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CARIES AND NON-INVASIVE METHODS OF CARIES TREATMENT

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Abstract: This review article discusses the main non-invasive methods of caries treatment today. Detection of caries in the early stages of its development, before the formation of a carious cavity, at the stage of a "spot" is one of the main tasks of a dentist – therapist. The treatment of such caries by noninvasive methods has a number of advantages over traditional treatment. The main advantages of non-invasive techniques are:
1) painlessness;
2) preservation of healthy tooth tissues;
3) prevention of relapse;
4) absence of microcracks on teeth after the procedure;
5) no risk of infection. So ART treatment is the best treatment option for people with stomatophobia, pregnant women and children. The use of the presented non-invasive technologies can lead to an increase in the level of visits to dental clinics, the quality of treatment and, as a result, an improvement in people's quality of life. The main disadvantage of non-invasive methods is the possibility of using non-invasive methods in the initial stages of caries.

Keywords: non-invasive methods, caries, treatment, atraumatic treatment.

Dentistry is one of the most intensively developing branches of medicine. Modern technologies and tools that meet the latest requirements help dentists to create positive emotions in the patient regarding the quality of reception and treatment. Thus, modern methods of caries treatment can be divided into invasive and non-invasive. Invasive techniques, according to statistics, are the main cause of the development of stomatophobia. One of the conditions for the development of fear is the patient's personal negative experience during previous visits, especially if they were associated with any painful manipulations. Other conditions include: fear of pain, needles, injections, drilling. Non-invasive methods also exclude the factors of stomatophobia.
Prevention of stomatophobia is necessary. People with this disease postpone visits to the dentist for a long time, do not attend regular checkups, professional dental cleaning. As a result, chronic gum inflammation, caries and its recurrence, and mucosal lesions may develop.
There are several non-invasive methods of caries treatment, the results of which have been proven by the long-term experience of practicing dentists. One of these methods is the treatment of caries in the initial stages of development with ozone. Ozone has an antiseptic effect against all known viruses, bacteria, fungi, spores, and cysts, as they have no natural resistance to this oxidant. Ozone also has a selective effect on pathologically altered cells of the body, but only at a certain preset concentration of the substance and the duration of its exposure. The most effective and frequently used device is HealOzone for the treatment of caries. It destroys 99.9%

of all cariogenic microorganisms, protein structures that counteract mineralization, neutralizes all acidic metabolic products of bacteria (lactic, pyruvic acids), enhance the natural mineralization of hard tooth tissues due to its oxidizing potential with the help of minerals calcium and phosphorus contained in saliva, preventing the recurrence of caries. Ozone is applied to the affected tooth through a soft silicone cap (the HealOzone system kit includes 50 disposable caps ranging in size from 3 to 8mm). They don't scare patients by sound or sight. The flexible transparent cap is attached to a special tip, into which strictly dosed portions of ozone are supplied via a hose from the device. A pressure below atmospheric pressure is created under the cap, so the cap is sucked into the tooth, and a complete seal is created, allowing for absolutely safe treatment, eliminating the ingress of ozone into surrounding tissues and inhalation of gas by the patient. In just 20-30 seconds, ozone makes the tooth almost sterile, preventing the destruction of the enamel. In most cases, it is enough to perform the procedure once and then repeat it every 6 months. After the procedure, remineralizing therapy of the hard tissues of the tooth is mandatory: the treated surfaces are moistened with the healing liquid HealOzone, which enhances mineralization and lowers the pH value, its components are xylitol, sodium benzoate, sodium fluoride, citric acid, methyl paraben, water; It is recommended to use the HealOzone kit for the patient daily for 4-6 weeks, which ensures a reliable supply of remineralizing substances for a long time through the use of the following products: toothpaste (used 2 times a day), mouthwash (used 2-3 times a day after meals. Components: high concentration of sodium fluoride, phosphates and calcium. One of the breakthroughs in dental technology is the treatment of caries by the "ICON" infiltration method. This method was developed in Germany in 2009. Infiltration is used in both pediatric and adult therapy. The essence of the method is that first, a dense, poorly permeable pseudointact layer of enamel is removed from the surface of the carious lesion. Then the focus is dried (dehydrated) and impregnated (infiltrated) with a high—flow polymer material, after which the pores in the demineralized enamel are filled with polymer resin, and the focus is "preserved". The treatment of caries by infiltration includes the following steps:

1. Cleaning of the tooth surface from plaque, assessment of the carious lesion, choice of treatment tactics.
2. Isolation of the treatment area. Treatment using the infiltration technique should be carried out in conditions of absolute dryness. To do this, the treatment area is isolated using a cofferdam. In the area of chewing teeth, a traditional cofferdam is used; in the area of frontal teeth, Liquid Dam is allowed as an alternative.
3. Etching of enamel. Icon-Etch etching gel is applied with a small excess to the area of the carious spot, as well as to the adjacent areas of the enamel, covering them by about 2 mm around the lesion. The application time is 2 minutes. Then the etching compound is thoroughly washed off with water for 30 seconds.
4. Drying of the infiltration area. The etched area is thoroughly dried with dry air from the gun of the dental unit. After that, the infiltration area is moistened with Icon-Dry. The application time is 30 seconds. Then the tooth is thoroughly dried again with dry air.

5. Applying the first portion of infiltrate. Icon-Infiltrant is applied in such a way that the entire etched surface is abundantly covered with the material. The exposure time is 3 minutes. Then the excess infiltrate is carefully removed.

6. Applying the second portion of infiltrate. The second portion of Icon-Infiltrant is applied to the surface of the hearth for 1 minute, after which the excess infiltrate is gently blown off, and then its photopolymerization is carried out for 40 seconds.

7. Final treatment of the infiltration zone. After the infiltration procedure is completed, the cofferdam is removed, and the interdental gap is cleaned of excess material using floss and polishing strips. Polishing of the treated surface is carried out using polishing discs and/or strips.

The next non-invasive method of caries treatment is the use of laser technology. The use of laser technologies makes it possible to achieve good results in aesthetic dentistry.

Laser systems based on erbium are widely used for the preparation of hard tooth tissues. Due to their specific excision mechanism, microretence is formed in the walls of the cavity being prepared, which enhances the adhesion of the composite material to the cavity. This allows the use of adhesive materials without traumatic technologies and eliminates any side effects: excessive acid etching, the threat of damage, toxicity to pulp, as well as pain caused by acid residues in the dentinal tubules. A very important property of lasers is the bactericidal effect with the lowest side effect on hard tissue. The reason is the same effect that leads to micro-explosions: laser radiation with a wavelength of 2.78 and 2.94 nm is maximally absorbed by water molecules, leading to heating of the intracellular fluid. In this case, the bacteria lose their ability to reproduce or are completely destroyed. This ensures protection against secondary caries, while ensuring adequate smoothing of the edge of the cavity and its precise filling. Laser treatment of enamel provides a more effective microretence than acid etching, since liquid adhesive penetrates into the micro-depressions formed during laser treatment, mechanically binding to the enamel. The chemical adhesion of the adhesive to the composite prevents the formation of an edge gap. The retention surface occurs as a result of evaporation of free interprism water. The principle of adhesion to dentin is the formation of microstages and mechanical retention. To do this, the dentine surface is treated with a laser beam with an energy of 150 MJ with a frequency of 15 Hz. During laser exposure, microretention treatment of the dentin surface occurs, a retention surface is created, and at the same time, dentin sterilization is achieved due to the bactericidal effect of laser radiation.

Conclusions.

Thus, we can confidently say that today there are modern, painless, non-invasive methods of caries treatment. Each method has quite significant advantages, excluding the disadvantages of the traditional method such as:

1) pain caused by pressure, vibration and temperature;
2) the need to use anesthetics;
3) formation of a "greased layer";
4) injury, necrosis of the pulp, as a result of exposure to the thermal factor;
5) Fear of needles and hogs. The use of the presented non-invasive technologies can lead to an increase in the level of visits to dental clinics, the quality of treatment and, as a result, an improvement in people's quality of life. The main disadvantage of non-invasive methods is the

possibility of using non-invasive methods in the initial stages of caries (levels E1-D1 according to the X-ray classification). Of course, today, it cannot be said that non-invasive technologies can completely replace the traditional method; when choosing treatment tactics, it is necessary to take into account the individual characteristics of the patient.

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