

## The Effectiveness of Various Methods of Preventing Dental Caries and its Complications

*Mirsalixova Firuza Luqmanovna*  
*Tashkent State Dental Institute*

**Relevance of the study.** Due to the high prevalence of initial caries, new means are still being sought to reverse the process of enamel demineralization. This opportunity is provided due to the preservation of the enamel protein matrix. The duration of traditional remineralizing therapy for initial caries and the not always visible result reduce the frequency of use of this method. The technique of caries infiltration allows in most cases to achieve a visible result in one visit without enamel preparation. The effectiveness of traditional therapy for initial caries is quite low. For complete remineralization of enamel, a long period of contact of remineralizing substances with enamel is necessary, since calcium ions and other trace elements penetrate into the enamel due to the slow diffusion process. The favorable results of remineralizing therapy are quite labile, the foci of demineralization easily recur over time. Therefore, the processes of remineralization must be constantly maintained by stimulating the remineralizing properties of the oral fluid. In addition to local remineralizing therapy, its combination with systemic administration of calcium and fluoride preparations gives the best effect. One of the modern drugs for the treatment and prevention of initial caries is the gel "R.O.C.S. Medical Minerals". It contains calcium glycerophosphate, magnesium chloride and xylitol.

Thanks to special additives, the gel has adhesive properties, lingers well on the surface of the teeth, thereby providing conditions for the gradual penetration of mineral components into the tooth tissue. For an individual approach to the prevention of caries, it is of great importance to predict its manifestation at a particular age. The authors from Kemerovo developed their own methodology for predicting dental caries in children aged 8-11 years, depending on the most significant indicators of the state of the oral cavity organs. In 132 organized children aged 8-11 years living in Kemerovo, the following were determined: the level of caries activity according to Nedoseko V. B., the level of acid resistance of enamel, the rate of enamel remineralization, the mineralizing potential of saliva, the content of calcium and phosphorus in saliva. The data was processed using discriminant analysis. The most significant factors in determining the activity levels of caries in children aged 8-11 years are: the level of acid resistance of enamel, the rate of remineralization of enamel, the mineralizing potential of saliva, the content of calcium and phosphorus in saliva and the season of birth of the child. The created methodology for predicting dental caries in children is workable and shows a high percentage of correct classification (above 68%) [1.3.5.7.9.11].

Thus, a powerful arsenal of tools is used for remineralizing therapy of initial caries. To achieve the effect, a large number of procedures are required, which is not always feasible in modern conditions. The proposed new method of caries infiltration makes it possible to "preserve" the carious process in one visit, provided that the pseudointact enamel layer is preserved, which puts this method in a leading position. International studies have confirmed the effectiveness of the infiltration method, which has made it possible to stop the development of caries in both adult patients and children for many years. The study by French scientists analyzes the 20-year application of minimally invasive dental caries treatment, which can provide effective recovery and preventive treatment. With the method of ozone therapy, drilling of the tooth is not carried out and the use of anesthesia is excluded, and in simple cases, it is possible to do without a seal. For ozone therapy, a special device is used that converts oxygen into ozone, instantly neutralizes carious foci, destroys harmful bacteria, and stops the destruction of dental tissues. At the end of treatment, ozone is released from the tooth and converted back into oxygen. One of the main advantages of the method is that healthy cells remain completely intact, they are more resistant to oxidation and are able to withstand the effects of ozone. Ozone therapy treatment is performed within 20 to 40 seconds. The ICON(®) nc technique dramatically

reduces cell viability (up to 98.9% after 48 hours), whereas ICON (®) lc exhibits only moderate cytotoxicity (10%). The results were consistent with cytokine expression, with elevated levels of IL-6 and IL-8, and a decrease in IL-10 after exposure to ICON (®) nc compared to ICON (®) lc. ICON (®) lc caused virtually no changes in DSPP, whereas ICON (®) nc significantly increased DSPP mRNA levels (130.3 times). A concentration-dependent effect was observed in TEGDMA-stimulated hDPSCs. The authors concluded that ICON (®) is a successful method of minimal invasion. However, doctors should strictly follow the manufacturer's instructions to prevent adverse effects [2.4.6]. The children who participated in the study had a fear of dissection with a drill. They used hand tools for necrectomy. Classic glass ionomer cements were used as a sealing material. The high efficiency of minimally invasive therapy of caries of permanent teeth in children has been shown. The author's attention was attracted by the method of "minimally invasive therapy" using Ketak-Molar glass ionomer cement in the treatment of caries of the first permanent molars in primary school children. In children of Smolensk aged 8-10 years, the author studied the dental status (prevalence, intensity, increase in the intensity of caries, hygienic condition of the oral cavity, quality of fillings and the frequency of "relapses" of caries). The technique has significantly reduced the number of children who refuse dental treatment and increased the percentage of sanitized schoolchildren. This is due to the fact that dental treatment was carried out painlessly, or with short-term use of a drill.

The method made it possible to reduce the cost of caries treatment and increase the amount of preventive work. When using the method of "minimally invasive therapy", a decrease in the "recurrence" of caries and its complications in younger schoolchildren, an increase in the service life of the seal was revealed. Relapse was noted after 2 years in 6.9+2.8% of cases, and with the traditional method in 28.8 +5.5%, i.e. 4 times more often. The most effective and less costly in dentistry is prevention in organized children's groups (gymnasiums, schools, gymnasiums and kindergartens). The epidemiological survey conducted by the author showed that in schools where dental offices function, there are several times more "dentitically healthy" children than in educational institutions where there are no such offices [8.10.12].

Modern dentistry, with the advent of new materials and means of treating caries, has moved to a new stage of development, treating caries as gently as possible, with minimal invasion, and preserving as much healthy tooth tissue as possible. The main value of the method of minimal intervention in dentistry consists in minimal surgical intrusion into the tooth tissue, followed by filling with special materials. The restoration of defects in the hard tissues of the teeth should make up for the anatomical deficiency of tissues and further contribute to the protection of tooth tissues from the secondary carious process. Minimally invasive technique of preparation of carious cavities is based on the removal of only destroyed tissues. Minimally invasive techniques make it possible to preserve tooth tissues as much as possible, followed by tooth restoration with composite materials using adhesive technologies. Studies by Oghushi and Fusyama, who studied the microstructure of carious dentin using scanning electron microscopy, proved that the affected dentin consists of two layers: external carious, and which is irreversibly denatured, not susceptible to recalcification, uninfected, sensitive and main. Indicators of caries have been developed: a 0.5% solution of basic fuchsin, which stains only the layer of external carious dentin with a fairly clear border. Fusyama proposed a new, pathoanatomical principle of carious cavity preparation, which consists in the complete removal of only the layer of external carious dentin. The criterion of correctness is visual control of staining of the walls of the cavity, 10-15 seconds after treatment with a caries indicator [11.12]. In children, the principle of minimally invasive intervention is the optimal method of treating caries of permanent unformed teeth. The preparation of permanent unformed teeth in accordance with the minimally invasive concept provides for an arbitrary design of the carious cavity with maximum preservation of hard dental tissues, especially immune zones, only infected dentin is removed, leaving a demineralized "affected" layer. Some authors recommend postponing the use of adhesive filling techniques in permanent teeth, the formation of which is not complete, or in patients with active (acute) caries [12]. The main condition for the use of minimally invasive intervention is the control of risk factors for the development of dental caries in children, active karyoprophylactic procedures. With minimally

invasive interventions, prevention includes the detection and removal of plaque, active remineralization of tooth tissues due to a preventive agent. (application of fluorides, cleaning with fluoride-containing toothpastes). And only after that, together with the patient, a treatment plan should be drawn up and carried out using the technique of minimal intervention. After filling, the patient is asked to come periodically for professional dental cleaning and application of fluoride preparations. As noted above, the introduction of this method of therapy into practice makes it possible to identify and seal carious cavities at the earliest stages. Minimally invasive therapy is undoubtedly a very interesting, promising method and deserves the close attention of dentists. However, when introducing it into practice, it should be borne in mind that the concept of minimally invasive therapy is focused on active bilateral cooperation between the doctor and the patient. The patient is required to have careful individual oral hygiene and regular visits to the dentist for dynamic examination and observation, as well as undergoing preventive procedures (professional tooth cleaning, the use of remineralizing compounds).

**Conclusion.** Additional training and changes in work priorities are required from the dentist – the transfer of the "center of gravity" from "surgical" methods of caries treatment to the medical aspects of this disease and its prevention. Sealing in this case fades into the background. Thus, the concept of minimally invasive therapy reflects the trend of the transition from "surgical" methods of caries treatment ("drill and seal") to "therapeutic" and preventive (to prevent, to identify the lesion at an early stage, to seal with minimal excision of unaffected tissues). The main purpose of this therapy is to move the patient to a low-risk group by actively identifying possible causes of caries development, normalization of mineral balance and priority of preventive measures.

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