

DENTAL MANAGEMENT OF PATIENTS WITH ALLERGIC MANIFESTATIONS

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Abstract: In the dental office, allergic manifestations can take all forms of immune reactions and are the result of human response to contact with antigens, which are represented by a diverse group of substances, medicine occupying a conspicuous role among them. In the therapeutic arsenal of the physician, there are a number of medicinal substances and materials that may be responsible for triggering allergic reactions: antibiotics, anesthetics, analgesics, iodine substances, acrylic or other synthetic materials etc. On the other hand, the dentist is often faced with oral manifestations of immunological disorders, which may require specific therapeutic conduct and may often become a victim of allergic reactions himself to the different substances he handles. The most frequently encountered type allergic reactions are: skin rash, itching, bronchospasm and less often anaphylactic shock, the most dramatic allergic phenomena encountered in the practice of dentistry.(3) Their incidence is difficult to assess due to their transient nature, without alarming or repetitive symptoms.

Cuvinte cheie: manifestări alergice, management, pacient

Rezumat: În cabinetul dentar, manifestările alergice pot îmbrăca toate formele de reacții imune și ele sunt rezultatul răspunsului uman la contactul acestuia cu antigenele, care sunt reprezentate de o grupă variată de substanțe, medicamentele ocupând un rol fruntaș. În arsenalul terapeutic al medicului, există o serie de substanțe medicamentoase și materiale care pot fi responsabile de declanșarea unor reacții alergice: antibiotice, anestezice, analgezice, substanțe iodate, rășini acrilice sau alte materiale sintetice etc. Pe de altă parte, medicul dentist este adesea pus în fața unor manifestări orale ale unor afecțiuni imunologice, care pot impune o conduită terapeutică specifică și adesea, poate deveni el însuși victima unor reacții alergice la diferite substanțe, materiale, pe care le vehiculează. Cel mai frecvent se întâlnește reacții alergice gen: eritemul cutanat, pruritul, bronhospasmul și mult mai rar șocul anafilactic, cel mai dramatic fenomen alergic întâlnit în practica medicală stomatologică.(3) Incidența acestora este destul de greu de apreciat datorită naturii lor pasagere, fără simptomatologie alarmantă, nerepetitive.

The immune system is defined as an information system for integrating antigenic type information, which is a defining element of the immune system, actually representing the relation between cell receptor and the immune ligand (antigen). The term "immunity" comes from Latin: *imunus* means "dropped (released)" of "disease" (cited by 1).

At the end of the eighteenth century and throughout the nineteenth century, immunity was considered a form by which the body defends against infectious diseases, but the beginnings in the field may be considered much earlier starting with the year 1798, when smallpox vaccination was proposed by Jenner.

The most important assessments occurred during the nineteenth century, when concepts such as phagocytosis, antibody allergy, appeared. The early twentieth century gave rise to the notion of antigen (Ag) as a foreign substance that has an effect on the production of antibodies and the idea that, by the action they have, the body may suffer other affections. The notion of specificity appears and research begins on the mechanisms underlying diseases.(1)

Research has led over time to the emergence of the concept of the immune system (IS), and the last 10 years have witnessed an explosion of information and of new understandings regarding the immunological phenomena and also the appliance of this notion of informational integration to the static concepts (Perețianu 1994 quote 1).

After the 2003 definition of J.D. Diaconu et al. (2) "the immune system is represented by the ensemble of biological mechanisms that provide the integrity and the protection of cells and tissues of the human body (self), by removing nonself structures (infectious agents, toxins, chemicals with which it comes into contact neoplastic cells, allograft, etc.)". In order to achieve this goal, the human body has developed two main components, namely:

- Non-specific immunity, innate or natural;
- Specific immunity, adaptive or acquired, which is characterized by immunological memory.

These components of immunity are based on:

- Cells (cell mediated immunity);
- Molecules which are soluble in biological liquids (humoral immunity).

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Antigens are complex molecular structures recognized as foreign (non-self) by immunocompetent cells; they can induce a specific immune response. Antigen receptors are found mainly in B and T lymphocytes and antigens may also be proteins, polysaccharides, nucleic acids, etc. Allergens can be exogenous (food allergens, medicine, inhalants, chemical contact, bio-allergens and endogenous), which includes some physiological products (estrogen, progesterone, testosterone), and autoantigens arising as a result of infectious factors, chemical or physical on its own tissues.(2)

Antibodies, the specific immunity molecules are (2):

- Immunoglobulins: immunoglobulin G (IgG), M (IgM), A (IgA), D (IgD), E (IgE);
- Cells involved in the immune response: B lymphocytes, T cells, NK;
- the complement, consisting of more than 34 soluble and membrane protein (receptors and regulatory proteins).

The immune response is:

- cellular, the most important role have the T lymphocytes;
- humoral immune response:
 - a) primary, which occurs after a short latency period after the first contact with the allergen and is characterized by an increase in titer immunoglobulin M in the serum, which reaches a maximum in 5-6 days and whose decline starts after about 10 days;
 - b) secondary, which occurs after subsequent contacts with the antigen and is characterized by a high secretion of antibodies.

In dentistry in the therapeutic arsenal of the doctor there are a number of medicinal substances and materials that may be responsible for triggering allergic reactions: antibiotics, anesthetics, analgesics, iodine, acrylic or other synthetic materials etc.(3) On the other hand, the dentist is often faced with oral manifestations of immunological disorders, which may require specific therapeutic conduct and may often himself become a victim of allergic reactions to different substances, he uses.

The diseases of the immune system of the connective tissue and joints are(4, 5, 6):

§ Diseases of the immune system:

- primitive immune deficits;
- HIV infection (human immunodeficiency virus): AIDS and its associated manifestations;
- amyloidosis;

§ Diseases with immunological mechanism:

- diseases with immediate hypersensitivity;
- immunologically mediated cutaneous diseases;
- rheumatoid polyarthritis;
- systemic lupus erythematosus;
- systemic scleroderma;
- dermatomyositis and polymyositis;
- Sjögren syndrome;
- Behcet disease etc.

§ Joint disorders, comprising a series of joint and musculoskeletal diseases.

Specific allergic manifestations of dentistry

The disorders with immediate hypersensitivity mechanisms are the result of the release of mediators from basophils and previously sensitized mast cells by contact with a

specific antigen (allergen), IgE dependent. These disorders include: anaphylaxis, allergic rhinitis, urticaria, asthma and eczematous dermatitis (atopic). Atopy defines a family predisposition to such diseases, either singly or in combination.(2,3,4,5)

In the dental office, allergic manifestations can take all forms of immune reactions and are the result of human responses to contact with antigens, which are represented by a diverse group of substances, medicine occupying a conspicuous role.

The most frequently encountered type allergic reactions are: skin rash, itching, bronchospasm and the less often anaphylactic shock, the most dramatic allergic phenomena encountered in medical practice.(3) Their incidence is quite difficult to assess due to their transient nature, non-repeating, without alarming symptoms. A classification of allergic reactions in dentistry was made in 2003 by Țovaru S. et al.(7) and is as follows:

1. General reactions with oral manifestations:

- Anaphylactic allergic reactions: angioedema, anaphylactic systemic stomatitis, contact stomatitis (atopic), orofacial granulomatosis;

- Fixed medicinal erythema:

- type II allergic reactions (purpura, bleeding);
- Multiform erythema;
- acute ulcerative eruptions;
- Leukocytoclastic vasculitis - type III

response;

- Lichen plan medication.

2. Contact allergic reactions:

- contact stomatitis;
- Lichenoid / keratoses contact reactions.

After Diaconu J. et al. (2) hypersensitivity reactions may be:

- ✓ Type I reaction or immediate hypersensitivity or anaphylactic which causes vasodilation (e.g. urticaria), hypersecretion, bronchoconstriction (asthma), sneezing runny nose (allergic rhinitis) etc.

Allergens can be:

§ pneumoallergens or aero-allergens (house dust, pollen, mold, appendages from animals etc);

§ food allergens (cow milk, eggs, peanuts, pork, fish, etc.).

§ bio-allergens or microbial, fungal, parasitic allergens;

§ allergenic medicine, penicillin, sulfonamides, procaine, aspirin, other NSAIDs etc.;

§ contact allergens: metals, dinitrochlorbenzene, cement, dyes, detergents, cosmetics, some of which are involved in delayed hypersensitivity mechanisms.

✓ Type II hypersensitivity reaction that occurs while the antigen is fixed on the surface of cells in the body;

✓ Type III hypersensitivity reaction by immune complexes;

✓ Type IV hypersensitivity reactions with a delayed latency period of 24-48 hours after contact with the allergen, with occurrence of some cytotoxic type manifestations (viral

infections, dermatosis, autoimmune, allergic contact dermatitis, etc.).(2)

Allergies can create a number of problems, even in the case of ordinary dental treatment, therefore, the dentist should, before instituting a type of treatment, identify patients with a history of allergic reactions, recognize oral manifestations caused by allergic reactions, identify patients with altered immune background and identify the symptoms of an acute exacerbation of allergy and immediately and effectively intervene.(3,8)

Substances capable of causing allergic reactions, which are of interest to the dentist are multiple, they can trigger a mild or moderate hyperallergic state, with one of the following reactions:

- immediate, type I (minutes);
- Late, delayed, type IV (24h – 2 months).

The commonly know terms are:

- Allergy;
- Anaphylaxis – which is a type of hyperallergic reaction which has one of the following responses:
 - immediate
 - quick
 - unpredictable
 - violent

} rapidly evolving to shock

Antigens are represented by many drugs present in the dental office:(3,4,6,9,10)

- Local anesthetics by preserved constituents of the anesthetic solution and of the adrenaline solution;
- Medicinal substances with iodine (iodoform), zinc chloride;
- Some of the restorative materials (amalgam, adhesive, and semi-noble alloys, acrylic, etc.);
- Antibiotics, most of which are sensitizing penicillin, streptomycin cyclins etc.;
- Analgesics : - Algocalmin;
 - Acetylsalicylic acid (aspirin);
- Sedatives;
- Bandages, plasters and such reactions may occur to physicians due to latex gloves;
- Dyes such as those in toothpaste, lipstick, mouth washes;
- Antiseptics

Their entrance in the body may be by:

- Inhalation;
- Contact;
- Digestive system;
- Parenteral (injection), which is ne most important way, due to the rapid spreading of the substance

The clinical picture varies by severity and allergenic substances.

Delayed hypersensitivity. It is a cell-mediated response. It begins with localized itching at the contact area and begins after the passing of several hours after contact. It evolves in a slow manner in 24 – 48 hours until swelling, erythema, pruritus, and vesiculation occurs. This type of delayed hypersensitivity is common to the dentist, as a reaction to the contact with used accelerators in the production of latex gloves, nitrile, neoprene or other chemicals such as methacrylates, glutaraldehyde, phenols, dithiocarbamates, peroxides, organic pigments.(8)

Treatment of this type of allergic reaction consists in removing the irritating stimulus and applying steroid preparations if the cases are severe.(8)

Immediate hypersensitivity, urticaria, angioedema (anaphylactic shock). This is a severe allergic reaction caused by exo- or endogenous allergens of which urticaria and angioedema are part.

Urticaria, the allergic reaction of the mucocutaneous is the most frequent. It involves superficial dermis and takes the form of transient erythematous-oedematous papules and plaques. These appear suddenly and are intensely itchy, have varying sizes, their color is white or porcelain pink, their margins are active, raised, well defined, with a paler center, located anywhere on the skin or mucous membranes, asymmetric, isolated or scattered and more serious forms may be accompanied by a stinging or burning sensation. Lesions are fugitive, transient and disappear within minutes or hours, but may occur in successive spikes, which take days, sometimes even months or years. It can sometimes be associated with headache, fever, nausea, vomiting, dizziness, digestive disorders, hypertension etc.(2)

Treatment consists in the identification and removal of precipitating factors and of those that emphasize symptoms and the administration of antihistamines after which the patient is referred to a specialist service

Angioedema (anaphylactic shock).

A different manifestation, is angioedema (anaphylactic shock). It is a particular form of more severe urticaria, characterized by a diffuse and more pronounced edema, affecting the deeper layers of the skin to the subcutaneous and submucosal tissue. The reaction occurs immediately after the injection or contact with the mucous membranes. It may also occur later (hours) if the allergen is in contact with the dentin and has the following clinical manifestations.(2,3,9,10,13)

- General nonspecific signs:
 - Chills;
 - Anxiety and restlessness, tingling in extremities and perioral tingling;
 - Sensations of vertigo.
- Skin and mucosal reactions:
 - Generalized pruritus rash, but this can also be missing;
 - At the level of the face (lips, cheeks, eyelids) edematous swelling appears, white or pinkish-white, fluffy, elastic, elevated from the surrounding skin;
 - Inflammatory edema of the tongue, soft palate, with mastication and phonation disorders, swallowing disorders of the throat, dysphagia of the larynx and of the glottis with glottis edema, dysphonia;
- Respiratory signs and symptoms:
 - Coughing ;
 - Shortness of breath to acute respiratory failure due to laryngeal edema and bronchospasm, with a potential death by asphyxia;
 - Tachypnea;
 - Bronchospasm, asthma attack;
- Cardiovascular signs and symptoms of:
 - Facial Congestion;
 - Weak pulse, hardly noticeable, rapid;
 - Loss of consciousness due to hypotension and arrhythmias, including ventricular fibrillation.

The events can last for 24 hours or more and are not fatal, but when death occurs, it is caused by cardiovascular collapse or by respiratory obstruction.

Treatment of anaphylaxis includes several targets (13) as follows:

- Immediate discontinuation of the treatment and removal of the suspected allergen and placing the patient supine with legs raised above the level of his head.
- Emergency treatment for maintaining the airways free:
- Cleaning the mouth and pharynx from blood, compresses, dental scrap, mobile prostheses or other foreign objects that can be vacuumed;
- Removing clothes, ties, belts or tight clothing accessories;
- Preventing the obstruction of airways and the falling of the tongue into the pharynx, by placing the patient in a position of safety;
- Against hypoxia oxygen therapy by oxygen mask or nasal cannula (if any) will be used;
- Combating skin reactions, for which purpose saline intravenous solution is given or Ringer in squirts;
- If the arterial pressure is lower 70-80 mm Hg epinephrine (0.3-0.5 mg) is administered subcutaneously or in the tongue, repeating the procedure every 5 minutes if the maximum arterial pressure has not reached 80 mm Hg;
- Antihistamine is intravenously or intralingual administered (2-4 mg cimetidine or ranitidine);
- Intravenous administration of hydrocortisone hemisuccinate 200 mg;
- Cardiopulmonary resuscitation in cardiac arrest;
- Requesting from the beginning the ambulance service for transportation to a hospital unit.

Allergy to medicine or dental materials. Allergy to medicine (antibiotics, sulfonamides, nonspecific anti-inflammatory, prepared with iodine, zinc chloride, etc.) is present, if the patient:(9)

- carries antibodies or sensitized T cells;
- Clinical manifestations are of immunologically induced inflammation.

The vast majority of allergic reactions mediated by T cells are dermatitis.

Responses caused by IgE antibody are specific organ reactions:

- Pruritus, urticaria, angioedema;
- Nausea, vomiting, diarrhea, related to the gastrointestinal tract;
- Pulmonary reactions (dyspnea, cough, etc.).

The occurrence of hypersensitivity to medicine is influenced by factors related to:(9)

◆ **Medicine:**

- Nature of the medicine
- Route of administration;
- Dosage;
- Duration of the treatment;
- Exposure frequency;

◆ **Patient:**

- Age;
- Sex;
- Genetic factors;
- Previous reactions to medication.

Women have a 35% higher rate of incidence with adverse skin reactions as compared to men.

Allergy to antibiotics, sulfonamides, anti-inflammatory etc. Sensitization can be determined by high doses for an extended period of time and repeating their administering, correlated with the characteristics of an individual reaction, with any general affection, such as that of the kidney or the liver. The most common allergic reactions are produced by oral and especially parenteral administration, the most common reaction being to penicillin, especially in adults 20-49 years. In particular with penicillin the most common manifestation is urticaria rash.(3,9)

Reaction to antibiotics is present after oral, parenteral and local administration. Local application of antibiotics in dentistry seeks direct contact with the germs quartered in an outbreak inaccessible to general antibiotic therapy (endodontic space), gingivitis and stomatitis, periodontitis.

The most common manifestations are cutaneous (urticaria, maculopapular rash), oral mucosal (oral thrush, allergic stomatitis).

Allergic reactions on the level of the skin or of the oral mucus meet even after administration of sulfonamides (co-trimoxazole) or nonsteroidal anti-inflammatory (phenylbutazone) treatment.

Treatment consists of drug discontinuation and conducting a desensitizing treatment with antihistamines, thereby consulting an allergist.

The events can last 24 hours or more and are not fatal, but it can sometimes death can occur by cardiovascular collapse or respiratory obstruction.

Allergic reactions to local anesthetics. Ester type local anesthetics (e.g. procaine) often trigger allergic reactions due to the fact that they are derived from p-aminobenzoic acid, which is a well-known allergen or because of a preservative having a p-aminobenzoic like structure. Anesthetic solutions may contain bisulphites, used as preservatives for epinephrine, which can cause allergic reactions, especially in asthmatic patients.(14)

Allergic reactions are usually minor, consisting in types of pruritic rash, and resolve spontaneously or after administration of antihistamines. If severe reactions occur (bronchospasm, tightness in the throat, anaphylactic shock) the first emergency measures should be taken until a doctor from reanimation is present:

- The patient is placed supine (Trendelenburg position in the case of anaphylactic shock);
- Oxygen is being administered;
- Rapid intravenous administration of 200-1000 mg of hydrocortisone hemisuccinate.

If cardiac arrest occurs, CPR should be immediately started and an emergency reanimation doctor should be called.(14)

Allergic reactions to analgesics and antipyretics, iodine substances etc. is characterized by urticaria or with a rash like aspect or by the Quincke angioedema, accompanied by fever, nausea, vomiting. The treatment consists in immediate discontinuation of the medication and in desensitization treatment. Other types of allergic reactions can be caused by restorative material such as amalgam and the alloys used in production of dentures. These are usually remote reactions, skin affections and are often not detected as such.

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