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COMPARATIVE EVALUATION OF THE APPLICATION OF CALCIUM HYDROXIDE AND MATERIAL ON THE BASIS OF MINERAL TRIOXIDE OF THE BIO-DENT UNIT IN THE TREATMENT OF DEEP CARIES WITH TEMPORARY TEETH WITH LOW INVASIVE METHODS

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ABSTRACT

The aim of the work was to evaluate the comparative clinical efficacy of the use of a material based on calcium hydroxide, which has successfully proven itself in pediatric dental practice, and the innovative material "Bio-Dent" (DentalsPfarma), the experience of which is limited in the treatment of deep caries of deciduous teeth using minimally invasive methods. Clinical studies were carried out on the basis of the Department of Hospital and Clinical Dentistry at the Children's Regional Dental Clinic in Andijan. The basis for the clinical analysis was the data obtained during the examination and treatment of 52 somatically healthy children 4 - 5 years of age with a compensated form of caries. Summarizing the results of the studies, it was concluded that the use of the "Bio-Dent" material in the teeth of temporary occlusion is the most effective and promising in the treatment of deep caries while maintaining the vitality of the pulp.

KEYWORDS: *Children, Temporary Teeth, Deep Caries, Calcium Hydroxide, "Bio-Dent"*

INTRODUCTION

At the reception of a pediatric dentist, the diagnosis of deep caries in milk teeth is made with great caution and very rarely. According to T.F. Vinogradova (1987), with an active course of caries, replacement dentin does not have time to form and with deep carious cavities, there are direct pathological changes in the pulp comparable to pulpitis. Thus, in the temporary teeth T. F. Vinogradova and co-authors propose to diagnose deep perforated pulpitis. [6].

Other authors are less categorical regarding the diagnosis of deep caries. They explain this by the fact that during the period of stabilization of the growth of a temporary tooth in a somatically healthy child, especially when the carious cavity is located on the chewing surface, such a diagnosis is quite justified (Ya.F. Kominek, 1968; A.A. Kolesov et al., 1991) It is known that the structure of hard tissues of milk teeth has certain anatomical and physiological features (smaller volume, wide dentinal tubules, the presence of low-mineralized zones of dentin, which in the form of wide strips of interglobular dentin reach the border of the pulp) contributing to the rapid spread of the infectious process and the development of complications even with a small depth of the carious cavity. Therefore, it is more justified to consider deep caries of a temporary tooth as a subclinical pulpitis, when, in the absence of clinical symptoms, serious morphological changes are observed in the pulp. At the same time, the primary task is to preserve the vitality of the pulp of the temporary tooth with minimal invasive intervention. The key to success in this situation is the selection of the most optimal material as a medical pad.

For many years, calcium hydroxide has been considered the most effective agent used to "heal" the pulp and restore dentin when the pulp is damaged by caries, trauma, or therapeutic intervention. Due to its high pH, calcium hydroxide has pronounced bactericidal properties, neutralizes the acidic products of bacteria, creates good conditions for dentin repair, and also has the ability to mobilize growth factors of the dentin matrix, which causes the formation of new dentin [1]. Recently, new high-tech materials such as mineral trioxide have appeared. unit (MTA®), Trioxident (VladMiVa), Biodentine ™ (Septodont), TheraCalLC (BISCODental Products), etc. According to the literature, MTA® stimulates the formation of dentinal bridges, protecting exposed pulp more effectively than calcium hydroxide.

According to various hypotheses, the dentinogenesis caused by it may be associated with its bio-capacity, the ability to maintain marginal integrity and a temporary increase in the pH index [3]. Bio-Dent is a new calcium silicate-based material belonging to the same class as MTA®, similar in characteristics to some Portland cement derivatives. From a biological point of view, it has good compatibility and is capable of causing reparative dentin deposition by stimulating the activity of odontoblasts and cell differentiation, can serve as an artificial dentin substitute and used as a material for direct and indirect pulp capping [2,4].

Aim of the study. The purpose of our work was a comparative assessment of the clinical efficacy and feasibility of using a material based on calcium hydroxide, an innovative material “Bio-Dent” (DentalsPfarma) that has proven itself successfully in pediatric dental practice, the experience of which is insufficient in the treatment of deep caries (subclinical pulpitis) of temporary teeth by minimally invasive method of indirect pulp covering.

MATERIALS AND METHODS

Clinical studies were carried out on the basis of the Department of Hospital and Clinical Dentistry in the children's regional dental clinic in Andijan.

The basis for the clinical analysis was the data obtained during the examination and treatment of 48 somatically healthy children 4 - 5 years of age with a compensated form of caries, satisfactory oral hygiene and a clinically established diagnosis: acute deep caries of temporary molars. The diagnosis was established on the basis of anamnesis data, clinical instrumental and X-ray examination. Parents of young patients were familiarized with the treatment plan and gave

written consent to participate in the study. Two groups of patients were formed, 26 children in each group, a total of 68 teeth were cured (33 in the first group and 35 in the second group). Before starting treatment, all patients underwent professional oral hygiene and were given recommendations for oral care. The dissection of the carious cavity was carried out with great care (in most cases, without the use of local anesthesia). With the help of a ball-shaped bur or an enamel knife, the eroded enamel was removed in order to widely open the carious cavity. The softened dentin was removed with an excavator, first from the walls of the carious cavity, controlling the degree of density by probing. At the bottom of the carious cavity, a small amount of light softened dentin was retained and the damaged dentin was considered as the wound surface of the tooth pulp. During instrumental treatment, the carious cavity was irrigated, if possible, with warm (t-37C) sterile saline solution. After isolation, the tooth cavity was dried with a sterile cotton swab without pressure. Then the patients of the first group were placed on the bottom of the cavity with a paste of calcium hydroxide Calcevit (Vladmiva) and a temporary filling made of glass ionomer cement, and in patients from the second group, the entire cavity was filled with Bio-Dent material (The second visit was appointed after 3 weeks. In the absence of complaints and pathological changes on the side of the tooth and on the X-ray, the treatment was completed.In the first group, a temporary filling with a medical bandage was removed, the cavity was irrigated with saline solution, dried, a thinner layer of Calcevit material was applied, an insulating pad made of modified GIC and a permanent filling from a compomer were applied.

In the second group, only the surface layer of the “Bio-Dent” material was removed (up to the enamel-dentin border) and after cleaning the cavity from sawdust, the tooth was restored with a computer. Control examinations were carried out every three months throughout the year. During the examinations, complaints, color and mobility of the tooth, the condition of the gums, clinical symptoms of the state of the pulp (its reaction to stimuli), the condition of the filling (integrity, marginal adhesion) and changes in the radiograph were assessed.

RESULTS AND DISCUSSIONS

Currently, a pediatric dentist should not only be aware of new filling materials, but also be able to choose the most optimal tactics for treating teeth in children, analyzing existing and new clinical experience.

In practice, we are increasingly using the principle of minimal invasive treatment of dental caries with subsequent clinical and radiological control. With the development of modern dentistry, the absolute removal of all altered and even infected tissues is not necessary to stop the carious process. This is especially important when it comes to temporary teeth. If a healthy child has even a deep carious cavity in a formed milk tooth, there is always hope for the potential of the pulp.

Studies by a number of authors have shown that hermetically sealed cavities with left carious dentin give a small percentage of recurrence and an absolute decrease in the number of microorganisms. Remineralization of the remaining carious dentin was proved by biochemical methods and X-ray observations. In these studies, calcium hydroxide pads were used. [4].

A significant disadvantage of materials based on calcium hydroxide is that it can be destroyed by the dentinal fluid flowing through the underlying dentinal tubules, since a constant current of the dental cerebrospinal fluid can facilitate the diffusion of the components of the paste along the

concentration gradient. The unregulated process of dentin formation can lead not only to the formation of conglomerates (denticles) in the tooth cavity, which, mechanically acting on the pulp, can cause its inflammation, but also to complete calcification of the coronal and root pulp and obliteration of the root canals.

The mechanism of action of cements based on calcium silicate, for example, Bio-Dent material, implies the release of calcium hydroxide with a basic pH value at the impermeable boundary of the material and dentin, as well as the resistance of the material to dissolution, eliminating the need for re-intervention. Despite the small amount of clinical data associated with the recent appearance of this material, animal studies convincingly indicate the positive qualities of the Bio-Dent material in terms of preserving the vitality of the pulp, the formation of dentinal bridges and the absence of complications (internal resorption). According to the manufacturer's data, Bio-Dent is compatible with all direct and indirect restorations and with all bonding systems. The remaining “Bio-Dent” can be treated as artificial dentin and remain in the deep cavity.

The research results showed a good therapeutic effect in both the first and second groups of patients. Dentin during the second opening of the tooth cavity using calcium hydroxide can be described as drier, harder and darker.

When using “Bio-Dent” material, the tooth cavity, according to the manufacturer's recommendation, was not re-opened. The condition of the bottom of the carious cavity was assessed radiographically. A month later, the radiographs showed a compaction of the bottom of the cavity in most cases. Clinically and radiographically, it was found that in the first group, out of 33 treated teeth, the carious process was arrested in 26 cases, in the second group - in 31 cases (out of 35 teeth). Thus, the effectiveness of treatment in the first group was 78%, in the second group - 87%. Also, in children of the second group, a smaller number of fillings with impaired marginal adhesion were revealed: 3 cases out of 32 treated teeth. While in the patients of the first group, the loss of the filling and the violation of its integrity was observed in 7 cases out of 33.

Based on our experience, the use of Bio-Dent material is much more convenient compared to the use of calcium hydroxide, does not require an insulating pad and is easier for children to tolerate, since the cavity is not reopened to excavate the treatment pad and replace it.

CONCLUSION

Summarizing the results of the clinical observations, we can conclude that the use of the Bio-Dent material in the teeth of temporary occlusion is the most effective (in comparison with the widely used calcium hydroxide) and promising in the treatment of deep caries and the preservation of pulp vitality. In addition to the effectiveness of the Bio-Dent material, the advantage of the drug is its ease of use and its budgetary nature, which gives reason to recommend this drug for the treatment of deep caries of deciduous teeth using minimally invasive methods as an alternative to imported drugs of this category.

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