

NATURAL RUBBER LATEX ALLERGY IN ORTHODONTICS

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Abstract

Natural rubber latex, which comes from the sap of rubber trees, contains a number of proteins that can cause allergic reactions in susceptible individuals. Exposure to latex allergens through skin contact, ingestion or inhalation during orthodontic treatment can induce immune responses that range from minor skin irritation to potentially more severe reactions such as anaphylaxis, which could result in death. The following article reviews diagnosis, management, and prevention of incidences of latex allergy during orthodontic treatment.

Introduction

Orthodontics embraces widespread use of multiple devices made of almost all the biomaterials known. From metals to plastics and from ceramics to composites, these materials may bring not only good health and beauty, but problems too. Hypersensitivity defined as any heightened immune response to an antigen. Although reactions of irritant origin are usually associated with direct friction between soft tissues and parts or accessories of the orthodontic appliances, hypersensitivity reactions are related to the antigenicity of some materials that results in an adverse patient response.

But then in cases where the phenomenon is observed, prompt diagnosis is of prime importance, and it should be followed by the immediate intervention is requires involving interruption of exposure to the allergen along with the substitution of any suspected /potent allergens or/and modification of treatment planning. Potential allergens in orthodontic practice can be Latex Components, Nickel, Cold Curing Acrylic, Bonding Materials, Cobalt, Chromium, etc. The most common and problematic hypersensitivity reactions are due to the use of latex-based products and alloy components of metal-based orthodontic appliances.¹

The aim of this review article is to describe, based on modern literature, the latest evidence based scientific data and care reports concerning etiology, diagnosis, and management of allergic reactions to latex used during orthodontic treatment.

Natural rubber latex allergy(NRL allergy)

Allergic reactions to latex have increased considerably since the 1980s and have become a significant problem in affecting patients and health care workers in general ^{2,3} as well as dental professionals and dental patients.^{4,5}

Natural latex is manufactured from the sap of the commercial rubber tree, *Havea brasiliensis*. During the manufacturing process, various chemicals, e.g. thiurams and carbamates, are added.⁶ These additives have been recognized as a cause of allergy.

The prevalence of NRL allergy has been reported as being less than 1% in the general population ⁷, and in dental professionals, higher prevalence of between 6 % to 12 % is reported. ^{8,9} and 24–60% in patients with spina bifida. ¹⁰

Sources of latex allergens in orthodontics are disposable medical gloves, particularly powdered gloves and latex elastics used in orthodontics treatment.

Types of reaction to Latex are as follows: ¹¹

- Irritant Contact Dermatitis
- Allergic Contact Dermatitis (Type IV, delayed response, usually presents a reaction localized to the area of skin contact,)
- Natural Rubber Latex Allergy (Type I, reaction occurs within minutes or as long as several hours after direct skin or mucosal contact with the allergen.

Diagnosing natural rubber latex allergy: For the diagnosis of latex allergy, a detailed medical history, alongwith documentation of a prior episode, identification of sources of natural rubber latex product exposure and any other previous allergic reactions should be done. Any medical history of atopy, extensive contact with rubber surgical drains/tubes, itching and redness from contact with balloons, rubber dams should be taken. ^{12, 13, 14}

Some more potential risk factors can be other allergies such as hay fever, asthma, eczema, and contact dermatitis, can also be taken as. Food allergy can also point to a potential latex allergy with some fruits such as banana, avocado, passion fruit, kiwi, and chestnuts having proteins that are capable of cross-reacting with latex proteins. ^{15, 16, 17, 18, 19, 20}

Careful observation of signs and symptoms of latex allergy should be done which includes: ²¹

- Occurrence of allergy within minutes or if several hours after contact with the allergen.
- The face, especially the lips and mouth, is affected first.
- Skin becomes itchy and develops weals, giving the skin a ‘nettle rash’ appearance.
- Severe systemic reactions, involving the skin, airways and/or cardiovascular systems.
- If untreated, anaphylaxis may lead to a cardiac arrest.

Tests for diagnosis: Testing for Latex allergy can be done prior to orthodontic treatment. Various types are:

- Skin prick testing (can determine the presence of circulating antinatural rubber latex antibodies. ^{22, 23}
- Patch testing which consists of a series of allergens applied to the upper back for 24 to 48 hours, is followed by a specialist examination for 1 to 7 days after the patches are removed. ²⁴ Positive testing reveals areas of red and inflamed skin under the patches, indicative of an allergy to the applied chemical.
- Immunoassay to detect Latex-specific IgE antibodies. ²⁵

Management: The management of orthodontic patients diagnosed with latex allergy includes, use of Natural Rubber Latex -free gloves / Synthetic non-latex gloves (Nitrile, Polychloroprene, Elastyren, Vinyl). nitrile, neoprene, vinyl, polyurethane, and styrene based rubbers or blends of these synthetic materials. ^{12, 13, 10, 26}

In addition, the use of powder-free gloves will diminish the amount of aerosolized allergens. In certain cases, appropriate treatment may have to include administration of pre-treatment antihistamines.

Orthodontic considerations include use of Natural Rubber Latex free alternatives to commonly used orthodontic materials, i.e. Intra-oral elastics, Ligatures, ligature chain, Rotation wedges, Headgear components, Separators, power chain and modules; plastic ligatures, ligature chain, rotation wedges, coloured modules, Elasto-Force plastic chain, e-

links, Self-ligating brackets, Masks without natural rubber latex ties, stainless steel ligatures. Treatment plan can also be modified avoiding Class II traction using elastics.

Concerns about the mechanical properties of NRL free elastics used in orthodontics have been raised.²⁷

Silicone bands also showed greater force decay, and it was concluded that great improvements in the physical properties of the silicone bands would be required before they could be considered as an acceptable alternative to NRL elastics. After static force extension of 450% for 1 day in saliva, the force decay was 33% for the silicone bands and 28% for the NRL elastics.²⁸

The management will depend on the severity of the patient's reaction, which may range from contact urticaria (CU) to full-blown anaphylaxis. CU is managed by avoiding any contact with NRL and possibly administering an oral antihistamine such as chlorphenamine. The patient needs to be warned of the likelihood of drowsiness if a sedating antihistamine is used, and may be sent home accompanied after a few hours of observation. A diagnosis of anaphylaxis can be made in the presence of respiratory distress and or hypotension. However, time should not be wasted in applying strict criteria in a deteriorating patient, and adrenaline should be given early (IM). The administration of salbutamol, chlorphenamine and hydrocortisone should also be considered.⁶

Management of a Type I allergic reaction to latex during orthodontic treatment involves following steps:²⁵

- Considered when compatible history of severe allergic type reaction with respiratory difficulty & / hypotension especially if skin changes present
- Oxygen administration when available. Call for specialist assistance.
- Stridor, wheeze, respiratory distress or clinical signs of shock.
 - Adrenalin 1: 1000 solution
 - > 12 yrs, 500 µmg IM (.5ml)
 - 250 µmg if small or pre-pubertal
 - 6 – 12 yrs: 250 µmg IM (0.25 ml)
 - Repeat in 5 minutes if no clinical response
- In addition consider IV fluids & / hydrocortisone if reaction recurrent, severe & patient has asthma

Conclusion

Hypersensitivity reactions to materials used during the orthodontic treatment, may develop into a serious health hazard for allergic / predisposed to allergic reactions patients. Proper training of clinicians and patients may help in the timely diagnosis as well as in the immediate management of any allergic episode throughout the course of orthodontic treatment.

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