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Research Article

TREATMENT OF PERIODONTAL DISEASES

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Article Received: June 2019**Accepted:** July 2019**Published:** August 2019**Abstract:**

Nowadays periodontal diseases are widely distributed and represent at least half of all diseases of the oral cavity. In this paper differentiation systems of periodontal diseases, the main factors and causes of their development are discussed. The types of microorganisms play the largest role in the development of periodontal diseases and in what ratio are aerobic and anaerobic microorganisms presented. Particular attention is paid to the methods of diagnosing periodontopathy and methods of their treatment - both conservative and radical. Special attention is paid to methods of diagnosis of periodontopathies and methods of their treatment - both conservative and radical.

Key words: *periodontium, periodontal diseases, periodontist, periodontopathy*

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INTRODUCTION

The history of the treatment of periodontal diseases begins far in the past of humankind and can be studied on the example of the remains of skeletal burials of ancient people (Loe et al., 1992). Hilson (1995) argues that these pathologies are “part of human ecology and represent the body’s response to environmental influence,” so diseases of the oral cavity and teeth are essentially a reflection of the influence of the diet. The teeth are constantly in direct contact with food, and most cases of diseases of the oral cavity are caused by poor hygiene and, as a result, the aggression of microorganisms normally living in the oral cavity. Despite the fact that anthropological researches have been devoted to the study of periodontal diseases for a long time, opinions on the development, diagnosis and treatment of periodontal diseases have diverged for thousands of years. (Lavigne and Molto 1995).

Some anthropologists believe that the first signs of periodontal diseases appeared in the Paleolithic period, and their frequency increased slightly in the Neolithic period and have continued to progress until today. Nowadays, the prevalence of periodontal diseases ranges from 75% to 96% (data from recent analyzes of statistics on the territory of the Russian Federation for 2012-2016). Other researchers argue that periodontal diseases cannot be associated with the development of civilization, as it existed in former times. [1]

Ratbun (1990) reports that the part of periodontopathies of the total number of diseases of the oral cavity is about 50-60%. Perera (Perera et al., 1994) described the oral condition of three Indo-European Yanomama tribes from South America, the incidence of which varied between 77 and 94%. According to a report by the WHO scientific team (2005), which generalizes the results of a survey of the population of 53 countries, a high level of periodontal diseases was noted both in the age group of 15-19 years (55-99%), and in the age group of 35-44 years (65 - 98%).

Etiology. Pathogenesis

During the life, periodontium undergoes various changes for a few reasons. [2] The main cause of periodontal diseases is bacterial dental deposits (dental plaque), which are formed because of poor oral hygiene and cause the development of an inflammatory process.

Mineralization of dental plaque leads to the formation of dental calculus (supragingival and subgingival) and even greater periodontal trauma. Changes in periodontium also depend on a variety of other factors, including social (age, gender, race,

socio-economic status), physiological or functional causes (occlusion injury, defects in filling, prosthetics, orthodontic care), bad habits (non-compliance with hygiene rules, smoking, betel chewing), system factors (hormonal changes in periodontium puberty, pregnancy, menopause, etc.), the use of certain medications (steroid drugs, oral contraceptives, heavy metal salts, hydantoin, cyclosporin, etc.). All the above factors are especially pronounced in people of the older age group, as periodontal endurance decreases, the connection of the circular ligament of the tooth with tooth cement is broken, and the ligament degenerates. Attenuation of the periodontium is compensated by tooth abrasion, and the progression of periodontal destruction is characterized by increased tooth loss, progressive bone loss and gum shrinkage. Timely treatment and prophylaxis of periodontopathies are necessary to prevent the development of periodontal diseases. According to V.A. Alimsky (2005) already 6.3% of the older people at 60-69 years have periodontal pockets with a depth of more than 6.0 mm. Their maximum (13.8%) reaches in the age group of 90 years and older.

One more circumstance should be considered the presence of bacteria in the periodontal tissues is an important element in the pathogenesis of periodontitis and, of course, supports inflammation in it. So, until today, millions of bacterial strains have been identified worldwide, and about 400-500 are in the oral cavity. From the above-mentioned bacteria, 10–15 are specific periodontopathogenic, and 5–10 “prevent” periodontal diseases [3].

The total number of microorganisms in the intact gingival sulcus is small and facultative anaerobic gram-positive bacteria predominate. In the early stages of periodontitis, the bacterial flora is similar to that of gingivitis: the number of bacteria is 10-20 times higher than the physiological norm, facultative anaerobic gram-positive microbes dominate, but the proportion of obligate-anaerobic gram-negative microorganisms - sticks and spirochetes - also increases.

There is prevailing number of gram-positive aerobic microorganisms and there are 10 - 15% of gram-negative bacteria in a healthy periodontium. This ratio becomes inverse since the progression of marginal periodontitis. Researchers have identified several groups of microorganisms, which are associated with periodontitis and most of them can’t be cultivated. According to modern data, the most prevalent group of bacteria are gram-positive *Peptostreptococcus* and *Filifactor*. Types *Megasphaera* and *Desulfobulbus*, as well as some representatives of the types of *Campylobacter*, *Selenomonas*, *Deferribacteres*, *Dialister*, *Catonella*,

Tannerella, Streptococcus, Atopobium, Eubacterium and Treponema, had a higher percentage of the total bacterial association in patients with marginal periodontitis. Representatives of Streptococcus and Veillonella were revealed in all samples, but in the healthy control group they were found in large quantities. Thus, they represent the main fraction of the microbial community in healthy people, but not in patients with periodontitis. Representatives of the types of Campylobacter, Abiotrophia, Gemella, Capnocytophaga and Neisseria are the newly discovered periodontopathogenic microorganisms. However, there is no answer to the question: do they play a significant role in the development of marginal periodontitis? Actinobacillus actinomycetemcomitans was found in 90% of patients. [4]

According to A. Grigoryan et al., today we can discuss the existence of two hypotheses, which interpret the problem of the relationship of specific microorganisms in the beginning of inflammatory periodontal diseases: 1. There is a possibility of participation of unidentified pathogenic bacteria in the etiology and pathogenesis of diseases of the oral cavity. 2. The leading factor of the pathogenesis of inflammatory periodontal diseases can be the intraspecific succession of already known bacterial forms, which, however, doesn't exclude the leading role of uncultivated components of the oral biocenosis in these processes.

Diagnostic

Thus, because of the development of modern microbiological methods, significant successes in the diagnosis of periodontal disease were achieved. Nowadays different clinical tests play a much bigger role in determining of the optimal therapeutic procedures and in the increasing of their success rate. These methods are based on the study of bacterial plaque, detection of markers of inflammatory processes, tissue destruction products and bacterial antigens. It should be noted that until this moment, there have not been found neither any identifiable biological markers which are able to predict the periodontal disease in the future, nor a single microorganism that can be pathognomonic for the transformation of gingivitis into periodontitis in adult patients. All the above achievements do not solve the objectives set by clinicians, which creates the need of searching the most rational, effective and reasonable diagnostic methods. There are several dozen classifications of periodontal disease at the modern periodontology. The variety of classification schemes is explained not only by the multiplicity of types of periodontal pathology but also by the lack of a single systematization principle. Clinical manifestations of the disease, pathomorphology, etiology, pathogenesis, as well as the nature and

prevalence of the process are used as a fundamental feature. Many different classifications of periodontal diseases are explained by the absence of accurate knowledge about the localization of primary changes in periodontal lesions and the causal relationships of diseases of different organs and systems of the body and periodontal pathology.

The main categories that dentists use to systematize periodontal diseases include the clinical form of periodontal disease and the nature of the pathological process, its stage (severity) at the present form. [5]

Fuchs bone metric is used to quantify bone destruction. It is calculated as follows: the unchanged height of the alveolar ridge is estimated at 4 points:

- 4 - there is no loss of bone tissue or the tooth was removed due to complicated caries;
- 3 - bone loss within 1/3 of the root;
- 2 - in the range from 1/3 to 2/3 of the root;
- 1 - over 2/3 of the root; 0 - when the tooth root is located outside the bone or the tooth have been removed. [6]

If uneven alveolar bone resorption is noted and the level from the medial and distal side of the root is different, maximum bone loss score is set.

Destructive processes in the alveolar process lead to the formation of intraosseous pockets and the exposure of the area of furcation of multi-rooted teeth. Defects can be: - three-walled; - two-walled (interdental crater); - single wall; -combined defect; - bone pockets in the form of a crater. The classification of the furcation defects is based on horizontal measurement results with a special probe. Exact assessment of bone tissue loss helps to the doctor to choose a surgical technique. The most common methods of diagnosis of marginal periodontitis are used: 1) objective examination allows to assess the condition of frenulum of the upper and lower lip, tongue, oral vestibule, firm and elastic buccal attachment, masseter muscles density and condition, occlusion, the presents into oral demountable and non-demountable prosthetics, which have a the injuring action on the oral mucosa and etc; 2) clinical assessment that determines the patient's periodontal status includes an assessment of the condition and color of the interdental papillae, the degree of bleeding, the existence and depth of periodontal pockets with the definition their localization on segments or surfaces of the tooth. The most informative indexes in periodontal examination are: Miller, Green-Vermillion Hygiene and Periodontal Health Indexes, CPITN Samples Schiller-Pisarev, etc. 3) X-ray methods (Ortopantomography, CT-research); 4) bacterioscopic examination of the oral microflora; 5) immunological research. [7] Immunological

research are perspective method to study of the pathogenesis of periodontitis, as the waste products of pathogens and liposaccharides of their cell wall activate the synthesis and secretion biologically active agents: cytokines (ILs, TNF), prostoglandins and hydrolytic enzymes by macrophages and leukocytes. That cause degradation extracellular matrix and lead to further destruction of alveolar bone tissue. Many scientific studies in recent years are aimed at studying energy metabolism in tissues in periodontitis. In the conditions of a hypoxia in the periodontal tissue, a cascade of biochemical reactions, primarily, including the disruption of energy metabolism. This is facilitated by a decrease in the rate of oxidative phosphorylation, the accumulation of under-oxidized metabolites and the change in the redox-cell systems. This complex of pathochemichals leads to a violation of the mechanisms of active transport and to irreversible changes. Thus, marginal periodontitis is a microbial-induced immune damage with a high probability of genetic and general somatic predisposition, occurring with a disease of free-radical mechanisms in tissue of periodontal complex, characterized by a progressive course and outcome of the bone resorption of alveolar process. This problem is especially relevant in people of old age, there are aggravating factors: due to the presence of multi-organ pathologies, there is a need for regular drug intake, also long-time bad habits, decrease of activity. The physiological process of aging includes a decrease in reparative and restorative function, barrier and immune defense mechanisms.

Treatment

The methods of marginal periodontitis treatment are divided into conservative and radical. The conservative methods of treatment include:

- therapy sanitation of oral cavity (normalization the hygiene of oral cavity, removing chronic sites of infection);
- using ultrasound scaler to remove above-gum and under-gum dental calcareous with polishing tooth roots (for example with the apparatuses Vector, Piezon-Master 409and etc.);
- correction the traumatic occlusion and poor therapy or orthopedic constructions with butt or traumatic influence;
- rinsing periodontal pockets with antiseptics such as Chlorhexidine 0.05%, Tetracycline 0.5%, Metronidazole 0,5% etc.);
- using general antibiotics, that also will facilitate the decrease of bacterial microflora of oral cavity effectively;
- medicines, designed for intensification of the body's immune response, including anti-inflammatory drugs, immunomodulators, vitamins, endogenous antioxidants etc.

The radical methods of treatment include the conducting the surgery manipulation such as:

- gingivectomy;
- closed curettage of the periodontal pockets;
- open curettage of the periodontal pockets;
- periodontal flap surgery;
- directional tissue regeneration.

All radical methods of treatment are quite traumatic and painful for the patients. To date, dentists are able to solve periodontal problems not only with blade, but also with laser tech. The lasers possess important qualities for treatment of marginal periodontitis such as antiseptic, hemostatic, cutting effects, - the laser technologies may serve like additional or alternative innovative methods of treatment.

The history of creation the lasers has begun in 1905, when Albert Einstein invented special theory of relativity, then in 1919 he formulated the principles of producing laser radiation, based on theory of relativity. In his works on quantum theory of light A. Einstein identified four types of the photoelectric effects:

- external (photoelectric emission);
- internal (photoconductivity);
- barrier-layer (a source of electromotive force (EMF) on the edge between metal and semiconductor or between dissimilar semiconductors);
- photoionization of gases.

In 1954 molecular-beam maser was created, and soon to be called laser. The term "laser" has come from changing letter M to L (Eng. light) in the term "maser". [8] It was developed and created independently and almost at the same time by two collective of scientists - the Soviet scientist worked in the P.N. Lebedev Physical Institute, Academy of Sciences of USSR, and the American scientists worked in Columbia University in the USA under the leadership of Ch. Townes. Their creation, the molecular-beam maser, generated on ammonia maser emission wavelength 1,25 cm. So began the new term in optics' development, that was named "the laser time".

The first, who started using laser technology for medical purposes, was Charles Campbell in ophthalmology in 1961. In stomatology the laser was firstly used by Goldman in 1964, who was experimenting on treatment caries with the ruby laser on extracted teeth. [9] However those manipulations were not widely spread because of high quantity of thermal energy. Since the lasers have been come in ordinary practice, including and dentistry. Despite the laser prevalence there is some indication restriction of using it for treatment of marginal periodontitis.

The aim of periodontopathy treatment is to restore the biological compatibility root surface with periodontal tissues. Without the complete extraction

of biofilms from the root surface is impossible periodontal tissue regeneration. However, this method is quite complex and gives the patient a lot of discomfort, say nothing of the fact that the complete removal of bacterial deposits and their toxins from the root surface is not always possible, in relation to limitation of access to tools. However, this method is quite complex and gives the patient a lot of discomfort, say nothing of the fact that the complete removal of bacterial deposits and their toxins from the root surface is not always possible, in relation to limitation of access to tools. For disinfection unremoved biofilms using solutions of topical antibiotics, that are input in periodontal pockets, but with frequent use there is potential risk of occur the resistance of microflora of periodontal pockets. The laser is able to make tissue's ablation because of its microbicides and detoxification effects, laser beam reaches all difficult places of oral cavity and so that it is the most perspective treatment. The part of laser energy dissipates in periodontal canal and the cells of sulcus gingivalis are mixed using laser with low energy, resulting in inflammatory process is declined and started tissue proliferation, is improving tissue attachment in the periodontium, so post-op pain syndrome is declining [10].

CONCLUSION:

The etiology and diagnostic of diseases of periodontium are well known, but it can not be said about pathogenesis because of during last years the new reasons and predictors of marginal periodontitis were observed. The treatment of marginal periodontitis also stays huge problem for dentistry due to the not satisfying efficiency or rather massive trauma for this kind of disease.

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