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COMPLICATIONS OF DENTAL IMPLANTATION IN OVERWEIGHT PATIENTS

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The purpose of the study was to assess the condition of periodontal tissues and oral microflora after dental implantation in obese individuals. Clinical and microbiological assessment of complications of dental implantation was carried out among 15 patients with obesity and peri-implant mucositis (Group I), 15 patients with metabolic disorders and mild dental peri-implantitis (Group II) and in Group III (20 similar somatic patients without pronounced pathological changes in the periodontal tissues and peri-implant zone). Obesity against the background of intensive deposition of soft dental plaque and further formation of hard dental deposits in the area of the orthopedic structure planted on the implant in somatic patients with peri-implant mucositis and peri-implantitis contributed to a reliable increase ($P<0.05$) in the values of the studied hygiene index according to Quigley and Hein and the PI index. Signs of deep pathological changes in the peri-implant soft and hard bone tissue were detected in the Group II (PI=4.94±0.081 points). Thus, patients with dental implantation have a greater severity of inflammatory symptoms against the background of a decrease in the intensity of reparative processes in the presence of soft tissue lesions.

Key words: dental implants, peri-implant disease, perimucositis, periimplantitis, microbiota.

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УСКЛАДНЕННЯ ДЕНТАЛЬНОЇ ІМПЛАНТАЦІЇ У ПАЦІЄНТІВ З НАДЛИШКОВОЮ ВАГОЮ

Метою дослідження було вивчити стан тканин пародонту та мікрофлори ротової порожнини після дентальної імплантації у осіб з ожирінням. Клінічна та мікробіологічна оцінка ускладнень дентальної імплантації проведена серед 15 хворих з ожирінням та періімплантатним мукозитом (I група), 15 пацієнтів з метаболічними порушеннями та дентальним періімплантитом легкого ступеня (II група) та у III групі (20 аналогічних соматичних хворих без виражених патологічних змін пародонту та періімплантатної зони). Ожиріння на тлі інтенсивного відкладення м'якого зубного нальоту та формування твердих зубних відкладень у зоні ортопедичної конструкції, підсадженої на імплантат, у соматичних хворих з періімплантатним мукозитом і періімплантитом сприяло достовірному підвищенню ($P<0,05$) значень гігієнічного індексу. При цьому ознаки глибоких патологічних змін періімплантатної м'якої та твердої кісткової тканини виявлялися у II групі (PI–4,94±0,081 бала). Отже, у пацієнтів із після дентальної імплантації має місце більша вираженість запальної симптоматики на фоні зниження інтенсивності репаративних процесів за наявності уражень м'яких тканин.

Ключові слова: дентальні імплантати, захворювання періімплантних тканин, перимукозит, періімплантит, мікробіота.

Recently, in many countries, the problem of obesity of the population has been aggravated, which, according to the authors who conducted a detailed examination of the state of periodontal tissues in obese patients and simultaneously studied the prevalence and unfavorable course of dental pathology in them, can negatively affect the state of oral tissues in general and become, in particular, the cause of the development of severe forms of inflammatory and destructive periodontal diseases [2, 14].

In addition, there are known results of scientific studies indicating the presence of a certain etiopathogenetic relationship between metabolic disorders and periodontal diseases of inflammatory genesis [7, 11, 12, 13]. That is, chronic generalized periodontitis, being an inflammatory-destructive disease with microbial etiology, can worsen the general medical condition of patients. Thus, obesity continues to be a global public health problem due to its increasing prevalence [5, 9].

At the same time, it should be especially noted that excessive increase in body weight and obesity is accompanied by various metabolic disorders, microcirculation disorders, immune status (increased levels of proinflammatory cytokines in saliva, characterizing the systemic proinflammatory state of patients), decreased bone mineral density with prevalence of alveolar bone resorption over reparative processes, which predisposes to the formation and progression of both periodontal pathology and the development of complications, as well as to the development of periodontal disease.

More precisely, obesity can be considered as a general risk factor for periodontitis, assuming that obese patients are more likely to develop complications of dental implantation. Dental implantation with subsequent fabrication of orthopedic structures fixed on them, due to the widespread partial and complete loss of teeth at this stage is one of the most popular methods of dental rehabilitation of patients and is widely implemented in the world and domestic practice [3, 10]. In recent years, significant advances have been made in one of the most important parts of clinical dentistry, which is dental implantology. However, despite the high level of technology development, improvement of characteristics, design, quality of dental implants, as well as improvement of surgical protocols, prosthetics with the use of implants is a rather

complicated area of medicine, because there is a number of serious problems that need to be solved, primarily related to the presence of somatic pathology that negatively affects the course of osseointegration, bone tissue remodeling [1, 4, 5].

The results of studies conducted in this area have shown a high frequency of inflammatory and destructive diseases of peri-implant tissues, as well as shortened survival time of implants in obese patients [6, 8]. Thus, the relevance of works at the present stage devoted to the results of dental implantation in patients with various metabolic disorders should be explained by sporadic studies and revealed contradictory data in this area.

The purpose of the study was to investigate the state of periodontal tissues and oral microflora after dental implantation in obese individuals.

Materials and methods. The study was conducted at the Departments of Orthopedic and Therapeutic Dentistry, in the Dental Clinic of the Azerbaijan Medical University. The work was approved by the Local Ethics Committee of the Azerbaijan Medical University, and informed consent was obtained from all patients. Clinical studies of 90 patients, of which 50 were overweight and 40 with normal body weight, included assessment of general and dental status of the patients. Clinical and microbiological evaluation of dental implantation complications was carried out among 15 patients with obesity and peri-implant mucositis (Group I), 15 patients with metabolic disorders and dental peri-implantitis of mild degree (Group II) and in Group III, which included 20 similar somatic patients without expressed pathological changes in periodontal tissues and peri-implant zone.

The dental status was evaluated on the basis of the dynamics of the values of hygienic and periodontal indices: plaque index according to Quigley and Nein (1962), periodontal index (Periodontal Index, PI, Russel, 1956) – to evaluate the degree of inflammation and destructive changes, index Muhlemann H.R., Cowell I., 1975 to determine the degree of gingival bleeding. The biological material for microbiological studies were washes from the oral cavity. Staphylococci were cultured on yolk-salt agar, streptococci – on blood agar, yeast fungi were cultured on Sabouraud medium. The population level of each group of microorganisms was calculated in CFU/mL of oral flush.

Statistical processing of data was carried out on a personal computer using the Statistica 7.0. application program package and Excell 2013 standard statistical analysis package. The critical level of reliability of the null statistical hypothesis (about the absence of significant differences or factor influences) was taken as $p \leq 0.05$.

Results of the study and their discussion. The present study proves the negative effect of metabolic disorders, excessive body weight and obesity on the state of oral organs and tissues after dental implantation and prosthetic treatment, which was associated with the development of inflammatory-destructive complications, deterioration of the quality of osseointegration, unfavorable course of the rehabilitation period and with the achievement of a comparatively worse final result of the treatment than in individuals not burdened with general organismal pathology.

Evaluation of clinical and laboratory parameters characterizing the course of inflammatory reaction after implantation in obese patients, before the standard and proposed scheme of postoperative therapy, indicated significant violations in the indicators of hygienic and periodontal indices, as well as pronounced pathological disorders in the microbiome of the oral cavity in the main group of patients with obesity and peri-implantitis. Practical results achieved by such studies, in our opinion, are timely detection and management of pain syndrome, reparation of functional state of tissues, improvement of microcirculation and correction of gingival bleeding.

Evaluating the influence of metabolic disorders on the hygienic state of the oral cavity, it can be noted that the development of obesity against the background of intensive deposition of soft dental plaque and further formation of hard dental deposits in the area of the prosthetic construction placed on the implant in somatic patients with peri-implant mucositis and peri-implantitis contributed to the reliable increase ($P<0,05$) of the studied hygienic index values according to Quigley and Nein (Table 1).

Table 1

Oral cavity condition in patients with excessive body weight and complications of dental implantation improvement of microcirculation and correction of gingival bleeding

Index, scores	Patient groups		
	Group I, n=15	Group II, n=15	Group III, n=20
Qugley-Hein Index	1.31±0.027*	2.04±0.051*	0.23±0.019
SBI Index	2.16±0.047*	2.39±0.021*	0
PI index	0.83±0.018*	4.94±0.081*	0

Note: * –indices significantly different from those in group III, at $p<0.05$ (Mann-Whitney U-criterion).

Thus, when evaluating the state of oral hygiene by this index of dental plaque, the amount of soft dental plaque and its prevalence were significantly higher in Group II of patients with obesity and with pathologic peri-implant disorders of severe degree, that is excessive inflammatory reaction, and the minimal index values were registered in the control group of persons without inflammatory changes around the implant – 0.23±0.019 and 2.04±0.05, indices of hygienic index values revealed in the Group II and Group III, respectively. Certain differences were also observed by groups when studying the periodontal index PI data, the values of which in the third control group demonstrated the absence of inflammatory changes in the soft and hard tissues surrounding the implant.

The mean index of PI index after in this group was 0 points; whereas in the first group of patients with obesity and perimucositis the PI index exceeded the control group and amounted to 0.83±0.018 points that spoke about the presence of initial inflammatory process of mild degree. The signs of deep pathological changes of peri-implant soft and hard bone tissue were revealed in the second group of patients with background pathology and peri-implantitis, which corresponded to the values of periodontal index – 4.94±0.081points.

During the research, along with distinct clinical signs of inflammatory process development in peri-implant tissues, represented by intensive plaque deposition, hyperemia, bleeding of gums, bacteriological analysis revealed a reliable increase in the number of oral microbiota representatives, belonging to opportunistic microflora, in particular, it is necessary to note the appearance of periodontopathogenic bacteria (Porphyromonas gingivalis, Prevotella intermedia), which were practically absent in the oral cavity of patients with excessive body weight of the third control group (Table 2).

Table 2

Oral microbiome structure in obese patients

The microorganisms	Patient group					
	Group I, n=15		Group II, n=15		Group III, n=20	
	%	CFU/mL (M±m)	%	CFU/mL (M±m)	%	CFU/mL (M±m)
Lactobacillus spp.	66.7*	$(3.16\pm0.13)\cdot10^2$	73.3*	$(3.88\pm0.08)\cdot10^4$	100	$(7.33\pm0.11)\cdot10^8$
Str. intermedius	26.7	$(3.01\pm0.13)\cdot10^3$	26.7	$(3.12\pm0.07)\cdot10^3$	25	$(1.14\pm0.10)\cdot10^2$
Candida albicans	26.7	$(2.06\pm0.10)\cdot10^4$	33.3	$(1.83\pm0.09)\cdot10^4$	10	$(0.26\pm0.08)\cdot10^2$
Staphylococcus aureus	33.3	$(5.14\pm0.12)\cdot10^4$	40	$(3.89\pm0.21)\cdot10^4$	10	$(1.28\pm0.11)\cdot10^2$
A.actinomycetemcomitans	6.7	$1.16\cdot10^3$	33.3	$(3.24\pm0.20)\cdot10^3$	5	$1.03\cdot10^1$
Porphyromonas gingivalis	13.3	$(1.13\pm0.09)\cdot10^3$	60*	$(2.09\pm0.15)\cdot10^4$	-	-
Prevotella intermedia	-	-	46.7*	$(1.27\pm0.14)\cdot10^3$	-	-

Note: *–statistically reliable difference of the index relative to the control group (by Fisher's exact test).

When studying the statistical significance of differences between the first and second groups with respect to the third control group using Fisher's exact method, it was found that a significant difference in the indicators was recorded between the main groups and the control group when assessing the incidence of Porphyromonas gingivalis. At the same time, there was no significant difference in the prevalence and intensity of A. actinomycetamcomitans between these groups.

The table below shows that of the investigated bacterial species Str. intermedius strains were frequently detected in the oral cavity, which was isolated practically in all examined patients regardless of the severity of pathologic changes around the implants. In obesity associated with peri-implantitis the frequency of detection of Candida albicans sharply increased–in 33.3 % of cases, while in this group the frequency of detection of a representative of the genus Gram-negative anaerobic bacteria, and bacteria of the genus Gram-positive anaerobic bacteria Lactobacillus spp. sharply decreased. Thus, the study of the oral cavity microflora showed that in the process of aggravation of clinical signs of pathological disorders in the tissues surrounding the prosthetic constructions on the implants, there was a tendency to increase the quantitative content of bacteria in biological materials that was characteristic for many representatives of opportunistic and pathogenic microflora, only the content of A.actinomycetemcomitans in the contents of the oral cavity in the patients with peri-implantitis and in the patients of the control group did not differ significantly.

When analyzing the results of microbiological studies, it also becomes obvious that obesity creates unfavorable conditions for the development and functional state of the oral cavity microflora, having pronounced bacteriostatic properties against representatives of normal microbiota. Thus, in the course of studies in the first and second groups, a pronounced advantage of some types of virulent microorganisms capable of participating in the development of inflammatory periodontal diseases and complications of dental implantation was noted. The following pathogenic microorganism species were detected in the oral cavity of obese patients with inflammatory and destructive complications: A. actinomycetamcomitans,

Porphyromonas gingivalis. Practically no virulent microorganisms were detected in the control group, which was explained by the absence of pathologic changes in the gingival area.

Yarov, Yu.Yu, et al. with the purpose to evaluate the effectiveness of the proposed differential maintenance treatment in patients who underwent dental implantation, conducted evaluation the outcomes based on the results of the clinical dynamic observation and the data of laboratory tests (microbiological, immunological and rheological), depending on the initial level of the Green-Vermillion's HI after the implant prosthetics stage, according to the clinical and radiologic control in the long-term (1 year). The obtained clinical and radiological result showed that more effective oral hygiene due to adequate frequency leads to timely eradication of periodontopathogens and normalization of microbiocenosis. This reduces the effect of lipopolysaccharide on osteoclasts, which helps to reduce the intensity of osteoclastic resorption of bone tissue in the area of functioning implants. Our study showed the similar results, but we evaluated both healthy people and patients with obesity [15].

Aizenbud I, et al. sought to gain insight into the fundamental mechanisms linking each systemic condition to metabolic syndrome using an Internet search of two databases: MEDLINE and Embase. They concluded that metabolic syndrome was positively associated with periodontal disease. The associated mechanisms between periodontal disease and metabolic syndrome components were elevated proinflammatory mediators (including elevated CRP and some cytokines) and persistent infiltration of periodontal pathogenic bacteria into the bloodstream. Thus, periodontal status should be assessed as part of metabolic syndrome treatment, as it significantly influences the onset and progression of metabolic syndrome [2, 7, 8].

All works mentioned above as well as our study can help a greater understanding of the interactions between these conditions and dental diseases and may pave the way for more effective treatments that take into account the broader impact of dental disease treatment on the overall treatment of metabolic diseases, and vice versa.

Conclusion

Development of obesity against the background of intensive deposition of soft dental plaque and further formation of hard dental deposits in the area of the orthopedic structure planted on the implant in somatic patients with peri-implant mucositis and peri-implantitis contributed to a reliable increase ($P<0.05$) in the values of the studied hygiene index according to Quigley and Hein and the PI index. Signs of deep pathological changes in the peri-implant soft and hard bone tissue were detected in the Group II (PI=4.94±0.081 points).

The comparative analysis of clinical and microbiological course of the early postimplantation and postprosthetic period in the patients who underwent the dental implantation has shown more expression of the inflammatory symptomatology along with the decrease of the reparative processes intensity in comparison with the clinical picture of the patients with the similar background pathological condition but without pathological changes in the peri-implant soft and hard tissues. The data obtained in the course of the present studies allow to reconstruct the clinical and microbiological picture of various forms of complications of dental implantation in patients with excessive body weight.

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STUDY OF SENSITISATION TO MOULD FUNGI IN PATIENTS WITH MICROBIAL ECZEMA

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There is no single concept of the etiology of eczema, and the complex links in of the pathogenesis of eczema, the formation of which reflects the dynamic and interrelated changes in the functions of various organs and systems of the body. One of the most important pathogenetic mechanisms of eczema, as well as allergy in general, is the development of immune reactions caused by exogenous allergens. Unlike pollen allergens, mold allergens are more complex in structure and cause not only IgE-mediated allergy, as each of their components (spores, mycelium, hyphae) to a certain extent has allergenic potential and can cause a multidirectional immune response. 78 (90.7 %) patients had an increased level of specific IgE to at least one of the investigated mold allergens. The highest concentration level of IgE (more than 17.5) was observed for the allergen of the fungus Penicillium notatum in 15.1 % of patients with chronic microbial eczema. The results of the study can be the basis for further study of mycogenic sensitisation.

Key words: sensitisation, moulds, microbial eczema, IgE.

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ДОСЛІДЖЕННЯ СЕНСИБІЛІЗАЦІЇ ДО ПЛІСНЯВИХ ГРИБІВ У ХВОРИХ НА МІКРОБНУ ЕКЗЕМУ

Немає єдиної концепції етіології екземи, недостатньо вивчені складні ланки патогенезу екземи у формуванні яких відображена дінамічна і взаємопов´язана зміна функцій різних органів і систем організму. Одним з важливих патогенетичних механізмів екземи, як і взагалі алергії, є розвиток імунних реакцій, обумовлених екзогенними алергенами. На відміну від пилкових алергени пліснявих грибів є більш комплексними за своєю структурою та спричинюють не лише IgE-опосередковану алергію, оскільки кожен з їх компонентів (спори, міцелій, гіфи) певною мірою володіє алергенним потенціалом і здатний зумовити різноспрямовану імунну відповідь. У 78 (90,7 %) хворих виявлено підвищений рівень специфічного IgE хоча б одного з досліджувальних алергенів до пліснявих грибів. Найвищий рівень концентрації IgE (більше 17,5) спостерігався до алергену гриба Penicillium notatum у 15,1 % хворих на хронічну мікробну екзему. Отримані результати дослідження можуть бути основою для подальшого вивчення мікогенної сенсибілізації.

Ключові слова: сенсибілізація, плісняві гриби, мікробна екзема, IgE.

The study is a fragment of the research project "Development of advanced methods for diagnosing and comprehensive treatment of chronic dermatoses and infections primarily transmitted sexually, taking into account the identification of additional factors significant in the pathogenesis of these diseases", state registration No. 0117U000272.

Today, the focus of scientific medical research is not only on studying the causes of pathological processes but also on the mechanisms of resistance to their occurrence and development. A key aspect of assessing resistance to risk factors involves studying molecular and cellular protection mechanisms, as well as the body's immunological parameters [1, 4]. Chronic recurrent eczema, cosmetic defects, and itching are additional stress factors that contribute to psychovegetative disorders and exacerbate the severity of the disease. As a result, a "vicious circle" is formed: stress → dermatosis → stress [2, 3, 5]. It should be noted that the conditions leading to the persistence of eczema, regardless of disease remission, act as an additional