ТЕРАПЕВТИЧНА СТОМАТОЛОГІЯ

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A.V. Sergeieva
Post-graduate student of the Department of Dentistry of the Bogomolets National Medical University, Dental Medical Center of the Bogomolets National Medical University
34 Beresteiskyi Ave., Kyiv, Ukraine, postal code 01601

THE ROLE OF TRAUMATIC NODES IN THE MAINTENANCE OF PERIODONTAL INFLAMMATION IN PATIENTS WITH GENERALIZED PERIODONTITIS, CHRONIC COURSE

Objective*. To conduct a comparative analysis between the clinical examination of patients with generalized periodontitis of the initial-first degree of chronic course and radiological changes in the areas of interdental membranes, taking into account the existing traumatic nodes.* ***Materials and methods.*** *The study was conducted in 60 patients living in the city of Kyiv and Kyiv region, aged 20 to 40 years, of whom 20 were in the control group. The patients were diagnosed with generalized periodontitis, initial – I degree, chronic course. The condition of periodontal tissues and the need for their treatment were assessed according to the structure of the CPITN index according to WHO criteria. As an indicator of antimicrobial protection in periodontal pockets, the functional activity of neutrophilic granulocytes in local foci of chronic inflammation was studied in comparison with the same indicators in the localization of traumatic nodes. The bactericidal activity of neutrophilocytes was studied by the content of non-enzymatic cationic proteins according to the method of V.E. Pigarevsky. Particular attention was paid to the comparative analysis of clinical manifestations of the inflammatory process in the periodontium, taking into account local irritants of periodontal tissues, traumatic nodes and occlusion. The state of bone tissue was assessed by orthopantomography and 3D computed tomography. The results of the examination in general revealed the need for hygienic interventions in 70.89 % of the examined patients, and the need for complex treatment in 47.18 %, where the depth of periodontal pockets up to 3-4 mm in four sextants was found in up to 65 %. At the same time, the bactericidal activity of neutrophilocytes is 1.3-1.4 times reduced in the areas of periodontal pockets and, compared to traumatic nodes, more than 2 times intracellular and 3 times extracellular. In addition, analog methods (orthopantomography) do not fully demonstrate changes in the structure of bone tissue in comparison with digital methods of 3D computed tomography of alveolar processes, interdental membranes in patients with generalized periodontitis of the initial – I degree, chronic course, accompanied by traumatic occlusion.*

Key words**:** *traumatic nodes, traumatic occlusion, periodontitis, alveolar process, comparative analysis of bacterial activity of neutrophilocytes in periodontal pockets, CPITN index, radiological examination.*

А.В. Сергеєва
аспірантка кафедри стоматології Інститут післядипломної освіти Національного медичного університету імені О.О. Богомольця, Стоматологічний медичний центр Національного медичного університету імені О.О. Богомольця
просп. Берестейський, 34, м. Київ, Україна, індекс 01601

РОЛЬ ТРАВМАТИЧНИХ ВУЗЛІВ У ПІДТРИМЦІ ЗАПАЛЕННЯ ПАРОДОНТА У ХВОРИХ НА ГЕНЕРАЛІЗОВАНИЙ ПАРОДОНТИТ, ХРОНІЧНИЙ ПЕРЕБІГ

Мета роботи. *Провести порівняльний аналіз між клінічним обстеженням пацієнтів на генералізований пародонтит початкового-першого ступеня хронічного перебігу та рентгенологічними змінами в ділянках міжзубних перетинок з урахуванням існуючих травматичних вузлів.*
Матеріали і методи. *Дослідження було проведено у 60 пацієнтів, які проживали у місті Києві та Київській області, віком від 20 до 40 років, з них контрольну групу складало 20 обстежених. Пацієнтам встановлений діагноз: генералізований пародонтит початкова – I ступінь хронічний перебіг. Стан тканин пародонту і потребу у їх лікуванні оцінювали за структурою індексу CPITN за критеріями ВООЗ. Як показник антимікробного захисту у пародонтальних кишенях досліджували функціональну активність нейтрофільних гранулоцитів у місцевих вогнищах хронічного запального процесу порівняно з тотожніми показниками у локалізації травматичних вузлів. Бактерицидну активність нейтрофілоцитів вивчали за вмістом неферментних катіонних білків за методом В.Є. Пігаревського. Особливу увагу звертали на порівняльний аналіз клінічних проявів запального процесу у пародонті з урахуванням місцевих подразників тканин пародонту, травматичних вузлів та оклюзії. Стан кісткової тканини оцінювали за даними ортопантомографії, та 3D комп'ютерної томографії. Результати обстеження в цілому виявили необхідність проведення гігієнічних втручань у 70,89 % обстежених пацієнтів, та потребу комплексного лікування у 47,18 %, де глибина пародонтальних кишень до 3-4 мм у чотирьох секстантах виявлено до 65 %. При цьому бактерицидна активність нейтрофілоцитів в 1,3-1,4 рази зменшується у зонах пародонтальних кишень та порівняно у травматичних вузлах понад 2 рази внутрішньоклітинна, та в 3 рази позаклітинна. Крім того, аналогові методи (ортопантомографія) не в повному обсязі об'єктивно демонструє зміни структури кісткової тканини*

в порівнянні з цифровими методами 3D комп'ютерної томографії альвелярних паростків, міжзубних перетинок у хворих на генералізований пародонтит початкової – I ступеню, хронічного перебігу, який супроводжується травматичною оклюзією.
Ключові слова: *травматичні вузли, травматична оклюзія, парадонтит, альвелярний відросток, порівняльний аналіз бактеріальної активності нейтрофілоцитів в пародонтальних кишенях, індекс CPITN, рентгенологічне обстеження.*

Comprehensive treatment of periodontal tissue diseases involves the elimination of traumatic occlusion and therapeutic, surgical and orthopedic measures. Occlusion is the closure of the dentition or individual teeth for a longer or shorter period of time. The components of the masticatory system, in addition to teeth and dentition, include bone tissue as the main component of the periodontal complex, the temporomandibular joint, and the neuromuscular system. Many factors can affect the balance between adaptation with functional compensation and periodontal tissue dysfunction [1]. Thus, irrational reconstructive therapeutic treatment of teeth, with violation of the principles of morphofunctional structure of teeth, can lead to functional disorders, and as a result, increased tooth abrasion, periodontal tissue diseases, chronic inflammation, or dystrophic changes, gingival recessions, bone atrophy [2, 3, 4]. Today, computerized diagnostic methods allow the study of occlusion in dynamics [5]. Despite the fact that more than a century has passed since the first publication of Coroly, which deals with the effect of occlusal forces on the state of periodontal tissues, there is still a deep-rooted controversy about the role of occlusion in the development of marginal inflammatory infectious processes in the periodontium.

Scientific studies provide different points of view on the factors of significance of the initiation of inflammatory processes in the marginal periodontium, without revealing the importance of the multifunctional relationship between occlusal trauma and the activity of periodontal pathogens and the prevalence of periodontal disease [6, 7, 8]. This is evidenced by various systematizations and classifications of periodontal tissues. The existing classification of periodontal diseases by M.F. Danilevsky and co-authors (1994) does not separately cover the nosological form of generalized periodontitis due to permanent occlusal trauma. At the same time, the adopted classification "The 2018 AAP/EFP Classification of Periodontal and Peri-implant Diseases" (Amsterdam, 2018) defines traumatic marginal periodontitis. Therefore, these issues are currently gaining relevance in Ukraine.

The main objective auxiliary clinical examination method is the radiological method, which is primarily an overview orthopantomography and detailing of the bone structure using 3D computed tomography of the jaw and temporomandibular joints.

Objective: to conduct a comparative analysis between the clinical examination of patients with generalized periodontitis of the initial – I degrees, chronic course and radiological changes in the areas of interdental membranes, taking into account the existing traumatic nodes.

Materials and methods. We examined 20 patients of the control group and 40 patients diagnosed with generalized periodontitis, initial stage I, chronic course (GP). All the subjects were homogeneous in age from 20 to 40 years, female and male, living in Kyiv and Kyiv region. During the clinical examination, a detailed examination of periodontal tissues was performed, the common degree and intensity of the inflammatory process in the gums, its shape, the presence of periodontal pockets, the nature and amount of exudate, the degree of gingival recession, and pathological tooth mobility were determined. Particular attention was paid to the presence of local irritants to periodontal tissues and traumatic occlusion. Traumatic occlusion was monitored with copy paper and wax base pads in the bite, and additionally, an occlusal bite roller made of C-silicone was obtained. Attention was paid to the number of filled or carious cavities according to Black's class I, II, III, the presence of orthodontic treatment in the history, braces, regularity of professional hygiene and visits to the dentist. The periodontal indices GI, PI, CPI, CPITM and individual clinical tests were evaluated: gingival bleeding, depth of periodontal pockets, pathological tooth mobility, neck exposure, gingival recession, changes in bone architecture. Bone tissue changes were assessed on an orthopontomogram using the MyRay Hyperion X9 PRO 3D/2D apparatus. The bactericidal activity of neutrophilic granulocytes from the lesion was evaluated by the method of V.E. Pigarevsky [9]. The extracellular and intracellular bactericidal activity of neutrophil protein cations was determined on the impression preparations from periodontal pockets (Laboratory of the Immunology Department of the Strazhesko Institute of Cardiology, Clinical and Regenerative Medicine). The statistical processing of digital arrays was performed by the method of variation statistics, differences by Student's t-test.

Results. The analysis of the state of periodontal tissues showed that in 62 subjects aged 20-23 years, signs of initial pathological changes in the periodontium prevail, which are manifested by point and

moderate bleeding of the gums 54.61±3.12 %. Periodontal pockets up to 3 mm deep were found in only 42.18±1.14 % of the examined subjects, with the intensity of sextants lesions being 1.98 0±0.05 per 1 examined (P<0.01). In the group of subjects from 27 to 40 years of age, these indicators increased, namely, the number of periodontal pockets up to 3 mm deep increased 69.1±2.38, the intensity of bleeding during the examination 67.83±2.87 and the prevalence of all sextants per 1 subject 4.02±0.28 (P<0.01), (CPITM index). The CPITM index to a certain extent allowed us to state that in patients diagnosed with generalized periodontitis, initial – I degree, chronic course, depending on the duration of inflammation, the prevalence of periodontal lesions increases, moderate spot bleeding prevails and the number of foci in the sextants of the dentition increases. This index to some extent allows to determine the need of the population for treatment of chronic inflammation in periodontal tissues. The analysis of the data shows that among young people, hygiene measures are indicated in 70.89 % of the examined, and complex treatment in 57.18 %, despite the chronic course of inflammation. It should be noted that the chronic course of inflammation does not negate the activity of the formation of functional occlusal traumatic factors. This is primarily clinically determined by detecting an increase in vertical traumatic damage to tooth enamel, especially in the anterior regions, which are combined with pathological abrasion of the cutting edge of the teeth, dystopia of the teeth, semi-retention of the canines, with subsequent changes in the management of canine or group, load and movement of the mandible, reduction in the height of the cusps of antagonistic teeth and gingival recession, especially in the areas of canines and premolars, increased sensitivity of teeth to thermal and chemical irritants, the appearance of wedge-shaped defects of the first degree, and radiographically – sclerosis of pulp chambers and root canals, systemic formation of denticles in the tooth cavities.

An important role in the formation of periodontal tissue resistance to damaging factors is played by mechanisms of nonspecific defense and immunological local homeostasis. Among these indicators, the phagocytic activity of neutrophilic granulocytes is essential [9] due to bactericidal systems stored in granules: myeloperoxidase, lysozyme, lactoferrin and non-enzymatic cationic proteins.

The results of the studies show that the level of bactericidal activity of neutrophils has a certain directional orientation. A significant decrease in the bactericidal activity of immunocytes in the areas of existing traumatic nodes was reliably detected compared to chronic inflammation. Even the study of the depth and content of exudate in the areas of traumatic occlusion is accompanied by more intense bleeding both in time and in quantity. This can be considered as a manifestation of low nonspecific tissue resistance compared to the surrounding areas of chronic inflammation. The bactericidal activity of cationic proteins in the chronic course – extracellular is 59.37±4, intracellular – 40.12±3.97 (P<0.001), in the areas of traumatic nodes – 33.21±3.07 and 21.8±1.75 (P<0.001), in the control group – 84.21±6.10 and 71.93±5.98 (P<0.001).

The analysis of the obtained results shows that the activity of bactericidal neutrophils in chronic inflammation in the periodontium is significantly different and decreases by almost 1.3-1.4 times, while in the areas of traumatic injury it is significantly reduced by more than 2 times – intracellular immune activity and extracellular activity – by more than 3 times. These indicators indicate that the presence of absorbed but living microorganisms in the cytoplasm of neutrophilocytes indicates incomplete phagocytosis and insufficient compensatory activity of innate immune cells in this case. The data obtained demonstrate that in areas of overload, in traumatic nodes, changes in microcirculatory support occur primarily, which requires further scientific research and determination. This involves the search for immunologic test systems to study changes in vascular endothelial function, which will be published in further studies. The results of the conducted studies indicate a high level of information, but not enough practical availability. This test provides an objective assessment of the bactericidal activity of neutrophils and nonspecific immune capacity to damage microorganisms in periodontal pockets.

It is characteristic that in patients with HP, the manifestation of protective and compensatory reactions in areas of traumatic load acquires a decompensated level, which contributes to the growth of a microbial periodontal focus and the progression of bone damage. This is confirmed by the results of the X-ray examination. A correlation was found between the structures of bone destruction, the severity of osteoporosis (densitometry data of radiographs) and the presence of traumatic occlusal nodes. Based on the above, it can be concluded that a decrease in the activity of local protective capacity of innate immunity cells due to excessive exposure to traumatic nodes leads to the progression of bone resorption in the interdental septa, which has a significant impact on the progression of generalized periodon-

titis, changes in the microbiological genome and the spread of infectious inflammation of periodontal tissues. Thus, the introduction of the nosological form of chronic traumatic periodontitis is reasonable in terms of examination and identification of existing traumatic factors, is appropriate and effective in terms of reducing their activity and the need to eliminate them. Such an approach will change the ways of correlation and treatment of periodontal tissues, which determines the appropriate choice of local medicines, with the possible use of antihomotoxic, natural substances that have primarily adaptogenic effects and versatile therapeutic properties.

It is this approach that determines the choice of herbal remedies and the modern PRF technique for the treatment of initial – first degree generalized chronic periodontitis. Clinical examination – the condition of the bone tissue of the jaw processes before treatment.

We pay attention to the presence of traumatic nodes, where bleeding from interdental spaces is manifested when measuring the length of periodontal pockets (disruption of the dental-alveolar junction) with a periodontal atraumatic probe (Fig. 1, 2).

Fig. 1. Intraoral photos of the patient showing bleeding from the interdental spaces when measuring the length of periodontal pockets

Fig. 2. Intraoral photos of the patient showing bleeding from the interdental spaces when measuring the length of periodontal pockets.

The orthopantomogram (Fig. 3) shows uniform resorption of the cortical layer within the apices of the interdental membranes of the upper and lower jaws, no osteoporosis is observed. The coronal part of teeth 36 and 35 does not have a natural anatomical shape. Displacement of the central line. Teeth 23, 24 are rotated. There is sclerosis of pulp chambers of teeth 46 and 36, appearance of denticles in teeth 16, 17 and 26, 27.

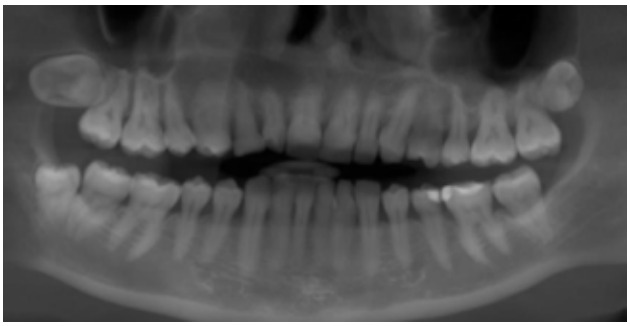

Fig. 3. Orthopantomogram/

3D computed tomography (Fig.4) shows the formation of a bone pocket in the area of 13 and 43. Expressed osteoporosis by 2/3 in the area of 43-44 teeth.

Changes in architectonics due to an increase in the intertrabecular space within the interdental spaces 31-41, 42-43 (Fig. 5).

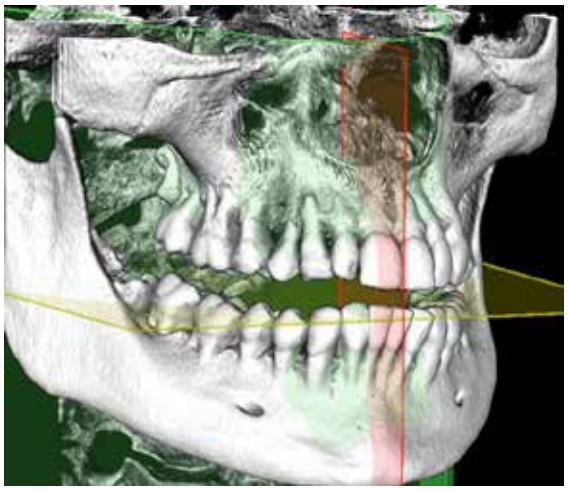

Fig. 4. 3D computed tomography in the area of 13, 43 teeth

Uneven border of sclerosis within the destroyed vertices of the interdental membranes with subsequent destruction of the trabeculae, severe local osteoporosis in the area of 43-46, sclerosis of the pulp chamber of 43, 46 teeth (Fig. 6).

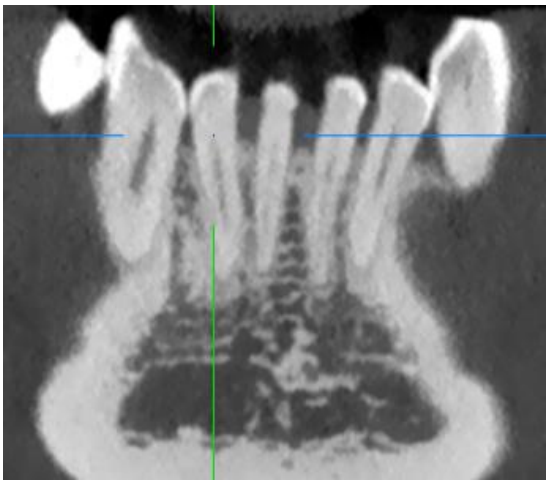

Fig. 5. 3D computed tomography in the area of 31-41, 42-43 teeth

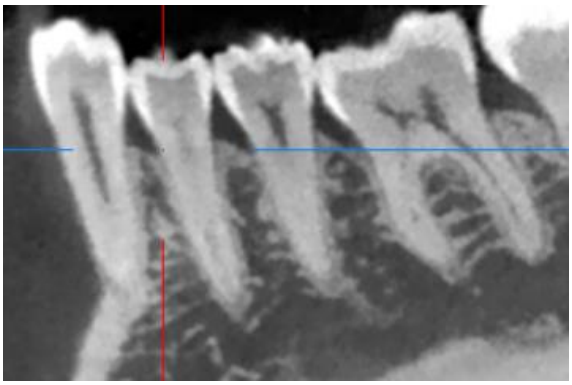

Fig. 6. 3D computed tomography in the area of 43, 46 teeth

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