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The deep dentin fluoridation in endodontics using physical factors

Britova A.A., Kolbina A.V.

FSBEI of HE "Yaroslav-the-Wise Novgorod State University". Department of Dentistry. Veliky Novgorod, Russia

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Summary. A tooth decay by caries, preparation, irrigation of the root canal with aggressive reagents in endodontics weaken the tooth structure of patients with diseases of the pulp and periapical tissues. The total deep dentin fluoridation and photomagnetic activation of mineralization strengthen the tooth tissues before the filling.

Relevance. A treatment of patients with diseases of the pulp and periapical tissues of the tooth is carried out in accordance with the basic protocol. The tooth decay by caries, preparation, a subsequent irrigation of the root canal with aggressive reagents make the tooth fragile and brittle. The restoration of the crown of the tooth is carried out taking into account the Index of the destruction of the occlusal surface (IDOS) by V.Yu. Milikevich, 1984. A prerequisite for strengthening and restoring a tooth with the stump inlay and intracanal pin is the absence of the destructive changes in the periapical tissues of the root. The modules of elasticity, the coefficients of thermal expansion of the tissues of the tooth and the filling material do not match, which lead to the appearance of cracks, secondary caries and tooth splitting. A method of the deep fluoridation of dentin before filling in order to prevent secondary caries and pulpitis is proposed [2]. "Dentingerizing liquid" by A. Knappvost, (Germany), is represented by liquid No. 1 containing magnesium fluoride with copper and calcium ions. Fluorine and copper have a bactericidal effect. Liquid No. 2 is represented by highly dispersed calcium hydroxyl. An analogue, the Gluftored kit (Russia), is also used, step-by-step activating the ingredients with the low-intensity laser radiation [1]. **Purpose**. To develop a method of an increase the strength of solid tissues after endodontic treatment and the level of disinfection before root canal filling and tooth restoration, and to raise a clinical efficacy by photomagnetic step-by-step activation of ingredients preparations for the dentine mineralization. **Technique**. *The first step*. The tooth is isolated from saliva, the root canal is dried with a paper pin, filled with the Knappvost's liquid No. 1 “Dentingerizing liquid” using an endodontic needle, without reaching the mouth of the canal by 3 mm. The liquid is activated by laser radiation, $\lambda = 632$ nm (red light), power 15 mW, for 30 sec using a fiber optic cable on which a ring magnet is placed, power 40 mT. The distance

from the cable to the mouth of the canal is 3 mm. *The second step*. The channel is drained, filled with the calcium hydroxyl suspension, agitating beforehand. Similarly photomagnetic activation of the suspension is held. The root canal is drained and sealed. *The third step*. The walls and bottom of the tooth cavity are dried, moistened with the liquid No. 1 using an applicator, a photo-magnetic activation is performed in the same way, the cable is 3-5 mm away from the tooth, exposure time is 30 seconds. The cavity is drained with a cotton swab. *The fourth step*. The walls and bottom of the cavity are moistened with the calcium hydroxyl suspension, agitating beforehand, similarly to the third step, activated, dried. The tooth is filled with any filling material, optimally, the "sandwich" technology with polymers. The ingredients of preparations for mineralization can be activated with a blue LED light, $\lambda \approx 400\text{-}500$ nm, a polymerization activator with a bactericidal effect. The possibilities of using a dental equipment, a polymerization activator are expanding. **Discussion**. The chemical reaction between the fluid and the suspension takes place when the ingredients are consistently applied to the dentin of the tooth. A barrier of silicic acid gel plugs with calcium fluoride, copper fluoride and magnesium fluoride crystals is formed. The nanocrystals tightly close the dentin micropores. The stepwise photomagnetic activation increases the crystallization, the depth of fluoridation and disinfection. A larger amount of the substance enters into a chemical reaction; more perfect crystals and in larger quantities are formed. **Conclusion**. The method of the deep dentin total fluoridation in endodontics with the use of the step-by-step photo-magnetic activation of the ingredients of preparations for mineralization increases the level of disinfection, mineralization, the strength of the hard tissues of the tooth and the clinical efficacy of treating patients.

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