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Pathological process of periodontal patients with chronic obstructive disease of the lungs

Over the recent years more and more researches have turned their attention to the study of the correlation between periodontal tissue diseases and systemic diseases. It has been proven that periodontal infections may become risk factors causing the following systemic diseases: cardiovascular, respiratory tract diseases, as well as cause unfavorable course of pregnancy in women [26]. A number of studies has established a direct correlation between periodontal tissue diseases and such respiratory tract illnesses as bacterial pneumonia and chronic obstructive pulmonary disease (COPD) [27]. This may be due to the fact that by the way of the system of blood circulation the infection from the periodontal pocket infiltrates other organs and systems, and eventually the inflammation becomes systemic. Moreover, the inflammation mediators synthesized during periodontitis also have their effect on the course of COPD. Besides, systemic diseases and their complications may in turn have negative impact the pathological processes in periodontium. The hypoxic conditions arising from long-term COPD development lead to disruption of oxygen restoration processes and to periodontal tissue trophism. A number of studies have proven that COPD patients also belong to the mineral metabolism disturbances risk group [6, 12, 14, 22]. Occurrence of secondary systemic osteoporosis in COPD patients deserves a special mention as well as its influence on pathological processes in periodontium.

It also pays to mention that COPD develops mainly in patients of mature and senior age - after 40 [12].

Studies conducted by Mazur I. P. and Povorozniuk V. V. (1996–2007) establish a correlation between periodontal tissue structural and functional condition and the bone system in patients of different age and gender in different regions of Ukraine [8, 9, 17]. It has been proven that a decrease of mineral density of bone tissue in osteoporosis is accompanied by advancement of dystrophic resorptive processes in periodontal tissues, destruction of interalveolar osseous septa, disturbance in bone matrix organic remodeling processes [7–9].

It has been established by a number of authors that dystrophic destructive processes in periodontal tissues as well as metabolic processes in alveolar bone crest are closely related to structural and functional condition of a body's bone system, and to the speed of general metabolic processes and skeleton remodeling intensity [28, 30].

The general structural and functional condition of the skeleton bones plays a key role in pathogenesis of destructive resorptive processes in periodontium. Also a high correlation has been established between the age of a patient and changes in his/her periodontal tissues and the mineral density of bones of the skeleton [7, 30].

Other researchers have established a correlation between mineral density of the bone tissue and the severity of development of generalized periodontitis in pre- and post-menopausal women [1, 21, 24]. The works of Jeffcoat M. K. [19–21] identify osteopenia and osteoporosis as periodontal disease risk factors both for women and men. The decrease in mineral density of the bones may have a negative impact on the condition of periodontal tissue [23, 30]. Loss of skeletal bone tissue over a lifetime, bone metabolism disturbances serve to accelerate the resorptive processes of alveolar bone, which causes premature loss of teeth [7].

Presence of any systemic diseases, including COPD, speeds up the resorptive processes in bones significantly especially in senior persons and post-menopausal women. Therefore, a continuous loss of alveolar bone height in persons with periodontal disease is conditioned by both influence of local pathological factors as well as general condition of the body, presence of systemic diseases [2]. Along with that the active destructive resorptive processes in the alveolar bone in patients with generalized periodontitis are correlated with the bone mass loss processes, bone tissue metabolism disruptions, imbalance in the remodeling process, and predominance of resorptive processes over osteosynthesis.

It should be mentioned that the issue of influence of metabolic disorders in the bone system on the course of periodontal diseases remain insufficiently explored in contemporary scientific literature, and the available research results appear to be contradictory [4]. Therefore, the most reliable research

method for structural and functional condition of the bone system should be considered the examination of the mineral density of the bones.

The study of correlation between structural and functional state of the bone system and generalized periodontitis is necessary for determination of pathogenesis mechanisms of the alveolar bone height loss in periodontal diseases and for substantiation of pathogenetic therapy [4].

Therefore, studies conducted within the recent years have given great attention to the correlation between systemic osteoporosis and the pathologic periodontal processes, however no such research has been conducted among COPD patients.

Osteoporosis is a progressive systemic skeletal disease, characterized by reduced bone mass and disorders in microarchitectonics of bone tissue leading to increased bone fragility and risk of fractures [11]. Development of secondary systemic osteoporosis in COPD patients leads to pathologic bone fractures and has a negative influence on periodontal tissues, which in turn has a severing impact on the course of the main disease and a negative influence on the digestive system and the quality of life [13, 15, 16, 25].

The term «periodontium» combines a complex of anatomic structures: gums, alveolar bone tissue and tooth root cement that share common sources of innervation and blood supply. The generalized term "periodontium" speaks of the genetic and functional unity of tissues surrounding a tooth. Periodontal tissues are of mesenchymal (periodontium, alveolar bone, cement, dentin, dental pulp) and ectodermal (tooth enamel, cuticle) origin [2, 10].

The periodontium has several important functions:

1) Supporting and shock absorbing function – holds the tooth in the alveole, distributes chewing load and adjusts the pressure during chewing;

2) Barrier function – it forms a barrier that prevents microorganisms and harmful substances from penetrating the root area;

3) Trophic function – provides cement nourishment;

4) Reflex function – thanks to availability of many sensory endings in periodontium.

Due to the quite complex construction of the periodontium which combines various types of tissues, its diseases may be of diverse nature. Most often these are inflammatory and dystrophic inflammatory processes. The inflammatory processes are generally localized in the gum tissues, thus called gingivitis. Depending on the nature of inflammation, there may be catarrhal, hypertrophic and ulcerative gingivitis. In the event that the pathological process permeates the entire periodontal tissue complex, it develops a kind of dystrophic-inflammatory process, called generalized periodontitis. The disease begins spontaneously, progresses over many years, and is characterized by the destruction of the entire complex of periodontal tissues. Clinical characteristics of generalized periodontitis can be presented by its fundamental signs or sets of symptoms. These include: symptomatic gingivitis, periodontal pocket, traumatic occlusion, progressive resorption of alveolus jaw bone [2, 3].

Symptomatic gingivitis develops against other symptom of generalized periodontitis and follows the course of catarrhal, hypertrophic or ulcerative inflammation. Clinical manifestations of symptomatic gingivitis are not much different from the above mentioned symptoms of gingivitis proper. Typical formation of periodontal pockets is characterized by formation of a gap between soft tissues of the gums and the tooth, later on the bone wall also suffers destruction. Periodontal damage leads to a condition when normal physiological load on the teeth causes periodontal injury, i.e. causing the state of traumatic occlusion. These processes lead to progressive resorption of alveolar bone and thus of the soft periodontal tissues.

The development of such pathological processes leads to increased tooth loosening, and further on – to its loss due to thinning of periodontal tissues supporting the tooth. This could occur at quite a young age. Periodontal diseases are very wide-spread; in Ukraine particularly they occur in 90 % of the population. The disease structure varies depending on the age and related pathology. Given the same prevalence, at the younger age gingivitis dominates, and in patients over 40 – generalized periodontitis does. Such high prevalence rate causes a significant loss of teeth, which is 5–10 times higher than the loss of teeth due to caries and its complications [1].

Development of pathological processes in periodontal patients with COPD occurs in cases where pathological factors intensity prevails over the adaptative and protective capacities of periodontal tissues as well as at the reduction of responsiveness of the body. Conventionally, all etiological factors can be divided into two groups: local and general. Local factors that affect the condition of periodontal tissues include dental plaque, pathological microflora, traumatic occlusion (primary), untreated mouth cavity, defective fillings, dentures, orthodontic devices, bad habits, improper placement of lips and tongue frenuli, etc. [10].

Common factors of development of pathological processes include severity of periodontal systemic inflammation in COPD, severity of bronchial obstruction, reduced physical activity and exercise tolerance. Occurrence of secondary systemic osteoporosis deserves special attention. It appears as a result of long-term hypoxia arising against a respiratory failure, development of the metabolic syndrome, decreased physical activity in COPD patients with a severe course and receiving inhaled or systemic gluco-corticosteroids [25, 29]. Therefore, research of the pathological processes in periodontal patients with COPD is very critical.

The first such study was conducted at the SE National Institute of Phthisiology and Pulmonology named after F. G. Yanovskyi, National Academy of Medical Sciences of Ukraine.

The Purpose of the Study was to examine the features of pathological processes in periodontal tissues in patients with chronic obstructive pulmonary disease (COPD).

The work was funded by the state budget.

The Object of the Study

The study participants were 20 patients with COPD who have made up the I group (16 men and 4 women aged 40 to 80 years, mean age – (64,9 ± 1,7) years). FEV1 before the sample with a bronchodilator – (50,1 ± 3,5) %; FEV_1/FVC – (52,8 ± 2,6)). FEV1 after the sample with a bronchodilator – (54,8 ± 3,4) %; FEV1/FVC – (52,8 ± 2,7)).

The patient selection was carried out in accordance with the disease severity and conducted under the Order of Ministry of Healthcare of Ukraine № 128 date march 19, 2007 «On Approval of Clinical Protocols of Medical Care in Pulmonology» [5].

Patients of the main and a control groups did not differ by age and gender.

The control group (II group) consisted of 20 practically healthy individuals (15 men and 5 women aged 40 to 80 years, mean age – (59,8 ± 1,5) years). FEV_1 – (115,2 ± 4,1) %; FEV_1/FVC – (79,0 ± 0,7)), who volunteered to participate in the study. The practically healthy individuals were men and women aged 40 to 80 years who had no history of chronic somatic diseases that would require medical supervision and treatment, and whose general clinical and functional laboratory tests were within their age norm.

Methods of Research:

All patients received a clinical, periodontal examination, a study of external respiratory function (ERF), a quantitative computed densitometry (3D QCT), and a multislice computer tomography of the maxillofacial area.

Four clinical groups (A, B, C, D on the recommendations of GOLD (Global Initiative for Chronic Obstructive Lung Disease, 2011)), where the patients were attributed, were determined based on the evaluation of clinical symptoms, functional parameters and the risk of possible complications [18].

For a comprehensive evaluation of clinical symptoms, in accordance with the GOLD 2011 Guidelines, the COPD Assessment Test – CAT (COPD Assessment Test) was used [18].

The study of pulmonary ventilation function of all patients was carried out according to the analysis of the «flow-volume» spirogram curve of forced expiratory volume and considering the total body plethysmography performed on «Master Screen PFT» equipment manufactured by «Cardinal Health» company (Germany). When the diagnosing COPD and determining the clinical groups of patients (A, B, C, D) the following parameters were evaluated before and after tests with bronchodilators: forced expiratory volume during the first second (FEV_1), the ratio of the forced expiratory volume in the first second to the forced vital capacity of the lungs (FVC) – FEV_1/FVC. The tests were taken in the morning, after a 12–14-hour break in administration of medications. In order to determine the presence and reversibility of bronchial obstruction, the evaluation of respiratory function was performed 15–30 minutes before and after 2 inhalation sessions (200 mcg) of β_2 short-acting agonist (salbutamol).

Dental examination was carried out by a dentist with the use of conventional methods. Periodontal examination included oral hygiene assessment (presence of plaque, tartar, the Greene-Vermilion oral hygiene index). The intensity of inflammation in periodontal tissues was determined by the papillary-marginal-alveolar index (PMA). During examination of periodontal tissues the depth of periodontal pockets at 6 different points and the nature of the exudate were measured. Bleeding of gums was assessed according to the Muhlemann-Cowell index, and was measured on a 3-point scale. Rassel PI periodontal index that characterizes not only gum inflammation rate, but also done tissue destruction rate, was assessed on a scale from 0 to 8. The degree of tooth loosening was estimated on the Miller scale in Fleszar modification, and determined on a scale from 0 to 3. Also nodes of traumatic occlusion as well as teeth and gums anomalies, denture defects were determined. Results of the examination were recorded in the periodontal assessment chart [3].

Examination for osteoporosis was performed on a multislice computer tomograph Aquilion TSX-101A «Toshiba» (Japan) using QST Pro licensing program based on a study of mineral density of the lumbar (L_1–L_3) vertebra.

The density of the spongy substance of the alveolar bone (DAB) and loss of height of the alveolar bone was studied with the use of multislice computer tomography (MCT), which was performed on a CT scanner, Aquilion TSX-101A «Toshiba» (Japan) using free software K-Pacs. During the study the average, the minimum and the maximum density for a given area were determined against the Hausfield scale (HU units) [31]. To determine the loss of height of the alveolar bone, the distance from enamel-cement edge to the top of the interdental septum (alveolar ridge) was measured.

Data aggregation and mathematical processing was performed with the use of licensed software products included in the Microsoft Office Professional 2007 package, license of Russian Academic OPEN No Level № 17016297. Statistical analysis was performed with the use of mathematical and statistical features of MS Excel which employed methods of descriptive statistics. For the assessment of statistical significance of differences parametric (Student's t-criterion) and nonparametric (Wilcoxon's T-criteiron) criteria were used.

Outcome of the Research. During the examination, the 20 COPD patients were divided into four clinical groups (A, B, C, D in accordance with recommendations of GOLD (Global Initiative for Chronic Obstructive Lung Disease, 2011)), depending on the severity of clinical symptoms, functional parameters and the risk of possible complications [18]. In so doing 4 (20 %) patients were allocated to the clinical group B, 4 patients (20 %) – to the clinical group C, and 12 (60 %) of the patients – to the clinical group D.

During examination of COPD patients and the practically healthy individuals of the same age and gender employing the method of quantitative computer densitometry the Z and T criteria were determined. The T-test evaluated the presence of osteopenia or osteoporosis. In this case, we note that the term osteopenia means the preclinical state of osteoporosis. The T-test results were interpreted as follows: 3,0 to –1,0 – as a norm, from –1,0 to –2,5 – as osteopenia, from –2,5 to –5,0 – as osteoporosis.

As result of the examination, systemic pathological changes in bone tissue were detected in all patients with COPD. Osteopenia was detected in 8 (40,0 ± 11,0) % patients out of 20, and osteoporosis – in 12 (60,0 ± 11,0) %. Along with that the frequency of diagnosis of osteopenia and osteoporosis in clinical groups differed.

Table 1 shows results of the study - the frequency of osteopenia or osteoporosis in patients with COPD based on belonging to a clinical group (A, B, C, D).

Thus, all 4 patients in the clinical group B had signs of osteopenia. In the clinical group C osteoporosis and osteopenia were recorded equally often (2 patients were

diagnosed with osteoporosis and 2 – with osteopenia). In the clinical group D osteoporosis was detected statistically significantly more frequently than osteopenia, which indicates the presence of decompensated systemic structural and functional abnormalities of the bone tissue. Thus, osteopenia was diagnosed in 2 patients (10,0 ± 6,7) % from the clinical group D and 10 patients (50,0 ± 11,2)% ± – with osteoporosis, ± diff. < 0,001. The results indicate that the structural and functional disorders of the skeletal system and the most frequent detection of osteoporosis were observed in patients in clinical group D that is characterized by the most severe clinical symptoms, the lowest values of functional performance and the highest risk of potential complications of COPD.

Patients of the control group were diagnosed with osteoporosis only in 2 cases (10,0 ± 6,7) %, which was significantly different from the group of patients with COPD, where osteoporosis was observed in 12 (60,0 ± 11,0) % of patients, diff. < 0,01. It should be noted that osteoporosis in the second group was detected in 2 women over 10 years in menopause. Osteopenia in the control group was identified in 11 (55,0 ± 11,1) % of patients and in 7 (45,0 ± 9,1) % – no changes of mineral density of the bone system were found.

The main and the control groups differed significantly in Z and T criteria. Thus, the Z-test in the first group was (–0,85 ± 0,20), while in the second group – (0,42 ± 0,22), diff. < 0,001. The T-test in the first group was (–3,01 ± 0,23), while in the second group (–1,44 ± 0,21), diff. < 0,001. (Table 2).

Analysis of these criteria in clinical groups of patients with COPD revealed the following characteristics. Patients from the clinical group D were significantly different from the practically healthy individuals as to their Z, and T-criteria. Patients from the clinical group C – by the Z-criterion. While patients of the clinical group B were not significantly different from the practically healthy individuals in their Z, and T-criteria.

Based on the clinical symptoms, periodontological examination data, pantomography and MCT, all of the main group patients studied were diagnosed with periodontal disease. Besides that, complete secondary adentia was identified in 5 (25,0 %) out of 20 patients from the first group. These patients had dentures. In other patients of the same group a significant loss of teeth was observed, while during a dental examination on the basis of a periodontal examination 9 (45,0 %) patients of stage I and 6 (30,0 %) patients of stage II were diagnosed with generalized periodontitis.

The control group examination revealed the following characteristics. None of the patients from the second group had complete secondary adentia; while periodontal examination revealed catarrhal gingivitis in 6 (30 %) patients, generalized periodontitis – in 10 (50,0%) patients of the I stage and in 4 (20,0 %) patients of the II stage. In our opinion, the absence of apparent difference in the severity of clinical symptoms of generalized periodontitis between patients of the first and the second groups is due to the fact that all patients with COPD who took part in the study had been receiving a long-term treatment of inhaled or systemic gluco-corticosteroids, which significantly reduced the inflammation of the mucous membrane of the mouth.

Measurement of height of alveolar bone was conducted only where teeth were preserved, where it was possible to differentiate the enamel-cement part of the tooth. The loss of the height of the alveolar bone in the group I patients studied was (3,8 ± 0,2) mm, which testified to a high intensity of destructive resorptive processes in the periodontal tissue. In the practically healthy control group loss of height of alveolar bone was (2,3 ± 0,1) mm, which was statistically significantly different from the value of this indicator in patients with COPD, diff. < 0,001.

In the study of DAB the following factors that can affect the perception of the structural and functional composition

Table 1

The frequency of osteopenia or osteoporosis in patients with COPD (n=20) based on theirbelonging to a clinical group (A, B, C, D).

Comorbidity	Clinical group						Total number of COPD patients (n = 20)	
	B (n = 4)		C (n = 4)		D (n = 12)			
	Absolute	%	Absolute	%	Absolute	%	Absolute	%
Osteopenia	4	20,0 ± 8,9	2	10,0 ± 6,7	2	10,0 ± 6,7	8	40,0 ± 11,0
Osteoporosis	0	0,0 ± 17,9	2	10,0 ± 6,7	10	50,0 ± 11,2*	12	60,0 ± 11,0

* – Statistically significant difference between osteopenia and osteoporosis in COPD clinical groups (diff. < 0,001).

Table 2

Z and T criteria in COPD patients and in practically healthy individuals

Criteria	I Group (n = 20)	Clinical groups of COPD patients			II Group (n = 20)
		B (n = 4)	C (n = 4)	D (n = 12)	
Z	–0,85 ± 0,20	–0,25 ± 0,26	–0,39 ± 0,47	–1,20 ± 0,27#	0,42 ± 0,22*
T	–3,01 ± 0,23	–1,91 ± 0,21	–2,91 ± 0,65&	–3,41 ± 0,26#	–1,44 ± 0,21*

* – Statistically significant difference between the first and the second groups (diff. < 0,001).
# – Statistically significant difference between the COPD group and the second group (diff. < 0,001);
& – Statistically significant difference between the COPD group and the second group (diff. < 0,05).

Table 3

Density of the Spongy Substance of the Alveolar Bone and Maxillary Tuber of the Upper Jaw Bone (Hausfield scale (HU units)) in COPD Patients

Value DAB	Right Side			Left Side		
	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3
Mean	367,6 ± 46,1	388,9 ± 46,4	108,9 ± 34,9	488,1 ± 56,9	428,2 ± 47,9	138,8 ± 39,6
Maximum	461,9 ± 89,6	457,1 ± 98,5	388,2 ±7 4,5*	363,9 ± 98,2	454,7 ± 86,2	473,9 ± 64,7#
Minimum	–114,7 ± 42,4#	–66,1 ± 49,6#	–216,5 ± 56,5#	39,6 ± 53,6#	–40,6 ± 47,3#	–174,8 ± 43,0#

* – Statistically significant difference compared to mean DAB value (diff. < 0,05).
# – Statistically significant difference compared to mean DAB value (diff. < 0,001).

Table 4

Density of the Spongy Substance of the Alveolar Bone and Maxillary Tuber of the Upper Jaw Bone (Hausfield scale (HU units)) in Practically Healthy Individuals

Value DAB	Right Side			Left Side		
	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3
Mean	387,3 ± 44,7	361,0 ± 40,9	183,9 ± 41,1	447,1 ± 35,9	403,6 ± 44,2	193,6 ± 56,2
Maximum	934,2 ± 79,6#	993,8 ± 81,1#	646,7 ± 64,2#	998,7 ± 68,5#	985,0 ± 69,4#	709,0 ± 74,6#
Minimum	–96,4 ± 39,6#	–118,0 ± 34,5#	–224,5 ± 35,6#	10,3 ± 44,0#	–82,3 ± 37,4#	–228,3 ± 45,7#

– Statistically significant difference compared to mean DAB value (diff. <0,001).

of the spongy substance of the alveolar bone were taken into account.

It should be noted that an average DAB value reflects the general structure of areas under study and does not always accurately describe the structure of the spongy substance of the bone. Therefore, for a more detailed study of the structural and functional composition of the alveolar bone a further investigation of the maximum and the minimum DAB values was conducted which provided a more detailed picture of the structure of the spongy substance in the study area.

Measurements were taken in three fixed areas on the right and the left sides: Area 1 – between teeth 1 and 2, area 2 – between teeth 3 and 4, and area 3 – maxillary tuber (retromolar area), and in the case of adentia – the areas of their projection were considered (Table 3, 4).

Both groups showed a significant difference (diff. < 0,001) between the mean and the minimum DAB value in all given areas. It should be noted that in the practically healthy individuals the same significant difference was observed between the mean and the maximum DAB values in all given areas (Table 4), and in patients with COPD – in only a few areas (Table 3).

According to the obtained data, the mean and the minimum DAB values at given areas did not differ between groups I and II, however the maximum DAB value in all the areas was significantly higher in practically healthy individuals indicating a less pronounced destructive resorptive processes of the bone tissue in control group individuals compared with patients with COPD (Table 5).

A significant decrease of the maximum DAB value in patients with COPD indicated active manifestations of destructive resorptive processes related to both systemic inflammation process in COPD, secondary systemic osteoporosis or osteopenia as well as local factors, which include full secondary adentia or loss of a large number of teeth, significantly reducing mechanical stress on the alveolar bone and contributing to the violation of structural and functional composition of the spongy substance of the bone.

Therefore, the results of the conducted study revealed that the presence of the clinical diagnosis alone does not give a complete picture of the severity of the dystrophic inflammatory processes of the periodontal tissue. Therefore, in patients with COPD in addition to a comprehensive assessment of clinical symptoms and a periodontal examination, an examination for any mineral density disorders should be conducted along with a check of density of the spongy substance of the alveolar bone.

Conclusions

1. It has been proven that osteoporosis in COPD patients was detected 6 times more often than in practically healthy individuals of the same age and gender.

2. Structural and functional disorders of the spongy substance of the alveolar bone, as well as the most frequent detection of osteoporosis was observed in patients of the clinical group D that is characterized by the most severe clinical symptoms, the lowest values of functional performance and the highest risk of potential complications of COPD.

3. The absence of any apparent difference in the severity of clinical symptoms of generalized periodontitis between patients with COPD and the practically healthy individuals was due to the fact that all patients with COPD had been receiving a comprehensive treatment with long-term administration of inhaled or systemic gluco-corticosteroids, which

Table 5

Maximum Density of the Spongy Substance of the Alveolar Bone and Maxillary Tuber of the Upper Jaw Bone (Hausfield scale (HU units)) in Patients of the I and II Groups

Patient Group	Right Side			Left Side		
	Area 1	Area 2	Area 3	Area 1	Area 2	Area 3
I Group	461,9 ± 89,6	457,1 ± 98,5	388,2 ±7 4,5	363,9 ± 98,2	454,7 ± 86,2	473,9 ± 64,7
II Group	934,2 ± 79,6#	993,8 ± 81,1#	646,7 ± 64,2*	998,7 ± 68,5#	985,0 ± 69,4#	709,0 ± 74,6*

* – Statistically significant difference between I and II groups (diff. < 0,05).
# – Statistically significant difference between I and II groups (diff. < 0,001).

significantly reduced the inflammation of the mucous membrane of the mouth and prevented adequate assessment of severity of the dystrophic inflammatory processes of the periodontal tissues.

4. A significant decrease of the maximum DAB value in patients with COPD indicated active manifestations of destructive resorptive processes related to both systemic inflammation process in COPD, secondary systemic osteoporosis or osteopenia as well as local factors, which include full secondary adentia or loss of a large number of teeth, significantly reducing mechanical stress on the alveolar bone and contributing to the violation of structural and functional composition of the spongy substance of the bone.

5. For diagnosing of pathologic processes in periodontal tissues in patients with COPD in addition to a comprehensive assessment of clinical symptoms and a periodontal examination, an examination for any mineral density disorders should be conducted along with a check of density of the spongy substance of the alveolar bone.

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ПАТОЛОГИЧЕСКИЕ ПРОЦЕССЫ ПАРОДОНТА У БОЛЬНЫХ ХРОНИЧЕСКИМ ОБСТРУКТИВНЫМ ЗАБОЛЕВАНИЕМ ЛЕГКИХ

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Резюме

Цель исследования – *изучить особенности патологических процессов тканей пародонта у больных на хроническим обструктивным заболеванием легких (ХОЗЛ).*

Объект исследования – *20 больных ХОЗЛ, которые составили I группу (16 мужнин и 4 женщины в возрасте от 40 до 80 лет, средний возраст – (64,9 ± 1,7) лет). FEV_1 в пробе с бронхолитиком – (50,1 ± 3,5) %; FEV_1/FVC – (52,8 ± 2,6)). FEV_1 после пробы с бронхолитиком – (54,8 ± 3,4) %; FEV_1/FVC – (52,8 ± 2,7)). Контрольную (II группу) составили 20 практически здоровых лиц (15 мужнин и 5 женщин в возрасте от 40 до 80 лет, средний возраст – (59,8 ± 1,5) лет. FEV_1 – (115,2 ± 4,1) %; FEV_1/FVC – (79,0 ± 0,7), которые добровольно согласились принять участие в исследовании.*

Методы исследования*: клинико-функциональные, пародонтологическое обследование, количественная компьютерная денситометрия (3D QCT), многосрезовая компьютерная томография челюстно-лицевой области, статистические.*

Результаты. *В проведенном исследовании доказано, что остеопороз у больных ХОЗЛ выявлялся в 6 раз чаще чем у практически здоровых лиц того же возраста и пола.*

Структурно-функциональные нарушения костной системы, а также наиболее частое выявление остеопороза наблюдалось у больных в клинической группе D, которая характеризовалась наиболее тяжелой выраженностью клинических симптомов, наиболее низкими значениями функциональных показателей и самым большим риском возможных осложнений ХОЗЛ.

У всех исследуемых больных на основании клинических симптомов, данных пародонтологического обследование, пантомограммы и многосрезовой компьютерной томографии челюстно-лицевой области были диагностовны заболевания пародонта. У 5 (25,0 %) из 20 больных выявлена полная вторичная адентия. Эти пациенты имели съемные зубные протезы. У других больных этой же группы наблюдалась потеря значительного количества зубов, а при исследовании врачом стоматологом на основании данных пародонтологического обследования диагностирован генерализованный пародонтит – у 9 (45,0 %) больных – I степени и у 6 (30,0 %) – II степени. Отсутствие явного различия в клинических признаках выраженности генерализованного пародонтита между больными ХОЗЛ и практически здоровыми лицами была обусловлена тем, что все больные ХОЗЛ, которые приняли участие в исследовании, продолжительное время получали в комплексном лечении ингаляционные или системные глюкокортикостероиды, что значительно уменьшало воспалительный процесс слизистой оболочки рта.

Значительное уменьшение максимального значения плотности губчатого вещества альвеолярного отростка у больных ХОЗЛ свидетельствовало о выраженных активных проявлениях резорбтивно-деструктивных процессов, которые были обусловлены как системным воспалительным процессом при ХОЗЛ, вторичным системным остеопорозом или остеопенией, так и местными факторами, к которым необходимо отнести вторичную полную адентию или потерю большого количества зубов, что значительно уменьшало механическую нагрузку на альвеолярный отросток и также способствовало нарушению структурно-функционального состава губчатого вещества альвеолярного отростка.

Выводы. *У всех больных ХОЗЛ были диагностированы заболевания пародонта. У 5 (25,0 %) из 20 больных выявлена полная вторичная адентия, у 9 (45,0 %) больных – генерализованный пародонтит I степени и у 6 (30,0 %) больных II степени. Значительное уменьшение максимального значения плотности губчатого вещества альвеолярного отростка у больных ХОЗЛ свидетельствовало о выраженных активных проявлениях резорбтивно-деструктивных процессов, которые были обусловлены как системным воспалительным процессом при ХОЗЛ, вторичным системным остеопорозом или остеопенией, так и местными факторами – потерей большого количества зубов или вторичной полной адонтией.*

Ключевые слова: *хроническое обструктивное заболевание легких, остеопороз, патологические процесс пародонта.*

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PATHOLOGICAL PROCESS OF PERIODONTAL PATIENTS WITH CHRONIC OBSTRUCTIVE DISEASE OF THE LUNGS

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Summary

The purpose of the study: *to study the characteristics of pathological processes of periodontal tissue in patients with chronic obstructive pulmonary disease (COPD).*

The object of study: *20 patients with COPD who have made the I group (16 marital and 4 women aged 40 to 80 years, mean age – (64,9 ± 1,7) years). FEV_1 in the sample with a bronchodilator – (50,1 ± 3,5) %; FEV_1/FVC – (52,8 ± 2,6)). FEV_1 after bronchodilator test with – (54,8 ± 3,4) %; FEV_1/FVC – (52,8 ± 2,7)). Control group (group II) consisted of 20 healthy individuals (15 marital and 5 women aged 40 to 80 years, mean age – (59,8 ± 1,5) years. FEV_1 – (115,2 ± 4,1) % ; FEV_1/FVC – (79,0 ± 0,7), who voluntarily agreed to participate in the study.*

Methods of research: *clinical-functional, periodontal examination, quantitative computed densitometry (3D QCT), multislice computed tomography of the maxillofacial region, the statistics.*

Outcome: *In this clinical study demonstrated that osteoporosis in patients with COPD was detected in 6 times more likely than healthy individuals of the same age and articles.*

Structural and functional abnormalities of the skeletal system, and the most frequent detection of osteoporosis was observed in patients in clinical

group D, which is characterized by the most severe severity of clinical symptoms, the lowest values of functional performance and the highest risk of potential complications of COPD.

In all study patients based on clinical symptoms, periodontal examination data, and pantomophy multislice computer tomography, maxillofacial area were diagnosed with periodontal disease. In 5 (25,0 %) of 20 patients indicated complete secondary adentia. These patients had dentures. In other patients the same group observed a significant loss of teeth, and dentists in the study on the basis of periodontal examination diagnosed generalized periodontitis – in 9 (45,0 %) patients with stage I and 6 (30,0 %) second degree. No apparent difference in the severity of clinical symptoms generalized periodontitis between patients with COPD and practically healthy persons was due to the fact that all patients with COPD who took part in the study, receiving long-term treatment of inhaled or systemic steroids, which significantly reduced the inflammation of the mucous membrane mouth.

Significant reduction of maximum density spongy substance alveolus in patients with COPD testified expressed active manifestations destructive resorptive processes related to both systemic inflammation in COPD, secondary to systemic osteoporosis or osteopenia and local factors, which must include full secondary adentia or loss of a large number of teeth, significantly reduced mechanical stress on alveolar bone and also contributed to the structural and functional disruption of the spongy substance alveolus.

Conclusions: *All patients with COPD were diagnosed with periodontal disease. In 5 (25,0 %) of 20 patients with complete secondary adentia identified in 9 (45,0 %) patients, generalized periodontitis and the extent and in 6 (30,0 %) patients with stage II. A significant decrease in maximum DAB in patients with COPD indicative of active manifestations of destructive resorptive processes that are related to both systemic inflammation in COPD, secondary to systemic osteoporosis or osteopenia and local factors – the loss of a large number of teeth or complete secondary adentia.*

Key words: *chronic obstructive pulmonary disease, osteoporosis, periodontal pathological processes.*

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