Original Research

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Improvement of methodological aspects treatment of the inflammatory parodontal diseases under the realization personality preventive programs in patients with congenital disorders adaptation and compensatory reserve of maxillary complex

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Abstract

AIM. Development strategic base of programs primary and secondary personality preventive maintenances of the inflammatory of parodontal diseases beside patients with congenital pathology of maxillary complex.

MATERIALS AND METHODS. When using anamnestic, clinical, x-ray and laboratory methods of the study were examined 35 patients of the group of the traditional prophylactic of the inflammatory parodontal diseases with congenital pathology of the upper lip and palate and 40 persons of the group of personality prophylactic of the inflammatory parodontal diseases with similar pathology at the age from 6 to 30 years. In the 1st group when planning and undertaking action within the framework of primary and secondary prophylactic of the inflammatory parodontal diseases were used general acceptance traditional methods, realized parodontologist in respect of given contingent patients. To participant of the 2nd group was used individual approach, which was actively developed and was used by us for 10 years amongst stationary patients with congenital disorders of maxillary complex. Clinical and laboratory diagnostics included bacterial and cytological study of the contents of teeth-gingival groove and parodontal pocket.

RESULTS. Personality medical-preventive actions of parodontal nature beside patients with congenital disorders of adapted-compensatory of the reserve of maxillary complex under dynamic observation on length three years have allowed obtaining the significant reduction prevalence and intensities of parodontal pathology. Active realization of personality medical-preventive action of dentistry nature within the framework of regular checkup promoted maintenance good level hygienic condition of oral cavity, making the happy circumstances not only for liquidation all parodontal manifestations of the pathological process, but also for achievement by rack to stabilizations got result, improvement of the condition hard tissue of teeth and mucous of oral cavity.

CONCLUSIONS. Active realization three stages of dispensaryzation promoted significant increasing efficiency of the revealing the persons with congenital pathology of maxillary complex, planning the individual programs of the prophylactic, full-fledged systematic observation and checking on their realization.

Keywords: congenital pathology, maxillary complex, parodont, parodontal pocket

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Совершенствование методологических аспектов лечения воспалительных заболеваний пародонта при осуществлении персонализированных программ профилактики у пациентов с врожденным нарушением верхнечелюстного комплекса

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Резюме

ЦЕЛЬ. Разработка стратегических основ программ первичной и вторичной персонализированной профилактики воспалительных заболеваний пародонта у больных с врожденной патологией верхнечелюстного комплекса.

МАТЕРИАЛЫ И МЕТОДЫ. С использованием анамнестических, клинико-рентгенологических и лабораторных методов исследования нами были обследованы 35 пациентов группы традиционной профилактики воспалительных заболеваний пародонта с врожденной патологией верхней губы и нёба и 40 человек группы персонализированной профилактики заболеваний пародонта с аналогичной патологией в возрасте от 6 до 30 лет. В первой группе при планировании и проведении мероприятий в рамках первичной и вторичной профилактики воспалительных заболеваний пародонта использовались общепринятые традиционные методы, осуществляемые врачами-пародонтологами в отношении данного контингента больных. К участникам второй группы применялся индивидуальный подход, который активно разрабатывался и применялся нами в течение 10 лет среди стационарных больных с врожденными нарушениями верхнечелюстного комплекса. Клинико-лабораторная диагностика включала бактериоскопическое и цитологическое исследование содержимого зубодесневой борозды и пародонтального кармана.

РЕЗУЛЬТАТЫ. Персонализированные лечебно-профилактические мероприятия пародонтологического характера у больных с врожденным нарушением адаптационно-компенсаторного резерва верхнечелюстного комплекса при динамическом наблюдении на протяжении трех лет позволили добиться значительного снижения распространенности и интенсивности патологии пародонта. Активная реализация персонализированных лечебно-профилактических мероприятий стоматологического характера в рамках регулярных осмотров способствовала поддержанию хорошего уровня гигиенического состояния полости рта, созданию благоприятных условий не только для ликвидации всех пародонтологических проявлений патологического процесса, но и для достижения стойкой стабилизации полученных результатов, улучшению состояния твердых тканей зубов и слизистой оболочки полости рта.

ВЫВОДЫ. Активная реализация трех этапов диспансеризации способствовала значительному повышению эффективности выявления лиц с врожденной патологией верхнечелюстного комплекса, планирования персонализированных программ профилактики, полноценному систематическому наблюдению и контролю над их осуществлением.

Ключевые слова: врожденная патология, верхнечелюстной комплекс, пародонт, пародонтальный карман

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INTRODUCTION

The high prevalence of inflammatory periodontal diseases in the general population, along with their tendency to approach a near-universal occurrence in the context of increasing severity and disease progression, as well as the proportional deterioration in quality of life relative to the activity of the pathological process, necessitates the continuous improvement of methods for early diagnosis and the implementation of effective preventive and therapeutic interventions across different age groups [1–4].

Scientific studies conducted over the past ten years by staff of the Department of Therapeutic Dentistry at the State Educational Institution of Postgraduate Medical Education in the Field of Healthcare of the Republic of Tajikistan, together with their clinical experience in treating periodontal patients, convincingly demonstrate that meaningful improvements in periodontal disease

prevention can only be achieved when each individual perceives the personalized nature of preventive programs [5–10].

Individual prevention of inflammatory periodontal diseases is aimed at identifying risk factors and eliminating them at the level of the individual patient. Some of these factors are common at the regional level and within specific age groups; therefore, they can and should be addressed through community-based and group prevention programs [11; 12].

However, at present, the integrated system for the prevention of dental diseases, particularly periodontal pathology, is disrupted [13].

For this reason, individual prevention of major dental diseases currently accounts for nearly all measures aimed at eliminating risk factors for the development and progression of inflammatory periodontal diseases, with a focus on lifestyle characteristics as well as the somatic and oral health status of a specific patient.

Nevertheless, without the implementation of a new population behavior model that assumes responsibility for one's own oral health status, it is impossible to achieve meaningful improvements in the quality of dental care delivery or a reduction in the incidence of diseases of the oral cavity and its tissues [14].

During periodontal examination, in addition to identifying the microbial factor, it is essential to consider other key aspects of the pathology, including socio-economic status, systemic diseases, and risk factors. This enables appropriate planning of preventive and therapeutic strategies for periodontal diseases [15].

In light of the above, neglecting the etiopathogenetic relationship and interdependence between congenital maxillofacial anomalies and periodontal pathology, as well as underestimating the importance of preoperative sanitation prior to surgical correction of congenital abnormalities of the maxillary complex, creates significant challenges for the development and implementation of periodontal disease prevention programs. Furthermore, the development of a personalized preventive program requires the identification of individual patient-specific characteristics associated with this nosological entity, and accordingly, the determination of preventive methods and tools based on the results of a comprehensive individualized diagnostic assessment.

It is therefore evident that modern approaches to organizing this field of activity are necessary. This includes the development and planning of individualized preventive measures aimed at reducing the incidence of periodontal pathology, improving the effectiveness of periodontal interventions, and defining priority directions for primary and secondary prevention of inflammatory periodontal diseases in patients with congenital impairment of the adaptive-compensatory capacity of the maxillary complex.

AIM

Development of the fundamental framework for primary and secondary personalized prevention programs for inflammatory periodontal diseases in patients with congenital pathology of the maxillary complex.

MATERIALS AND METHODS

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Local Ethics Committees of the State Educational Institution of Postgraduate Medical Education in the Field of Healthcare of the Republic of Tajikistan and the Avicenna Tajik State Medical University. The results of the ethical review confirmed that the study protocols complied with international regulatory and ethical standards, including the World Medical Association Declaration of Helsinki (1964) and the Ethical Principles for Medical Research Involving Human Subjects, as amended by the 64th General Assembly of the WMA (2013).

Inclusion criteria comprised patients with congenital cleft lip and palate, patients with maxillary constriction, age ranging from 6 to 30 years, individuals presenting with periodontopathogenic and predisposing oral risk factors, as well as patients with localized forms of gingivitis and periodontitis. Exclusion criteria included age below 6 and above 30 years, and absence of congenital maxillofacial anomalies or periodontal pathology.

A total of 35 patients were examined in the conventional periodontal prevention group with congenital cleft lip and palate, and 40 patients were included in the personalized periodontal prevention group with similar pathology, aged between 6 and 20 years. In the first group, primary and secondary preventive measures for inflammatory periodontal diseases were carried out using standard conventional approaches applied by periodontists for this category of patients. These individuals agreed only to follow-up examinations, citing lack of time and motivation.

In the second group, an individualized preventive approach was implemented, which had been developed and applied over a 10-year period in hospitalized patients with congenital maxillofacial developmental disorders. A critical step prior to group allocation was the assessment of baseline periodontal status, including comprehensive evaluation of all parameters characterizing the pathological condition.

The diagnostic protocol included a range of clinical methods: medical history taking, visual and tactile examination of periodontal tissues, assessment of gingival bleeding, the Schiller–Pisarev test, gingivoscopy, measurement of periodontal pocket depth and gingival sulcus depth, as well as the use of periodontal and oral hygiene indices, including the Green–Vermillion index, PMA index, CPITN, DMFT index, modified periodontal index (PI), and pH measurement of oral fluid. The KOSRE test was also performed, along with radiographic examination. Clinical and laboratory diagnostics further included bacterioscopic and cytological analysis of gingival crevicular fluid and periodontal pocket contents in order to evaluate the impact of preventive and therapeutic interventions on periodontal status, as well as on the structure and metabolic processes of surrounding hard dental tissues.

In the personalized prevention group, the scope and content of preventive and therapeutic measures were individually determined for each patient based on examination findings. These measures included

standardized components such as individualized oral hygiene instruction, complete oral cavity sanitation, elimination of local traumatic factors, daily interdental cleaning using floss and interdental brushes, professional oral hygiene procedures, and supervised tooth brushing with evaluation of technique and correction of identified errors. Additional components included patient motivation toward maintaining optimal oral hygiene and the implementation of maintenance therapy courses.

In the conventional prevention group, similar baseline general measures were performed; however, subsequent management was limited to follow-up examinations using the same clinical and laboratory methods for comparative assessment, without scheduled specialized preventive interventions.

Statistical analysis of the obtained data was performed using the Statistica 9.0 software package and Microsoft Office Excel 2007.

RESULTS

The primary functional and organizational framework for delivering personalized therapeutic and preventive interventions in patients with congenital impairment of the adaptive-compensatory capacity of the maxillary complex, encompassing a series of mandatory sequential stages, should be a hospital-based dental clinic. This structure ensures long-term effectiveness in preventing the onset and progression of inflammatory periodontal diseases.

Since 2015, a dedicated periodontal clinic has been operating at the Department of Maxillofacial Surgery of the Avicenna Tajik State Medical University. The clinical staff of this unit is responsible for diagnosing inflammatory periodontal diseases, assessing disease risk, developing and monitoring individualized dental preventive and therapeutic programs, and, when necessary, performing their modification in patients with congenital impairment of the adaptive-compensatory reserve of the maxillary complex.

Preliminary clinical examination of patients with congenital maxillofacial anomalies, as well as the identification of pathways to achieve the aims and objectives of the study, determined the necessity of establishing a structured system in which the dentist operating within a hospital-based setting is actively involved at all stages of periodontal disease progression, including remission, as well as in the long-term follow-up of patients with congenital cleft lip and palate and associated periodontopathogenic risk factors. This is ensured through an active recall system with individually defined follow-up intervals.

To address these challenges in patients with congenital maxillofacial pathology, a dispensary-based management model was developed and implemented into clinical practice. This model enables a differentiated approach to the prevention of inflammatory periodontal diseases based on a three-stage principle: (1) dispensary selection, involving identification of patients with periodontal risk factors eligible for registration; (2) dispensary registration of patients with congenital cleft lip and palate requiring structured periodontal follow-up; and (3) dispensary monitoring, including implementation of individualized dental preventive and therapeutic interventions and dynamic assessment of their effectiveness.

In order to ensure timely and targeted personalized periodontal preventive measures in patients with congenital cleft lip and palate, a diagnostic complex was developed, in which the integral mechanisms of periodontal disease development and its external clinical manifestations are systematically represented. The selection of 15 most relevant periodontal assessment methods was performed using a method of non-strict a priori ranking. This set included the most informative and clinically feasible indices that reliably reflect the patient's dental status and enable objective monitoring of periodontal tissue condition in patients with congenital maxillofacial disorders.

The results of identifying the most significant indicators of periodontal tissue status represent an important contribution to the refinement of methodological approaches for the diagnosis of inflammatory periodontal diseases within personalized preventive programs in patients with congenital cleft lip and palate.

Following clinical interviews and primary diagnostic assessment during the dispensary screening stage, patients were registered and allocated into the following study groups:

– patients with clinically intact periodontium (n = 5);

– patients with clinically intact periodontium presenting periodontopathogenic and predisposing oral risk factors (supragingival and subgingival soft and hard deposits, impaired functional loading of periodontal tissues, pathological changes in oral structures, retention factors, poor oral hygiene status, and harmful habits) (n = 15);

– patients with localized forms of gingivitis (n = 20);

– patients with localized forms of periodontitis (n = 16);

– patients with generalized forms of gingivitis (n = 12);

– patients with generalized forms of periodontitis (n = 7).

Taking into account the characteristics of periodontal disease prevalence and the presence of periodontal risk factors in the oral cavity of patients with congenital maxillofacial pathology, dispensary observation groups were established as follows:

– Group I – patients requiring active prevention or treatment of inflammatory periodontal diseases;

– Group II – patients receiving secondary prevention or maintenance therapy for periodontal diseases;

– Group III – rehabilitation group undergoing routine periodontal control examinations.

At the second and third stages of dispensary management, patients with congenital maxillofacial anomalies underwent comprehensive examination using highly informative diagnostic methods for early detection and prognostic assessment of inflammatory periodontal diseases. The depth and extent of pathological involvement of periodontal structures were assessed using periodontal indices as well as simple and extended gin-

givoscopy, enabling objective evaluation of periodontal status dynamics and the effectiveness of preventive and therapeutic interventions during follow-up.

According to the obtained data, baseline values of the PMA index (19.12 ± 1.10 and 18.20 ± 0.92, respectively) and the PI index (Russell periodontal index) (0.72 ± 0.09 and 0.69 ± 0.08, respectively) were comparable between both groups of patients with congenital impairment of the adaptive-compensatory capacity of the maxillary complex and corresponded to the severity of the inflammatory process in periodontal structures.

In the personalized prevention group, after one year, a marked clinical improvement in periodontal status was observed: PMA index values decreased by 2.3-fold (56.8%), while the Russell periodontal index (PI) decreased by 2.3-fold (56.5%). In contrast, in the conventional prevention group, these indices remained largely unchanged (PMA: 19.12 ± 1.10% vs. 18.98 ± 0.76%; PI: 0.72 ± 0.09% vs. 0.68 ± 0.07%).

As demonstrated by the obtained data, in the conventional prevention group of patients with congenital cleft lip and palate, no significant changes in periodontal status were observed throughout the follow-up period. Baseline values of the above-mentioned indices were 19.12 ± 1.10% and 0.72 ± 0.09%, respectively, while after three years they were 18.05 ± 0.92% and 0.65 ± 0.07%, respectively. Thus, the reduction of the inflammatory process in periodontal tissues amounted to only 5.60% for the PMA index and 9.72% for the modified Russell index compared to baseline values.

For a more precise objective assessment of periodontal status in patients with congenital maxillofacial disorders during dispensary follow-up, Schiller–Pisarev testing and gingivoscopy were additionally applied. After three years of follow-up in the conventional prevention group, clinical deterioration indicative of progression of the pathological process was observed in three patients (8.57%) who initially presented with clinically intact periodontium. Furthermore, extended gingivoscopy revealed grade I iodine positivity (yellow staining of gingival mucosa), indicating the development of inflammatory changes in periodontal tissues.

In comparative analysis, in the personalized prevention group, following the active implementation of a comprehensive preventive and therapeutic protocol – including professional oral hygiene (removal of supragingival and subgingival calculus and plaque), use of anti-inflammatory therapeutic toothpastes, and low-intensity laser therapy (2–7 sessions) – signs of gingival inflammation were eliminated. This was confirmed by a pale-yellow staining response to Lugol's solution, absence of epithelial whitening during the Këchke test, and tissue blanching upon application of 4% acetic acid. An exception was observed in one patient (2.5%) with chronic generalized mild periodontitis in remission, in whom grade I iodine positivity (yellow staining) persisted.

In the conventional prevention group (n = 30) with an initially diagnosed intact periodontium, gingivoscopy enabled not only the refinement of the extent of pathological involvement in patients with congenital cleft lip and palate combined with periodontal pathology during follow-up examinations, but also the detection of a subclinical, visually non-detectable inflammatory gingival response at the end of the observation period in 2 individuals (6.7%). Accordingly, this parameter may be considered an important preclinical diagnostic test, allowing timely identification of patients with congenital impairment of the adaptive-compensatory capacity of the maxillary complex who require comprehensive diagnostic evaluation and dynamic follow-up by a periodontist.

Among the examined cohort, data regarding the need for therapeutic and preventive periodontal care were reflected in the Community Periodontal Index of Treatment Needs (CPITN). The findings demonstrated a relatively high prevalence of periodontal involvement in both groups, amounting to 80.8% and 81.3% in the personalized and conventional prevention groups, respectively.

However, following active implementation of a comprehensive preventive and therapeutic program in patients with congenital maxillofacial impairment, the proportion of individuals with healthy periodontal segments in the personalized prevention group increased to 78.6% after 6 months of follow-up, representing a 4.1-fold improvement compared with baseline levels (19.2%).

At 3 years post-intervention, periodontal status in the personalized prevention group stabilized, with only 9.9% of patients requiring periodontal treatment, which was 8.2 times lower than baseline values (80.8%) prior to implementation of the preventive program.

As a result of the active implementation of personalized preventive and therapeutic measures, the most significant improvements were observed in oral hygiene status, contributing to the elimination of periodontal risk conditions, cessation of inflammatory-dystrophic progression, and long-term stabilization of periodontal structures throughout the observation period in patients with congenital maxillofacial anomalies. After 3 years, the outcomes achieved during the first year of dispensary follow-up remained stable in the personalized prevention group, with a predominance of individuals demonstrating good and satisfactory oral hygiene levels. In contrast, over the same observation period, the conventional prevention group continued to be characterized by a predominance of patients with poor oral hygiene status, accounting for 18 individuals (51.4%) out of 35 examined subjects.

It is well established that oral hygiene status is closely associated with the pH of oral fluid, which represents a key homeostatic parameter influencing plaque accumulation and calculus formation. At baseline, both study groups were stratified according to oral hygiene status in relation to salivary pH values. Poor and unsatisfactory oral hygiene associated with a shift of pH toward acidic values was observed in 8 patients (22.9%) in the conventional prevention group and in 9 individuals (22.5%) in the personalized prevention group. This indicates that the hydrogen ion concentration of oral fluid has a direct impact on oral hygiene status, thereby possessing diagnostic value as a criterion for the development of periodontal pathology and serving as an early diagnostic indicator.

In the course of the study, we recorded a correlation between the level of oral hygiene and the hydrogen ion concentration (pH) of the oral environment surrounding the teeth and periodontal tissues. After three years of dispensary follow-up in the conventional prevention group, whose participants used neutral toothpaste formulations, both oral hygiene indices and salivary pH values remained largely unchanged.

In contrast, in the group of patients who underwent individualized interventions aimed at preventing the onset and progression of inflammatory periodontal diseases – including personalized selection of oral hygiene products, restorative materials, topical medications for applications and rinses, management of carious lesions, as well as treatment of gastrointestinal and other systemic conditions in coordination with an internist – the proportion of individuals demonstrating good and satisfactory oral hygiene status with neutral salivary pH increased from 11 patients (27.5%) to 22 patients (55.0%), i.e., a twofold increase.

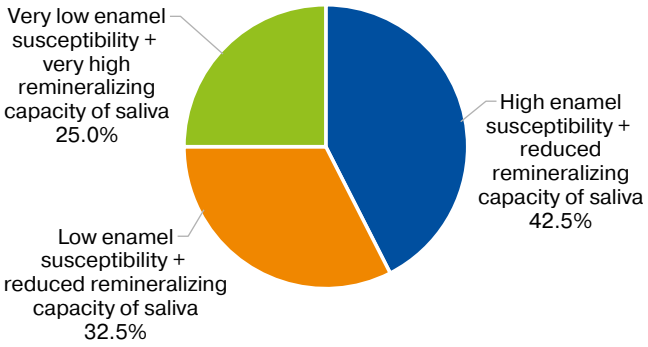

Fig. 1. Distribution of the personalized prevention group according to enamel susceptibility to acids and remineralizing capacity of oral fluid

Рис. 1. Распределение группы индивидуальной профилактики в зависимости от податливости эмали к действию кислот и реминерализирующей способностью ротовой жидкости

However, a decrease in salivary pH, which serves as an exchange medium for hard and soft oral tissues, creates favorable conditions not only for the development of periodontal pathology but also for focal enamel demineralization. This process is associated with the accumulation of dental plaque and biofilm containing acidogenic microorganisms. Therefore, during the examination of patients with congenital impairment of the adaptive-compensatory capacity of the maxillary complex, enamel resistance was additionally assessed using the clinical test of enamel remineralization rate (TER test), which allowed evaluation of the remineralizing capacity of oral fluid.

The obtained data indicate that prior to the study, patients in both the conventional and individualized prevention groups were approximately evenly distributed according to varying degrees of enamel susceptibility to acid exposure and differing levels of salivary remineralization capacity (Fig. 1).

As shown in Fig. 2, in the personalized prevention group of patients with congenital maxillofacial anomalies combined with inflammatory periodontal diseases, individuals were initially predominantly characterized by high enamel susceptibility to acid exposure combined with reduced remineralizing capacity of oral fluid (n = 17; 42.5%), followed by those with low enamel susceptibility and reduced remineralizing capacity of oral fluid (n = 13; 32.5%), as well as those with very low enamel susceptibility to acid action and very high remineralizing capacity of oral fluid (n = 10; 25.0%).

In the conventional prevention group of patients with congenital cleft lip and palate combined with inflammatory periodontal diseases, the baseline distribution of the above parameters was 13 (34.3%), 12 (34.3%), and 10 (28.6%), respectively.

During the three-year follow-up period in the conventional prevention group, enamel resistance remained largely unchanged compared with baseline values, demonstrating no significant dynamic improvement in the structural resistance of dental hard tissues.

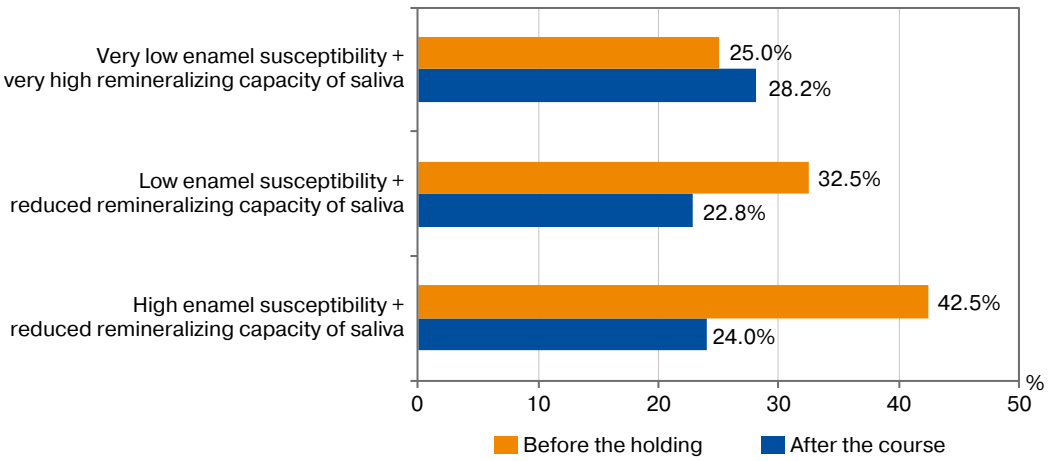

Fig. 2. Distribution of patients in the personalized prevention group according to TER test (enamel remineralization rate) during dispensary follow-up in patients with congenital maxillofacial pathology (CMFP)

Рис. 2. Распределение пациентов индивидуальной профилактики по результатам КОСРЭ-теста на этапах диспансерного наблюдения пациентов с врожденной челюстно-лицевой патологией (ВЧЛП)

In parallel, in the personalized prevention group, following the implementation of a comprehensive dental therapeutic and preventive protocol – including a course of remineralizing therapy combined with low-intensity laser therapy, as well as the home use of R.O.C.S. Medical Minerals gel and R.O.C.S. toothpaste with the Mineralin complex, and, in cases of dentinal hypersensitivity, desensitizing agents (Lacalut Sensitive, Sensodyne Total Care, Asepta Sensitive) – the proportion of individuals with very low enamel susceptibility and high remineralizing capacity of saliva increased from 10 patients (25.0%) to 22 patients (55.0%), representing a 2.2-fold increase.

The number of patients with low enamel susceptibility to acid exposure and reduced remineralizing capacity of oral fluid decreased from 13 (32.5%) to 7 (17.5%), while the proportion of individuals with high enamel susceptibility and reduced remineralizing capacity of oral fluid decreased from 17 (42.5%) to 11 (27.5%), corresponding to a 1.6-fold reduction.

Considering that inflammatory processes in periodontal tissues stimulate the cariogenic activity of dental plaque and contribute to a reduction in the pH of oral and gingival fluids, thereby promoting caries development, it was deemed essential for the successful implementation of personalized periodontal prevention programs to assess the prevalence and severity of dental caries status in both study groups.

The analysis demonstrated a high baseline prevalence of dental caries in both the conventional and personalized prevention groups (29 patients, 82.9%, and 33 patients, 82.5%, respectively). However, following the active implementation of core principles of personalized dental preventive care, after three years of dispensary follow-up, caries prevalence in the personalized prevention group stabilized at 85.0% (34 patients), whereas in the conventional prevention group this indicator continued to increase steadily, reaching 97.1% (34 patients). Mathematical analysis showed that the increase in caries prevalence over the three-year observation period amounted to 14.2% in the conventional prevention group, compared with 2.5% in the personalized prevention group relative to baseline values.

One of the primary objectives in the prevention of inflammatory periodontal diseases is the identification of risk factors reflected in cytological and bacterioscopic parameters, which often precede clinical manifestations. The obtained cytobacterioscopic data indicated that at baseline, in patients with congenital impairment of the adaptive-compensatory capacity of the maxillary complex combined with inflammatory periodontal diseases, both study groups exhibited leukocytes, epithelial cells, macrophages, as well as elements of *Candida albicans* in smears obtained from the gingival sulcus and periodontal pockets.

Cytomorphological assessment of imprint smears revealed immature epithelial cells with a nucleus-to-cytoplasm ratio of 1 : 2, indicating disruption of the epithelial lining within the periodontal pocket. During the first year of follow-up in the personalized prevention group, a reduction in cellular components of gingival fluid was observed: leukocytes decreased to 6.50 ± 0.13 compared with the baseline 11.4 ± 0.28 (1.8-fold reduction), macrophages decreased to 0.28 ± 0.05 versus 0.43 ± 0.07 (1.5-fold reduction), epithelial cells decreased to 3.8 ± 0.12 (1.5-fold reduction), and yeast-like fungal elements decreased 2.5-fold.

After three years of dynamic observation, significant changes were recorded in the composition of gingival crevicular fluid and periodontal pocket contents in this group. The quantitative levels of leukocytes and epithelial cells decreased by 2.7-fold and 3.2-fold, respectively, compared with baseline values, alongside an almost complete absence of pathogenic coccal and fungal microbiota.

In the conventional prevention group, no substantial temporal changes were observed in the composition of gingival crevicular fluid and periodontal pocket contents throughout the follow-up period. Accordingly, no statistically or clinically relevant differences were identified between cytomorphological parameters obtained at different observation points and baseline values.

At the same time, a slight decrease in *Candida albicans* elements was recorded (to 1.8 ± 0.03 per field of view). However, this finding was accompanied by a shift toward maturation of pseudomycelial forms and a pronounced predominance of coccal microflora, which extensively covered the microscopic fields in the majority of patients. These cytomicrobiological characteristics indicate persistence and progression of the inflammatory process within the structural components of periodontal tissues, reflecting an unfavorable microbial and cytological profile under conditions of conventional preventive management.

DISCUSSION

Three-year follow-up interventional studies conducted among patients with congenital maxillofacial complex pathology demonstrated a favorable trend in clinical indices reflecting inflammatory activity within periodontal tissues.

In the personalized prevention group, a pronounced reduction in periodontal inflammation was observed, with regression rates of 94.4% for the papillary-marginal-alveolar index and 82.6% for the modified Russell Periodontal Index (PI) compared with data obtained at earlier stages of dispensary follow-up. The statistically significant decrease in the modified Russell Index corresponded to a periodontal status categorized as a risk level for the development of inflammatory periodontal diseases, primarily due to the presence of patients with generalized periodontitis in remission. In contrast, prior to the implementation of individualized periodontal preventive measures, the modified Russell Index reflected an initial stage of inflammatory involvement within periodontal structures.

Comparative analysis between the personalized and conventional prevention groups demonstrated that in the former, the reduction in periodontal disease prevalence reached 87.7% relative to the three-year follow-up data, whereas in the conventional prevention group an increase in periodontal pathology was observed, amounting to 7.4% (baseline and three-year values: 88.7% and 81.3%, respectively).

The critical role of oral hygiene should be emphasized, as subgingival and supragingival mineralized deposits are regarded as a key microbial etiopathogenic factor in inflammatory periodontal diseases. Their dynamic control represents an essential component of preventive strategies in patients with congenital impairment of the adaptive-compensatory capacity of the maxillofacial complex.

Based on the obtained findings, it can be concluded that prevention programs for inflammatory periodontal diseases in this patient cohort should include targeted interventions aimed at enhancing metabolic processes in dental hard tissues and periodontal structures, as well as reducing dental plaque accumulation, thereby exerting a beneficial effect on the adjacent gingival tissues.

The presented results further confirm that traditional preventive and therapeutic approaches do not fully meet the requirements for effective prevention of inflammatory periodontal diseases and dental caries. Conversely, the implementation of personalized preventive programs, incorporating a комплекс of measures aimed at eliminating both cariogenic and periodontopathogenic conditions in the oral cavity, enables a significant reduction in the incidence of major dental diseases in patients under dispensary supervision for congenital maxillofacial abnormalities, thereby improving the overall condition of periodontal tissues.

CONCLUSION

The obtained data indicate that personalized therapeutic and preventive interventions based on a three-year dynamic follow-up in patients with congenital impairment of the adaptive-compensatory capacity of the maxillary complex, combined with inflammatory periodontal diseases, enable a substantial reduction in both the prevalence and severity of periodontal pathology.

The application of the papillary-marginal-alveolar index and the modified Russell Periodontal Index demonstrated high diagnostic accuracy within the framework of personalized prevention of inflammatory periodontal diseases in patients with congenital maxillofacial abnormalities, allowing for the registration of virtually all clinically detectable manifestations of periodontal pathology, ranging from inflammatory changes to structural periodontal destruction.

Cytological and bacterioscopic methods contribute to the identification of etiological factors in the development of inflammatory periodontal diseases within the examined cohort of patients with congenital maxillofacial disorders. The implementation of a three-stage dispensary follow-up system significantly enhances the effectiveness of identifying individuals at periodontal risk, supports the planning of individualized preventive programs, and ensures comprehensive and systematic monitoring of their execution.

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AUTHOR'S CONTRIBUTION

All the authors made equal contributions to the publication preparation in terms of the idea and design of the article; data collection; critical revision of the article in terms of significant intellectual content and final approval of the version of the article for publication.

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