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Modern Presentation of Calcium-Containing Drugs in the Course of the Study of Dental Diseases

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Abstract: This work is aimed at studying the effect of drugs on the content of Ca and Mg in the hard tissues of the tooth and the caries resistance of the enamel. The object of the study was 30 people who had one intact tooth removed according to orthodontic indications. After two weeks of taking the drug, the extraction of the second tooth was performed. To study the effectiveness of the drug used, a comparative analysis of the calcium and magnesium content in teeth removed before and after the use of Ca preparations was performed, the assessment was carried out by X-ray spectral microanalysis and spectrophotometry. After application of the drug, there was a significant increase in the concentration of Ca and Mg in the hard tissues of the tooth, which contributes to an increase in their caries resistance.

Keywords: calcium, enamel, Ca preparations.

Currently, in view of the constantly deteriorating environmental situation, environmental pollution, increasing stress, accelerating the rhythm of life, humanity is forced to take more and more care of the health of its body. It is indisputable that health in general depends on the condition of the oral cavity [1,2].

The most common disease of the hard tissues of teeth is caries. It has been proven that calcium preparations increase the caries resistance of enamel. There are many publications in the domestic and foreign literature on the topical use of calcium gluconate, calcium glycerophosphate, calcium chloride and other substances that reduce the risk of caries [3,4].

Attempts have also been made to increase caries resistance by systemic administration of drugs containing the main enamel-forming components: calcium and phosphorus [1,2,3,4]. One of the new calcium-containing drugs is Ca drugs, the indication for the use of which is: calcium deficiency conditions, systemic osteoporosis, rickets, etc. We have not found any information in the literature about the effect of this drug on the organs of the oral cavity. The aim of the study was to study the effect of the preparation of Ca preparations on the calcium content in the hard tissues of the tooth. Materials and methods of research. The object of the study was a group of patients requiring the removal of intact teeth for the installation of orthodontic structures in order to correct the bite. The group included 30 girls aged 12-18 years. Before the start of the study, each patient had one tooth extracted (1.4). Next, all patients were prescribed the drug Ca preparations, in a dosage of 2 tablets 1 time a day for 3 weeks. Ca preparations contain calcium (400 mg), magnesium (150 mg), zinc (5 mg), vitamin D3. This drug is indicated: for the prevention and complex therapy of osteoporosis and osteopenia, correction of calcium metabolism disorders during pregnancy and lactation, acceleration of healing and prevention of bone fractures, during the period of rapid growth in children during puberty, active sports, lack of calcium in the diet.

In accordance with the purpose of the research, we studied the change in the concentration of calcium in the surface layers of enamel. Throughout the use of the calcium-containing drug, changes in the acid resistance of enamel were recorded (according to the data of a clinical laboratory spectrophotometric examination of an acid biopsy of enamel for calcium and phosphorus content). After a course of treatment with a calcium-containing preparation, the extraction of the second tooth was performed (2.4) and an orthodontic structure was installed. All patients were aware of the study. To study the

effectiveness of the drug used, a comparative analysis of the calcium content in teeth 1.1. and 2.1. obtained before and after taking Ca drugs was performed. The acid resistance of enamel was studied by quantitative analysis of the calcium and phosphorus content in an acid biopsy by spectrophotometry. After application of the drug Ca, there was a tendency to decrease the yield of Ca and P in the acid biopsy from the surface layers of tooth enamel. The Ca output from the tooth enamel was 36.18±0.39 mmol/min. Thus, after the use of this drug, the yield of Ca from the tooth enamel decreased by 16% and P by 18%, which indicates an increase in the acid resistance of the enamel and, accordingly, its caries resistance.

These studies suggest that the use of calcium-containing drugs can be recommended to patients in order to increase the effectiveness of preventive measures to prevent the carious process. To confirm our preliminary conclusions, it is necessary to study changes in the absolute amount of calcium and phosphorus in the surface layers of enamel. These changes can be registered using high research technologies such as X-ray spectral microanalysis (RhMA) and scanning electron microscopy (SEM), which simultaneously determine the features of the microstructure and chemical spectrum of the tooth area under study. Determination of the absolute content of the main chemical elements of tooth enamel 1.4. and 2.4. made it possible to register changes that occurred after taking Ca preparations.

The results of the research. Thus, the increase in the concentration of chemical elements was: calcium – 50%, phosphorus – 14%. According to the research results, the use of calcium-containing preparations significantly increases the mineralization of hard tooth tissues, which corresponds to the data obtained by acid biopsy of enamel. According to our research, the caries resistance of enamel can characterize the amount of the trace element Mg in the hard tissues of teeth. Magnesium, participating in the regulation of calcium metabolism and mineralization of hard tooth tissues, with sufficient concentration in the enamel significantly reduces the level of caries susceptibility of patients by increasing the caries resistance of the enamel. Since the preparation of Ca preparations used in research contains a magnesium compound in its composition, it was interesting for us to trace the quantitative changes occurring in the enamel at the stages of research work.

The obtained results of these laboratory studies allow us to conclude about the average level of magnesium content in the enamel of the teeth of the examined after three weeks of taking the drug Ca preparations. The Mg content before the use of the drug was 0.22 ± 0.04, after application 0.35 ± 0.04, which is 60% higher than the initial level of this trace element. It follows that the medicinal formula of Ca preparations contributes to the effective absorption of its components, including magnesium.

Analyzing the work we have done, we can conclude the following: the Ca and Mg preparations contained in the preparation are able to penetrate into the enamel, strengthen the structure of hard tissues of teeth, which helps to increase their caries resistance and, in general, reduces the caries susceptibility of patients. Thus, the preparation of Ca preparations can be recommended for inclusion in comprehensive caries prevention programs, in order to increase enamel caries resistance and reduce tooth caries susceptibility.

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