



Modern Basics of Diagnosis and Prevention of Dental Caries

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Abstract: Dental caries is the most common dental disease. Caries of temporary teeth is registered already at the age of two, and by the age of 6 - 8, up to 100% of the child population is affected by this disease. Therefore, along with prevention, the issues of treatment of caries of temporary teeth remain relevant. Effective treatment of temporary teeth is a difficult task. Clinical manipulations should be performed at such a high professional level that repeated treatment of baby teeth is not required before their physiological replacement with permanent ones. Timely diagnosis and the correct choice of the method of treatment of caries of temporary teeth contributes to the reduction of complicated forms of this disease, which in turn is the prevention of the occurrence of foci of odontogenic infection.

Goal: to learn how to choose the optimal method of treatment of caries of temporary teeth in children, taking into account the stage of tooth development, the depth of hard tissue damage and the activity of the carious process, and to carry out dispensary monitoring of children with carious tooth damage.

Numerous clinical studies have proven that fluorides stabilize demineralization and accelerate the process of remineralization of hard dental tissues. The WHO Expert Committee confirms the importance of regular oral hygiene with the use of fluoride-containing drugs to maintain oral health at the population level. The use of endogenous and exogenous methods of prevention of dental caries significantly reduces the growth of caries. According to WHO, fluoridation of drinking water reduces the prevalence of dental caries by 25.0%, the use of fluoride-containing toothpastes and mouthwashes reduces the growth of caries by 34-36%. Fluoride ions contribute to the incorporation and retention of calcium and phosphate ions in the enamel structure, forming the compound fluorapatite, which is more resistant to acids than tooth enamel. At the same time, there is no reliable data that the use of fluorides harms the body [1.3.5.7.9.11].

Oral hygiene and compliance of parents in matters of dental care of children is shown. The study revealed a low level of compliance of parents of young children, as only half of the interviewed mothers (a standardized indicator of 49.5%) carried out the necessary hygienic dental care for their babies. Consequently, every second child aged 4-35 months did not receive the necessary hygienic dental care. In the course of the study, low compliance of parents of children of the first and second years of life was registered, for whom oral hygiene after teething was carried out only in 23.3% and 35.4% of cases, respectively; most children (89.8%) began to receive dental hygiene only after two years, only 16.9% of mothers carried out oral hygiene for babies with using pastes with fluorides [2.4.6.8].

Effective and safe concentrations of fluorides in toothpastes for the prevention of dental caries in adults, prove the high effectiveness of double daily oral hygiene with fluoride-containing oral hygiene products with a fluoride concentration of at least 1000 ppm, compared with fluoride-free toothpastes. Toothpastes with a higher concentration of fluoride are recommended for patients with a high risk of developing caries. Hygiene products with a low fluoride content (500 ppm) are prescribed to children under 6 years of age in order to prevent and balance the risk of caries and the

risk of fluorosis. Numerous studies prove that the incidence of dental caries correlates with a low level of oral hygiene and poor-quality brushing of teeth. Taking into account this fact, it became necessary to create technologies that can not only influence the processes of de-mineralization in the hard tissues of teeth, but also suppress the pathogenicity of plaque on the enamel surface [13.15.17.19.21.23].

An important component of a new generation toothpaste based on this technology is 1.5% arginine, which is a natural amino acid that is normally present in saliva. The new technology is based on the principle of changing the pH of plaque by using the arginine-deaminase enzyme pathway in arginolytic (non-pathogenic) bacteria (for example, *S. Sanguis*). It is argininolytic bacteria that break down arginine to an ammonium base, which is able to neutralize plaque acids and stabilize the microbial balance of dental biofilm [4].

Thus, increasing the pH of plaque creates a favorable environment for stopping demineralization and starting remineralization, preserving the ecological balance in the microbial biofilm and providing a "healthy microflora" in it. The influence of exogenous sources of arginine on the activity of the arginine-deaminase system both in individuals who do not suffer from caries and in patients with an active carious process has shown that daily double oral hygiene for 4 weeks with toothpaste without fluoride, but with a content of 1.5% arginine in combination with calcium carbonate significantly increases the activity of arginine-deaminase system compared to the control toothpaste with a content of 1100 ppm fluoride

This indicates that exogenous arginine delivered during brushing can reduce the risk of caries by increasing the activity of the arginine deaminase system. A two-year study of toothpaste with 1.5% arginine in combination with calcium carbonate without fluoride (study group) and toothpaste with 1100 ppm NaF/silicon dioxide (control group) with the participation of 11-12-year-olds showed the same effectiveness of arginine and fluoride-containing toothpastes in reducing the growth of caries. This clearly indicates that the effect of arginine-containing toothpaste on reducing the cariesogenicity of plaque leads to clinically pronounced benefits for the prevention of caries [12.14.16.18.20.22].

Clinical studies involving patients who used arginine-containing toothpaste (study group) showed that in the study group, the pH of plaque was significantly higher than in the control group, where patients used toothpaste with 1100 ppm fluoride. An increase in the pH of plaque occurs due to the splitting of arginine and the formation of an ammonium base, which leads to the neutralization of the acidity of plaque, and calcium and fluoride, which are part of the toothpaste, participate in the process of remineralization of hard tissues in an environment safe from cariesogenic acids [22.23].

Diagnostics of caries in the early stages of QLF showed that the use of toothpaste with 1.5% arginine, 1450 ppm fluoride and insoluble calcium compound (study group) more effectively stabilizes demineralization and stimulates remineralization of hard tissues of teeth compared with pastes containing only 1450 ppm fluoride (control group). The analysis of the volume of initial carious lesions (ΔQ) after 6 months of using arginine-containing toothpaste was 44.6% less than at the initial examination, while in the control group, ΔQ was 28.9% less than at the initial examination, respectively. The difference in indicators between the new oral hygiene product and positive control was statistically significant ($p < 0.001$) [24].

Prevention of caries in adults. Adult men and women who do not have serious chronic diseases are shown a full range of possible preventive measures aimed at countering the possible manifestation of caries.

Comprehensive prevention usually includes the elimination of a potentially dangerous caries situation, as well as a significant increase in the resistance of the disease of all structures of the oral cavity, both in general and at the local level.

The main activities include:

1. Systematic oral care using toothpaste/powder, rinsing solutions, filaments, etc.;

2. Giving up bad habits that can provoke caries indirectly — smoking and alcohol;
3. The use of special sugar-free gum based on xylitol, additionally cleansing the oral cavity;
4. Significant correction of the daily nutrition scheme with the exclusion of foods rich in sugar and simple carbohydrates from the diet;
5. Dental methods of caries prevention — fluoridation and sealing of fissures with polymer compositions;
6. Regular preventive examinations at the dentist, at least once every six months. Mandatory treatment of any non-carious diseases, pathologies and dental problems.

Prevention of caries in children. Children from one year to 14 years old are at a special risk group for caries — as modern medical statistics show, they most often quickly acquire this pathology, and the carious process on milk teeth develops rapidly — sometimes the time of transition from the stage of the stain to a deep lesion of the dentin takes only a few months.

When to start the first preventive measures? Dentists recommend paying attention to the potential risk after the eruption of the baby's first teeth.

Where to start? To begin with, introduce drugs with high calcium content into the child's diet, adjusting the nutrition scheme in parallel, limiting the use of products based on simple carbohydrates as much as possible. Chips, sparkling water, inexpensive sweets, industrial muffins — all this negatively affects the condition of the child's teeth. Be sure to include milk, cottage cheese, hard cheeses in the diet, do not forget about vitamins — it is advisable to put not very sweet fruits in the diet, and in the autumn-winter period it becomes mandatory to take vitamin and mineral complexes.

Almost every child does not like brushing his teeth too much — try to organize this monotonous process in a playful way, carefully monitoring the brushing time (it should not be less than 3-4 minutes). Teach your baby the correct treatment of the cavity with manipulations over all parts / elements of the dentition.

As a supplement for children over 5 years of age, regular rinsing of the oral cavity with fluoridated water is allowed — this will speed up the processes of natural mineralization of the enamel and protect not too resistant baby teeth from the potential negative effects of bacteria.

Methods and types of caries prevention

Modern medicine knows many methods and types of caries prevention. Their effectiveness in most cases is due to a number of factors — from genetic predisposition to pathology to external influence. Basically, all measures can be divided into two large groups — endogenous (general) and exogenous prevention.

Endogenous (general) prevention of caries

It is the prevention of the appearance of caries by general improvement and increasing the body's resistance.

In turn, it is divided into prevention with the help of medicines and drug-free measures. Drug-free endogenous prevention is carried out in two directions.

1. Rational balanced nutrition. The main task is to exclude foods rich in simple carbohydrates and sugar from the daily diet. It is these components in the oral cavity that create optimal conditions for the start of carious processes, especially in childhood. Along the way, it is necessary to control the intake of all necessary proteins, complex carbohydrates, fats, vitamins, amino acids and trace elements into the body. It is necessary to consume more unsweetened fruits and vegetables, meat, seafood and fish rich in fluoride, as well as dairy and fermented milk products containing natural calcium;
2. Physical activity. General strengthening of the body is impossible without moderate physical exertion. Morning exercises, rest breaks during working hours, evening jogging, complex

hardening — all this forms the prerequisites for optimal resistance of the body to any diseases, including caries.

Drug endogenous prophylaxis is carried out strictly under medical supervision. The dentist prescribes the optimal doses of medications taking into account age, the current state of the body, the presence of concomitant chronic and acute diseases.

Typical representatives:

1. Calcemin, calcium glycerophosphate;
2. Phytafluoride, sodium fluoride;
3. Fish oil;
4. Immune modulators of the natural spectrum — echinacea, eleutherococcus;
5. Vitamins of groups D and B.

Exogenous (local) prevention of caries

By the term "exogenous caries prevention" dentists mean local methods of preventing dental caries. Despite the high efficiency of the systematic approach to reducing the risks of carious processes, due to economic, technical and physiological reasons, as well as the characteristics of the body, there is a need for additional direct treatment of the oral cavity and dentition.

The two main directions of exogenous prevention include oral hygiene and the use of special means of direct action:

1. Remineralization complexes;
2. Sealing fissures of sealants;
3. Fluorinated topical products in the form of pastes, varnishes, solutions, gels.

Conclusion. As modern medical statistics show, the trend towards a decrease in cases of caries diagnosis in developing countries is associated with the beginning of the total use of fluoride—containing pastes - about 90 percent of such products present on the markets contain this substance. Also, an important contribution is made by the use of additional hygienic oral devices — sugar-free gum based on xylitol, organic and synthetic means of removing plaque from enamel, under which carious processes are formed, an increasing fascination of the population with professional methods of cleaning the oral cavity in a dental office.

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