

Icon as a Method of Choice for Injectable Treatment of Initial Caries in Patients with Fibrodysplasia Ossificans Progressive: a Clinical Case

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Abstract

The method considered in this clinical case makes it possible to treat the initial stages of the carious process in patients who are contraindicated by local injection anesthesia. The purpose of this study is to identify opportunities for treating the early stages of the carious process using ICON technology, without the use of injection methods of anesthesia, in patients who were diagnosed with Fibrodysplasia ossificans progressive (FOP). Conclusions: Patients were treated with infiltration of polymer material, without the use of injection methods of anesthesia. The result of this clinical case showed the effectiveness of this technique for patients diagnosed with FOP.

Keywords: *Fibrodysplasia ossificans progressiva (FOP), Painless, Icon, Carious process, Genetic diseases.*

Abbreviations: FOP- Fibrodysplasia ossificans progressive, MFR- maxillofacial region.

Introduction

Features of innervations of the maxillofacial region (MFR) lead to the fact that, despite the constant improvement of methods and methods of treatment, a number of dental procedures are accompanied by pain of varying intensity. To avoid this, it is possible to carry out local injection anesthesia. Its purpose is to infiltrate the tissues at the injection site with an anesthetic solution and block the transmission of pain impulse. Despite the prevalence of this method of anesthesia, it has a number of contraindications: allergic reactions to the anesthetic used the presence of pathological processes on the skin or mucous membrane in the area of injection, mental and a number of somatic diseases of the patient.

One of these diseases is Fibrodysplasia ossificans progressiva (FOP) [1-4, 5-7]. FOP is a genetic autosomal dominant connective tissue disease in which even small soft tissue injuries, including injectable ones, can cause the formation of heterotopic ossifications. In MFR, this can lead to deformation of the

temporomandibular joint with subsequent restriction of the mobility of the lower jaw. Patients with this complication find it difficult and sometimes impossible to monitor oral hygiene and health, which requires more frequent access to dental care and, as a rule, more frequent use of injection or General anesthesia. This requires new technologies for the treatment of dental diseases that reduce or eliminate pain when using them [6, 8, 9-11]. To modern methods of painless treatment of carious process at an early stage is chemotherapy. This method is a professional treatment of teeth with special preparations, which contributes to the normalization of the mineral composition of tooth enamel.

The technology allows eliminating defects of the tooth enamel caused by demineralization, and also is a powerful preventive measure preventing subsequent defeat of hard tissues of tooth, caused by the leaching of minerals (mostly calcium and phosphorus). One of these tools used in this technique is Icon [12-

14, 15-18]. Icon is a modern innovative drug for microinvasive gentle treatment of caries in the early stages of the process on the proximal and vestibular surfaces. The technology of its use allows processing the carious spot without dissecting the tooth tissues. Antibacterial action and sealing of the carious cavity is due to the polymer solution included in the composition, and its subsequent polymerization using a halogen lamp [19, 20-25, 26-29]. With the right approach to the choice of this method of treatment of caries in the early stages and in the absence of contraindications to its use, it is a reliable and successful modern nanotechnology [13, 14, 31, 32].

Materials and Methods

This work was done at Sechenov University with supported by the "Russian Academic Excellence Project 5-100". Patient I., 16 years old, who was diagnosed with

Fibrodysplasia ossificans progressiva, turned to the clinic Of the Institute of dentistry of the First Moscow state medical UNIVERSITY. I. M. Sechenova (Russia, Moscow) for the purpose of preventive examination and with complaints of weak sensitivity from stimuli for a month. The diagnosis of FOP was made based on the conclusion of a genetic test and clinical signs found in childhood-deformity of the big toes, with 7 years of limited mobility of the cervical spine due to ossifications. During the examination of the oral cavity, defects were found on the vestibular surface of the enamel of the frontal group of teeth, rough when probing, the temperature test was weakly positive.

According to the results of the survey, the diagnosis was made: K02. 0 enamel caries (international classification) of teeth 22, 23, 24, 25 (Fig.1).



Results and Discussions

The method of treatment of enamel caries was chosen non-invasive method without the use of local anesthesia. ICON ® - DMG America (resin infiltration) material was used to eliminate the disease and prevent its complications. Initially, the patient was conducted professional hygiene of the oral

cavity with the help of ultrasonic scaler, polishing paste and brush. The working field was isolated using OptraGate (Ivoklar Vivadent). 15% hydrochloric acid gel was applied to the affected area and nearby enamel tissues for 2 minutes using a syringe included in the Icon system, Icon - Etch, and a vestibular attachment (Fig.2).



At the end of the time, the Icon-Etch was washed off with distilled water for 30 seconds and dried with air from the Puster for 10 seconds. The rest of the liquid in the enamel and dentin pores was dried using Icon-Dry.

Ethanol, also included in the Icon kit, was applied to the etched enamel surface for 30 seconds using a specialized cannula and dried with air from the puster (Fig.3).



In accordance with the manufacturer's recommendations, the infiltration stage was divided into 2 stages, using an Icon-Infiltrant syringe and vestibular nozzles. Initially, Icon-Infiltrant was applied to the dried surface of the teeth, carefully rubbed into the

enamel and inflated the excess air for 3 minutes with the lamp turned off. Icon-Infiltrant polymerization was performed with a polymerization lamp for 40 seconds, at a wavelength of 460 nm (Fig.4).



The second stage of Icon-Infiltrant application was performed with an exposure of 1 minute and polymerized for 40 seconds. Next, the surface of the teeth was treated

with a polishing brush and paste. The gum after the Icon procedure was treated with an oil solution of vitamin E (Fig.5).



During and after the procedure, there was no pain sensitivity and hyperesthesia. The surface of the teeth became dense, smooth, lost visual signs of caries, enamel took a natural healthy appearance.

Conclusions

This clinical case shows the possibility of using non-invasive methods of treatment of caries using the Icon system in patients diagnosed with Fibrodysplasia ossificans progressiva. This technique suspends the

development of the carious process and returns the enamel to its natural appearance. In patients with FOP who are contraindicated injectable methods of anesthesia in dentistry, the Icon system is the method of choice for the treatment of the initial stages of caries. In addition, the painlessness of the procedure helps to prevent the fear of pain in the treatment of teeth, which can also positively motivate patients to go to the dentist to identify problems and eliminate them at an early stage of education.

References

- Enina YuI, Sevbitov AV, Dorofeev AE, Pustokhina IG (2019) Experimental substantiation of the choice of the restoration method in the cervical area of teeth with abfraction defects. *International Journal of Mechanical Engineering and Technology*, 10(5): 41-47.
- Espigares J, Hayashi J, Shimada Y, Tagami J, Sadr A (2018) Enamel margins resealing by low-viscosity resin infiltration. *Dent Materials Journal*, 37(2):350-357.
- Gannon FH, Valentine BA, Shore EM, Zasloff MA, Kaplan FS (1998) Acute lymphocytic infiltration in an extremely early lesion of fibrodysplasia ossificans progressiva. *Clin Orthop. Rel. Res.*, 346: 19-25.
- Kaan Orhan DDS, PhD, Lokman Onur Uyanık DDS, PhD Erkan Erkmen DDS, PhD Yeliz Kilinc (2012) Unusually severe limitation of the jaw attributable to fibrodysplasia ossificans progressiva: a case report with cone-beam computed tomography finding // *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*, 113 (3): 404-409.
- Platonova VV, Sevbitov AV, Shakaryants AA, Dorofeev AE (2018) The experimental clinical substantiation of treatment of patients with odontogenic phlegmon of maxillofacial area using delargin in complex therapy. *Klinicheskaya Laboratornaya Diagnostika*, 63(5): 293-296.
- Rey N, Benbachir N, Bortolotto T, Krejci I (2014) Evaluation of the staining potential of a caries infiltrant in comparison to other products. *Dent Mater. J.*, 33: 86-91.
- Schmidlin PR, Sener B, Attin T, Wiegand A (2012) Protection of sound enamel and artificial enamel lesions against demineralization: caries infiltrant versus adhesive. *J. Dent.*, 40: 851-6.
- Sevbitov A, Davidyants A, Kuznetsova M, Dorofeev A, Mironov S (2019) Analysis of electronic microscopy results based on combining the infiltration method with different restoration technologies and in vitro investigation of enamel focal demineralization treatment at the defect stage. *Periodico Tche Quimica*, 16(33): 53-59.
- Sevbitov AV, Kuznetsova MYu, Dorofeev AV, Borisov VV, Mironov SN, Iusupova II (2020) Dental anomalies in people living in radionuclide-contaminated regions. *Journal of Environmental Radioactivity*, 216: 106-190.
- Sevbitov AV, Pankratova NV, Persin LS, Slabkovskaya AB, Skatova EA (2000) Prevalence of dental anomalies in children exposed to the "Chernobyl factor" *Orthodont-info*, 3: 8-12.
- Sevbitov AV, Skatova EA (2005) Factors of individual radiation sensitivity in caries prevalence in population of radiation polluted regions. *Stomatologiya*. 84(2): 15-20.
- Kaplan FS, Tabas J, Gannon FH, Finkel G, Hahn GV, Zasloff MA (1993) The histopathology of fibrodysplasia ossificans progressiva: an endochondral process. *J. Bone Joint Surg. Am.*, 75: 220-230.
- Kaplan FS (2005) Fibrodysplasia ossificans progressiva: an historical perspective. *Clin Rev Bone Miner Metab.*, 3: 179-181.
- Kielbassa AM, Müller A, Gerhard CR (2009) Closing the gap between oral hygiene and minimally invasive infiltration technique of incipient (proximal) enamel lesions. *Quintessence Int.*, 40: 663-681.
- Sevbitov AV (2004) Remote effects of the chernobyl accident: Evaluation of the maxillofacial status of the children. *Stomatologiya*, 83(1): 44-47.
- Silverstone LM (1973) Structure of carious enamel including the early lesion. *Orl. Sic. Rev.*, 3: 100-60.
- Skucha-Nowak M, Gibas M, Tanasiewicz M, Twardawa H, Szklarski T (2015) Natural and controlled demineralization for study purposes in minimally invasive dentistry. *Adv Clin Exp. Med.*, 24: 891-898.
- Skucha-Nowak M, Machorowska-Pieniążek A, Tanasiewicz M (2016) Assessing the Penetrating Abilities of Experimental Preparation with Dental Infiltrant Features Using Optical Microscope: Preliminary Study. *Adv. Clin Exp. Med.*, 25 (5): 961-969.
- Kaplan FS, Shore EM, Connor JM (2002) Fibrodysplasia ossificans progressiva (FOP) In: Royce PM, Steinmann B, editors. *Connective Tissue and Its Heritable Disorders: Molecular, Genetic, and Medical Aspects*. 2. New York: Wiley-Liss, John Wiley & Sons, Inc., 827-840.
- Mamedov A, Morozova N, Yumashev A, Dybov A, Nikolenko D (2019) Criteria for provisional restorations used in preparation for comprehensive orthodontic and orthopedic rehabilitation. *Periodico Tche Quimica*, 16(32): 647-655.
- Mironov SN, Emelina ES, Troitsky VI, Yablokova N, Kuznetsov II (2020) The impact of smoking, including hookah, on the human body. *Journal of Global Pharma Technology*, 12(1): 211-217.
- Mitin NE, Vasilveva TA, Kulikova AV, Aleksandrova EN, Gurkin RB (2019)

- Comparative evaluation of some modern approaches to determining chewing effectiveness, is taking into account the temperament of patients. Pakistan Journal of Medical and Health Sciences, 13(4): 1097-1100.
23. Montasser MA, El-Wassefy NA, Taha M (2015) In vitro study of the potential protection of sound enamel against demineralization. Progress in Orthodontics, 16: 12.
 24. Munoz MA, Arana-Gordillo LA, Gomes GM, Gomes OM, Bombarda NHC, Reis A, Loguercio AD (2013) Alternative esthetic management of fluorosis and hypoplasia stains blending effect obtained with resin infiltration techniques. J. Esthet. Restor. Dent, 25: 32-39.
 25. O'Reilly MM, Featherstone JD (1987) Demineralization and demineralization around orthodontic appliances: an in vivo study. Am J. Orthod. Dentofacial. Orthop., 92: 33-40.
 26. Tüfekçi E, Pennella DR, Mitchell JC, Best AM, Lindauer SJ (2014) Efficacy of a fluoride-releasing orthodontic primer in reducing demineralization around brackets: an in-vivo study. Am J. Orthod. Dentofacial Orthop., 146: 207-14.
 27. Vennat E, Denis M, David B, Attal JP (2015) A natural biomimetic porous medium mimicking hypomineralized enamel. Dent Mater., 3: 225-234.
 28. Voloshina IM, Borisov VV, Sevbitov AV, Davidiants AA, Mironov SN, Kuznetsova MY, Ergesheva EV (2018) Distinctive features of microcrystallization of mixed saliva in children with different levels of activity of carious process. Asian Journal of Pharmaceutics, 12(3): S1017-S1020.
 29. White DJ, Featherstone JD (1987) A longitudinal micro hardness analysis of fluoride dentifrice effects on lesion progression in vitro. Caries Res., 21: 502-12.
 30. Yumashev A, Berestova A, Karapetyan A (2020) Cervical Caries: Modern Methods of Diagnosis and Treatment. Journal of Global Pharma Technology, 12(1): 89-96.
 31. Yumashev A, Karapetyan A, Garnova N, Berestova A (2020) Characteristics of Biocompatible Coatings on Dental Implants. Journal of Global Pharma Technology, 12(1): 30-37.
 32. Sevbitov AV, Brago AS, Enina YI, Dorofeev AE, & Mironov SN (2018) Experience in the application of hybrid ceramic restorations in the cervical region. Asian Journal of Pharmaceutics, 12(3): S1106-S1109.
 33. Sevbitov AV, Dorofeev AE, Davidiants AA, Ershov KA, Timoshin AV (2018) Assessment of pain perception of elderly patients with different levels of dentophobia during surgical dental appointment. Asian Journal of Pharmaceutics, 12(3). S1012-S1016.
 34. Sevbitov AV, Dorofeev AE, Kuznetsova MU, Timoshin AV, Ershov KA (2019) Comparative characteristics of the crystallogram of the oral fluid in patients who use heroin and methadone. Periodico Tche Quimica., 16(33). 94-101.
 35. Sevbitov AV, Ergesheva EV, Sirak SV, Enina YuI, Mallkov S., Kuznetsova MY (2020) Clinical and laboratory analysis of the efficiency of hirudotherapy in complex treatment of endodontal diseases. Journal of Global Pharma Technology, 12(1). 253-260.

