MINIMALLY INVASIVE METHOD OF TREATMENT OF DENTAL CARIES IN CHILDREN

EMU University,

Mirzamuxamedova M.Sh.

Introduction and Aim of the Study

Dental caries remains one of the most распространённых заболеваний among children worldwide and continues to be a major public health concern. The особенностью течения кариеса в детском возрасте является его быстрое прогрессирование, особенно в период формирования корней постоянных зубов и незавершённой минерализации твёрдых тканей. In such conditions, traditional approaches to treatment, which involve extensive removal of affected tissues, may lead to unnecessary loss of tooth structure and negatively affect дальнейшее развитие зуба.

In recent years, minimally invasive dentistry has gained increasing importance as a modern concept aimed at preserving maximum healthy tooth tissue while effectively eliminating pathological processes. This approach is especially relevant in pediatric dentistry, where psychological comfort of the child and biological сохранность зуба играют ключевую роль.

The aim of this study was to evaluate the effectiveness of a minimally invasive method for the treatment of caries in permanent teeth with unformed roots in children, and to compare its clinical outcomes with those of the traditional method of cavity preparation.

Materials and Methods

The study was conducted on a group of 90 children aged 7 to 13 years who were students of School No. 42 in Tashkent. All children included in the study had carious lesions affecting permanent molars (first permanent molars – 1PM) at the stage of root formation.

The participants were divided into two groups depending on the method of treatment used.

Group 1 (main group) included patients in whom caries treatment was performed using a minimally invasive technique. A total of 102 restorations were placed in this group. After selective removal of infected dentin, cavities were restored using glass ionomer cement (GIC) "Argion Molar AC," known for its fluoride release and good adhesion to tooth tissues.

Group 2 (control group) consisted of patients who underwent traditional treatment according to the principles of Black's cavity preparation. In this group, 129 restorations were performed using silicophosphate cement "Belotsin," which has been widely used in conventional pediatric dentistry.

The minimally invasive method was carried out in several stages under the control of a caries detector, specifically a 0.5% solution of fuchsin. This dye selectively stains demineralized and infected dentin, allowing for precise differentiation between affected and healthy tissues. During the procedure, only the softened, pathologically altered upper layers of dentin were removed, preserving the deeper, potentially remineralizable dentin.

Necrotomy was performed carefully and repeated several times until all stained areas were eliminated, ensuring complete removal of infected tissue while maintaining the structural integrity of the tooth. This approach minimizes trauma to the pulp and reduces the risk of complications.

Results

The comparative analysis of the two treatment methods demonstrated a significantly higher clinical effectiveness of the minimally invasive approach compared to the traditional method.

After a follow-up period of 6 months, several clinical criteria were evaluated, including the development of secondary caries, marginal integrity of restorations, and preservation of anatomical form.

The results showed that in the control group (traditional method), the incidence of secondary caries reached **28.7 ± 3.1%**, whereas in the minimally

invasive group this показатель was significantly lower at **4.5 ± 1.6%**. This indicates a more reliable sealing and better preservation of tooth tissues when using minimally invasive techniques.

Similarly, нарушения краевого прилегания пломб were observed in **22.3 ± 2.7%** of cases in the control group, compared to only **5.3 ± 1.5%** in the main group. Good marginal adaptation is crucial for preventing microleakage and subsequent development of recurrent caries, and these results highlight the superiority of the minimally invasive approach.

In terms of anatomical form preservation, restorations placed using the traditional method showed defects in **12.3 ± 1.8%** of cases, whereas in the minimally invasive group this показатель was only **3.1 ± 1.2%**. This reflects better stability and durability of restorations performed with modern materials and techniques.

The improved outcomes observed in the minimally invasive group can be attributed to several factors. First, the preservation of healthy tooth structure enhances the mechanical stability of the tooth. Second, the use of glass ionomer cement provides chemical adhesion and continuous fluoride release, contributing to secondary caries prevention. Third, the selective removal of infected dentin reduces the risk of pulp irritation and promotes biological healing processes.

Discussion

The findings of this study confirm that minimally invasive methods represent a highly effective approach to the treatment of caries in children, particularly in teeth with incomplete root formation. This is of great clinical importance, as preserving pulp vitality during this stage is essential for normal root development and long-term tooth function.

Traditional methods of cavity preparation, while effective in removing carious tissue, often involve excessive removal of sound dentin, which can weaken the tooth and increase the risk of complications. In contrast, minimally invasive techniques focus on targeted removal of infected tissue, preserving the natural защитные механизмы зуба.

Another important advantage of the minimally invasive approach is its психологическая приемлемость for children. Reduced use of rotary instruments, less noise and vibration, and shorter treatment time contribute to decreased anxiety and improved cooperation during dental visits. This is particularly relevant in pediatric dentistry, where negative experiences can lead to long-term dental fear.

The use of caries detectors further enhances the precision of treatment, allowing clinicians to avoid both under-treatment and over-preparation. In addition, the application of modern restorative materials, such as glass ionomer cements, provides additional benefits due to their biocompatibility and cariostatic properties.

The results of this study are consistent with current trends in evidence-based dentistry, which emphasize the importance of tissue preservation, prevention, and individualized treatment planning. Minimally invasive dentistry aligns with these principles and represents a shift from purely mechanical treatment approaches to biologically oriented care.

Conclusion

The comparative evaluation of minimally invasive and traditional methods of caries treatment in permanent teeth during the period of root formation demonstrated a significantly higher clinical effectiveness of the minimally invasive approach.

The use of minimally invasive preparation techniques in combination with glass ionomer cement “Argion Molar AC” ensures:

reduced incidence of secondary caries;

improved marginal adaptation of restorations;

better preservation of anatomical form;

increased durability of treatment outcomes;

improved psychological comfort for pediatric patients.

The high clinical efficiency and good tolerability of this method allow it to be recommended for widespread use in pediatric dental practice, especially in cases of incomplete mineralization of tooth tissues.

In conclusion, minimally invasive therapy for caries in permanent teeth with unformed roots not only improves treatment outcomes but also contributes to the

preservation of dental health in children. Its implementation in routine clinical practice represents an important step toward enhancing the quality of pediatric dental care and ensuring long-term success of restorative treatments.

***Key Words**: Treatment of caries in children, minimally invasive dentistry, micropreparation, pediatric caries, glass ionomer cement, restorative dentistry.*