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Orthodontic Retainers and Anterior Tongue Hypersensitivity: Case Reports

This article reports 2 cases involving patients with anterior erythematous contact lesions that appear to be due to hypersensitivity reactions to orthodontic retainers containing metal alloys. In both cases, the lesions resolved after the removal of the retainers.

Sana P. Augustus, DDS, completed her dental education and orthodontic residency at the Howard University College of Dentistry (HUCD). She currently practices in Washington, DC, and is an assistant clinical professor of orthodontics at HUCD. Dr. Augustus holds memberships in various professional organizations, including the ADA, the National Dental Association, the American Dental Education Association, and the American Association of Orthodontists (AAO). She can be reached via email at sana.augustus@howard.edu.

Marianne S. Siewe, DDS, MS, graduated from HUCD in 2004, where she also completed her AEGD Certificate (2005) and Orthodontic Certificate (2007). She currently works as a clinical assistant professor at HUCD and maintains a part-time private practice in Silver Spring, Md. Dr. Siewe is currently president of the Omicron Kappa Upsilon dental honor society at HUCD and is a member of the AAO, the ADA, and the Southern Maryland Dental Association, as well as a Fellow of the World Federation of Orthodontists. She teaches numerous classes to orthodontic residents, is a research coordinator in her department, and is a CPR instructor. She can be reached via email at mssiewe@howard.edu.

Ronald S. Brown, DDS, MS, is a professor in the Department of Clinical Dentistry at HUCD and a clinical associate professor in the Department of Otolaryngology at Georgetown University Medical Center in Washington, DC. He can be reached via email at rbrown@howard.edu.

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Dental materials used for restorative, orthodontic, and prosthodontic procedures, especially nonprecious metal alloys, are known at times to cause oral mucosal hypersensitivity or allergic reactions. Oral lesions secondary to dental material allergies may be secondary to a particular metal or alloy or to secondary by-products generated within the oral environment. These by-products may be generated by wear, dissolution, corrosion, and/or leaching, which may result in immunologic reaction manifestations such as an excessive immune response to an antigen, damaging tissue. Hypersensitivity reactions, and particularly Class IV (contact) allergic (delayed hypersensitivity) reactions, are exaggerated reactions to an antigen that require previous contact between the host and antigen that sensitizes the host immune system.¹⁻⁴

Nickel is a relatively common contact allergen with a prevalence of contact allergies between 4.5% and 28.5% within the industrialized world. Exposure sources for sensitization include jewelry (particularly piercings), clothing, fasteners, cellular phones, nonprecious metal crowns, and orthodontic retainers. The incidence of nickel allergy is approximately 10 times greater in women compared to men. Nickel-containing alloys are utilized in a variety of orthodontic appliances and auxiliary devices. The typical percentage of metals in orthodontic appliances is 18% chromium and 8% nickel, while nickel-titanium (NiTi) wire may contain up to 70% nickel. Nickel-related hypersensitivity reactions are a much noted adverse effect, secondary to the release of nickel ions due to intraoral corrosion, ionic, thermal, and enzymatic properties of orthodontic alloys within the oral environment.²⁻⁴ However, Ehrnrooth et al⁵ reported that the prevalence of nickel contact lesions secondary to orthodontic appliances is much less than expected: between 0.2% and 0.4%.

The field of orthodontics and dentofacial orthopedics consists of the diagnosis, prevention, and correction of malpositioned teeth and jaws. The clinician engages minor forces through the utilization of orthodontic appliances to move teeth into proper alignment. Once the treatment is accomplished and the alignment is satisfactory, it is essential that tooth position be stabilized to ensure the maintenance of the proper alignments.

The methods of orthodontic stabilization vary from removable (Hawley retainers, wrap-around, and Essix retainers) to fixed (braided or preformed straight wire that is bonded on the lingual or palatal surfaces of teeth). The primary benefit of fixed compared to removable orthodontic appliances is compliance, as removing a fixed orthodontic appliance is difficult. However, removable orthodontic appliances have an advantage compared to fixed orthodontic appliances, as removable appliances facilitate dental cleaning with toothbrushes and floss.^{6,7}

CASE 1.

Figure 1. The denuded erythematous appearance of the anterior dorsal tongue.



Figure 2. The alloy mandibular fixed anterior orthodontic retainer.

CASE 2.

Figure 3. The erythematous tip of the tongue and anterior dorsal tongue and the maxillary wire fixed anterior orthodontic retainer.

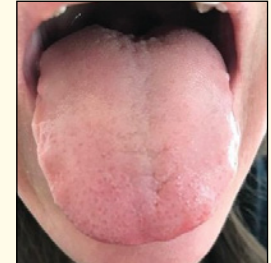


Figure 4. The appearance of the tongue after resolution of the lesions.

This article presents 2 cases consistent with delayed hypersensitivity reaction (type IV allergy) to orthodontic retainers.

CASE REPORTS**Case 1**

In October 2016, a 60-year-old female presented to an oral medicine clinician with a chief complaint of “frequent tongue ulcers, blisters, tingling, and burning tongue ulcers.” The patient’s prosthodontist referred the patient for an oral medicine evaluation. The patient’s medical history did not appear to be contributory to her chief complaint. The patient did not smoke cigarettes. She was taking metoprolol for hypertension, omeprazole for gastric reflux, vitamin B₁₂ (B₁₂) for a vitamin deficiency, and cyclosporine eye drops for dry and inflamed eyes. The anterior dorsal tongue demonstrated erythema and denudation (Figure 1). A mandibular lingual anterior orthodontic appliance was in place, and the patient reported that she had worn the appliance for approximately 30 years (Figure 2). The remaining oral tissues appeared to be within normal limits.

The patient was instructed to return to her dentist for the removal of the lingual bar orthodontic retainer, and the retainer was removed 2 weeks later. On followup (May 2017), the patient reported that the tongue lesions had cleared up and were no longer an issue, although the patient still suspected that her tongue felt better after B₁₂ supplemental therapy, which she began several weeks after the retainer was removed. At the followup in October 2017, the patient reported that there had been no further flares.

Case 2

In September 2017, a 39-year-old female patient presented to an oral medicine clinician, referred by her otolaryngologist, with a chief complaint of “tip-of-the-tongue aphthae and severe pain.” This severe pain episode began several weeks previously. The pain condition and tip-of-the-tongue ulcer did not respond to dexamethasone topical steroid rinse therapy, which was previously successful with respect to treating recurrent aphthous ulcers. The patient’s physician believed the condition was allergy-related and referred the patient for allergy testing.

The allergy workup revealed a potential possible hypersensitivity to dairy and coffee. The patient discontinued consuming those food products without experiencing any decrease in pain or resolution of the oral lesion. The clinical examination revealed an erythematous ulcer of the anterior dorsal tongue (Figure 3). Also, it was noted that the patient had

a metal alloy wire and composite maxillary fixed anterior orthodontic retainer (Figure 3). The patient reported that she had the fixed orthodontic retainer in place since she was a teenager. A punch biopsy of the inflamed area was performed, and the specimen was sent out for histopathologic evaluation. The patient was referred to a private dentist (prosthodontist) for the removal of the fixed maxillary orthodontic appliance.

The patient’s medical history noted that she was taking hydrochlorothiazide for mild hypertension. She did not smoke cigarettes. She had reported previously for an oral medicine consultation regarding oral aphthae in September 2015. A topical steroid rinse was prescribed, which helped to control her recurrent aphthae condition. Also, the patient adopted a gluten-free diet and believed that this had helped improve her oral aphthae condition.

Several case reports describe oral mucosal allergic reactions to orthodontic appliances containing nickel.

The patient had the fixed orthodontic retainer removed several days later and reported that her tongue felt better immediately. The biopsy histopathologic evaluation reported oral mucosa with edematous and hyperplastic epithelium and underlying mixed chronic inflammation and vascular telangiectasia. The lesions slowly resolved, and a prescription of hydroxychloroquine (one 200-mg tablet twice daily) was initiated. The lesions and sensitivity totally resolved 3 weeks after the retainer was removed (Figure 4).

DISCUSSION

Many dental materials produce oral contact allergy mucositis. Metals such as nickel, copper, palladium, chromium, mercury, amalgam, gold, and titanium are documented to cause oral contact allergy lesions. Furthermore, various nonmetal dental materials may cause contact allergy oral mucosal lesions, such as composite, acrylic, eugenol, and glutaraldehyde.⁸⁻¹⁰

Although nickel is well recognized as the most common orthodontic appliance contact allergen, nickel alloys are widely utilized for orthodontic appliances.^{2,11,12} Nickel alloys are used extensively within stainless steel and NiTi wires, orthodontic brackets, extraoral orthodontic appliances,

and fixed and removable orthodontic retainers. Furthermore, an increasing issue is the sensitization to nickel and nickel alloys with respect to costume jewelry and piercings.¹³

Several case reports describe oral mucosal allergic reactions to orthodontic appliances containing nickel.^{4,5,13-17} Of these, only the case reported by Bishara¹⁶ was related to an orthodontic retainer. Pazzini et al¹⁵ reported a similar histopathologic appearance to that in Case 2. Noble et al¹³ reported that, in their second case, after the removal of the contact allergen, the symptoms and lesions took several weeks to resolve. Counts et al⁴ reported, with respect to their case, that after the removal of the orthodontic appliance contact allergen, the symptoms and lesions took several months to resolve.

The lesions and sensitivity totally resolved 3 weeks after the retainer was removed....

Veien et al¹⁸ reported on oral contact lesions secondary to orthodontic metal wire. They noted that 2 of 5 patients had positive patch tests to nickel and 3 did not. They reported that the lesions of 4 out of the 5 patients completely resolved after the removal of the metal orthodontic appliances. Three of these patients had recurrent hand lesions, which flared after an oral allergy challenge with one of the metals used within their orthodontic appliances. Two out of these 3 patients had negative patch tests.

Gözl et al² reported that the reproducibility of patch test results ranged between 60% and 90%. They noted a debate between researchers concerning whether or not patch testing could conceivably sensitize patients to nickel. They also said that patient medication and ultraviolet radiation might influence patch test evaluations. Nevertheless,

they considered patch tests to constitute a valid criterion for their meta-analysis study on the effect of orthodontic treatments' influence regarding nickel hypersensitivity. Lyzak et al¹ reported a case in which an oral mucosal allergy challenge demonstrated a positive challenge and cutaneous patch testing was negative.

In the 2 cases reported in this article, neither patient reported a previous contact lesion with costume jewelry or other metal alloy reactions. Both patients had fixed orthodontic retainers in place for a number of years. Neither patient received cutaneous patch testing procedures. Cutaneous patch testing would have possibly aided in the diagnoses, but it is noted that there are false positive and false negative results from patch testing. In the cases reported, neither patient was interested in a challenge procedure to verify the assumption of a hypersensitivity reaction to alloys within the orthodontic retainers.

It is understandable that patients do not wish to risk the recurrence of further lesions and symptoms. It took more than a month for resolution of the tongue lesion in the patient described in Case 1. Also, she seemed to believe that taking a B12 supplement helped resolve the condition. It is possible that taking B12 improved the patient's host resistance and enhanced healing. It is also possible that the tongue lesion was going to heal anyway, regardless of the B12 supplementation. It took several weeks for the resolution of the tongue lesion in the patient described in Case 2. She believed that taking the hydroxychloroquine prescription advanced the healing. Hydroxychloroquine is known as being helpful in calming down the immune system.¹⁹ However, it is impossible to know whether or not the tongue lesion was healing regardless of the prescription medication. Both patients reported having had their retainers placed at least a decade previous to noticing the tongue lesions. However, prior exposure to

an allergen is part of the history of allergic contact lesions.¹⁻⁴

CONCLUSION

This article has presented 2 cases that are consistent with a hypersensitivity contact reaction to orthodontic retainer material, presumably to a nickel alloy.♦

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COMING IN OCTOBER: MORE OPPORTUNITIES TO EARN CE CREDIT

Attention Deficit Hyperactivity Disorder in Adolescence: Dental Implications

Lisa Efron, MA, PhD, discusses the diagnosis, etiology, clinical presentation, treatment, and other aspects of attention deficit hyperactivity disorder (ADHD) in adolescence. The implications of ADHD for dentistry are discussed. This article is peer reviewed and available for 2 hours of CE credit.



To submit Continuing Education (CE) answers, use the answer sheet below. Or, use our easy online option at dentalcetoday.com. This article is available for 2 hours of CE credit. The following 10 questions were derived from "Orthodontic Retainers and Anterior Tongue Hypersensitivity: Case Reports," by Sana P Augustus, DDS; Marianne S. Siewe, DDS, MS; and Ronald S. Brown, DDS, MS, on pages 104 to 106.

Learning Objectives: After reading this article, the individual will learn: (1) certain causes of oral mucosal hypersensitivity/allergic reactions, and (2) the diagnosis and treatment of 2 cases consistent with hypersensitivity reaction to orthodontic retainers. **Subject Code:** 730.

1. Nickel has a prevalence of contact allergies between _____ in the industrialized world.
 - a. 1.5% and 4%.
 - b. 4.5% and 28.5%.
 - c. 29% and 35.5%.
 - d. 40% and 50%.
2. The incidence of nickel allergy is approximately _____ times greater in women compared to men.
 - a. 5.
 - b. 10.
 - c. 15.
 - d. 20.
3. The typical percentage of metals in orthodontic appliances is 18% chromium and 8% nickel. NiTi wire may contain up to 70% nickel.
 - a. The first statement is true; the second is false.
 - b. The first statement is false; the second is true.
 - c. Both statements are true.
 - d. Both statements are false.
4. In Case 1 reported in this article, the patient had worn a mandibular lingual anterior orthodontic appliance for approximately 30 years. After removal of the appliance, the follow-up visit revealed that the tongue lesions present at the initial visit were gone.
 - a. The first statement is true; the second is false.
 - b. The first statement is false; the second is true.
 - c. Both statements are true.
 - d. Both statements are false.
5. In Case 2 reported in this article, how long after the removal of a fixed orthodontic retainer did the tongue aphthae lesions resolve?
 - a. One week.
 - b. 2 weeks.
 - c. 3 weeks.
 - d. 4 weeks.
6. Which of the following dental materials are known to produce oral contact allergy mucosal lesions?
 - a. Copper.
 - b. Chromium.
 - c. Eugenol.
 - d. All of the above.
7. The following is well-recognized as the most common orthodontic appliance contact allergen.
 - a. Chromium.
 - b. Nickel.
 - c. Titanium.
 - d. Copper.
8. Gölz et al reported that the reproducibility of patch test results ranged between:
 - a. 10% and 30%.
 - b. 40% and 50%.
 - c. 50% and 60%.
 - d. 60% and 90%.
9. In the 2 cases presented in this article, neither patient reported a previous contact lesion with costume jewelry or other metal alloy reactions.
 - a. True.
 - b. False.
10. In the cases presented in this article, both patients reported having had their orthodontic retainers placed at least a decade prior to noticing tongue lesions. Prior exposure to an allergen is part of the history of allergic contact lesions.
 - a. The first statement is true; the second is false.
 - b. The first statement is false; the second is true.
 - c. Both statements are true.
 - d. Both statements are false.

ANSWER SHEET Test 225, beginning on page 104

Complete the paper answer sheet and submit your answers for this issue's CE examination. Answer at least 7 of the 10 questions correctly to earn 2 CE credits.

Please check the correct box for each question below.

1. a b c d
2. a b c d
3. a b c d
4. a b c d
5. a b c d
6. a b c d
7. a b c d
8. a b c d
9. True False
10. a b c d

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