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Allergic contact stomatitis caused by (meth)acrylates in an occlusal splint

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Allergic contact dermatitis to (meth)acrylates is common in dental personnel[1] but the equivalent of this in dental patients, allergic contact stomatitis, is rarely reported.[2] Here, we present an unusual case of a delayed type IV hypersensitivity reaction caused by residual acrylic monomers in an occlusal splint.

CASE REPORT

A 66-year-old woman was referred to our dermatology clinic for evaluation of stomatitis. The patient described episodes of erosions, and a painful burning sensation of the oral mucosa following exposure to a newly acquired occlusal splint made from Orthocryl (DENTAURUM GmbH & Co. KG, Ispringen, Germany). Symptoms of discomfort and soreness in the mouth started after the first night of exposure, and after a second night of exposure, the patient developed burning pain and multiple erosions in the mouth. No systemic symptoms were reported. She consulted her dentist who noted erythema and erosions at sites of contact with the occlusal splint on the left and right buccal mucosa (Figure 1). On advice from the dentist the patient stopped using the product and her symptoms slowly resolved without treatment after 7 days. She was otherwise healthy with no known history of previous acrylic nail use. Because of bruxism she had been using other occlusal splints for the past 20 years without any reactions.

According to the material safety data sheet (MSDS) the product consisted of an acrylic polymer-based powder with declared polymethylmethacrylate and a monomer-based liquid with methyl methacrylate (MMA) and ethylene glycol dimethacrylate (EGDMA). The occlusal splint was prepared at a local orthodontic laboratory where the Orthocryl liquid and powder were mixed, manually molded on a tooth model using a "doughing technique", and subsequently polymerized in a pressure vessel filled with warm water. The product was disinfected but was not eluted in water for 3 days before use, as recommended.

Patch tests were performed with the European baseline series, the Gentofte Hospital extended test series, a dental screening series containing acrylics, and with scrapings from the occlusal splint using Finn chambers (SmartPractice, Phoenix, Arizona) on Scanpor tape (Norgesplaster, Vennesla, Norway). Readings were performed on day



FIGURE 1 Erythema and erosions seen at the right and left buccal mucosa

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TABLE 1 Patch-test results of relevant allergens

Allergens	Pet.	D2	D3	D7
Methyl methacrylate	2%	+	+	+
2-Hydroxyethyl methacrylate	1%	–	–	–
Ethylene glycol dimethacrylate	2%	–	+	–
2-Hydroxypropyl methacrylate	2%	–	?+	–
Occlusal splint (scrapings)		–	–	–

[a]–, Negative reaction; ?+, Doubtfull reaction; +, Weak positive reaction.

(D) 2, D3, and D7 according to the European patch test guideline[3] and showed positive (+) reactions to MMA on D2, D3, and D7 and to EGDMA on D3. Patch-testing results with scrapings from the occlusal splint were negative (Table 1). Consequently, the occlusal splint was later re-polymerized by the same method, but afterward being eluted in water 3 days prior to use. After this the patient has been using the occlusal splint daily without any symptoms of discomfort or stomatitis.

DISCUSSION

Occlusal splints (or bite splints) are removable dental devices commonly worn over teeth at night to prevent tooth wear. Although they can be constructed of various materials, most are composed of acrylics.[4,5] (Meth)acrylates are monomers that undergo polymerization (usually through heat, chemicals, visible light, or UV radiation) to form plastic materials. Polymerized (meth)acrylates have little or no sensitizing capacity, whereas unpolymerized monomers are potent allergens.[6] (Meth)acrylates are widely used in dentistry and have been identified as important causes of contact allergy among dental personnel[1,6,7] and also, but to a lesser extent, in dental patients.[2,8,9] MMA is a monofunctional monomer and EGDMA is a multifunctional monomer also used as cross-linking agents in polymer production.[9] Thus, when dental materials made from (meth)acrylates are incompletely polymerized, residual monomers can leak into the mouth, potentially resulting in contact allergy.

In the present case, the patient's history and the patch-test results suggest a delayed type IV hypersensitivity reaction to MMA and EGDMA caused by leaching residual monomers from the occlusal splint. The rapid onset of symptoms could indicate a previous subclinical sensitization in the mouth resulting most likely from the use of other occlusal splints. The patient did not react to scrapings from the splint itself at patch testing. This could be explained by low amounts of allergens in the product and moreover, the upper back, as a naïve test site, may be less sensitive than the primary exposure site. Furthermore, the monomer content in the surface layer of the splint could have diminished at the time of patch test. The levels of residual monomers might change with different polymerization methods, cycles, and elution periods[10] and, as in our case, patients with acrylic monomer allergy have previously been shown to tolerate the same dental device after reducing the monomer content by re-polymerization.[2]

Despite this, allergic contact stomatitis to (meth)acrylates is rare. This might be due to the dilutional effect of saliva or a lower sensitization capacity in the mouth; besides, symptoms are often more prominent than the physical signs in allergic contact stomatitis, thereby making it difficult to diagnose.[2] In our case, MMA and EGDMA were declared in the MSDS but acrylic products often contain undeclared (meth)acrylates.[11] In conclusion we present, to our knowledge, the first reported case of allergic contact stomatitis caused by MMA and EGDMA in an occlusal splint and highlight the importance of clinicians to recognize contact allergy in patients wearing new dental devices containing acrylics.

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CONFLICTS OF INTEREST

The authors have no conflicts of interest to report.

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