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# ASSESSMENT OF THE RISK OF ENAMEL DEMINERALIZATION AROUND BRACES AND PREVENTION STRATEGIES

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**Relevance.** The practical significance of the issue is determined by the high prevalence of dental caries among the population and the incidence of periodontal tissue. Braces, rings, and arches fixed on teeth significantly complicate oral hygiene, which leads in 32.7% of cases to damage to the hard tissues of teeth, mainly surfaces immune to caries, and in 92% of cases, periodontal tissues are in poor condition. Poorly performed orthodontic treatment also contributes to these changes. To prevent the development of these complications, various preparations containing calcium and fluoride have been proposed. However, these drugs do not always give the desired effect, as 65-67% of the examined patients have poor oral hygiene, and local fluoridation is not effective enough due to the rapid loss of calcium fluoride crystals. For the prevention and treatment of dental hard tissue lesions, a method of deep fluoridation with tiphenfluorides has been proposed, which release fluoride in high concentrations for a long time, contributing to reliable remineralization. Currently, many fundamental aspects of prevention in the process of orthodontic treatment have not yet been fully resolved. There is no data on the use of deep fluoridation in orthodontics. The issues of assessing the resistance of tooth enamel and the effectiveness of remineralizing agents using the electrometric method in the process of orthodontic treatment have not been sufficiently highlighted. There are no effective motivational methods for teaching and self-monitoring the quality of dental cleaning for orthodontic patients. In this regard, the urgent task is the further development of preventive measures in the process of orthotic treatment. The purpose of the study: Development and implementation of a set of preventive measures aimed at preventing the development of complications in orthodontic treatment of patients using non-removable equipment. For the first time, changes in the state of dental hard tissues and dental tissues in children with different levels of caries resistance during orthodontic treatment using non-removable equipment were studied according to electrometric, colorimetric methods and indicators of hygienic and periodontal status in dynamics. During the first orthodontic treatment, the condition of the hard tissues of the teeth around the fixed braces was assessed and the effectiveness of remineralizing agents using the electrometric method was revealed. For the first time, the effectiveness of a complex of preventive measures has been studied in patients with a reduced and increased risk of dental caries at the stages of treatment with fixed orthodontic equipment. The proposed complex of therapeutic and preventive measures, taking into account the risk of dental caries, improves the quality of orthodontic treatment using non-removable equipment, prevents the development of complications from the hard tissues of teeth and periodontal tissues. Before starting orthodontic treatment, patients with a reduced and increased risk of caries should be identified for the purpose of differentiated prescribing of preventive measures. When determining the hygienic condition of the oral cavity, the RNR hygiene index is the most informative. It has been established that the initial foci of enamel demineralization around fixed braces, visually indistinguishable but detectable using the electrometric examination method, occur in all patients undergoing orthodontic treatment using non-removable equipment. It is noted that focal demineralization of the enamel around braces occurs earlier in the cervical region of the teeth of the upper and lower jaw. Professional and individual oral hygiene with the help of highly effective hygiene products, exogenous and endogenous caries prevention using the drugs "Enamel-sealing liquid", "Oligovit", "Immunal" made it possible to reduce the increase in caries of permanent teeth in patients with an increased risk of caries by 89.2% and by 90.2% in those with reduced a risk. All patients undergoing orthodontic treatment using non-removable equipment need comprehensive therapeutic and preventive measures, including hygienic training, professional oral hygiene and the use of highly effective preventive measures. The use of the drug "Enamel-sealing liquid" in patients during

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orthodontic treatment, taking into account the risk of dental caries, helps to increase acid resistance and enamel resistance, providing effective prevention of caries. The developed complex of preventive measures helps to improve the hygienic condition of the oral cavity and reduces the increase in dental caries and periodontal diseases in patients during orthodontic treatment using non-removable equipment.

By interviewing and questioning the children participating in the study, the knowledge and skills of oral hygiene were determined. The quality of manual oral care skills was assessed using a specially developed technique. All patients underwent oral sanitation for 1-2 months before orthodontic treatment, their diet was adjusted, oral hygiene was taught, and they were motivated to perform regular oral hygiene using a recommended set of hygiene products. In group 2, 63 patients had an average CPI value of 4.25 + 0.26 to 4.78 + 0.23, the average baseline value of the TER test was from 58.32 + 1.37 to 68.13 + 1.32%, and the KOSRE test was 4.92 + 0.34 days, indicating a low level of resistance in the hard tissues of the teeth. 4 subgroups were formed - Bl, B2, EZ, B4. Subgroup B1 was the control group. The usual oral hygiene was carried out. No preventive measures were used. In subgroup B2, in order to increase the functional resistance of the enamel, "Enamel-sealing liquid" was used 2 times with an interval of 2 weeks before the braces were fixed and 2 times every 3 months for prophylaxis during orthodontic treatment. Preventive dental treatment in the VZ subgroup was performed using fluoride-containing varnish "Belak F" 2 weeks before the braces were fixed three times in 3 days, after fixation with a repeated course every 2 months. In subgroup B4, preventive dental treatment was performed with fluoride gel Fluoridin Gel No. 5 before braces were fixed 5 times a day and during orthodontic treatment with a repeat course every 3 months. All patients of the preventive subgroups B2, VZ and B4 underwent sealing of the fissures of molars and premolars with a fluoride-containing Dyract Seab (Dentsply) compound before orthodontic treatment, and to optimize the endogenous prevention of dental caries and periodontal diseases, the mineral and vitamin preparation Oligovit was administered orally 1 tablet per day for 1 month 2 times a year, the immunostimulating drug "Immunal" 15 drops 3 times a day for 6 weeks 2 times a year. To correct dental anomalies in patients, a non-removable orthodontic technique of the Roth system with a working bracket groove of 018 inches (0.46 mm), accessories and materials from ORMCO were used. The braces and support locks were fixed to the tooth enamel using orthophosphoric acid, a No-Mix "Sistem 1+" composite material. The support rings on the molars were installed on Fuji I glass ionomer cement (GC). Tying the arc to the breke was performed using metal ligatures 0.010 inches thick. In the course of orthodontic treatment, a systematic change of arches was performed. So, at the beginning of treatment, round thermally dependent nickel-titanium wire arcs (0.016" CuNi-Ti 35 °C) were used to level the dentition for 8-10 weeks, which did not exert excessive forces and did not cause severe pain in patients. Then rectangular thermally dependent nickel-titanium wire arcs (0.016" x 0.022" CuNi-Ti 35°C) were used for 10-12 weeks to perform initial control over the torc. Application of titanium-molybdenum arcs (0.016" x 0.022" TMA; 0.017" x 0.025" TMA with loops) made it possible to adjust the occlusal plane and close the postextraction gaps for 14-16 weeks. A rectangular steel wire arc (0.016" x 0.022" 0.017" x 0.025" 88) was used for 16-22 weeks to correct the occlusal plane, dentition rows in the sagittal, transversal plane, consolidation and stabilization of dental arches. The use of a steel circular arc (0.014" 88) and elastic bands for 4-6 weeks at the last stages of orthodontic treatment contributed to the final detailing of the position of the teeth and the creation of occlusal contacts. After active orthodontic treatment, non-removable and removable traction devices were used to stabilize the treatment results. Taking into account the pronounced relationship between the development of dental caries and periodontal diseases from the hygienic condition of the oral cavity, the level of hygienic knowledge and skills was determined in all patients before orthodontic treatment through questionnaires and assessment of manual skills. The analysis of the obtained data indicated a low level of knowledge on the prevention of dental diseases and the acquisition of manual skills. The survey showed that 53% of patients in group 1 and 67% in group 2 knew about the need to brush their teeth 2 times a day. 43% of patients in group 1 and 61% in group 2 believed that the time for individual hygiene procedures should be 3 minutes. 49% of patients in group 1 and 65% in group 2 change their toothbrush after 2-3 months. All types of toothbrush movements (horizontal, sweeping, and circular) are performed by only 19% of

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children in group 1 and 41% in group 2 when brushing teeth. 28% and 39% of children answered in the affirmative that brushing teeth is done correctly, respectively. During the survey, it was found that 76% of children in the 1st group and 43% in the 2nd group considered their teeth healthy. It turned out that only 7% of children in the 1st group and 18% of children in the 2nd group were trained in oral hygiene at a dentist's appointment. The assessment of manual oral care skills (Fig. 1) showed that only 3% of the examined children in the 1st group and 12% in the 2nd group demonstrated proper brushing of teeth, which was assessed as good. Satisfactory manual oral care skills were found in 18% of the surveyed in group 1 and 21% in group 2, unsatisfactory in 79% and 67%, respectively. Comprehensive preventive measures based on the CPI index using various fluorinated preparations, which were regularly carried out throughout the study period, were evaluated 18 months after the start of treatment. A change in the intensity of caries was revealed in all the examined patients. Thus, in children of the 1st group with a reduced risk of caries after applying Fluoridin Gel No. 5, Belak F varnish and Enamel - sealing liquid in a complex of preventive measures, the increase in carious cavities was 0.24 + 0.03; 0.29 + 0.03, respectively.; 0.09 + 0.007 and 0,43 + 0,04; 0,47 + 0,02; 0,17 + 0,01 in patients with an increased risk of developing a carious process. An increase in caries was found on both the chewing and contact surfaces of the teeth. In the control subgroups A1 and B1, where preventive measures were not carried out, the increase in carious cavities in patients was 0.92 + 0.07 and 1.57 + 0.06, respectively. Reduction of caries after the use of the drug "Enamel-sealing liquid" amounted to 90.2% and 89.2%, respectively, in patients with a reduced and increased risk of dental caries. The use of drugs containing fluoride compounds and other neutralizing agents helps to increase the resistance of dental hard tissues and stabilize the development of initial caries, as evidenced by a clinical assessment using the electrometric method. Thus, based on the results of the study, it was found that the lowest values of electric current were detected in caries-susceptible and caries-resistant patients at all points under study after using the drug "Enamel-sealing liquid", which indicates the best caries-static properties of this drug. The main patterns of the process of demineralization of dental hard tissues in the dynamics of orthodontic treatment are revealed, manifested in an increase in the values of electrical conductivity of the enamel around the braces. At the final examination of patients, the electrical conductivity of the hard tissues of the mandibular teeth in the cervical region in children with an increased risk of caries in the control group B1 was 1.96 times higher than in children with a reduced risk of caries. Carrying out sanitary and educational work, individual and professional oral hygiene, along with the use of anti-caries drugs: "Enamel-sealing liquid", "Belak F" and "Fluoridin Gel No. 5" allowed, after 18 months of orthodontic treatment, to reduce the electrical conductivity of the hard tissues of the teeth of the upper jaw in the cervical region compared with the control in patients 2in the 1st group, 5.86; 3.42 and 3.97 times and 3.93; 2.86 and 2.42 times in patients of the 1st group. The values of the electrical conductivity of the hard tissues of the teeth on the lower jaw in the cervical region at the final examination in patients with increased and decreased risk of caries in the control subgroups B1 and A1 were respectively 8.9% and 8.7% higher than in the upper jaw. When using the preparations "Enamel-sealing liquid", "Belak F" and "Fluoridin Gel No. 5" to improve the structural resistance of dental hard tissues before braces were fixed in children with an increased risk of caries, the TER test values decreased by 27.8%, 16.8%, and 19.1%, respectively, relative to the initial examination. Comprehensive preventive measures using the drugs "Enamel-sealing liquid", "Belak F" and "Fluoridin Gel No. 5" in the course of orthodontic treatment in patients with a reduced and increased risk of caries led to a reduction in the growth of caries in permanent teeth by 90.2%, 68.5%, 73.9% and 89.2%, 70.1%, 72.6%, respectively. The developed and tested complex of preventive measures, including the topical application of various therapeutic and prophylactic drugs, improves the hygienic condition of the oral cavity, stabilizes the condition of periodontal tissues and reduces the growth of dental caries, which makes it possible to prevent the development of complicated forms of major dental diseases and improves the quality of orthodontic care.

**Conclusions.** Before orthodontic treatment, all the examined patients showed poor oral hygiene and insufficient motivation for the prevention of dental diseases and oral care. In 12% of patients with an increased risk of dental caries, manual oral care skills were good, and in 67% they were unsatisfactory. At the final stage of the study, the hygienic condition in the preventive subgroups was satisfactory

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according to the OSH-S index, and unsatisfactory according to the RNR index, ranging from 1.83 + 0.14 to 2.21 + 0.36.

**LIST OF USED LITERATURE**


1. Авраамова О.Г. Процессы реминерализации и проницаемости эмали зубов при гигиене полости рта: Труды V съезда Стоматологической Ассоциации России.- М, 1999.- С. 39 40.
2. Боровский Е.В., Леонтьев В.К. Биология полости рта. М.: Мед. Книга, Н.Новгород. // Изд-во НГМА, 2001. - 304 с.
3. Воронин В.В., Леонтьев В.К., Шестаков В.Т. Две модели обоснования этиологии кариеса с позиции системного подхода // Стоматология.- 2001. -№ 6. С. 15-17.
4. Гоменюк Т.Н., Сечень И.Т. Интенсивность показателей кариеса зубов у детей до 3 лет в зависимости от количества потребляемого сахара // Стоматология. -1997. Т. 76. - № 4. - С. 58 - 59.
5. Карницкая И.В., Сунцов В.Г., Дистель В.А. Профилактика кариеса зубов при ортодонтическом лечении детей у стоматолога: Труды VII Всероссийского съезда стоматологов. М., 2001. - С. 340 - 341.
6. Леонтьев В.К., Авраамова О.Г. Основные направления профилактики кариеса зубов, механизм их действия и тенденции развития: Труды VII Всероссийского съезда стоматологов. М., 2000.-С. 321 -328.
7. Рубежов А.Л., Соболева Т.Ю. Особенности профилактики кариеса зубов и заболеваний пародонта у лиц, пользующихся несъемными зубными протезами и ортодонтическими конструкциями: Труды V съезда Стоматологической Ассоциации России. М., 1999. - С. 70 - 72.
8. Attanassouli I., Mamai-Homata E., Papagopoulos H., Koletsi-Kounari H., Apos-toloponlos A. Dental caries changes between 1982 and 1991 in children aged 6-12 in Athens, Greece // Caries Res. 1994. - Vol. 28, № 5. - P. 378 - 382.
9. Gorelick L., Geiger A.M., Gwinnett A.J. Incidence of white spot formation after bonding and banding // Am. J. Orthod. 1982. - Vol. 81. - P.93 - 98.
10. Mengel R., Wissing E., Schmitz-Habban S., Flores-de-Jacoby L. Plaque and gingivitis hemmung durch Aminfluorid / Zinfiuorid (Meridol) and Natriumfiuorid // De-itsch Zahn. Zeitschrift. 1995. - Bd. 9. - S. 643 - 648.
11. Thylstrup A., Bruun C., Holmen L. In vivo caries models mechanisms for caries initiation and arrestment // Adv. Dent. Res. - 1994. - Vol. 8, № 2. -P. 144 -157.


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