypotheses were type IV hypersensitive reaction to SLS and pemphigoid. The patient confirmed the use of toothpaste containing SLS and alcoholic mouthwash. She was advised to switch to a SLS-free toothpaste and suspend the use of mouthwash to test the hypothesis of a hypersensitive reaction. After seven days, both gingiva and buccal mucosa were normal (Figure 1B).

Case 2
A 69-year-old man presenting tongue irritation and gingival desquamation with three years of duration was evaluated. The patient reported to be using a specific gingiva toothpaste and alcoholic mouthwash. He had no health problems and did not smoke nor drink alcohol. The clinical exam showed the presence of removable grayish-white membrane on the buccal mucosa (Figure 2). In addition, the gingiva presented an erythematous aspect. Our diagnosis hypothesis was a type IV hypersensitive reaction to SLS.
A sample of the desquamated mucosa was collected and histological analysis showed a superficial layer of stratified squamous epithelium with degenerative characteristics (Figure 3). According to clinical and histological features, the diagnosis was consistent with epitheliolysis. The patient was advised to switch the toothpaste to a SLS-free one and suspend the use of mouthwash, and one week later no mucosa alteration was evident.

Case 3
An 18-year-old girl was referred to our clinic for conventional dental treatment. She had no health problems and did not smoke nor drink alcohol. On clinical examination the presence of an underlying removable tissue in the buccal mucosa was observed. However, she did not refer any complaint in such region of the mouth. She was advised to switch the toothpaste to a SLS-free one. After seven days of follow-up, none alteration was observed in the oral region.

Case 4
A 46-year-old woman complaining of asymptomatic mucosal desquamation was evaluated. She had no health problems and did not smoke nor drink alcohol. On clinical examination, exuberant mucosal desquamation affecting the buccal, labial and gingival mucosa bilaterally could be seen (Figure 4). Oral mucosal desquamation due to SLS irritation was hypothesized. She was advised to switch the toothpaste to a SLS-free one. After one week, the mucosal desquamation resolved.
Oral mucosal desquamation is usually caused by SLS, a surfactant found in several hygiene products, such as toothpaste. As surface tension decreases the foaming power is intensified, thus causing a sensation of cleanliness [6]. Sodium lauryl sulfate may cause irritative and inflammatory reactions [2]. Damage to the oral tissues is SLS concentration dependent. Currently, SLS concentrations of 0.5–2% have been significantly associated with an increase of desquamation of oral mucosa when compared to dentifrices containing other detergents [3].

This condition usually presents low morbidity and low sensitivity by the patient, and it is rarely described. Therefore, dentists and other health professionals have limited knowledge of this buccal alteration [7]. In the present case series, four well-documented cases are presented as an attempt to increase the clinician awareness and to better diagnose this disease.

Some studies have related the clinical observations to the toxic effects produced by SLS. This product has the ability to cause biochemical denaturation of the proteins causing the separation of the epithelial layers of the mucosa, which result in a visible desquamation membrane [3, 8]. Besides this desquamation, adsorption and epithelial degradation are also mentioned to cause the undesirable effects [8, 9]. Also, recurrent aphthous stomatitis healing delay is also described [6, 10].

Regarding the management of the OMD, a recent study reported three symptomatic patients with areas of inflammation, erythema, and denudation of the filiform papillae of the dorsal of the tongue. All patients were using toothpaste containing SLS, and symptoms and clinical alterations disappearance was noticed after changing to a SLS-free toothpaste [2]. Similarly, in our case series, two patients presented symptomatic lesions on the gingiva with erythematosus aspect (cases 1 and 2). In addition, both patients were using alcoholic mouthwash after brushing their teeth. The effects of the alcohol on desquamated mucosa can be a secondary irritative factor, consequently increasing the patient sensibility. Patients of cases 3 and 4 were asymptomatic and used only SLS containing toothpaste. All patients presented a complete resolution of the lesions after one week of discontinuation of the toothpaste with SLS. Furthermore, Winning et al. [11] suggest that patients with desquamative gingivitis should be advised to discontinue the use of any oral hygiene product that contains SLS, in order to exclude a local reaction to this surfactant. The patient’s improvement was not rechallenged due to ethical concerns.

Therefore, the OMD diagnosis is based on a clinical and therapeutic test, that is, to advise the patient to change the SLS toothpaste. Histologically, there is evidence of a widening of the stratum corneum of the epithelium due to the loss of the surface integrity [3]. It was possible to collect a grayish-white membrane on the buccal mucosa of one of our cases, and the histopathological analysis showed a stratified squamous epithelium layer with degenerative alteration what is consistent with a desquamated mucosa.

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Conflict of Interest
Authors declare no conflict of interest.

Data Availability
All relevant data are within the paper and its Supporting Information files.

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