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To Compare the Dynamics of the Ionic Composition of Saliva and the State of Blood Microcirculation in the Oral Mucosa during the Treatment of Dental Anomalies in Children with Chronic Gastroduodenitis

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Relevance. Anomalies of the maxillary system (DCS) occupy the third place in terms of prevalence after caries and periodontal diseases. According to modern concepts, they are among the multifactorial diseases that arise as a result of a complex interaction of hereditary and exogenous factors, and none of them can be the only cause of the development of dental anomalies (ZFA). The frequency of HFA in various regions of our country ranges from 11.4 to 71.4%. HFA occurs under the influence of genotypic, phenotypic and environmental factors. Among them, improper artificial feeding, bad habits, premature loss of milk molars, frenulum abnormalities, impaired functions of chewing, speech, breathing, swallowing, and previous diseases play a role. The number of anomalies in the period from the beginning of the formation of a milk bite to the beginning of a replacement bite, according to a number of authors, increased by 15-25%, during the period of permanent bite it decreased by 7-14%, that is, self-regulation of PH was observed on average in 8-11%. The percentage of HPV in people with other dental diseases (caries, periodontal diseases) increased significantly, averaging 58.5%. In the presence of common diseases of the body, it increases to 74.6%.

The structure of anomalies of teeth, dentition and occlusion is approximately the same. The most common are neutral occlusion with anomalies of tooth position -39%, deep - 23%, distal - 29% and mesial - 13%. According to the survey conducted by R.K. Aliyeva (1999) in Baku, the frequency of deep bite is 17.8%, open bite is 7%, cross bite is 1.9%. In Turkmenistan, the frequency of PHA was 23.4% at a concentration of fluoride in drinking water of 2.7-3 mg/l and 44.8% at a concentration of less than 0.5 mg/L. PHA contributes to the occurrence and development of other dental diseases. Children with HFA are much more likely to have such pathologies as caries and periodontal diseases than healthy children.

All patients were divided into groups. The 1st group included 90 children with dentoalveolar abnormalities (HFA) (44 girls and 46 boys) without gastrointestinal pathology, the 2nd - 62 patients (34 girls and 28 boys) with HFA abnormalities and gastroduodenal pathology, and the 3rd - 28 children without HFA suffering from chronic gastroduodenitis (HCG). 30 practically healthy children, i.e. persons without pathology of the gastrointestinal tract and without HPV, were grouped into a control group. The distribution of patients by gender and age is shown in table 1. All patients with HFA underwent a clinical examination, including anamnesis collection and examination. All children were imprinted; control and diagnostic models for biometric measurements were made. X-ray examination (orthopantomography, telerentgenography and intraoral contact radiography) was used as additional research methods. The diagnosis was made on the basis of Engl's classification, supplemented by the classification of Kalvelis D.A. and the classification of anomalies of teeth and jaws of the Department of Orthodontics and Pediatric Prosthetics of MMSI. The study included children with compensated and subcompensated forms of caries, without periodontal pathology (the PMA index ranged from 0-20%). The pathology of the gastroduodenal zone was established on the basis of a comprehensive clinical and morphological examination and fibrogastroduodenoscopy, contrast radiography of the results of endoscopic data. The distribution of patients into groups was

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carried out in accordance with the classification of diseases of the digestive organs in children. In the selection of patients, patients with chronic pathology of the hepatobiliary and urinary systems were excluded [1.3.5.7.9.11.12].

Dental anomalies (DFA) should be considered as a pathology accompanied not only by aesthetic, morphological, but also functional disorders that lead to changes in the mechanical and chemical processing of food. Treatment of HPV is a long process involving the wearing of various orthodontic devices made of acrylic plastics. It is well known that a violation of the oral digestion process in combination with prolonged exposure to an orthodontic device in the oral cavity is an important factor in changing the composition of saliva and, in particular, its ionic composition. The ionic composition of saliva largely determines its mineralizing properties, affects the condition of the oral mucosa and the hygienic condition of the oral cavity. However, to date, the effect of the duration of wearing removable plate orthodontic devices with varying degrees of PH on the ionic composition of saliva has not been analyzed.

In the course of this study, the effect of the duration of use of removable plate orthodontic devices made of various plastics on the concentration of the main electrolytes of saliva (potassium and calcium) and the hydrogen index (pH) was evaluated. Table 2 shows the results of a study of the ionic composition of saliva in 27 practically healthy children and 90 patients with varying severity of AF.

Results: As follows from the data presented in Table 2, the hydrogen index, calcium and potassium ion activity indicators in patients with Engl class I anomalies differed slightly from the control group and amounted to 1.26±0.06, 24.1 ± 0.1 and 7.0±0.1, respectively. In class II anomalies, a decrease in pH was observed to 6.75 ± 0.2, the concentration of potassium ions did not exceed 24.06 + 0.1, and the calcium content reached 1.28±0.06. The data obtained seem to be related to the fact that the anomalies of class II according to Engl were characterized by pronounced morphological changes in the oral cavity. This pathology related to sagittal malocclusion and was associated with the distal position of the lower jaw relative to the upper one. Since the occlusal contacts are disrupted, oral digestion changes, therefore, the ionic composition of the oral fluid also changes. If patients had an anomaly of class III according to Engl-Katz, an even greater shift in the composition of saliva was determined; the pH decreased to 6.6 ± 0.1, the concentration of potassium ions was 23.65± 0.1, and calcium reached a value of 1.39± 0.05.

Anomalies in the position of teeth (crowding, tortoanomalia) lead to a violation of microcirculation in periodontal tissues: the number of functioning capillaries decreases due to their compression, venous and lymphatic outflow becomes difficult, the architectonics of superficially located microvessels is disrupted, all this leads to a change in tissue metabolism and the occurrence of tissue hypoxia. Orthodontic treatment is an intervention that changes the biological balance in the tissues of the oral cavity and the body. The nature and severity of these changes depend on the type of materials from which the devices are made. The use of polymer materials in dentistry has shown that in addition to positive qualities, they also have a number of negative properties, which are associated with the effect of plastic components from which the device is made and metal inclusions on the mucous membrane of the oral cavity.

During orthodontic interventions, accompanied by prolonged use of appropriate equipment, overload of individual teeth, severe periodontal complications often develop, tissue nutrition is disrupted due to lymph and hemostasis, and existing tissue hypoxia increases. A leading role in the occurrence of periodontal diseases is played by a violation of the hygienic condition of the oral cavity. Orthodontic equipment contributes to the additional retention of food residues and plaque. Thus, prolonged use of devices that eliminate dental anomalies can contribute to the occurrence of circulatory disorders in the tissues of the gum and oral mucosa (SOPR) and provoke the development of inflammatory diseases of periodontal tissues.

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We examined 90 people using cross-correlation speckle interferometry in order to study the effect of the duration of use of removable orthodontic devices on the state of blood microcirculation in the oral mucosa, as well as changes in the nature of blood circulation depending on the type of material used to manufacture the device. The control group included 30 children aged 7-14 years without HFA and concomitant pathology. Removable orthodontic devices made of self—hardening acrylic plastic Redont were used in 30 people for the treatment of HPV, 33 patients used plastic plates for cold polymerization of Orthocryl, and 27 people used Biocryl C devices obtained on a Ministar device. Patients with a satisfactory level of oral hygiene and no obvious signs of periodontal tissue inflammation were selected for examination. The study assessed the state of microcirculation in patients before orthodontic treatment, after 1, 3, and 6 months of treatment with removable plate devices. For a more complete characterization of microcirculation in periodontal tissues, the signal was recorded in the frontal area of the alveolar processes and in the area of chewing teeth. The light guide was supplied from the vestibular side of the alveolar process, microcirculation indicators were recorded in the marginal gum (MD) and attached gum (PD).

The main problem of pediatrics at present is the growing number of children suffering from gastroduodenal pathology. The most common gastroenterological diseases are chronic gastritis and gastroduodenitis. Chronic gastroduodenitis (HCG) occurs in children in 70-80% of the number of diseases of the digestive tract. In the occurrence of HCG, the acid-peptic factor, stress effects, pyloric helicobacteriosis, violation of the motor evacuation function of the digestive tract are important. Saliva is the first secret that starts the digestive process due to the enzymes contained. In addition, saliva has pronounced buffer functions, which plays an important role in neutralizing the acidity of gastric contents. In gastroenterological diseases, the composition of saliva changes and, consequently, the balance of the oral cavity - esophagus and stomach is disturbed. When dental anomalies are found in children suffering from HCG, it is necessary to carefully approach the issue of choosing an orthodontic device and treatment tactics for such children. The presence of a removable orthodontic device in the oral cavity will disrupt not only the homeostasis of the oral cavity, affecting the ionic composition of saliva, but also indirectly the condition of the gastrointestinal tract and the course of the underlying disease [2.4.6.8.10.11.12].

Conclusions: We conducted a survey of 90 children aged 7-14 years. Of these, 62 children with HFA and HCG were on orthodontic treatment using removable orthodontic devices made of various types of plastics, 28 children without HFA suffering from HCG. The control group included 30 practically healthy children. HCG is characterized by a variety of different symptoms. We analyzed the features of the clinical course of HCG when using removable plate orthodontic devices for the treatment of HPV. Table 7 Frequency of occurrence of various clinical signs of HCG when using removable plate orthodontic devices As follows from the data presented in table 7, a tendency to increase in such clinical symptoms as epigastric pain, pain after eating, hunger pains, belching in groups of children with HCG and HFA using removable orthodontic devices was revealed, on average by 2-5%, and night pains by 2 times. The frequency of other signs differed slightly (25% of children with HCG complained of heartburn, in the group of children with HCG undergoing orthodontic treatment, this clinical symptom was detected in 20.9%, stool disorders were noted in 7.4% of children with HCG and 8% of patients with this symptom were identified in the group who on orthodontic treatment).

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