SIDE EFFECTS OF DENTAL MATERIALS IN PEDIATRIC PATIENTS

Abstract

There is a possibility that the use of numerous dental materials, on or after diagnostic to restoration for the management of dental disease, could cause allergic responses in the patient, the technician, and the dentist. This Chapter discusses the numerous dental materials that result in dental hypersensitivity or have a negative impact on the oral musculature, the diagnosis of that allergy, and the prevention and treatment of that undesirable reaction in the pediatric population. This dental materials and their adverse reactions were broadly categorized based on diagnostic method, restorative procedure, local anesthetic solution, endodontic irrigation and root canal filling materials, orthodontic appliances, and stainless steel crown which primarily include Ni-Cr.

Keywords: Adverse Reactions, Pediatric Dentistry, Dental Materials, Hypersensitivity

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I. INTRODUCTION

It is common for the lips and oral cavity to come into contact with a wide variety of things that could irritate and sensitize them. During dental care, approximately 10 to 15 distinct metals, as well as synthesized resin, topically applied agents and other kinds dental materials, might be used on the mucosal surface of oral cavity. The signs of contact hypersensitivity in the oral cavity include anything from subjective issues like burning, pain, and dryness of the mucosa (burning mouth syndrome) to objective changes in type of stomatitis and cheilitis with reddish and erosive, edematous mucosa.

Fleischmann noted the first occurrence of dental metal allergy in 1928, attributing it to amalgam restoration on tooth, led to stomatitis and dermatitis around the anus. Type IV allergic reactions are T-cell-mediated hypersensitivity reactions. Hypersensitivity actually being such a powerful reaction that it damages the tissue. It is not possible to generalize the safety of medications used in adult age group patients to a pediatric age group. Certain commonly used drugs have very different pharmacokinetics and pharmacodynamics in pediatric patients compared to adult patients.

II. CHAPTER CONTENT

1. **Adverse Reaction of Dental Material:** Allergy or allergic reaction from dental products can be categorized according to the treatment we undertake, for example in the diagnostic treatment latex allergy, allergy due to restorative materials, allergy due to the use of endodontic irrigation or root canal filling material in primary dentition, allergy because of local anaesthesia during the treatment, allergic reaction owing to the use of stainless steel crystals In the Pediatric population, there was very less study describing the adverse reaction of dental material.

2. **Adverse Reaction to Latex Gloves or Rubber Dam:** In 1979, Nutter first mentioned having a latex allergy. Children with spina bifida have the maximum risk of developing a latex allergy, followed by people who have surgery before turning one year old, people who have latex-fruit syndrome (an allergy to several fruits), and medical professionals, who have the maximum risk due to their frequent glove changes and sweating.

   Built on a medical history and lab investigations, the diagnosis of latex allergy is made. The best way to diagnose a latex allergy is typically with a skin prick test. This test has a diagnostic sensitivity of 95% in people with a history of latex allergy and a precision of 100% in people without a history of latex allergy. As latex sensitization reacts with a variety of foods, including kiwi, avocado, tomato, banana, chestnut, potato, food allergies are a sign of latex allergy.

   A child's oral rubber dam angioneurotic edema was described by Blinkhorn and Leggate. Three patients with delayed rubber hypersensitivity were also observed by Smart et al. Daniela Prócida Raggio et al. have documented two cases in which 19-year-old and 5-year-old girl was found to have adverse reaction due to rubber and had swelling in her body.

3. **Adverse Reaction to Restorative Materials:** In process employing restorative materials, adverse effects are reportedly present at a rate of between 1 in 1000 and 1 in 10,000. Asthma and urticaria were reported as unfavorable reactions after the application of a fissure sealant, but the symptoms vanished after removal, indicating an allergy, according to a case study by Hallstrom U.

   Contact dermatitis and asthma brought on by methacrylate are common complaints among dentists. The responsibility for occupational contact allergies lies with HEMA, EGDMA and TEG-DMA. A case reported in which patients experienced lichenoid reactions and patch testing revealed positive reactivity to composite material. Antifungal treatment and the removal of preexisting restorations are improvements.

   Fisher et al identified methyl methacrylate monomer as the primary contributor to allergic dermatitis in dental professionals and dental lab operators. Previously used as restorative material in children, but now a few days of amalgam replaced by composite or Glass ionomer cement restoration due to toxic effects of mercury.

4. **Adverse Reaction due to Local Anesthesia:** Just under 1% of the adverse responses associated with LA are known to be hypersensitive reactions in the pediatric population. Adversative reactions are often reported as 'allergies' after administration of LA. For these cases, however, it is estimated that in the paediatric population, less than 1 percent are reported allergies to LA. It has been reported that adverse reactions can be reduced by careful injection. Most of the adversative reactions are vasovagal /psychogenic. To lessen the widespread misconceptions & concerns around the use of LA in dental offices, medical practitioners and dentists should be aware of these facts.

   Bhole et al. evaluated the scientific literature on IgE-mediated allergy and discovered 23 cases, involving 2978 people with reported Local anesthetic agents' related allergies. An IgE-mediated allergy has been confirmed in just 29 out of 2978 patients, which means a prevalence of 0.97 percent in patients tested for suspected LA allergy.

   In order to determine if a patient is allergic to Local anesthetic agent, dermatological tests are utilized. However, if the source of the allergic reaction is not evident, a challenge test is performed. In this investigation, an individual is 'challenged' by receiving subcutaneous injections of Local anesthetic agent in increasing amounts until the recommended therapeutic dose. Just 2 patients out of 188 cases in the study have successfully overcome this challenge.

5. **Adverse reaction due to Endodontic Irrigation and Primary Root Canal Filling Materials:** Just a few cases of allergic reaction to Naocl are recorded in which the skin patch tests indicated hypersensitivity to household bleach.

   It also records another case study of sodium hypochlorite allergy. Patients had burning sensation and trouble in breathing while irrigating the canals with the same, and were given symptomatic relief corticosteroids, antibiotics, antihistamines and analgesics. Positive skin scratch test was observed after 15 days that reported allergy to 1 percent sodium hypochlorite.

Dermatitis due to allergic contact is frequently brought on by formaldehyde. According to reports, formaldehyde was in responsible for between 40% to 60% of responses. Patients with formaldehyde allergies are mostly female and exhibit dermatitis on their hands or faces. Generalized urticaria and anaphylactic response are two signs of formaldehyde allergies. The assessment of particular IgE antibodies that are reactive to formaldehyde is the most reliable and accurate way for diagnosing hypersensitivity reactions related to formaldehyde.

There has only been one incidence of a patient with a ZOE allergy receiving an effective root canal treatment. Eugenol has irritating contact effects and causes type IV allergic reactions in addition to extensive anaphylaxis signs. In addition to experiencing gingival irritation, the patient also experienced an allergic reaction to eugenol in the mucosa near the metal-ceramic bridge. Additionally, when ZOE was employed as a temporary restoration and GIC (glass ionomer cement) was substituted, there were no lesion & allergic contact stomatitis.

6. **Adverse Reaction due to Stainless Steel Crown and Orthodontic Brackets Contain Ni-Cr:** According to Fisher, nickel is a key factor contributing to hypersensitive reaction lads to contact dermatitis in women. Goldman originally noted a nickel dermatitis case in 1889, which is marked by reactivity to nickel compounds. There are 0.1–0.2% of people who are allergic to nickel. Overall, 4–10 women have sensitivity to nickel, whereas 10% in men and 3% in women have chromium allergy. Burning, gingival overgrowth and numbness on one side of the tongue are some of the symptoms of nickel allergy. Patch testing with nickel sulphate in 5% petroleum jelly is used to check the diagnosis. Sensitized people who are exposed to nickel develop persistent allergic contact dermatitis.

When new-generation SSCs (9–12% nickel) were used in place of the old-generation SSCs (72% nickel), no nickel sensitivity was seen in the children treated with them. Orthodontic products, space maintainers, and archwires all have the highest levels of in vitro nickel leaching during the first week, which thereafter gradually decreases. Reactivity to chromium and cobalt and allergy to nickel are frequently associated. 18.5 percent of the 1208 patients with contact dermatitis who underwent the Duarte patch test responded favorably to two or three metals.

III. CONCLUSION

Mouth is frequently exposed to allergen-inducing sensitizing chemicals. Dental professionals frequently experience adverse responses to formaldehyde, latex, and acrylates. While PMMA and latex elicit delayed hypersensitivity reactions, sodium metabisulphite and nickel generate rapid reactions. To make a diagnosis, a detailed history of allergies, a clinical evaluation, and ratification tests such patch tests and MELISA are required. A pediatric dentist should be knowledgeable about the different types of allergies they might cause, how to recognize them, and how to treat them.

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