Volume 2, Issue 7, July 2024 ISSN (E): 2938-3765

THE EFFECTIVENESS OF THE TREATMENT OF INITIAL DENTAL CARIES IN CHILDREN BY THE METHOD OF CARIES INFILTRATION

Hamroyeva Dilafruz Shukurovna
Bukhara State Medical Institute

Abstract

In children, carious defects in permanent teeth are often formed against the background of focal demineralization of the teeth. Traditional caries treatment involves the complete removal of enamel with signs of demineralization. This approach to treatment led to significant loss of hard tissue and weakening of the supporting structures of the teeth.

Currently, focal demineralization of enamel is being treated by remineralizing therapy or fluorization. However, this approach requires multiple visits and does not guarantee good results, especially when patients are poorly competent to follow the recommendations for brushing teeth, nutrition, and the use of flossids.

The article presents the results of treatment of children with focal demineralization of enamel on permanent teeth. The topographic features of the location of focal demineralization of enamel on the vestibular surfaces of the teeth were determined. Described is the technique of demineralized enamel infiltration technology in combination with rational oral hygiene, which makes it possible to “conserve” the carious process in one visit, provided that the pseudo-intact enamel layer is preserved.

The study revealed a high caries-static efficiency of the ICON technology infiltration method due to adequate sealing of pores in the demineralization focus.

Keywords: caries, demineralization, fluorization, infiltration.

Introduction

As it is known, today, caries is one of the most common diseases in the world (over 95% of people) [1,5,7,11]. Diagnosis and prevention of the development of the carious process is still considered important and not fully understood problems in modern dentistry. It has been proven that caries is a multi–stage process [3,5,7,13] and a combination of risk factors and time is necessary for the formation of a cavity.

The task of dentists today is to maximize the preservation of their own tooth tissues, to prevent the pathological process at an early stage of its development [2,4,6,12].

The most important task of the treatment of focal demineralization of tooth enamel is the elimination of an aesthetic defect associated with local discoloration of teeth in the smile area. Minimally invasive methods of treatment are more often used to treat the early stages of dental caries, whereas its developed forms require excision of a significant amount of hard tooth tissue, which adversely affects the macroarchitectonics and biomechanics of the tooth. The carious process in the hard tissues of teeth develops step by step, gradually affecting the enamel and dentin, involving the pulp in the process, which mainly determines the choice of treatment methods:

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

minimally invasive (rheotherapy [1]), deep fluoridation, air-abrasive and ultrasonic preparation [6], microabrasion [5]); operative-restorative [2]. A fundamentally new minimally invasive technology for the treatment of focal demineralization of tooth enamel is the caries-infiltration technology with light-cured composite material icon [8], the principle of operation of which is based on impregnation of the ODE zone with a special infiltrate carried out after preliminary etching of the surface, relatively highly mineralized - "pseudo-contact" layer of enamel. Passive infiltration is based on the ability of a high–flow composite to penetrate into the intercrystalline pores of enamel throughout the entire volume of its lesion area and thereby strengthen - reinforce the demineralized enamel framework, preventing further progression of the process [1,8,9,10].

The purpose of the study

To evaluate the effectiveness of the treatment of initial carious lesions of hard dental tissues in children by the method of caries infiltration.

Materials and methods

To study the effectiveness of the treatment of focal enamel demineralization (ODE) by infiltration, using ICON technology, 2 groups of children aged 7-10 years were formed – the first group and 10-13 years old group 2. The choice of this age is based on the fact that during this age period there is active eruption, growth and formation of the roots of permanent teeth in children. This period is characterized by physiological maturation of the enamel (mineralization) and can last from 2 to 5 years, and throughout the entire period of mineral maturation (especially during the first year after eruption) the teeth need careful and effective care.

A comprehensive assessment of the results of ODE treatment using ICON technology was definitely performed on 160 permanent teeth.

The inclusion criteria were: the presence of caries at the stage of a chalky spot – according to the topographic classification or caries of tooth enamel according to the ICD classification (K.02.0); the absence of pathological changes in the periodontium.

The clinical examination of the oral cavity was carried out according to the standard scheme with filling out an individual card, determining the value of the KPUz index, KPUp. The intensity of demineralization in caries was assessed by staining chalky spots with a 2% methylene blue solution on a 10-point Axamit scale. To assess the hygienic condition of the oral cavity, an index was used to assess plaque in young children [10].

According to the indications, they were assigned the following set of conservative therapeutic and preventive measures:

1. Improvement of the hygienic condition of the oral cavity a) Individual oral hygiene; b) Professional oral hygiene by including oral hygiene lessons).
2. Normalization of the nature and diet (elimination of the carbohydrate factor).
3. Infiltration of ICON technology.
4. Medical supervision.

All patients were trained in the rules of brushing teeth using the standard method and additional items for individual oral hygiene (brushes, floss, rinses).

Before the infiltration, the teeth were cleaned with a brush, polishing paste and floss. To minimize the humidity of the oral cavity and visualize the area of the spot in case of enamel caries, the isolation of the operating field by the cofferdam system was used [1,6,7,13].

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

A nozzle for the treatment of vestibular surfaces was screwed onto an Icon-Etch syringe and with its help Icon-Etch, an etching gel of 15% hydrochloric acid, was applied to the vestibular surface (1.5–2 turns of the piston correspond to the required amount of material). The Icon-Etch was left to act for 3 minutes, then rinsed with water for 30 seconds. The affected area was dried with dry air from an oil-free compressor. To better open the pores, Icon-Etch was applied repeatedly to the vestibular surface of the tooth affected by caries for another 3 minutes, after which it was rinsed with water for 30 seconds and dried with dry air.

To create optimal conditions for the adhesion of polymer resins, it is necessary to completely remove moisture that is present in the pores of the enamel after rinsing with water and subsequent drying. For this purpose, ethanol was applied to the treated areas by screwing an applicative cannula onto an Icon-Dry syringe. Approximately half of the contents of the syringe were applied to the lesion and left to act for 30 seconds.

Then they were dried again with dry, low-fat air.

The next stage of treatment is the direct infiltration of the lesion. To perform it, a special nozzle was screwed onto the Icon-Infiltrant syringe. Before applying the infiltrate, it is necessary to turn on the lamp of the dental unit.

Icon-Infiltrant was applied with a small excess to the site of the lesion (1.5-2 turns of the piston approximately correspond to the required amount of material). The material was left to act for 3 minutes. Icon-Infiltrant was polymerized from all sides for at least 40 seconds.

To reduce polymerization shrinkage and increase microhardness, the material was applied a second time by screwing a new nozzle onto the Icon-Infiltrant syringe. They were left to act for 1 minute and polymerized the material from all sides for at least 40 seconds. The cofferdam was removed. The surface was polished using special Shophy heads (Japan).

The results of the research and discussion. During the examination, it was found that most ODES were more often located on the vestibular surface of the frontal teeth on the central incisors of the upper jaw 65.9%; mandible 34.4%, on the lateral incisors of the upper jaw 64.5%; mandible 35.6%. The data on the topography of the ODE are summarized in Table 1.

Table 1. **The frequency of detection of ODE on various teeth of the frontal group** (abs.number and in % of the number of all detected teeth with short-circuit)

Group affiliation of teeth		Central incisors		Side incisors		Fangs		1 permanent molars	
		abs	%	abs	%	Abs	%	abs	%
Jaws	upper	31	65,9	23	64,5$^{\Delta}$	17	58,6^{x}	25	55,6 $^{\Theta}$
	lower	16	34,4	16	35,6$^{\Delta}$	12	41,4	20	44,4 $^{\Theta}$
Total		47	100	45	100	29	100	45	100

Note: Θ - reliability of differences in indicators of the upper and lower jaw: * - reliability of differences between indicators of central and lateral incisors; ^{x} - reliability of differences between indicators of central incisors and canines; $^{\Delta}$ - reliability of differences between indicators of lateral incisors and canines.

It is obvious that ODE was more often localized on the teeth of the upper jaw ($p<0.001$). Foci were detected almost equally often on the central and lateral incisors of the upper jaw (65.9% and 64.5%, respectively), canines were significantly less often affected. A similar pattern was observed on the

teeth of the lower jaw. More often (59.0%), one focus of demineralization was detected, in 24.8% of teeth – 2-3 isolated carious spots; in 17.1% of teeth, multiple spots (more than three foci) were detected. More often (51.2%), ADE manifested itself as a single, rather bright white spot, which indicated an acute course of caries, and 94.6% of the foci had clear, well-contoured borders against the background of unchanged enamel.

During the clinical examination of the oral cavity of children after caries infiltration, after 1 month of observation, the absence of new carious cavities and ODES was noted: gloss was restored on the existing chalky spots, a symptom of probe sliding on a smooth surface was noted, which is an indicator of a positive result.

Before caries infiltration, pretty spots were stained blue with a 2% methylene blue solution of varying intensity on a blue scale (from 5 to 9 points), then after a month of using ICON technology, staining did not occur (0 points).

The ODE practically disappeared, and the color of the infiltrated enamel coincided with the native color of the crown. The children performed adequate oral hygiene using manual toothbrushes of medium hardness and therapeutic toothpaste Blend-a-MedProExpert. Undoubtedly, the color and opalescence of the filtered enamel improved due to good hydration with saliva. The smallest number of unsatisfactory results (17.1%) were detected after six months. At the same time, good results were noted in 82.9%. The overall picture did not significantly change with 12 months of observations.

The key to successful treatment of caries in the stage of a chalky spot is strict observance of oral hygiene. The conducted research has demonstrated a high level of effectiveness of the proposed method. This indicates a high caries-static effect of the method of infiltration with a mixture of methyl methacrylate-based resins due to adequate sealing of the pore system in the demineralization site.

Conclusion

Thus, the use of the new ICON technology, based on the infiltration of demineralized enamel with a highly volatile light composite, for the treatment of early stages of caries, provides excellent and good results in the near and long-term follow-up. The composite cured in a demineralized enamel frame not only strengthens the structure of the damaged enamel, but also provides the necessary aesthetic effect of treatment.

The caries infiltration technique allows you to "preserve" the carious process in one visit, provided that the pseudo-compact enamel layer is preserved, which puts this method in a leading position.

References

1. Гилёва О.С., Муравьёва М,А., Серебренникова Е.В. Комплексный подход к оценке эстетико-функциональных результатов кариес-инфильтрации при лечении кариеса эмали //Современные проблемы науки и образования.- 2013.-№ 2.; URL: https: science-education.ru/ru/ article/view?id=8806 (дата обращения: 07.09.2021).

2. Детская терапевтическая стоматология. Национальное руководство. Под ред.В.К. Леонтьева Л.П. Кисельниковой.-М.: ГЭОТАР-Медия, 2010.-896 с.

3. Кузьминская О.Ю., Рутковская П.В. //Стоматология детского возраста и профилактика.- 2016.-№ 1.-С. 28-30.

Web of Medicine: Journal of Medicine, Practice and Nursing
webofjournals.com/index.php/5

4. Масляк Е.Е., Куюмджиди Н.В., Добренькова Н.К., Гоменюк Е.В. //Волгоградский научно-медицинский журнал.-2012.-Вып.36, № 4.-С.41-44.
5. Сафонова Ю.С. Методы клинической и доклинической диагностики поражения твердых тканей зубов //Новости стоматологии.- 2009.-№ 22.-С. 59-62.
6. Скатова Е.А., Хорощевская И.А. //Институт стоматологии.- 2010.-№ 3.-С. 65-67.
7. Харитонова Т.Л., Лебедева С.Н., Казакова Л.Н. Ранняя профилактика кариеса зубов у детей //Саратовский научно-медицинский журнал.- 2011.-Т.7, № 1(приложение).-С.260-262.
8. Шакарьянц А.А. Оценка эффективности лечения очаговой деминерализации эмали в стадии дефекта методом инфильтрации в сочетании с различными реставрационными технологиями: Автореф. дис. … канд.мед.наук.-М., 2014.-24 с.
9. Altarabulsi M.B., Alkilzy M., Petrou M.A., Splieth C. //Eur J. Paediatr Dent.- 2014.-Vol. 15(1).-P. 39-44.
10. Fejerskov O., Kidd A.M. Dental Caries. The disease and its clinical management.-2nd ed.-Wiley-Blackwell, 2008.-P. 640.
11. Domejean S., Ducamp R., Holmgren C. //Med. Pract.- 2015.-Vol. 24(3).- P. 216-221.
12. Paris S., Meyer-Luecket H., Kielbassa A.M. //Dent Res.- 2007.-Vol. 86(7).-P. 662-666.
13. Ryge G. //Int. dent. J.- 1980.-Vol. 30.-P. 347-358.
14. Hamroyeva Dilafruz Shukurovna. General dental condition and characteristics of dental caries in children with heart defects// American Journal of Medicine and Medical Sciences. USA. -2023. - №2 (13). - P. 153-155. DOI: 10.5923/j.ajmms.20231302.26
15. Hamroeva Dilafruz Shukurovna. Prevalence indicators of caries and parodont soft tissue diseases in children with congenital heart defects// Eurasian Medical Research Periodical. Belgium. -2023. - Volume 21. - P. 165-169. (Impact factor: 8.1)
16.Хамроева Дилафруз Шукуровна.Сравнительная эффективность лечения начального кариеса зубов у детей с врожденными пороками сердца// Научные тенденции в медицине. Ташкент. -2024. -№ 3. –С. 11-19. E-ISSN: 3030-3516
17. Hamroyeva Dilafruz Shukurovna. Improving the Diagnosis and Treatment of Tooth Enamel Demineralization in Children with Heart Defects// American Journal of Pediatric Medicine and Health Sciences (2993-2149). America. -2024. -Volume 2. -Issue 3. –P.296-301.