

Immediate Hypersensitivity Reaction to Composite Restorations

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Abstract

Restorative materials used in dentistry are constantly exposed to salivary components like enzymes that have a high impact on the degradation of these materials and subsequent leaching of some of their constituents which may be harmful to the oral tissues in some patients. Released triethyleneglycol-methacrylate, bisphenol A-glycidyl methacrylate (Bis-GMA), diurethanedimethacrylate (UDMA) and formaldehyde have been detected from incompletely polymerized composite and are implicated in occurrence of various adverse reactions. We present a case of a 60 year old female who had composite restorations done. She later presented with complaints of several episodes of intermittent gingival and cheek swellings of sudden onset adjacent to the restored teeth. The filling was taken off and patient was placed on anti-allergy medications with a close follow-up. This presentation highlights the occurrence of a typical allergy to composite material in our centre. It serves to educate dental practitioners about the awareness of such adverse reactions to dental resin materials and the need to be prompt in management of the condition.

Keywords: Immediate; hypersensitivity; composite

Introduction

Composite resin is currently the preferred choice of restorative material used especially for anterior restorations. Even though resin-based restorative materials are considered safe, their constituents can leach out and induce reactions in patients and dental personnel. Documented incidents of adverse reactions in patients caused by resin-based materials in dentistry are quite few and under reporting is suspected to be high¹.

Adverse reactions can be either allergic or non-allergic. Allergy to dental resin-based materials is due to a reaction to some of the substances in the resin matrix (e.g. monomers, inhibitors, stabilizers). Common ways of exposure to these substances may be; pre-polymerization, incomplete polymerization, degradation and leaching of products from polymerized materials by saliva components via passive hydrolysis and enzymatic action.

Reported type of reactions could be cell-mediated delayed reactions (type IV) or immediate reactions with humoral antibodies (type I-III). Allergic reactions to resin-based materials are normally type IV hypersensitivity reactions while type I reactions are

extremely rare². A case of immediate reaction to composite resin material is hereby presented.

Case report

A 50 year old female presented at the conservative dentistry clinic of Lagos University Teaching Hospital, Lagos, Nigeria for restoration of abrasive cavities on several teeth. She was referred to our clinic after extraction of a damaged tooth about 2 weeks earlier. She is a known hypertensive who is well-controlled on Co-myocardis 40mg daily and Cavedilol 40mg daily for 3years. She was not asthmatic but she reported a drug allergy to Chloroquine to which she reacts to by itching. The family history is noncontributory for any medical condition.

On examination, no facial asymmetry was detected. Intra-oral examination revealed missing 14, Ellis class 1 fracture of 21, and cervical abrasions on all the premolars and molars excluding the last molars. All the abraded teeth were subsequently restored with composite filling material followed by post-operative instructions and oral hygiene counseling.

The patient returned after two weeks with complaints of chipping off of composite from some of the teeth

that were restored. She was reviewed and repeat composite restorations were done on the affected teeth.

She reported that on completion of the restorations, she immediately noticed a swelling of the left cheek and called the attention of the managing dentist. She was reassured that the symptoms would resolve spontaneously and was asked to come again in a week for review if symptoms persisted.

The patient came back 18 days later and complained that she has been having recurrent episodes of swelling of the cheek, tongue and gums with associated temporomandibular joint pain (Figures 1 and 2).



Figure 1: Swelling of the left cheek following placement of composite restorations



Figure 2: Tongue swelling following placement of composite restorations

There was no associated difficulty in breathing or swallowing. Each episode lasted for about five days, resolved and then re-occurred. She was on prednisolone tablets prescribed by a doctor during one of the episodes. She was reviewed in the clinic, reassured and given a week appointment for further review.

On her third visit, the symptoms still persisted. She was reviewed by a Consultant physician and further probing revealed that she is atopic with history of reactions to extreme dust, some cosmetics and some sea foods. She also has early morning allergies when she jogs which often results in eruption of reddish bumps on her thigh and legs.



Figure 3: Sloughing of the oral mucosa adjacent to where the fillings were placed

The swollen tongue she reported had resolved but the patient presented pictures that showed the tongue swelling with erythematous areas and picture evidence of other recurrent episodes of the reactions.

A tentative diagnosis of an allergic reaction to composite filling material was made subject to further investigation and consultation. The composite restorations were removed and consultation with a dermatologist was proposed with recommendation to do a patch test. She was reviewed by a dermatologist and a diagnosis of allergic reaction to composite resin and specifically, a type I immediate hypersensitivity reaction was confirmed. The proposed patch testing was ruled out on account of the possibility of inducing a severe reaction.

The abrasive lesions were reassessed and all residual resin was removed. She was placed on 5mg Xyzal tablets daily for 4 weeks, 5mg Diazepam tablets daily for 3 days, 1g paracetamol tablets three times daily for 3 days.

The patient presented four weeks later and recounted only one or two mild episodes although a slight midline shift was still present. She was reviewed with an orthopantomograph at the oral surgery clinic but no obvious pathology was found. Patient's subsequent recall visits were uneventful with complaints of occasional mild episodes.

Discussion

Dental composite is a commonly used restorative material in dentistry due to its high aesthetic appeal. Composite material however contains methacrylate monomers, such as TEGDMA, Bis-GMA, MMA and EGDMA and these have been reported as allergens³. Hypersensitivity can affect patients, dental professionals, dental technicians and technologists⁴.

Allergies to methacrylate monomers are being reported in growing frequencies⁵, even though experimental data have shown that these monomers have only mild to moderate potential to induce allergies. The allergic reactions are usually due to exposure of the oral mucosa or the skin to free monomers as they are unlikely to cause allergy when fully polymerized.

However, some authors have reported that reactions to composite are relatively uncommon⁶. They stated that documentations on the risk of such monomers in composites and bonding agents are quite few and this may be due to underreporting¹.

When the reactions do occur, they most commonly take the form of delayed Type IV reactions affecting oral mucosa in direct contact with the restorations (allergic contact dermatitis/ mucositis). Immediate Type I reaction to composite restorations is said to be extremely rare².

Type I reactions involve immunoglobulin E (IgE)-mediated release of histamine and other mediators from mast cells and basophils. Immediate Type I reactions occur within seconds to minutes after allergen exposure following an initial exposure that caused sensitization in genetically predisposed individuals who are said to be atopic⁷.

The patient in this case report was probably sensitized when the composite restorations were first placed. She only reacted when the failed restorations were being replaced about two weeks later. Her reaction was immediate after completion of the restorations while still on the dental chair. She reported to the managing dentist that her left cheek was swollen even though no anaesthesia was given prior to treatment.

The clinical presentations of allergic reaction to composite and similar dental materials are not uniform⁸. These reactions may be allergic angioedema of upper lip, anaphylaxis, urticaria, hereditary atopic eczema, cellulitis, cheilitis granulomatosa, and cheilitis glandularis^{3,9}.

In this patient, a diagnosis of Type I hypersensitivity reaction was made based on the following:

- Immediate onset of reaction after prior sensitization
- Angioedema of lip, cheek, tongue
- Recurrent episodes
- History of allergic reactions to other allergen in the environment including pigs, food items, sunlight

A similar case was reported in India where a patient received direct and indirect composite restorations and suffered an upper lip swelling less than an hour after the treatment. Blood tests revealed an increase in IgE and an absolute eosinophilic count which are consistent with a type 1 hypersensitivity reaction. It was later diagnosed as an acute allergic angioedema of the upper lip³.

When a patient is suspected of an allergy, a thorough history taking and clinical examination should be done. In this case, atopic nature of the patient was missed by the dentist despite revelation that she has a specific drug allergy. A further probe to ascertain other allergic items might have established this peculiarity of this patient. A high level of suspicion of possible allergy to restorative or dental materials should be aligned with any history of allergy. Prompt management of cases of allergic reactions to dental materials must be employed to avoid life-threatening complications. This should include patient education and a personalized treatment plan³. All filling materials containing the suspected allergens or trigger factors must be eliminated immediately and medications should be administered. The important drugs in management of type 1 hypersensitivity are antihistamines, corticosteroids and/or epinephrine. These drugs must be readily available in the dental emergency kit. Patient should be monitored safely till symptoms subside and followed up with recall visits.

Prick method (test) and scratch test are used to confirm immediate hypersensitivity while the patch test verifies delayed hypersensitivity¹⁰. Studies in the literature have shown that 2-HEMA (2-hydroxyethyl methacrylate) and BIS-GMA are the methacrylates that show the greatest percentage of sensitization with patch testing^{11, 12}. The result of patch testing must however be correlated with a good history and clinical examination in order to achieve a clinical relevance¹³.

Radioallergosorbent Test (RAST) is recommended for confirmation of Type I reactions. It detects allergen specific IgE in the blood. However we were unable to perform this test based on non-availability of RAST for components of resin composite materials in our centre.

Conclusion

Adverse reactions to composite resin material are possible in dental practice. Practitioners need to be aware of these conditions and be ready for prompt management in everyday practice.

References

1. Van Noort R, Gjerdet NR, Schedle A, Björkman L, Berglund A. An overview of the current status of national reporting systems for adverse reactions to dental materials. *J Dent*. 2004 Jul;32(5):351-358
2. Schedle A, Ortengren U, Eidler N, Gabauer M, Hensten A. Do adverse effects of dental materials exist? What are the consequences, and how can they be diagnosed and treated? *Clin Oral Implants Res*. 2007 Jun;18 Suppl 3:232-256.
3. Mahendran K, Padmini G, Murugesan R, Srikumar A. Acute allergic angioedema of upper lip. *J Conserv Dent* 2016;19:285-288.
4. Isaksson M, Lindberg M, Sundberg K, Hallander A, Bruze M. The development and course of patch-test reactions to 2-hydroxyethyl methacrylate and ethyleneglycoldimethacrylate. *Contact Dermatitis*. 2005 Nov;53(5):292-297.
5. Ahsan A, Ashley M. Hypersensitivity to Dental Composites and Resin-Bonding Agents. *Dent Update*. 2016 Nov;43(9):836-8, 841-842.
6. Goon A, Isaksson M, Zimerson E, Goh C, Bruze M. Contact allergy to (meth)acrylates in the dental series in southern Sweden: simultaneous positive patch test reactions patterns and possible screening allergens. *Contact Dermatitis* 2006;55:219-226
7. Nimmagadda SR, Evans R. Allergy: etiology and epidemiology. *Pediatr Rev*. 1999 Apr;20(4):111-5; quiz 116
8. Khamaysi Z, Bergman R, Weltfreund S. Positive patch test reactions to allergens of the dental series and the relation to the clinical presentations. *Contact Dermatitis*. 2006 Oct;55(4):216-218.
9. Martin N, HK Bell, LR Longman, CM King. Orofacial reaction to methacrylates in dental materials: A clinical report. *J Prosthet Dent* 2003;90:225-227
10. Bakula A, Lugović-Mihić L, Situm M, Turcin J, Sinković A. Contact allergy in the mouth: diversity of clinical presentations and diagnosis of common allergens relevant to dental practice. *Acta Clin Croat*. 2011 Dec;50(4):553-561.
11. Koch P. Allergic contact stomatitis from BIS-GMA and epoxy resin in dental bonding agents. *Contact Dermatitis* 2003;49:104-105
12. Gonzalo Rojas-Alcayaga, Alonso Carrasco-Labra, Paula Danús, María A. Guzmán, Irene Morales-Bozo, Blanca Urzúa. Determination of susceptibility to sensitization to dental materials in atopic and non-atopic patients. *Med Oral Patol Oral Cir Bucal*. 2012 Mar; 17(2): e320–e324.
13. Fonacier L. A Practical Guide to Patch Testing. 2015 Sep-Oct;3(5):669-675.