ALLERGIC REACTIONS IN ORAL SURGERY: A REVIEW

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Abstract

Allergic reactions pose significant challenges due to the diverse allergens encountered, including local anesthetics, antibiotics, latex, antiseptics, and suture materials. These immune responses range from mild localized symptoms to severe systemic anaphylaxis, necessitating vigilant recognition and timely management. True allergies to amide local anesthetics are rare, whereas ester types and additives pose higher risks. Latex remains a major cause of immediate hypersensitivity reactions. Delayed hypersensitivity to sutures and antiseptics, such as povidone-iodine, also complicate post-operative care. Accurate diagnosis through clinical evaluation, skin testing, and serum markers is essential to differentiate allergic reactions from other complications. Immediate treatment with epinephrine, antihistamines, and supportive care is critical in severe cases. Enhanced awareness, individualized allergy assessment, and preventive strategies are paramount to improve patient safety and outcomes in oral surgical settings.

Keywords: Oral Surgery, Allergic Reactions, Anaphylaxis, Local Anesthetics, Latex Allergy

Introduction

Allergic reactions in oral surgery present a unique challenge to both clinicians and patients, as they can be triggered by a variety of substances and materials routinely used during procedures. These immune-mediated responses range from mild localized symptoms such as redness or itching to severe systemic reactions, including potentially life-threatening anaphylaxis.[1] Although the incidence of true allergic reactions is relatively low, their unpredictable nature necessitates heightened awareness and preparedness.[2] In the context of oral and maxillofacial surgery, common allergens include local anesthetics, antibiotics, latex, antiseptics, and various dental materials.[3] True allergies to amide-based local anesthetics

(e.g., lidocaine) are exceedingly rare, while ester-based agents (e.g., procaine) are more prone to cause hypersensitivity due to their metabolic byproduct, para-aminobenzoic acid (PABA). Among antibiotics, penicillins and cephalosporins are most frequently implicated in allergic responses. Non-steroidal anti-inflammatory drugs (NSAIDs), particularly in individuals with asthma, may also trigger hypersensitivity.[4] Additionally, latex, commonly found in gloves, syringes, and rubber dams, is a well-known cause of Type I (immediate) allergic reactions. Certain oral surgical interventions such as suture placement, local anesthesia administration, and the use of antiseptics like povidone-iodine can provoke Type I or Type IV hypersensitivity reactions, resulting in clinical manifestations such as persistent mucosal redness, ulceration, or lichenoid lesions.[5] Accurate identification and differentiation of allergic responses from other post-operative complications are critical. However, this can be challenging without appropriate diagnostic tools. There is a growing need for improved diagnostic strategies such as skin patch testing and serum tryptase measurements to enhance early recognition and ensure safe, individualized patient care.[6] This review gives an overview of allergic reactions in Oral and Maxillofacial surgery.

Types of Allergic Reactions in Oral Surgery

Allergic reactions can vary significantly in severity, ranging from mild, self-limiting cutaneous symptoms to severe systemic emergencies requiring immediate intervention. Mild allergic reactions typically present with localized itching, hives, skin rashes, or a tingling or burning sensation in the mouth—sometimes accompanied by a metallic taste. These are generally not associated with respiratory or cardiovascular complications and are usually the result of histamine released by mast cells in response to an allergen.[7] Such reactions require prompt symptomatic management, including assessment of consciousness, monitoring of vital signs, and administration of antihistamines like diphenhydramine through the intramuscular (IM) or intravenous (IV) route for faster relief. Oral diphenhydramine may be prescribed for ongoing symptom control, with clear instructions regarding its sedative effects. Moderate to severe allergic reactions are characterized by more intense symptoms such as angioedema—marked swelling of the lips, tongue, throat, or face—leading to difficulty in breathing or swallowing, wheezing, shortness of breath, dizziness, or even loss of consciousness due to reduced oxygen supply. In the most critical cases, anaphylaxis, a rapid-onset systemic reaction involving multiple organ systems, may occur.[8]

Anaphylaxis is triggered by the cross-linking of antigen-specific IgE on mast cells and basophils, leading to the release of potent inflammatory mediators like histamine, prostaglandins, leukotrienes, and cytokines. These mediators contribute to symptoms including airway obstruction, hypotension, cardiovascular collapse, and, if untreated, death. Anaphylactoid reactions, although not IgE-mediated, can produce similar clinical manifestations. Onset of symptoms generally occurs within 20 minutes of exposure, though this can vary. Common perioperative triggers include neuromuscular blocking agents, antibiotics (notably β-lactam antibiotics such as penicillins and cephalosporins), and latex a well-documented allergen found in gloves and other surgical materials.[9] Rapid intravenous infusion of vancomycin can produce a reaction resembling anaphylaxis known as "red man syndrome," which is non-allergic in origin and must be differentiated from true hypersensitivity. Additionally, delayed

hypersensitivity reactions such as Stevens-Johnson syndrome (SJS) and toxic epidermal necrolysis (TEN) may arise hours to weeks post-exposure to certain drugs, manifesting as fever, mucosal ulceration, fatigue, and widespread skin eruptions. Given the potential severity of these allergic responses, their timely identification and management are crucial. Enhanced vigilance, accurate diagnosis, and preparedness with emergency treatment protocols are essential in reducing morbidity and ensuring patient safety in oral surgical settings.[10]

The management of anaphylaxis begins with the immediate recognition of symptoms and prompt discontinuation of the triggering agent, followed by securing the airway, breathing, and circulation. Intramuscular epinephrine (0.3 mg for adults and 0.15 mg for children) injected into the lateral thigh is the first-line treatment and may be repeated every 5–15 minutes as needed. In severe or refractory cases, intravenous epinephrine, IV fluids (25–50 mL/kg of crystalloids), vasopressors like vasopressin, and advanced airway management may be required. Secondary treatments include antihistamines (diphenhydramine), bronchodilators (albuterol), H2 blockers (famotidine), and corticosteroids (hydrocortisone or methylprednisolone). Patients must be monitored for biphasic reactions, educated about allergen avoidance, prescribed an epinephrine autoinjector, and referred for allergy testing. In cases of agent-specific reactions, such as those from opioids or benzodiazepines, reversal agents like naloxone or flumazenil may be used as appropriate.

Allergy to Local Anesthetics

Although local anesthetics (LAs) are generally safe and well-tolerated, they can occasionally lead to adverse effects. These reactions may be related to the pharmacological properties of the anesthetic itself, overdose or toxic levels, or psychogenic causes such as anxiety or fear. Documented adverse events have been associated with various agents like lidocaine, prilocaine, and mepivacaine, as well as with preservatives and additives such as methylparaben and sodium metabisulfite. Ester-type anesthetics are more frequently associated with hypersensitivity reactions, primarily due to their metabolic byproduct, para-aminobenzoic acid (PABA), which is a known allergen. While allergic responses have been reported for both ester and amide groups of LAs, true immunologic allergies to amide anesthetics (like lidocaine) remain rare.[11] A prospective study investigating local anesthetic-related reactions during dental procedures found that most adverse events—such as syncope and vasovagal episodes—were psychogenic in origin rather than true allergic responses. Syncope, in particular, was the most commonly observed issue.[12] Anaphylaxis following LA administration is extremely rare, with an estimated incidence of approximately 1 in 6000 cases. Distinguishing true anaphylaxis from other causes of cardiovascular collapse is crucial, and confirmation can be aided by measuring serum mast cell tryptase levels. For diagnostic clarity, skin testing is often employed to identify true LA allergies. If the skin test results are inconclusive, a graded challenge test involving incremental subcutaneous doses up to the therapeutic level may be performed. [13]In one study involving 188 patients undergoing this challenge, only two tested positive for an allergic reaction. Although fatalities related to local anesthetics are exceedingly uncommon, three cases have been reported involving combinations such as prilocaine with felypressin, lignocaine alone, and prilocaine with

adrenaline. In each instance, the local anesthetic agent may have contributed to the outcome. Proper management of LA-related adverse reactions includes both emergency treatment and preventive measures. [14]Strategies to reduce risk include minimizing patient anxiety, using aspirating syringes to avoid intravascular injection, and administering the anesthetic slowly and carefully.

Allergic Reactions to Suture Materials

While suture materials are generally considered biocompatible and safe for use in oral surgery, they can occasionally elicit hypersensitivity reactions in susceptible individuals. Polyglactin 910, a commonly used synthetic absorbable suture, has been implicated in rare cases of contact allergy within the oral cavity. One documented case involved a patient who developed notable swelling and pruritus (itching) of the palate following a muco-gingival surgical procedure in which polyglactin 910 sutures were used. The clinical symptoms were persistent and did not respond to conventional post-operative care. However, resolution occurred rapidly after the removal of the suture material, strongly suggesting an allergic etiology .[8,11]

Such cases show the need for vigilant post-operative monitoring, particularly when patients report unusual or prolonged inflammatory responses. Although allergic reactions to suture materials are uncommon, they should be considered in the differential diagnosis of post-surgical complications, especially when symptoms do not align with typical healing trajectories.[14] The pathogenesis of these reactions may involve Type IV (delayed-type) hypersensitivity, mediated by T-lymphocytes in response to chemical additives or degradation products in the suture material. Factors influencing this reaction may include the duration of exposure, the site of implantation, and the patient's prior sensitization to synthetic polymers. In clinical practice, alternative materials—such as silk, polytetrafluoroethylene (PTFE), or other non-reactive monofilament sutures—may be considered for patients with a history of material sensitivities. In suspected cases, patch testing or referral to an allergist may help identify specific allergens and guide future treatment planning.[15]

Allergic Reactions to Antiseptics

Povidone-iodine (PVP-I) is a widely used antiseptic agent in oral and maxillofacial surgery, commonly employed for skin and mucosal disinfection due to its broad-spectrum antimicrobial activity. Despite its efficacy and general safety profile, PVP-I can occasionally induce allergic contact dermatitis, though it is considered a relatively rare sensitizer. Reports have documented cases in which patients developed cutaneous symptoms such as erythema, itching, and blistering approximately 24 hours after the application of PVP-I.[9] These findings suggest the involvement of a Type IV delayed hypersensitivity reaction, mediated by T-cell immune responses. While such reactions are uncommon, they are clinically significant and can complicate post-operative recovery if not promptly recognized and managed. The incidence of PVP-I hypersensitivity appears to be underreported and under-investigated compared to other more commonly recognized allergens in surgical settings, such as latex or antibiotics. This may be due to the subtle presentation of symptoms, misattribution to irritant dermatitis, or lack of routine allergy testing for antiseptics.[12] Given the widespread use of PVP-

I as a pre-operative skin and mucosal antiseptic in oral surgery, especially in patients with repeated surgical exposures, pre-operative screening or inquiry into prior adverse reactions to antiseptics could be beneficial. In high-risk individuals, alternative antiseptics such as chlorhexidine gluconate or alcohol-based solutions may be considered, though these agents also carry their own risk profiles for hypersensitivity. In cases where an allergic reaction to PVP-I is suspected, patch testing can help confirm the diagnosis. Prompt discontinuation of the antiseptic and symptomatic treatment with topical corticosteroids or antihistamines are typically effective in resolving the reaction.[12,13]

Clinical Signs and Management of Anaphylactic and Allergic Reactions in Oral Surgery

Anaphylactic and anaphylactoid reactions can be triggered by a variety of agents medications such as antibiotics, NSAIDs, aspirin, opioids, anesthetics, radiocontrast dyes, protamine, and neuromuscular blocking agents.[15] Latex is a significant concern, especially in at-risk populations like individuals with myelodysplasia, multiple surgeries, healthcare workers, those with atopic conditions, and rubber industry workers. While local anesthetics and substances like nitrous oxide, benzodiazepines, and antihistamines are rarely involved, caution is necessary.[16] Latex-related reactions can range from non-allergic irritant dermatitis and delayed type IV hypersensitivity to severe, IgE-mediated type I reactions. Anaphylaxis typically presents rapidly after IV administration of a triggering agent, affecting skin, mucosa, respiratory, cardiovascular, gastrointestinal, renal, hematologic, and neurologic systems.[17] Symptoms include erythema, angioedema, hypotension, bronchospasm, and even cardiovascular collapse. Clinical severity is graded from mild skin involvement (Grade I) to cardiac arrest (Grade IV). Prompt diagnosis and intervention are essential; management includes discontinuing the trigger, administering IM epinephrine—preferably into the thigh (vastus lateralis)—maintaining airway patency, providing oxygen, and seeking emergency assistance. In severe or refractory cases, IV epinephrine or vasopressin may be used. Adjunct treatments include IV fluids, bronchodilators like albuterol, H1- and H2-blockers, and corticosteroids. Evaluation of suspected local anesthetic allergies requires a detailed history and structured testing protocol.[18] At the University of Cincinnati Medical Center, a multimodal testing program involves intradermal testing with various agents, an IV lidocaine challenge, and subsequent nerve blocks under close monitoring to rule out anxiety, vasovagal reactions, or actual hypersensitivity.[19] Mild reactions are managed by discontinuing the agent and administering antihistamines, while severe cases require epinephrine, airway management, and emergency support. Follow-up includes allergen identification, use of alternative agents, thorough documentation, and interdisciplinary coordination to prevent recurrence.[20]

Conclusion

While allergic reactions are not uncommon, they are often underreported and under-evaluated. The variability in individual responses to materials and substances used in dental procedures necessitates a personalized approach to allergy testing and management. Enhanced awareness and education among dental professionals can significantly improve

patient safety and outcomes. A thorough understanding of allergens, prompt recognition of symptoms, and appropriate management strategies are key to ensuring patient safety.

References

1. Syed M, Chopra R, Sachdev V. Allergic Reactions to Dental Materials-A Systematic Review. J Clin Diagn Res. 2015 Oct;9(10):ZE04-9. doi: 10.7860/JCDR/2015/15640.6589. Epub 2015 Oct 1. PMID: 26557634; PMCID: PMC4625353.
2. Chen AH. Toxicity and allergy to local anaesthesia. J Calif Dent Assoc. 1998;26(9):683–92.
3. Rood JP. Adverse reaction to dental local anaesthetic injection — 'allergy' is not the cause. Br Dent J. 2000;189(7):380–84. doi: 10.1038/sj.bdj.4800776
4. Baluga JC, Casamayou R, Carozzi E, López N, Anale R, Borges R, et al. Allergy to local anaesthetics in dentistry. Myth or reality? Allergo lImmunopathol (Madr) 2002;30(1):14–19. doi: 10.1016/s0301-0546(02)79081-2
5. Sambrook PJ, Smith W, Elijah J, Goss AN. Severe adverse reactions to dental local anaesthetics: systemic reactions. Aust Dent J. 2011;56(2):148–53. doi: 10.1111/j.1834-7819.2011.01316.x.
6. Jevon, P., Shamsi, S. Management of anaphylaxis in the dental practice: an update. *Br Dent J* **229**, 721–728 (2020). https://doi.org/10.1038/s41415-020-2454-1
7. Ho JT, van Riet TC, Afrian Y, Sem KT, Spijker R, de Lange J, Lindeboom JA. Adverse effects following dental local anesthesia: a literature review. J Dent Anesth Pain Med. 2021 Dec;21(6):507-525.
8. Bakr, M. M., Cruden, C. K., Albrani, H., Hannawi, H., George, R., & Khzam, N. (2016). An Unusual Allergic Reaction to Polyglactin 910 Suture Material Following Muco-gingival Surgery. *Journal of Research in Medical and Dental Science*, *4*(4), 31–37. https://doi.org/10.5455/JRMDS.2016447
9. Reyazulla, M. A., Gopinath, A. L., Vaibhav, N., & Raut, R. P. (2014). An unusual complication of late onset allergic contact dermatitis to povidone iodine in oral & maxillofacial surgery - a report of 2 cases. *European Annals of Allergy and Clinical Immunology*, *46*(4), 157–159. https://pubmed.ncbi.nlm.nih.gov/25053635/
10. Biočina-Lukenda, D., & Diz, P. (2006). US3 Allergy in dental practice. *Oral Diseases*, *12*, 3. https://doi.org/10.1111/J.1601-0825.2006.01306_14.X
11. Rosa, A., Fiorillo, L., D'Amico, C., Pujia, A., Heboyan, A., Cervino, G., Ronsivalle, V., & Arcuri, C. (2024). Local anesthetic-induced allergic reactions in dentistry: current perspectives and key considerations. *Vestnik Stomatologii i Čelustno-Licevoj Hirurgii*, 93–102. https://doi.org/10.58240/1829006x-2024.3-93
12. Schroeder, M. J., Kraft, C. T., Janis, J. E., & Kraft, M. T. (2024). Diagnosis and Treatment of Perioperative Allergic Complications: A Practical Review. *Plastic and Reconstructive Surgery. Global Open*, *12*. https://doi.org/10.1097/gox.0000000000005734
13. Goto T. Management of Anaphylaxis in Dental Practice. Anesth Prog. 2023 Summer;70(2):93–105. doi: 10.2344/anpr-70-02-16. Epub 2023 Jun 28. PMCID: PMC10328186.
14. Vassallo SA. Perioperative care of latex-allergic patients. In: Lake ED, editor. Advances in Anesthesia. St. Louis (MO): Mosby-Year Book; 1998. p. 107–31.

15. Reed KL. Basic management of medical emergencies: recognizing a patient's distress. *J Am Dent Assoc*. 2010;141 Suppl 1:20S–24S.
16. Desai SV. Natural rubber latex allergy and dental practice. N Z Dent J. 2007;103:101–7.
17. Mertes PM. Recognition and management of anaphylactic and anaphylactoid reactions during anesthesia. *Anesthesiology News*. 2005.
18. Hepner DL, Castells MC. Anaphylaxis during the perioperative period. Anesth Analg. 2003;97:1381–95.
19. Rosenberg MB, et al. Management of allergy and anaphylaxis during oral surgery. *Oral Maxillofac Surg Clin North Am*. 2013;25(3):401–6.
20. Maher, N., de Looze, J., & Hoffman, G. R. (2014). Anaphylaxis: an update for dental practitioners. *Australian Dental Journal*, *59*(2), 142–148. https://doi.org/10.1111/ADJ.12161