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Metal-based orthodontic appliances may cause delayed-type hypersensitivity type IV allergic reactions (1). During orthodontic treatment, wires and brackets are applied, which are generally made of stainless steel or nickel–titanium. These alloys have a nickel content of 8–14 wt% for stainless steel and more than 50 wt% for NiTi wires. Frequently, a stainless steel wire is attached to the frontal teeth of the lower and the upper tooth arch, as a fixed retainer or ‘splint’, to maintain the orthodontic result (Fig. 2). In this way, even years after initial orthodontic treatment, patients are continuously exposed to nickel, chromium, and other metals. We have treated patients who were allergic to nickel and/or chromium, whose oral or systemic symptoms decline after removal of these stainless steel splints. The aim of this case report is to show that nickel-containing orthodontic appliances can be a cause of allergic contact dermatitis without accompanying oral symptoms.

Case

A 35-year-old woman with Von Willebrand’s disease (clotting factor VIII and with deficient factor XI), complaining of excessive peri-oral and peri-orbital itchy eczema lesions (erythema, papules, and squames) (Fig. 1), was referred by her physician to a dermatologist. The medical history showed sensitization to dust and some kind of mascara, which provoked red and swollen eyes. Patch tests with the European standard series and cosmetic series (supplied by Trolab, Hermal, Hamburg, Germany) were performed with Finn Chambers[®] and occluded with Fixomull stretch tape (Beiersdorf, Hamburg, Germany) on the back of the patient and evaluated after 2 and 3 days. Erythematous and indurated test results were regarded as positive. Patch testing showed doubtful-to-weakly positive reactions to fragrance mix II, chromate and nickel.

As there were no intra-oral signs of contact reaction, the dermatologists’ diagnosis was allergic contact dermatitis in an atopic patient (the

Facial eczema because of orthodontic fixed retainer wires

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Fig. 1. (a) Before removal of orthodontic retainer wire and (b–d) 2 weeks, 3 months and 6 months, respectively, after removal of orthodontic retainer wire.

spectacles did not contain nickel or chromate). The patient was advised to avoid exposure to fragrances and nickel- and chromate-containing substances and was treated intermittently with hydrocortisone ointment for 2 years without good results. Meanwhile, her dentist referred her to our dental hospital, with the question of whether a dental origin could be found for the eczema. At the age of 18 years, she received orthodontic treatment, which lasted about 2 years. At that time, her ears were already pierced. Immediately after the treatment, 2 orthodontic stainless steel retainer wires were cemented to

the upper and lower jaw incisors (Fig. 2). At that time, she had no eczema. At the age of 33, she gave birth to her second child, and few weeks later, a facial eczema occurred without any known precipitant. Beside the retainer wires, 5 amalgam restorations and a few resin composite restorations were found at intra-oral inspection.

Microanalysis (2), a method for qualitative and quantitative composition assessment for metals in general and dental metals in specific, of the orthodontic splint wire gave the following results: Ni, 8 wt%; Fe, 75 wt%; Mn, 1 wt%; and Cr, 16 wt%. Based on

weak reaction to nickel and chromate and the minimal invasive character of the treatment, we decided to remove the retainer wires and to stabilize the orthodontic treatment temporarily with a thin plastic splint in the upper and lower jaws (Fig. 3). Within 4 weeks after removal of the wires, a remarkable improvement of her eczema was noted (Fig. 1b–d), while during the following 6 months, no flare-ups occurred. A blood sample was taken 6 months after removal of the splint to carry out a lymphocyte proliferation test (LPT) (3, 4) to validate the weak positive patch test reactions (5). The results of this test showed a significant sensitization to nickel (stimulation index 11.9) and no sensitization to mercury and chromate.

Discussion

From this case, several interesting issues may be highlighted. Oral exposure to metals may be relevant in dermatology for its possible adverse effects on the skin. It was shown that early oral exposure to nickel by orthodontic appliances may create oral tolerance, while late exposure may sensitize people (6). This patient had her ears pierced before she received the orthodontic treatment. Therefore, it is more likely that she was exposed to nickel through the skin prior to her orthodontic treatment. Patch testing as well as LPT clearly showed a type IV allergic sensitization to nickel, even 0.5 year after removal of the oral exposure. It is remarkable that the facial contact dermatitis in the vicinity of a stainless steel orthodontic splint, which was already in place for many years without symptoms, developed after giving birth to her second child. It is possible that hormonal influences played an important, aetiological role (7). Oral exposure to dental metal alloys, as in this case because of fixed orthodontic devices, may elicit systemic reactions, as has been confirmed in several published reports (8–11). Facial sensitization was not caused primarily by oral exposure, but probably by cosmetic products which may contain metal salts. Oral exposure to metals may lead to a systemic exposure that might have activated memory T-cells on these primarily exposed places. Finally, this case report emphasizes prolonged oral exposure to nickel, chromate, and other metals after finishing the orthodontic



Fig. 2. Stainless steel retainer wire attached to the lower front teeth to 'splint' the incisors for maintaining the result of the orthodontic treatment.



Fig. 3. The retainer wire is removed, and the orthodontic treatment is temporarily stabilized with a thin plastic splint during night.

treatment because of the use of retaining wires.

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