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Bisphenol-A-glycidylmethacrylate (BIS-GMA) is a frequently used monomer in dental composite resins and is produced by the reaction of methyl methacrylate and diglycidyl-ether of bisphenol A (epoxy resin). We report 2 cases of allergic contact dermatitis from BIS-GMA, which has been rarely reported in dental patients.

Case 1

A 13-year-old schoolgirl was referred to the contact dermatitis clinic with a history of having developed a florid swelling of the upper lip and gingivae, with marked inflammation of the perioral skin 24 hr after having an orthodontic fixed appliance fitted. The appliance was removed, and a new one fitted using a different composite resin and stainless steel archwires. She was treated with oral antihistamines and 1% hydrocortisone, and her symptoms settled within a few days. The orthodontist had used a dental composite resin to attach the permanent fixed appliance to the patient's teeth. The adhesive was directly applied to the teeth and cured using blue light, as is standard practice. On the first occasion, the adhesive 3M Unitek Transbond XT light cure adhesive[®] (3M UK PLC, 3M Centre, Berkshire, UK) was used, but the orthodontist switched to light bond paste with fluoride[®] (Reliance orthodontic products Inc, Itasca, IL, USA) on the second occasion.

There was no personal or family history of atopy. She was otherwise normal although she had a history of jewellery intolerance. At the time of review, the examination was unremarkable.

Patch testing was performed with the British standard series and the additional dental and rubber series. Patches were applied to the upper back and occluded for 2 days

Allergic contact dermatitis from bisphenol-A-glycidylmethacrylate during application of orthodontic fixed appliance

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using the occlusive Finn Chamber® (Tuusula, Finland) technique. They were read on days 2 and 4. She had a striking positive reaction (++) to both epoxy resin 1% pet. and BIS-GMA 2% pet. at 4 days. All other patch tests, including nickel, were negative. Prick tests to latex were also negative.

The orthodontic fixed appliance that was originally fitted consisted of stainless steel brackets, with a nickel content ~18%, along with archwires, with a nickel content ~50%. The adhesive used to bond the appliance to the teeth contained a variety of acrylates. Although both adhesives were light cured, it was clear from the material safety data sheets that 3M Unitek Transbond XT light cure adhesive® contained BIS-GMA, whereas the light bond paste with floride® did not.

Case 2

A 14-year-old girl was referred with a history of having developed facial and lip swelling associated with erythema and dryness within 24 hr of having an orthodontic fixed appliance fitted. The appliance was removed 4 days later, and a nickel-free appliance substituted. Unfortunately, within 4–5 hr, she developed painful, dry, and cracked lips associated with facial swelling and tenderness of the buccal mucosa, and the brace was removed. On both occasions, the orthodontist used the same dental composite resin 3M Unitek Transbond XT light cure adhesive® to attach the permanent fixed appliance to the patient's teeth. She had a history of atopic dermatitis, asthma, and hay fever and was known to be allergic to peanuts, shellfish, and cow's milk. Examination at presentation was unremarkable.

She was patch tested to the British Standard series and additional dental and rubber series as well as to the individual constituents of the orthodontic fixed appliance and dental composite resin.

The results confirmed that she was allergic to epoxy resin, BIS-GMA 2%, ethylene glycol dimethacrylate, and 2-hydroxymethyl methacrylate (Table 1). It was clear from the material safety data sheets that 3M Unitek Transbond XT light cure adhesive® contained all these ingredients. Her positive reaction to goldsodium thiosulphate 0.5% could not be explained

Table 1. Results of patch testing

	Day 2	Day 4
Case 1		
Epoxy resin 1% pet.	++	++
BIS-GMA 2% pet.	++	++
Nickel	–	–
Case 2		
Epoxy resin 1% pet.	++	++
BIS-GMA 2% pet.	+	+
Ethylene glycol dimethacrylate 2%	+	+
2-Hydroxymethyl methacrylate 2%	+	+
Goldsodium thiosulphate 0.5%	+	++
Nickel	–	–

as neither the orthodontic fixed appliance nor the dental composite resin contained gold.

Discussion

BIS-GMA is the most commonly used monomer in dental composite resins and is produced by the reaction of methyl methacrylate and diglycidylether of bisphenol A (epoxy resin) (1). It is cured by the peroxide/amine method or visible light to produce the final non-allergenic polymer in the mouth (1). BIS-GMA sensitivity is a rare cause of allergic contact dermatitis in dental patients as they are only briefly exposed to the resin before it is polymerized and becomes non-allergenic. Staerkjaer and Menne concluded that although nickel sensitization was common, it was a rare cause of stomatitis from orthodontic material (2).

Our first patient had no history of exposure to acrylates or epoxy resins and thus we assume that the fitting of the orthodontic appliance was the sensitizing episode. Interestingly, she did not react adversely when the second brace was applied, as fortunately a dental resin without BIS-GMA was used. The second patient may have previously been exposed to epoxy resins in glue, which she had used in helping her father to make model planes. As the orthodontist had used the same dental resins on both occasions, she developed a recurrence of her symptoms after the second nickel-free appliance was fitted. These cases highlight the importance for clinicians to document which bonding agent they use rather than just recording 'bonds upper and lower' as, contrary to popular belief, dental adhesives are not all the same, i.e. some have BIS-GMA, others do not.

References

1. Carmichael A J, Gibson J J, Walls A W G. Allergic contact dermatitis to bisphenol-A-glycidyl dimethacrylate (BIS-GMA) dental resin associated with sensitivity to epoxy resin. *Br Dent J* 1997; 183: 297–298.
2. Staerkjaer L, Menne T. Nickel allergy and orthodontic treatment. *Eur J Orthod* 1990; 121: 284–289.

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