EUROPEAN INTERNATIONAL JOURNAL OF MULTIDISCIPLINARY RESEARCH AND MANAGEMENT STUDIES

TYPE Original Research
PAGE NO. 79-83
DOI 10.55640/eijmrms-05-04-18

Modern Materials for Hermetization Of Fissur Used in Pediatric Dentistry

Shukurova Nodira Tillaevna

Assistant of the Therapeutic Dentistry Department, Samarkand state medical university, Uzbekistan

OPEN ACCESS

SUBMITED 20 February 2025
ACCEPTED 19 March 2025
PUBLISHED 21 April 2025
VOLUME Vol.05 Issue04 2025

Abstract: Fissures are special natural grooves and grooves located on the dental enamel of the chewing surface of teeth between the chewing cusps. The method of sealing consists of obturation of fissures and other anatomical recesses.

Healthy teeth with adhesive materials in order to create a barrier for external cariesogenic factors.

Keywords: Fissure sealing, caries prevention, composite materials.

Introduction: Purpose of the work: to hermetically protect the fissures of teeth against caries

Functions of fissure sealing: creates a barrier for cariesogenic bacteria; has a remineralizing effect on enamel, if the sealant contains active fluoride ions.

Four types of fissure structure: Funnel-shaped fissures - more open, well mineralized, they do not retain food residues due to free washing with oral fluid, are caries-resistant. Cone-shaped - mainly mineralized due to oral fluid, but there are conditions for the retention of food residues and microorganisms. Mineralization of drop-shaped and polyp-shaped fissures occurs mainly from the pulp side of the tooth. This process is less intensive than mineralization due to oral fluid, and fissures remain hypomineralized for a long time. Given the high caries resistance of hard tissues, in teeth with a high initial level of mineralization (IUM) fissure sealing is not recommended. General hygienic measures are sufficient. For teeth with medium BMI - immediately after eruption it is recommended to conduct a one-month course of topical application of calcium-phosphate-containing and fluoride-containing preparations with subsequent sealing with a composite

sealant. It is not recommended to use composite sealants with 38% orthophosphoric acid as an etching agent for teeth with low fissure IUM. In this case, glass ionomer sealants are used, or invasive sealing with composite sealants, or if indicated - the method of prophylactic filling. The presence of pigmented fissures and natural cavities in teeth at the stage of maturation, unlike teeth with mature enamel, indicates an active process and requires invasive methods of sealing.

Initial caries is an indication for invasive sealing with composite sealants.

Contraindications to sealing: the presence of intact wide, well communicating fissures; teeth with healthy pits and fissures, but with carious lesions on the aproximal surfaces; pits and fissures that remain healthy for 4 years or more, do not require sealing; poor oral hygiene.

Indications for sealing and prophylactic procedures for fissures of erupted teeth with immature enamel based on fissure enamel electrometry values (μA): Low ELM (up to 8 μA) - hygienic measures, observation; medium ELM (9 to 20 μA) - hygienic measures, course of fluoride- and calciumphosphate-containing preparations, fissure sealing; high ELM (up to 20 μA) - hygienic measures, course of fluoride- and calciumphosphate-containing preparations, fissure enlargement, prophylactic filling.

For fissures after enamel maturation: 0 μA, healthy enamel - hygienic measures, observation 1-2 μA, initial caries - hygienic measures, a course of fluoride- and calcium-phosphate-containing preparations, fissure sealing; up to 8 μA, progressive initial or superficial caries - hygienic measures, a course of fluoride- and calcium-phosphate-containing preparations, fissure enlargement, prophylactic filling.

This complex approach is taken into account by the world's leading manufacturers of prophylactic agents. VOCO company (Germany, Kuxhafen) produces fluoride-containing rinse “Profluoride M”, gel for applications “Profluoride Jelly”, two-component self-curing multi-purpose fluoride-containing varnish “Bifluoride 12”, a series of sealants “Fissurite” and a unique high-filled sealant based on ormoker “Admira Sil”.

High efficiency (preventive effect of fissure sealing) is estimated by different authors from 55% (Going, Coti,

Hough, 1976) to 99, 1% (Buonocore 1974) and small cost of the method of fissure sealing in combination with the general complex prophylaxis of dental diseases will significantly reduce the growth of dental caries in the area of fissures and fossae.

Nowadays, in order to seal blind pits and fissures of teeth, sealants belonging to three classes of materials are used: composite chemo- and photo-curing materials, glass ionomer cements and compomers.

The material used for fissure sealing (silant) is usually a special composite resin that cures chemically or with light. Due to their high flowability, unfilled silants easily penetrate even very narrow and deep fissures to the bottom, smoothing the chewing surface of the tooth and facilitating hygiene. They have better marginal adaptation, longer retention, wear and deterioration. Filled silants have a shallower penetration depth, smaller micromechanical bonding area, shorter retention times, but are more resistant to abrasion. They are used for invasive sealing technology, but their technological application process is relatively complex, time-consuming and sensitive to moisture. Sealants do not adversely affect the normal mineralization process of enamel. Mineral elements from the oral fluid can freely diffuse along the edge and partially through the coating substance itself. This allows the physiological level of metabolic processes in the hard tissues of the tooth under the coating to be ensured, while preventing the penetration of large protein molecules. The material is moisture-proof and very strong, which allows to protect teeth from fissure caries for a long time (up to 5-8 years). In addition, the sealant promotes saturation of tooth enamel and peri-dental environment with fluoride in the reaction of ionic exchange due to the added soluble salt (fluorides) within 1-28 days.

Types of composite sealants: 1) Self-polymerizing or chemo-curing “Concise White Sealant”. “Delton” (Johnson and Johnson), ‘Delton’, ‘Fis Sil’ (Russia); 2) Photopolymerizable ‘Estisial LC’ (Kulrer), ‘Sealant’ (Bisco), ‘Fissurit’, ‘Fissurit F’ (Voco), ‘Delton-S’, ‘Fis Sil-S’ (Russia), Helioseal, Prisma Sheild.1) The following types of composite sealants: 1) Self-polymerizing or chemically curing ‘Concise White Sealant’. Opaque (not transparent) - easy to control, but do not imitate the color of the tooth and it is impossible to monitor the state of enamel under them; 2. Transparent - aesthetic, allow to monitor the state of enamel under them, but poorly distinguishable when controlling preservation; a) Colored (chameleons) have a bright color only at the time of polymerization, and after that correspond to the natural tone of the tooth or transparent “ClinPro Sealant” (3M ESPE, USA), “Helioseal Cler Chroma” (Ivoclar Vivadent); b) Not colored. A. Fluoride-containing (Fissurit); B. Fluoride-free (Fissurit F).

The third generation of CPMs are materials curing under the influence of visible light with wavelengths from 430 to 490 nm (“Fissurit”, “Helioseal”, “Estisial LC”), they are one-component, working time is long, the

completeness of polymerization is determined by light escaping, the risk of destruction during the curing test is minimal. These materials are based on low viscosity methacrylic acid derivatives. Borosilicate glass with 99% particle size less than 1 micron is used as a filler in the preparations, which provides good penetration properties.

The release of fluoride from Fissurit F and its entry into enamel lasts more than 190 days, Fissurit F gives during this period 4-5 mg of fluoride to strengthen dentin enamel.

Another preparation of the company VOCO (Germany, Kuxhafen) with fluoride light-curing sealant "Admira Sil" contains spatially inorganic-organic copolymers (ormokers), providing excellent mechanical properties and ideal biocompatibility (no toxic resin).

The procedure of fissure sealing starts with a thorough cleaning of the tooth from plaque by brushing and paste, and then air drying. Next, the fissures are treated with 32% orthophosphoric acid for etching (a process in which the acid destroys the core or shell of enamel prisms) for 30-40 seconds, rinsed with distilled water and dried again. Then they are filled with the liquid phase of composite filling material. Under the influence of a special lamp, the material hardens in 40-45 seconds, after which a hard carborundum head is used to remove the excess and grind the material on the chewing surface.

Prophylactic efficiency of materials is determined by the degree of their preservation in fissures and retention of this class of sealants ranges from 20 to 90% and depends on the accuracy of sealing technology.

Glass ionomer cements - Dyract seal (Dentsply), Prima flou (DG), Vitacryl (Medpolymer), ASPA (Dentsply), Fuji (WHS), Glass Ionomer (Shofu Inc.), Alfa-dent, Aqua Ionoseal (Voco) have cariesstatic effect, due to the contained F, Al, Zn, Ca, due to fluorine release these materials have a pronounced cariesstatic effect. SIC are chemically fixed on the tooth surface, do not require etching of enamel before the procedure, have high biocompatibility, less than CPM requirement for drying of the working field, but have a number of technological inconveniences (the need for mixing, difficulty of placement, short working time, long curing), low aesthetic properties, low fluidity, large marginal leakage, are not strong enough compared to composites, and quickly abrade. For sealing purposes, type II glass ionomer cements (designed for dental restorations) can be used for loaded restorations. Some studies show that the use of glass ionomer materials as fissure sealants may be appropriate in newly erupted teeth with extremely low mineralization of the fissures. The difficulty in such cases is associated with the need for a longer enamel etching followed by the application of composite sealants. When it is necessary to perform prophylactic filling (when the tip of the probe gets stuck in the fissure during the examination of the fissure), we offer condensable highly esthetic glass ionomer cement - "VOCO Ionofil Molar" - characterized by three excellent properties. They are easy to apply and less sensitive to the technique of execution, allowing them to be used without etching or the use of an adhesive. The plastic-free classical glass ionomers have a coefficient of thermal expansion similar to dentin, and they also have the so-called "battery" effect of continuously releasing a significant amount of active fluorides. Preservation of SIC in 1, 6, 12, 24 months. Accordingly 90, 80, 60 and 20% respectively, after 3 years - 10% (composite silant - 90%), but nevertheless, SIC provide a high level of reduction of caries of occlusal surfaces - 80-90% for 2 years, teeth, even after macroscopic loss of material, have twice less risk of caries than teeth not covered with SIC.

Compomers - light-curing composite materials, which by virtue of their composition have some of the properties of glass ionomer cements, namely - a little more than composites, hydrophilicity, fluidity and the ability to release fluoride in small quantities in contact with oral fluid. Dyrect Seal (Dentsply) is a compomer sealant.

It is used with NRC (Non-Rise Conditioner) and the fifth-generation adhesive system Prime&Bond NT, which ensures a deeper sealing of the fissures with the polymer. NRC conditioner simultaneously partially dissolves mineral components and prims tooth tissues, Prime&Bond NT is applied on top of it, to which the sealant itself is fixed. The developers of this system consider this technique as an alternative to invasive fissure sealing. Wear of compomer silants is higher, and retention is lower than that of CPM. In 2 years the retention of composite silant is 32%, compomer silant 0%; complete loss is 10 and 38% respectively, but caries develops less frequently after compomer loss than after CPM loss.

The efficacy of caries prevention has been confirmed by many studies. Coating of teeth with fluoride-containing varnish resulted in reduction of caries growth on treated surfaces up to 70% and reduction of CPM up to 35%. The highest efficiency of caries prevention is provided by the method of fissure sealing: the reduction of fissure caries growth for a year amounted to 92.5%.

Achievement of high results of prophylaxis by sealing is conditioned by fulfillment of two main functions of sealants:

1. Creation of a physical barrier on the tooth surface for

cariesogenic factors.

2. Remineralization of enamel in the fissure area, in the presence of active fluoride ions in the composition of the sealant.

CONCLUSION

Evaluation of the effectiveness of sealants showed that the reduction of dental caries growth depends on the retention of sealants on the occlusal surfaces of teeth, the ability to release fluoride ions into the tooth tissue and oral fluid, and the effectiveness of prevention of caries of permanent teeth increases significantly when combining the sealing of fissures and pits with local fluoride prophylaxis and oral hygiene.

Scientific studies have proven that a properly performed procedure is 100% effective in protecting tooth surfaces from decay, as it serves as a physical barrier to possible decay. The effectiveness of the procedure is halted or stopped when the bonding agents between the film and the tooth are destroyed or lost. However, teeth that have been sealed are significantly less susceptible to cavities later in life than teeth that have never been treated. Sealing is effective for 5 years, but can remain effective for up to 10 years. Reports from doctors show that 7 years after sealing, about 49% of teeth remain completely sealed. But sealing should not be considered as a permanent procedure. Regular visits to the dentist for preventive checkups are necessary to monitor the condition of the sealed teeth. The essence of fissure sealing is to protect the teeth from plaque, which is a precursor to tooth decay.

REFERENCE

Kadirovna M. S. et al. PREDICTIVE MODELING OF THE PROBABILITY OF DEVELOPING PERIODONTAL DISEASES IN PATIENTS WITH CARDIOVASCULAR DISEASE //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 04. – С. 65-70.

Shukurova N., Muratova S., Teshayev S. PREVENTION OF TUBERCULOSIS. TACTICS OF A DENTIST FOR ORAL TUBERCULOSIS //Science and innovation. – 2024. – Т. 3. – №. D3. – С. 144-149.

RO M. S. K. N. S. N. T. Statistical analysis of the method of delayed filling in chronic apical periodontitis //CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION. – 2023. – Т. 2. – №. 11 Part 3. – С. 148-151.

Kadirovna M. S. Shukurova Nodira Tillayevna Assessment of the Dental Condition of Patients with Impaired Cerebral Circulation //Eurasian Medical Research Periodical. – 2023. – С. 38-41.

Kadirovna M. S., Tillaevna S. N., Otabekovich T. S. CLINICAL PROTOCOLS OF DENTAL TREATMENT OF PATIENTS WITH CARDIOVASCULAR DISEASES (REVIEW OF SCIENTIFIC RESEARCH) //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 04. – С. 55-64.

Tillayevna S. N. Wedge-Shaped Defects, Erosion, Necrosis, And Wear of Dental Hard Tissues //European International Journal of Multidisciplinary Research and Management Studies. – 2025. – Т. 5. – №. 02. – С. 168-170.

Tillayevna S. N. Discoloration, Trauma, Clinical Presentation, And Treatment in Therapeutic Dentistry //European International Journal of Multidisciplinary Research and Management Studies. – 2025. – Т. 5. – №. 02. – С. 171-173.

Шукурова Н. Т., Муратова С. К., Тураев А. Б. Врачебная тактика при диагностике туберкулеза полости рта //Вестник науки и образования. – 2020. – №. 18-2 (96). – С. 86-91.

Fakhriddinovna A. N. et al. Platelet condition in children with congenital cleft palate in chronic foci of infection //Достижения науки и образования. – 2019. – №. 12 (53). – С. 113-115.

Muratova S., Shukurova N., Xabibova N. THE PREVALENCE OF A COMBINATION OF THE THREE MAIN DENTAL DISEASES OF DENTAL CARIES IN PATIENTS WITH CHRONIC CORONARY HEART DISEASE //Science and innovation. – 2024. – Т. 3. – №. D4. – С. 216-220.

Muratova S., Shukurova N., Xabibova N. TO STUDY PERIODONTAL, HYGIENIC INDICES OF THE ORAL CAVITY, MINERAL COMPOSITION OF ORAL FLUID IN DENTAL PATIENTS WITH ISCHEMIC PATHOLOGY //Science and innovation. – 2024. – Т. 3. – №. D4. – С. 211-215.

Shukurova N. STUDYING THE INTEGRATION OF HUMAN SPIRITUAL DEVELOPMENT IN THE MIDDLE AGES WITH THE TEACHINGS OF SUFI AND SUFI AND TODAY'S PSYCHOLOGY //Science and innovation. – 2024. – Т. 3. – №. B4. – С. 223-228.

Sevinch E., Zarafruz B. ETIOLOGICAL TREATMENT FEATURES INFLAMMATORY PERIODONTAL DISEASE //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 03. – С. 241-246.

Yusufboy S., Qobilovna B. Z. FEATURES OF THE STRUCTURE OF COPD IN ELDERLY PATIENTS //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 05. – С. 363-368.

Sevinch E., Qobilovna B. Z. A STUDY ON THE MORPHOFUNCTIONAL STATE OF ORAL ORGAN TISSUES DURING THE USE OF NON-REMOVABLE ORTHODONTIC

STRUCTURES //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 03. – С. 247-253.

Shaximardonova E. S., Kobilovna B. Z. RED LICHEN PLANUS OF THE ORAL MUCOSA AND ITS CLINICAL ANALYSIS OF A PATIENT WITH, ASSOCIATED WITH THE EPSTEIN—BARR VIRUS //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 01. – С. 272-279.

Yusufboy S., Qobilovna B. Z. STUDY OF CHANGES IN THE ORAL CAVITY IN ENDOCRINE DISEASES //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 05. – С. 357-362.

Yusufboy S., Qobilovna B. Z. SOCIAL AND DENTAL SURVEY OF PATIENTS TECHNOLOGY OF OLDER AGE GROUPS SUFFERING WITH ACUTE LEUKEMIA //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 05. – С. 352-356.

Muxtasar A. MODERN PROTOCOL FOR CLINICAL AND FUNCTIONAL RESEARCH AND PREVENTION OF TEMPOROMANDIBULAR JOINT DISORDERS //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 02. – С. 232-238.

Muxtasar A. A COMPARATIVE EVALUATION OF ORTHOPEDIC TREATMENT FOR PARTIAL DEFECTS OF DENTAL ROWS USING DIGITAL TECHNOLOGIES //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 03. – С. 254-257.

Shaxnoza T., Qobilovna B. Z. COMPREHENSIVE TREATMENT OF PERIODONTAL DISEASES USING LOW-INTENSITY MAGNETIC LASER RADIATION //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 02. – С. 137-144.

Nigora N., Kobilovna B. Z. EARLY SIGNS AND RISK FACTORS FOR THE DEVELOPMENT OF THE ARTICULAR FORM OF TRANSVERSAL OCCLUSION ANOMALY //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 02. – С. 93-98.

Mukhtasar A. Changes in immunological indicators of the oral liquids in children at the stages of orthodontic treatment //Thematics Journal of Education. – 2022. – Т. 7. – №. 3.

Mukhtasar A. Changes in the order of orthodonic treatment in children's oral fluid homestast instructions //Thematics Journal of Education. – 2022. – Т. 7. – №. 3.

Ulug'bek X., Kobilovna B. Z. STUDY OF COMPOSITE MATERIAL SAMPLES0 //European International Journal of Multidisciplinary Research and Management Studies. – 2024. – Т. 4. – №. 02. – С. 115-119.

Qobilovna B. Z. Nodirovich EA EVALUATION OF ORTHOPEDIC TREATMENT WITH REMOVABLE DENTAL PROSTHESES FOR PATIENTS WITH PAIR PATHOLOGY //Spectrum Journal of Innovation, Reforms and Development. – 2023. – Т. 11. – С. 95-101.

Anvarovich E. S., TYPES Q. B. Z. I. O. F. D. OF RETRACTION THREADS ON THE DEGREE OF GINGI RECESSION //Spectrum Journal of Innovation, Reforms and Development. – 2023. – Т. 11. – С. 84-86.

Tavakalova Q. M., Qobilovna B. Z., Sarvinoz Y. Preventive Measures in the Treatment of Caries in School children //Eurasian Research Bulletin. – 2023. – Т. 17. – С. 60-65.

Tohirovna M. L., Qobilovna B. Z. Optimization of Complex Methods Treatment of Inflammatory Periodontal Diseases //Eurasian Research Bulletin. – 2023. – Т. 17. – С. 138-143.

Qobilovna B. Z., Maxzuna U. Improvement of Providing Therapeutic Dental Care to Pregnant Women. Therapeutic and Preventive Measures //Eurasian Research Bulletin. – 2023. – Т. 16. – С. 146-150.