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An Unusual Allergic Response to Orthodontic Treatment

Abstract: This paper describes a case of a 13-year-old patient with a systemic hypersensitivity reaction to orthodontic treatment. Her allergy was investigated resulting in a provisional diagnosis of pressure urticaria. The aetiology, diagnosis and clinical management of allergic reactions to dental procedures are discussed.

CPD/Clinical Relevance: A significant underlying medical condition may be revealed by dental procedures. Appropriate liaison with medical professionals is essential so that appropriate diagnostic measures may be taken and treatment instigated. This paper shows the importance of patient safety both with regard to the taking of accurate medical and dental histories and the management of untoward reactions to dental procedures.

Dental Update 2015; 42: 580–582

A 13-year-old girl was referred to her local hospital orthodontic department by her general dental practitioner. Her presenting complaint was that she was unhappy with her crooked teeth. Her medical history revealed a history of mild asthma, well controlled with *Salbutamol prn* inhaler and *Becotide MDI*. She appeared to be fit and well.

Her relevant dental history included surgical removal three years previously of an unerupted supernumerary tooth from the maxillary midline, associated with an impacted maxillary left central incisor. The surgical treatment had

proceeded uneventfully and the central incisor had erupted spontaneously within the year following surgery. Orthodontic examination revealed a Class II division 1 occlusion with a severely crowded maxillary arch (Figure 1). Panoramic radiography revealed no abnormal tooth or bony pathology.

Orthodontic treatment and investigations

The orthodontic treatment plan was to correct her malocclusion with a combination of an upper removable appliance initially, using headgear for anchorage reinforcement. With good compliance established, the extraction of four first premolars and upper and lower fixed appliances were planned. She co-operated well with the removable appliance and headgear wear, and she was therefore referred to her dental practitioner for the extraction of all four first premolars. One day after the extractions, she attended the hospital Orthodontic Department as an emergency patient, complaining of severely swollen lips. On examination, her lips were inflamed, oedematous and crusting (Figure

2). The swelling was not associated with any itchiness and there was no swelling elsewhere. To investigate this unusual reaction to extractions she was referred to the hospital's Accident and Emergency Department. The diagnosis at this time was 'trauma-induced oedema following dental extractions' and, following subsequent spontaneous subsidence of her symptoms within the next few hours, no active treatment was instigated. There were no further episodes of swelling at this time and it was decided to continue her orthodontic treatment.

She continued to wear her headgear during the levelling and alignment with fixed appliances and, on her fifth visit for adjustment of her fixed appliances, space closure was started using elastomeric chain. She was given intermaxillary elastics to wear full-time.

One day later, she attended the Orthodontic Department as an emergency patient, complaining of severely swollen gums. She gave a history of sudden swelling which had started a few hours after her orthodontic appointment.

On examination, the gingival

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Figure 1. Anterior intra-oral view prior to treatment showing normal gingivae.



Figure 2. Extra-oral view of patient's lips showing urticarial oedema.

margins in both the upper and lower arches were swollen and oedematous. It was suspected that she could be suffering from a delayed Type IV hypersensitivity reaction to latex and a decision was taken by the orthodontist to avoid use of any latex products¹ during investigation immediately. The latex components on her fixed appliances were removed that day and active space closure was temporarily discontinued. We referred her to her general medical practitioner to arrange urgent investigation into a possible allergy. Prophylactic measures included the use of non-latex gloves, omission of latex components on her fixed appliances (intermaxillary elastics, elastomeric chain and modules) and arranging to see her first in the morning to decrease the latex exposure occurring through the treatment of other patients.¹

However, whilst the medical investigation proceeded, she continued to suffer episodes of oedematous lips and gingivae following adjustments to her orthodontic appliances. The lip and gingival swelling happened one hour after orthodontic adjustments; it was self-limiting and subsided within approximately

Types of angioedema	Description
Acute allergic	Type I hypersensitivity
Drug-induced	Induced by ACE inhibitors
Hereditary	C1 esterase inhibitor deficiency
Acquired	Acquired angioedema Type I Acquired angioedema Type II Haematoma
Pressure (Contact) Urticaria	Occurs through contact or when pressure is applied to the skin

Table 1. Hypersensitivity type swellings of the facial area.

Aetiology	Type
Allergy	Drug allergy: penicillin, aspirin Food allergy
Infection	Viral infections Parasitic infections
Cold	Cold urticaria
Stress or heat	Cholinergic urticaria
Sunlight	Solar urticaria
Water	Aquagenic urticaria
Pressure/skin contact	Pressure/contact urticaria

Table 2. Causes of urticaria.

two hours, with no medication used. An alternative diagnosis of a Type IV cell-mediated delayed hypersensitivity reaction to nickel was being considered and, therefore, precautions were planned in order to reduce, as far as possible, the use of archwires with high nickel content and the omission of nickel active components, such as nickel-titanium closing springs.² Her headgear wear was terminated at this point.

When the investigations for latex allergy and nickel allergy proved to be negative, the patient was referred to the hospital's dermatologist, who carried out further tests. Initial blood test results appeared to suggest a possible reduction in her C1 esterase inhibitor levels.³ She was therefore referred to the immunologist's allergy clinic at the university hospital for further investigations and for advice as to whether she would require medical

treatment.

Subsequent skin prick and blood tests revealed her C1 inhibitor levels to be within normal limits, but her histamine levels were found to be raised.

Diagnosis and treatment

There are various causes of hypersensitivity swellings in the facial area (Table 1).

A diagnosis of pressure or contact urticaria was made by the immunologist. The patient was advised to use *Loratadine* 10 mg orally the night before her orthodontic appointments and a dose on the day of the procedure. This successfully prevented the lip and gingival swelling. Her orthodontic treatment was somewhat delayed owing to the necessity of stopping tooth movement during the

initial investigations, but she completed her treatment after two and a half years and suffered no further episodes of lip or gingival swelling since the anti-histamine treatment was started.

Discussion

Urticaria can affect up to 20% of the population.⁴ It is characterized by acute development of itchy wheals or swellings⁵ in the skin owing to increased local vascular permeability. The pathogenesis of urticaria involves a Type I hypersensitivity reaction which involves degranulation of mast cells releasing their inflammatory mediators (including histamine) which, as well as local inflammatory reaction, leads to an increase in vascular permeability. There are various causes of Type I hypersensitivity (Table 2). The patient may present with a history of cutaneous swellings and wheals which may occur over a few minutes but last for several hours. The lesions are normally, but not always, itchy and erythematous. Severe urticaria may present with angio-oedema, which may include swelling around the eyes, lips and hands. This may be life-threatening if the oedema involves the larynx. The diagnosis of urticaria is based on the history and clinical features. The treatment of this disease is based on prevention and, for the treatment of idiopathic cases, is based on treating with anti-histamines (eg cetirizine or loratadine).

Delayed pressure urticaria

follows after a pressure stimulus with swelling, which can peak around 6–9 hours following a delay of a few hours.⁶ Although the pathogenesis of pressure urticaria is unknown,⁶ it still shows the similar characteristics of generalized urticaria.⁷ There are many variants of delayed pressure urticaria which range from the mild to the more severe bullous type.⁸

It would appear that this patient suffered from oedema caused by the normal handling of her oral tissues during dental procedures. This was initially associated with the dental procedure to extract her teeth and subsequently through the handling forces associated with orthodontic procedures to adjust her appliances. Swelling caused by allergy to handling during orthodontic treatment is rare and this is the first reported case. Urticaria is normally an immediate antibody mediated allergic response occurring within minutes or hours after direct skin or mucosal contact with an allergen.

Conclusion

The majority of patients treated in orthodontic practice are children and adolescents who are medically fit and well. If a Type IV delayed hypersensitivity is suspected during orthodontic treatment, it is essential to instigate preventive procedures and to liaise with the appropriate medical staff whilst the patient is investigated. Type I immediate allergic reactions range from contact urticaria to full-blown anaphylaxis;

hence the need for extensive investigation to establish the cause and its treatment. The aim is to reduce, or ideally prevent, the occurrence of serious complications from an unusual medical condition.

References

1. Hain MA, Longman LP, Field EA, Harrison JE. Natural rubber latex allergy: implications for the orthodontist. *J Orthod* 2007; **34**: 6–11.
2. Bass JK, Fine H, Cisneros GJ. Nickel sensitivity in the orthodontic patient. *Am J Dentofac Orthop Orthod* 1993; **103**: 280–285.
3. Gompels MM, Lock RJ, Morgan JE, Osborne J, Brown A, Virgo PF. A multi-centre evaluation of the diagnostic efficiency of serological investigations for C1 inhibitor deficiency. *J Clin Pathol* 2002; **55**: 145–147.
4. Dice JP. Physical urticaria. *Immunol Allergy Clin North Am* 2004; **24**: 225–246.
5. Grattan CE. The urticaria spectrum: recognition of clinical patterns can help management. *Clin Exp Dermatol* 2004; **29**: 217–221.
6. Lawlor F, Black AK. Delayed pressure urticaria. *Immunol Allergy Clin North Am* 2004; **24**: 247–258.
7. Ryan TJ, Shim-Young N, Turk JL. Delayed pressure urticaria. *Br J Dermatol* 1968; **80**: 485–490.
8. Kontou-Fili K, Borici-Mazi R, Kapp A, Matjevic LJ, Mitchel FB. Physical urticaria: classification and diagnostic guidelines; an EAACI position paper. *Allergy* 1997; **52**: 504–513.

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May 2015

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