

ALLERGIC MANIFESTATION IN OUTPATIENT ORAL SURGERY – IMPLICATIONS OF LOCAL ANESTHETICS

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Abstract

Nowadays the allergic accidents to the local anesthetics are exceptional and rare. The additional agents can be a source of allergy. Also the individual factors can favourise the onset of the allergic reactions. The quest of a patient with history of allergic reactions will be included in the medical record. The diagnostic of allergy must be confirmed by using allergy tests, by the selection of a proper and non-allergenic anesthetic, and by ensuring the optimal operatory comfort both for the patient and the dental practitioner. Despite the low frequency of the allergic accidents in the oral surgery (0,96 % minor allergic reactions, 0,032 % severe allergic reactions), they must be considered due to the potential risk for the patient's vital prognostic. The allergy tests (Prick test, IDR, provoking tests) are requested to remove the contraindicated materials with high risk for the initiation of the allergic reactions.

Key words: local anesthetics, allergic reactions, hypersensitivity, anaphylactic shock, allergy tests

The allergy is an abnormal and excessive reaction of the organism when in contact with a foreign substance (antigen). If this antigen provokes an allergic reaction, it is named allergen. A harmless antigen in normal conditions (for example, pollen) can be dangerous for allergic people, triggering a

hypersensitivity reaction. In the oral cavity are present all the specific and nonspecific cells that trigger allergic reactions: lymphocytes B and T, eosinophils, basophils, cells Langerhans, keratinocytes (Arshad S., Holgate S.T., Adkinson F.N., 2005).

The allergy is classified by WHO as fourth

disease worldwide after cancer, cardiovascular diseases, and SIDA. The main cause of allergies are as follows: exterior environment, nutritional habits, animals and cleaning products. According to WHO estimations, in 2050, 50% of world population will be affected by allergy.

The statistic data highlight a disturbing increase of the drugs allergies worldwide, both in general medical practice and in dental practice. This increased frequency of drugs allergic accidents is linked by high number of prescribed drugs, superficial indications, late recognition of the iatrogenic effects as well as the increase of the organism sensitisation" (**Voroneanu M., Bucur A., 2007**)

"Allergy" means a changed reaction of the organism to the foreign agents (protective or harmful). „Anaphylaxis" is a hyperreaction that „overpass the protective needs of the organism". Anaphylaxis is an immediate reaction with immediate and fast onset, unpredictable, that evolve to shock. Both allergic reactions and anaphylaxis reactions represent the response of the organism to contact with substances like complex proteins and drugs.

In their activity, the dentists manipulate a high number of allergens. The organism reacts with vasomotor reactions, vascular

hyperpermeability, diffuse or circumscribed oedema, hyperactivity of the mucosal glands, pulmonary vasoconstriction associated with acute respiratory insufficiency and asthmatic dyspnea. The acute vasodilatation and vascular hyperpermeability evolve to hypotension and hypovolaemia. The allergic reactions are associated with skin eruptions, rash, and acute angiooedema at the level of face, lips, tongue, and buccal floor. The allergic reactions can conduct to signs of cerebral distress (agitation, anxiety, dizziness, vertigo, conscience loss) due to an insufficient oxygen supply.

The dental practitioner must diagnose the potential of a patient to develop an allergy by investigating the next aspects:

- triggering conditions of previous allergies;
- drug allergy history;
- history of surgical interventions;
- chronology of the clinical signs;
- initial aspects of the cutaneous lesions (ulcerations, inflammations, pain, itching);
- number of allergic episodes;
- profession (manipulated products, protection techniques).

The collaboration with an allergist is important to detect the allergen and to perform allergy tests. Considering the frequency of the allergenic reactions it is important that dentists to identify high risk

patients. A detailed anamnesis is the first stage to identify this category of patients, followed by the ability of the dentists to recognise the signs and symptoms of the local manifestations of the hypersensitivity reactions. It is important to know that materials and drugs used in the dental surgery can be the source of these allergic reactions (**Austen FK., 2006**)

The first local anesthetic was cocaine used first time in 1880 for its effects of blocking nervous impulses in axons. The adverse effects were vasoconstriction and heart stimulation. The cocaine was followed by Procaine and, in 1948, by Lidocaine, the most used local anesthetic in dentistry. However literature data report an increasing number of cases with allergies to local anesthetics and their compounds (**Bucur A, Cioacă R., 2004**) Gell&Coombs describe 4 types of immunological hypersensitivity:

- Hipersensitivity type I : anaphylactic (mediated by IgE)
- Hipersensitivity type II : cytotoxic (mediated by IgG and IgM)
- Hipersensitivity type III: soluble immune complexes (mediated by immune complexes antigen-antibody IgG)
- Hipersensitivity type IV: late, mediated by lymphocytes type T.

In the dental medicine the most frequently allergic reactions are hypersensitivity type I with onset after a few seconds/minutes after the contact with an allergen. This type of reactions are encountered often as reactions to the compounds from the local anesthetics. The allergic reactions type IV are rarely seen after a few days from the contact with allergen, in the local anesthesia reactions (**Cojocaru M., 2007**)

★Symptoms

The contact with allergen provokes local or systemic inflammatory reactions to organisms sensitised previously. The organs targeted by local or systemic inflammatory reactions are skin, mucous tissues, respiratory system and digestive system. The symptoms can be local or systemic, by variable intensity and severity, sometimes even leading to death. The systemic reactions appear when the allergenic agents are introduced directly in the blood circulation (by injections, perfusions, transfusions). (**Pawankar R., Holgate T., 2010**)

Local symptoms

- cutaneous : pruritus, cutaneous rash, erythema, angiooedema
- oculare : pruritus, eyelid tumefaction, lacrimation

-ORL : nose obstruction, rhinorrhoea, hoarseness, cough, ear pain

-pulmonary : respiratory disorders, cough, wheezing, dyspnea

-digestiv : nausea, diarrhea, abdominal pains.

General symptoms

-alteration of the systemic status: headache, fever, vertigo

-cardio-vascular symptoms: hypotension, syncope, bradycardia, cardiopulmonary arrest.

Clinical manifestations

► immediate allergic reactions

Rash

The oral mucosa rash is rarely seen, representing a symptom associated with an allergic reaction. The rash is caused by the releasing of mediators (histamine, cytokines) in IgE dependent allergy. The histamine will induce the vasodilatation of capillaries from the superficial dermis and will increase the vascular permeability inducing an oedema.

The clinical signs are multiple cutaneous eruptions with a diameter between a few millimeters and centimeters, associated with burning sensation. The rash can be the first sign of an anaphylactic shock or an angiooedema. When is observed the rash, it is contraindicated the administration of aspirine or AINS drugs.

Asthma crisis

The bronchospasm is caused by the obstruction of the respiratory ways. The clinical signs are as follows:

- respiratory difficulties;
- superficial respiration;
- paroxistic dyspnea;
- wheezing;
- tachypnea;
- cyanosis;
- anxiety.

Quincke oedema

Quincke oedema is an emergency in the dental cabinet. It can be chronic or acute. The clinical signs are as follows:

- face oedema;
- larynx dyspnea with inspiratory bradypnoea.

Anaphylactic shock

The anaphylactic shock is a rare severe reaction recognised by sudden hypotension and bronchospasm leading to cardiovascular collapse. It is caused by sudden increase of histamine and other allergenic mediators.

Simptomatology:

- cutaneous rash to the level of face and teguments; sometimes it can be associated with rash plaques or diffuse erythema and angio-oedema;

- difficulties in deglutition or respiration and voice change;
- digestive signs: abdominal pain, puke, diarrhea;
- cardiovascular signs: cianosis, pallor, arrhythmia, hypotension, heart arrest;
- respiratory signs: rhinitis, larynx oedema, cough, bronchospasm, apnoea;
- neurological signs: convulsions, confusions;
- general shock with sudden hypotension, collapse, death.

► **Late allergic reactions contact stomatitis**

The clinical signs of contact stomatitis are as follows: erythema and oedema indicating mucosa inflammation. It can be diffuse or localised (gingivitis, glossitis, cheilitis), in relation with the causal factor.

Contact allergic cheilitis

The contact allergic cheilitis is initiated with an erythema and oedema of the lips, followed by the apparition of vesicles that are transformed in scabs.

Even if the allergy to a local anesthetic in dental medicine is rarely seen, a complication is always possible. When accidents happen, these put in danger the vital prognostic. Some patients have a form of allergy to the local anesthetics, but the

true severe allergy is rarely seen, less than 1% from the secondary effects of the local anesthetics. In some cases the severe allergy is caused by antioxidants or preservation agents from the local anesthetics (Voroneanu M., Bucur A., 2007)

The possible allergenic compounds of the local anesthetics.

The local anesthetic is composed by an anesthetic agent and additional agents. The anesthetic molecule is an « amino-ester » (procaine, benzocaine, tetracaine) or an « amino-amid ». All amino-esters are metabolised in para-aminobenzoic acid (PABA) that is responsible for the most of the allergic reactions. (PABA). Despite the elimination of the molecules that are metabolised in PABA, an amino-ester, Benzocaine, is still included in the local anesthetics with topic application. The local anesthetics based on amino-amids (Mepivacaine, Articaine, Lidocaine, Prilocaine) are associated with significantly less allergic reactions.

Sulphites.

The sulphites are preservation agents of pressors included in an anesthetic solution. The local anesthetics without pressors (mepivacaine 3%, prilocaine 4%) do not

include sulphites and thus the risk for allergic reactions is significantly reduced.

The allergic reactions are encountered in 2% of general population, 4-10% in asthmatic people and can reach 20-40% of the patients that do not tolerate aspirine (**Radford A., 2007**)

EDTA. Etilen Diamin Tetra Acetat is a preservation agent of sulphites, preventing the oxydation of sulphites and hard metal ions. EDTA is only included in the local anesthetics which contain hard metal ions.

The non-allergic effects of the local anesthetics are frequent and are related to the pharmacologic and toxic effects. The non-allergic effects are as follows:

- neurologic reactions (vaso-vagal sincope: pallor, bradycardia, fainting spell);
- hyperventilation syndrome (sick feeling, raise of body temperature, face erythema);
- toxic accidents by reactions to the local anesthetic (tongue, lips paraesthesia, vertigo);
- reactions due to adrenaline (hyperactivity, pallor).

In the dental surgery and in general dentistry, the dental practitioner, the assistant and the patient are confronted with frequent allergy and intolerance phenomenons. The diversification of the

allergenic products lead to the increase of the allergy reactions prevalence. The latex is one of the most documented material responsible by cutaneous and respiratory local allergic reactions (2,6%-16,9%). Other materials are the metals, impression materials, disinfectants and local anesthetics. The local allergic reactions are associated to mucous erythema, cutaneous rash, but can lead to severe forms (Quincke oedema, anaphylactic shock, unexplained implants failures).

The allergy tests are requested to remove the contraindicated materials with high risk for the initiation of the allergic reactions. The most used allergy tests are Prick test and IDR. In case of negative result, it can be used a provoking test with injections 0,5-1 ml of local anesthetic solution without adrenaline. The test is negative if is not recorded any anaphylactic reaction for the next 30 minutes after injection.

Prick Test: cutaneous test that allow the exploration of the immediate hypersensitivity reactions by applying the alllergenic solution on a cutaneous leak. The test is positive if it is observed after 20 minutes a cutaneous erythema.

Epicutaneous tests : These tests are performed for patients with contact rash.

The tested substance is applied on the skin and maintained for 48 hours with a bandage.

The allergic reaction can appear in 2-3 days and the reactions are evaluated by using ICDRG criteria (International Contact Dermatitis Research Group).

Provoking tests: The provoking tests with allergen reexposure allow to obtain a certainty diagnostic; these tests can be made only in hospital (exposure to severe allergy reactions).

The generalised severe allergic reaction is rare but when detected it is considered an emergency. The dental team must be prepared to treat these emergency situations with the requested materials and drugs. The anaphylactic reaction is evolving in 4 stages, from cutaneous and mucosal reactions (pruritus, rash) and respiratory disorders (bronchospasm, asthma) to anaphylactic shock or even cardio-respiratory arrest.

The first interventions must be the removal of the allergenic agent, call for emergency medical help, and the initiation of the emergency procedures by dentist and his team:

- patient positioning in a proper position (laid out dental chair);

- ✿ Nowadays the allergic accidents to the local anesthetics are exceptional and rare.

- maintaining the opening of the respiratory ways;

- oxygen supply;

- drugs administration in the next order: antihistamine drugs, cortisone, fenoterol, adrenaline.

Oxygen: indicated in all emergencies, in a dose of 6 – 10 l/min;

Epinephrine : election drug for the emergency treatment of the allergic reactions or in asthma crisis. Epinephrine act on short term (5 -10 minutes following intravenous administration); if the allergic reaction is not eliminated, epinephrine will be administered again.

Intravenous antihistamines : drugs indicated in the treatment of severe allergic reactions. The most used antihistamines are difenidramine (25 - 50mg) and clorfeniramine (10 – 20mg) given for the management of the allergic reaction or to reduce the potential to develop allergic reactions to the patients with previous allergic reactions (**Voroneanu M., Bucur A., 2007**)

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