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Oral and Perioral Adverse Reaction Following Alginate Impression Making: A Rare Case Report

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تفاعل ضار فموي ومحيط بالفم عقب أخذ طبعة سنية بمادة الألجينات: تقرير حالة نادرة

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Abstract

Background: Alginate impression material is widely used in dentistry and is generally considered biocompatible; however, hypersensitivity-like reactions, although rare, have occasionally been reported.

Case presentation: This report describes a 56-year-old healthy female who developed a suspected hypersensitivity-related reaction following exposure to alginate impression material. Primary impressions were taken uneventfully, but within one hour the patient reported oral itching and discomfort. After two days, she presented with extraoral erythematous, crusted lesions at the labial commissures and a severe localized intraoral ulcerative lesion involving the mandibular lingual vestibule and floor of the mouth, covered by a fibrinous pseudomembrane. No systemic symptoms were observed. Based on clinical findings and temporal association with alginate exposure, a provisional diagnosis of suspected allergic contact stomatitis and cheilitis was made.

Management and outcome: The patient was treated conservatively with antihistamines, topical anesthetic gel, and antiseptic mouthwash, with complete resolution within one week

Conclusion: Although uncommon, oral and perioral adverse reactions may occur following exposure to alginate impression materials. The present case suggests a possible association between alginate exposure and mucosal lesions; however, confirmatory allergy testing was not performed. Further investigations are required to establish the exact etiology and immunological mechanism.

Keywords: Allergy, Alginate, Hypersensitivity, Impression materials, Stomatitis.

الملخص

الخلفية: تُستخدم مادة الألجينات على نطاق واسع في طب الأسنان وتُعد بشكل عام مادة متوافقة حيوياً مع الأنسجة، إلا أن تفاعلات فرط التحسس رغم ندرتها قد تحدث في بعض الحالات.

عرض الحالة: يصف هذا التقرير حالة لمريضة تبلغ من العمر 56 عاماً تتمتع بصحة عامة جيدة، ظهر لديها تفاعل يُشتبه في ارتباطه بفرط التحسس بعد التعرض لمادة الألجينات، تم أخذ الطبعات الأولية للفكين العلوي والسفلي دون حدوث مضاعفات فورية، بعد حوالي ساعة من الإجراء اشتكت المريضة من حكة وانزعاج فموي وبعد يومين حضرت إلى العيادة مع وجود آفات احمرارية متقشرة ومُتقرنة خارج الفم في زوايا الشفاه، بالإضافة إلى آفة تقرحية شديدة ومحدودة داخل الفم شملت الدهليز اللساني للفك السفلي وأرضية الفم ، وبالاعتماد على الفحص السريري والتزامن الزمني بين التعرض وبدء الأعراض، تم وضع تشخيص مبدئي لالتهاب فم والتهاب شفوي تحسسي تماسي مشتبه بارتباطهما بالتعرض لمادة الألجينات.

التدبير والنتائج: عولجت الحالة تحفظياً باستخدام مضادات الهيستامين، وجل مخدر موضعي، وغسول فم مطهر، مع تحقيق شفاء سريري كامل خلال أسبوع واحد.

الاستنتاج: رغم ندرة حدوثها، يمكن أن تُسبب مواد طبعات الألجينات تفاعلات فرط تحسس، وتشير هذه الحالة إلى احتمال وجود ارتباط بين التعرض لمادة الألجينات وحدوث هذه الآفات، إلا أن ذلك يحتاج إلى دراسات واختبارات تشخيصية إضافية للتأكيد.

الكلمات المفتاحية: الحساسية، الألجينات، فرط التحسس، مواد الطبعات السنية، التهاب الفم.

Introduction

The use of dental biomaterials is an essential component of modern restorative and prosthetic dentistry. These materials are continuously exposed to the oral environment, which is a complex biological system characterized by moisture, microbial flora, enzymatic activity, and mechanical stresses. Therefore, any material placed intraorally must demonstrate excellent biocompatibility to avoid adverse local or systemic tissue responses [1].

Despite continuous advances in dental material science, adverse reactions remain a clinical challenge. These reactions may vary from mild localized irritation to severe immunologically mediated hypersensitivity responses affecting the oral mucosa and perioral tissues [2]. The oral mucosa is highly vascularized and immunologically active, making it susceptible to both immediate and delayed allergic reactions [3].

Hypersensitivity reactions are classified according to the Gell and Coombs system into four types. In dentistry, Type IV delayed hypersensitivity reactions are the most frequently encountered and are mediated by T-lymphocyte activation following antigen exposure. These reactions typically develop within 24–72 hours after contact with the offending agent (4). However, Type I immediate hypersensitivity reactions, mediated by

IgE antibodies, may also occur and present rapidly with erythema, edema, pruritus, or systemic manifestations in severe cases [5].

A wide range of dental materials have been implicated in hypersensitivity reactions, including amalgam restorations, nickel-containing alloys, cobalt-chromium frameworks, acrylic resins, and local anesthetics [6]. Among these, prosthodontic materials such as acrylic resins are more commonly associated with documented allergic responses, while impression materials are generally considered highly biocompatible and rarely implicated in hypersensitivity reactions [7].

Alginate (irreversible hydrocolloid) remains one of the most widely used impression materials in dentistry, particularly for preliminary impressions in removable prosthodontics and orthodontics. It is primarily composed of sodium or potassium alginate, calcium sulfate, trisodium phosphate, and diatomaceous earth [8]. Commercial formulations may also include flavoring agents, preservatives, and other additives that improve handling characteristics but may act as potential sensitizing agents in susceptible individuals [9].

Although alginate is generally considered biologically safe, rare hypersensitivity reactions have been reported in the literature. These reactions are believed to be caused not by the alginate base polymer itself, but rather by additives or impurities that act as haptens, binding to host proteins and triggering immune-mediated responses [10]. Once sensitization occurs, re-exposure can result in localized mucosal or perioral inflammatory reactions.

Clinically, allergic reactions to dental materials may present as contact stomatitis, burning sensation, erythema, ulceration, desquamation, or angular cheilitis-like lesions. These manifestations can mimic other conditions such as traumatic ulceration, candidiasis, or chemical burns, making diagnosis challenging without a detailed clinical history and temporal correlation [11].

Given the widespread use of alginate in routine dental practice, even rare adverse reactions are of clinical importance, particularly in academic institutions where repeated exposure occurs. Early recognition of hypersensitivity reactions is essential to prevent progression, ensure patient safety, and guide clinicians toward alternative impression techniques such as elastomeric materials or digital intraoral scanning systems [12].

Therefore, this case report describes a suspected adverse oral and perioral reaction temporally associated with alginate impression material exposure, highlighting the diagnostic challenges involved and emphasizing the importance of careful differential diagnosis and patient monitoring.

Case Report

A 56-year-old female patient presented to the Prosthodontics Clinic at the Educational Advisory Clinics, Faculty of Dentistry, Misurata University, Libya, seeking prosthodontic rehabilitation with a removable mandibular partial denture.

The patient was medically free, with no history of systemic diseases, hospitalization, or known drug, food, or material allergies. She had been partially edentulous for approximately one year and had never previously worn any removable or fixed dental prosthesis. Furthermore, she reported no previous exposure to dental impression materials.

As part of the routine prosthodontic treatment procedure, primary impressions of both the maxillary and mandibular arches were made using an irreversible hydrocolloid

alginate impression material (Hydrogum 5®, Zhermack, Badia Polesine, Italy). According to the manufacturer, the material contains potassium alginate, calcium sulfate, trisodium phosphate, diatomaceous earth, pigments, flavoring agents, and proprietary additives. The impression procedure was completed uneventfully, and the patient was discharged.

Approximately one hour after impression making, the patient contacted the clinic complaining of mild itching and discomfort involving the lips and oral cavity. No clinically visible lesions were noted at that time, and the patient was advised to monitor her symptoms and seek further evaluation if they persisted or worsened.

Two days later, the patient returned to the clinic with a marked progression of symptoms. Extraoral examination revealed erythematous, crusted, and desquamative lesions involving the labial commissures, clinically suggestive of allergic contact cheilitis (Figure 1).

Intraoral examination revealed a localized severe mucosal reaction involving the mandibular lingual vestibule and the floor of the mouth (Figure 2). A prominent, large, shallow ulcerative lesion was observed adjacent to the lingual surfaces of the mandibular anterior teeth. The lesion was covered by a thick yellowish-white fibrinous pseudomembrane and surrounded by a well-defined, intensely erythematous inflammatory halo. The remaining oral mucosa appeared clinically normal.

The patient denied respiratory distress, facial swelling, dysphagia, generalized urticaria, or any other systemic manifestations. Differential diagnoses included traumatic ulceration, chemical irritation, thermal injury, and infectious stomatitis. However, these conditions were considered less likely because of the characteristic clinical presentation and the clear temporal relationship between symptom onset and exposure to the impression material.

Based on the patient's history, clinical findings, and the temporal association between alginate exposure and lesion development, a provisional diagnosis of suspected allergic contact stomatitis and cheilitis temporally associated with alginate impression material exposure was established. No confirmatory allergy testing, including patch testing, skin prick testing, or specialist allergy assessment, was performed.

Clinical photographs were obtained during the patient's visit after obtaining written informed consent. The patient was prescribed an oral antihistamine, topical lidocaine gel, and an antiseptic mouthwash. She was also advised to maintain meticulous oral hygiene and follow a soft diet for at least three days to minimize discomfort and reduce the risk of secondary infection.

A follow-up evaluation was performed one week later, at which time the patient reported complete resolution of symptoms. Clinical healing of both the intraoral and extraoral lesions was achieved within seven days following treatment.

Discussion

Hypersensitivity reactions associated with dental materials remain a clinically relevant concern in contemporary prosthodontic practice, despite significant advances in biomaterial science and improvements in biocompatibility standards. Although such reactions are uncommon, their diagnosis can be challenging due to their ability to mimic a wide range of inflammatory, traumatic, and infectious oral conditions[1].

In this case, both intraoral and extraoral manifestations developed within approximately 24–48 hours following exposure to an irreversible hydrocolloid (alginate) impression material. The clinical presentation observed in this case suggests a possible

hypersensitivity reaction associated with exposure to the impression material. However, the exact immunological mechanism remains uncertain. The patient's initial symptoms appeared approximately one hour after impression making, which is earlier than the typical onset of Type IV delayed hypersensitivity reactions (24–72 hours). Therefore, classification of the reaction as a Type IV hypersensitivity response cannot be confirmed on the basis of clinical findings alone[4].

Alginate impression materials are widely considered among the safest materials used in dentistry, particularly for preliminary impressions in prosthodontic and orthodontic practice, due to their ease of use, acceptable accuracy, and overall biocompatibility [8]. Nevertheless, rare adverse reactions have been reported, indicating that these materials are not completely biologically inert.

The underlying mechanism of hypersensitivity to alginate is not fully understood. It has been suggested that the alginate polymer itself is unlikely to be the primary allergen. Instead, reactions may be triggered by additives such as preservatives, flavoring agents, colorants, or trace contaminants introduced during manufacturing [13]. These substances may act as haptens, binding to host proteins and inducing an immune-mediated inflammatory response in susceptible individuals.

Clinically, the present case demonstrated a localized mucosal reaction involving the mandibular lingual vestibule and floor of the mouth, with a prominent ulcerative lesion covered by a fibrinous pseudomembrane and surrounded by marked erythema. This distribution is consistent with the area of prolonged contact and pooling of impression material during mandibular impression procedures.The presence of associated extraoral angular cheilitis-like lesions may support a contact hypersensitivity-related process rather than a purely mechanical or infectious etiology.

The differential diagnosis included traumatic ulceration, chemical irritation, thermal injury, infectious stomatitis, oral candidiasis, and aphthous ulceration. Traumatic ulceration was considered unlikely because no sharp teeth, defective restorations, or identifiable mechanical injury were present in the affected area. Chemical burn was also considered less likely because no caustic materials other than the impression material had been applied to the oral mucosa. Oral candidiasis was excluded due to the absence of removable white plaques and the rapid resolution of the lesion without antifungal therapy. Aphthous ulceration was considered less probable because of the unusual anatomical location, the associated extraoral lesions, and the close temporal relationship with the dental procedure. Nevertheless, definitive exclusion of all alternative causes remains difficult in the absence of histopathological examination and confirmatory allergy testing.

Although hypersensitivity reactions to alginate are rare, most reported cases are associated with elastomeric impression materials such as polyether and polysulfide rather than alginate [14].

Management in this case was conservative and focused on elimination of the suspected causative agent and symptomatic relief using antihistamines, topical anesthetic agents, and antiseptic mouthwash. The complete resolution of symptoms within one week is consistent with previously reported allergic or hypersensitivity-related reactions following elimination of the suspected causative agent [4].

Limitations

A major limitation of the present case is the absence of confirmatory diagnostic testing. Patch testing, skin prick testing, or referral to an allergy specialist could have

provided additional evidence regarding the causative agent and underlying mechanism. Consequently, the diagnosis should be regarded as provisional and based primarily on clinical findings and temporal association rather than definitive proof of allergy.

Conclusion

Alginate impression materials are generally regarded as safe and biocompatible. This case describes a suspected adverse oral and perioral reaction occurring shortly after alginate impression making. Although a temporal association was observed, a definitive causal relationship could not be established because confirmatory allergy testing was not performed. Clinicians should remain aware of the possibility of uncommon adverse reactions following impression procedures and should consider a broad differential diagnosis when evaluating similar lesions. Further studies and documented cases are required to clarify the nature and prevalence of such reactions.

Figure 1: Extraoral angular cheilitis-like lesions.

Figure 2: Intraoral ulcerative lesion in mandibular lingual vestibule.

Compliance with ethical standards

Ethical approval: Not required for this case report.
Informed consent: Obtained from the patient.

Conflict of interest

The authors declare that they have no conflict of interest.

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Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.