

# Allergy

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An allergic reaction, either during or after any dental procedure, is one of the most serious problems a dentist may encounter.

Drugs and other substances that may evoke allergic reactions are: local anesthetics, antibiotics, analgesics, anxiolytic drugs, as well as various other dental materials or products.

Drugs are the most common cause of urticarial reaction in adults, and food and infection are the most common causes of these lesions in children. Urticaria occurs in 15% to 20% of young adults. In approximately 70% of patients with chronic urticaria, no etiologic agent can be identified. About 5% to 10% of individuals who are given penicillin develop an allergic reaction.

## **Etiology**

Allergic diseases result from an immunologic reaction to a noninfectious foreign substance (antigen). These reactions involve the humoral, cellular, and nonspecific mechanisms.

Table 1: Gell and Coomb's allergy classification

<i>Class</i>	<i>Mechanism</i>
I (immediate)	IgE-mediated release of autacoids
II (cytotoxic)	IgG-mediated antigen-antibody complex triggers complement-induced lysis
III (immune complex)	Antigen-antibody complexes deposited in tissues
IV (delayed)	T cell-mediated cytokine release

\* IgE indicates immunoglobulin E; IgG, immunoglobulin G.

### **Box 1: Type I Hypersensitivity**

- 1.** Immunoglobulin (Ig)E antibody mediated
- 2.** Immediate response
- 3.** Usual allergens (antigens)
  1. Dust
  2. Mites
  3. Pollens
  4. Food
  5. Drugs (haptens)
- 4.** Manifestations:
  - a.** Anaphylaxis
  - b.** Hay fever
  - c.** Asthma
  - d.** Urticaria, angioedema
  - e.** Symptoms on occasion
- 5.** Frequency: Affects about 10% of the population

## **MEDICAL MANAGEMENT**

Patients with atopy may be given injections to gradually desensitize them so that they are no longer allergic to the antigen. Patients with asthma (immune complex injury, or cytotoxic immune reactions) may be treated with systemic steroids, whereas those with hay fever or urticaria are treated with antihistamines

From a dental standpoint, the patient who is being treated for allergies has an increased chance of being allergic to another substance; in addition, if this individual is taking steroids, his or her reaction to stress may be impaired. Further, if the patient should receive an organ transplant, he or she may be susceptible to infection.

## **DENTAL MANAGEMENT**

### *Medical Considerations*

The dentist is often confronted with problems related to allergy. One of the most common concerns is the patient who reports an allergy to a local anesthetic, antibiotic, or analgesic. Taking comprehensive history is important so:

- If the adverse reaction was of an allergic nature, one or more of the classic signs or symptoms of allergy should have been present ( **Box 2** ).
- If these signs or symptoms were not reported, the patient probably did not experience a true allergic reaction. Common examples of mislabeled allergy include syncope after injection of a local anesthetic and nausea or vomiting after ingestion of codeine.

### **Box 2: Signs and Symptoms Suggestive of an Allergic Reaction**

- Urticaria
- Swelling
- Skin rash
- Chest tightness
- Dyspnea, shortness of breath
- Rhinorrhea
- Conjunctivitis

### **Local Anesthetics**

The reaction most often associated with local anesthetics is a toxic reaction, which usually results from inadvertent intravenous injection of the anesthetic solution or overdose. Other adverse effects to local anesthesia:

- Anxiety: involves the anxious patient who, because of concern about receiving a “shot,” stimulation of either vagus nerve( Vasovagal syncope (bradycardia, pallor, sweating) or Sympathetic stimulation (anxiety, tremor, tachycardia, hypertension)
- Allergic reaction

If the patient's history supports a toxic or vasoconstrictor reaction, the dentist should explain the nature of the previous reaction and avoid injecting the local anesthetic solution intravenously by aspirating before the injection and limiting the amount of solution to the recommended dose.

If the patient's history supports an interpretation of fainting and not a toxic or allergic reaction, the dentist's primary task will be to work with the patient to reduce anxiety during dental visits.

If the history supports a true allergic reaction to a local anesthetic, the dentist should try to identify the type of local anesthetic that was used and change to another new one. If this fails, the following two options are available:

1. An antihistamine (diphenhydramine [Benadryl]) can be used as the local anesthetic
2. The patient may be referred to an allergist for provocative dose testing (PDT)

A 1% solution of diphenhydramine that contains 1 : 100,000 epinephrine can be easily compounded by a pharmacist, but it must be confirmed that methylparaben is not used as a preservative. This solution induces anesthesia of about 30 minutes average duration and can be used for infiltration or block injection. When it is used for a mandibular block, 1 to 4 mL of solution is needed. Some patients have reported a burning sensation, swelling, or erythema after a mandibular block with 1% diphenhydramine, but these effects were not serious and cleared within 1 or 2 days.

### **Penicillin**

The antibiotic that interests the dentist most (as far as allergy is concerned) is penicillin, because it is considered the antibiotic of choice in most cases of dental procedure. The frequency of allergic reactions due to use of penicillin ranges from 2% to 10% and reactions manifest as mild, severe, or even fatal.

Reactions to penicillin are preventable by mere avoidance of the beta-lactam antibiotic like ampicillin, methicillin. Cephalosporins cross-react in 5% to 10% of penicillin-sensitive patients.

#### **Procedures for Prevention of a Penicillin Reaction**

1. Have emergency kit for treatment.
2. Take medical history on all patients, including the following:
  - a. Previous contact with penicillin
  - b. Reactions to penicillin
  - c. Allergic reactions to other agents
3. Do not use penicillin in patient with a history of reactions to drugs.
4. Tell patient when you are going to give penicillin.
5. Do not use penicillin in topical preparations.
6. Do not use penicillinase-resistant penicillins unless infection is caused by penicillinaseproducing staphylococci.
7. Use oral penicillin whenever possible.
8. Use disposable syringes for injection of penicillin.
9. Have patient wait in office for 30 minutes after first dose of penicillin is given.
10. Inform patient about signs and symptoms of allergic reaction to penicillin, and if these occur, to seek immediate medical assistance.

### **Oral Complications and Manifestations**

*1- Type I hypersensitivity: Oral lesions* can be produced by type I hypersensitivity reactions. An atopic reaction to various foods, drugs, or anesthetic agents may occur within or around the oral cavity and is usually characterized by urticarial swelling or angioneurotic edema.

- a. Reaction occurs soon after contact with antigen
- b. Reaction consists of painless swelling

- c. Itching and burning may occur
- d. Lesion may remain for 1 to 3 days

#### Treatment

- a. Reaction not involving tongue, pharynx, or larynx and with no respiratory distress noted requires 50 mg of diphenhydramine 4 times a day until swelling diminishes
- b. Reaction involving tongue, pharynx, or larynx with respiratory distress noted requires the following to prevent death from respiratory failure:
  - (1) 0.5 mL of 1 : 1000 epinephrine, IM or SC
  - (2) Oxygen
  - (3) Once immediate danger is over, 50 mg of diphenhydramine should be given 4 times a day until swelling diminishes

2- ***Type III Hypersensitivity Reactions:*** Usually occur within 24 hours after contact with antigen. Consist of

- a. Erythema
- b. Rash
- c. Ulceration

Treatment requires

- a. Topical steroids plus syrup of diphenhydramine
- b. Systemic steroids (in severe cases)
- c. Identification of antigen
- d. Avoidance of any further contact with antigen

3- ***Type IV hypersensitivity:*** Contact stomatitis is a delayed allergic reaction that is associated with the cellular immune response in most cases. Because of the delayed nature of the reaction after contact is made with the allergen in cases of contact stomatitis, the dentist must inquire about contacts with materials that may have occurred 2 to 3 days before the lesions appeared. Treatment consist of removal of antigen from further contact with the patient; however, if the tissue reaction is severe or persistent, topical corticosteroids should be used

#### 4- ***Lichenoid Drug Eruptions.***

Some patients with skin and/or oral lesions identical to those of lichen planus will be found to have taken certain drugs before the onset of their lesions. If these drugs are withdrawn, the lesions clear within several days (in most patients) or within a few weeks.

## **MANAGEMENT OF SEVERE TYPE I HYPERSENSITIVITY REACTIONS**

Even when the dentist has taken appropriate precautions, an allergic reaction may occur. Most of these are mild and of a nonemergency nature; however, some may be severe and life threatening (anaphylactic). The dentist must be ready to deal with either type. In handling the anaphylactic reaction, the dentist should remember that it has an allergic origin. In other words, the reaction should occur soon after (i.e., minutes) the injection, ingestion, or application of a topical anesthetic, medication, drug, local anesthetic, or dental product. The dentist must take the following actions immediately:

- a. Place the patient in a head-down or supine position.
- b. Make certain that the airway is patent.
- c. Administer oxygen.
- d. Be prepared to send for help and to support respiration and circulation. The rate and depth of respiration should be noted, as should the patient's other vital signs. Most reactions in dental patients consist of simple fainting, which can be well managed by the preceding actions. In addition, the dentist may administer aromatic spirits of ammonia through inhalation, which encourages breathing through reflex stimulation.
- e. If these initial steps have not solved the emergency problem, and the problem is of an allergic cause, the dentist is faced with an edematous-type or an anaphylactic reaction

**1- Angioneurotic Edema: discussed previously**

**2- Anaphylaxis: is a serious allergic reaction that is rapid in onset and may cause death. In contrast to a severe edematous reaction, in which respiratory distress occurs first, both respiratory and circulatory depression occur early in the anaphylactic reaction.**

#### **Signs and Symptoms of Anaphylaxis:**

- Itching of soft palate
- Nausea, vomiting
- Substernal pressure
- Shortness of breath
- Hypotension
- Pruritus
- Urticaria
- Laryngeal edema
- Bronchospasm
- Cardiac arrhythmias

#### **Management of anaphylaxis**

1. Call for medical help.
2. Place patient in the supine position.
3. Check for open airway.
4. Administer oxygen.
5. Check pulse, blood pressure, and respiration.
  - a. If depressed or absent, inject 0.3 to 0.5 mL 1 : 1000 epinephrine IM into the tongue.
  - b. Provide cardiopulmonary resuscitation if needed.
  - c. Repeat injection of 0.5 mL 1 : 1000 epinephrine if no response.