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CASE REPORT ON THE USE OF RIVA STAR AQUA AND RIVA SELF CURE GLASS IONOMER CEMENT RESTORATION IN PRIMARY TEETH

ПРИКАЗ НА СЛУЧАЈ ЗА УПОТРЕБА НА RIVA STAR AQUA И RIVA SELF CURE ГЛАС ЈОНОМЕРНА РЕСТАВРАЦИЈА КАЈ МЛЕЧНИ ЗАБИ

Mitrova O.[1], Sotirovska Ivkovska A.[2], Kocovski D.[3]

[1]*PHI General Hospital Gevgelija, [2]Department of Pediatric and Preventive Dentistry, Faculty of Dentistry – Skopje, Ss. Cyril and Methodius University in Skopje, Republic of North Macedonia, [3]PHI Medical Center, Demir Hisar

Abstract

Dental caries remains a severe oral health problem in children, and its impact in terms of pain, function impairment, and oral health-related quality of life of the population is high. In pediatric and operative dentistry, caries treatment benefits from a therapeutic option based on the use of silver fluoride (AgF) associated with potassium iodide (KI) to avoid dark colorations on dental tissues. The objective of this study was to evaluate the use of Riva Star Aqua and Riva Self Cure glass ionomer cement for restoration in deciduous teeth. Nowadays, Minimal and noninvasive approaches for management of dental caries are preferred, in lieu of conventional approaches. Silver diamine fluoride allows a more conservative tooth preparation, it is applied directly to carious lesions to arrest remaining decay, remineralize, and harden leathery dentin. Since management of dental caries with Riva Star Aqua is noninvasive and much comfortably performed, it can be a favorable means to treat dental caries in children. The present study is an insight into the use of Riva Star Aqua and Riva Self Cure glass ionomer cement for restoration in primary teeth and its clinical significance. **Keywords:** pediatric dentistry; silver fluoride; glass ionomer cement; tooth restoration; dental caries.

Апстракт

Денталниот кариес претставува сериозен проблем за оралното здравје кај децата и можност за предизвикување болка, пореметување на функцијата и квалитетот на животот на населението. Во детската и реставративна стоматологија, третманот на кариес има потреба од терапевтска постапка која вклучува употреба на сребрен флуорид (AgF) поврзан со калиум јодид (КИ) за да се избегнат темните пребојувања на забните ткива. Целта на оваа студија беше да се оцени употребата на Riva Star Aqua и Riva Self Cure глас јономер цемент за реставрација кај млечни заби. Во современата стоматологија се претпочитаат минимални и неинвазивни постапки за справување со денталниот кариес, наместо конвенционалните методи. Сребрениот диамин флуорид овозможува поконзервативен третман на забите, се нанесува директно на кариозните лезии за да се спречи понатамошно ширење на кариозната лезија, се овозможува реминерализација и зацврстување на деминерализираниот дентин. Бидејќи третманот на денталниот кариес со Riva Star Aqua е неинвазивен и многу лесен за изведување, може да биде средство кое е прифатливо за терапија на дентален кариес кај децата. Оваа студија дава увид за предностите кои ги има употребата на Riva Star Aqua и Riva Self Cure глас јономер цемент за реставрација на млечни заби и неговото клиничко значење. **Клучни зборови:** детска стоматологија; сребро флуорид; глас јономер цемент; реставрација на заби; дентален кариес.

Introduction

Dental caries is considered the most common disease in children. Factors that influence its occurrence are a diet rich in fermentable carbohydrates, the presence of bacteria in the biofilm, and oral hygiene habits. When left untreated, it can cause pain, dysfunction and can affect daily activities.

Local treatment with silver fluoride is important to stop carious lesions in primary teeth. The action of fluorine and silver can enhance the remineralization of the carious lesion, increase the resistance of hard dental tissues to further demineralization, cause the death of microorganisms and prevent adhesion and bacteria growth[1].

There are certain clinical conditions that present a challenge to pediatric dentists, even with the use of silver fluoride solutions, such as occlusal cavities. Due to the shape of the cavity, it is possible for some retentive parts,

that allow the growth and maturation of the biofilm, to remain, and therefore, even with the application of silver fluoride solution, these lesions can progress. This happens because during daily tooth brushing with a toothbrush and fluoride paste it is not possible to remove the biofilm in these retentive parts and the plaque becomes more and more cariogenic. In such cases, the efficacy of the treatment with silver fluoride alone decreases over time and the carious lesion is reactivated[2]. In such clinical conditions, the combination of a silver fluoride solution with a glass ionomer restoration is convenient, to ensure a faster remineralization of the carious dentin, together with an aesthetic restoration that closes the cavity and restores the shape of the teeth, eliminates the retentive parts and allows adequate biofilm control.

With the advance of science, Silver Fluoride (AgF) Riva Star Aqua product is available on the market, which is used as a dental caries control agent. It has proven to be effective, with its preventive and cariostatic properties, it is indicated for patients with a high risk of caries and has a simple procedure for application in dental practice[3].

The staining of the restoration's cavosuperficial margin becomes a problem when Silver Fluoride solutions are used alone. In order to overcome this deficiency, it is recommended to use Riva Star Aqua step 1 silver fluoride (AgF) and step 2 potassium iodide (KI), a combination that is available in Riva Star Aqua (SDI). Riva Star Aqua is a product that has a cariostatic effect, contains silver fluoride, and has similar performance to silver diamine fluoride products, without the disadvantages of ammonia-based solutions (odorless, unpleasant taste and soft tissue irritation). Riva Star Aqua (AgF) is an aqueous solution of silver fluoride without the presence of ammonia (with an improved formula unlike Riva Star), a non-invasive patented two-step system. The high concentration of silver fluoride ions inhibits cariogenic biofilm growth. 38% silver fluoride, used as the first step when using Riva Star Aqua, shows an effective inhibition of the biofilm, allowing immediate reduction of tooth hypersensitivity (by blocking the dentinal tubules). There is no risk of burns of the gingival tissue because it does not contain ammonia. Silver fluoride stimulates remineralization and provides an adequate ph value forforming minerals, protects collagen from degradation, and prevents growth and adhesion of bacteria[4]. Potassium iodide is used as a second step in the use of the agent by preventing teeth discoloration, and making it more aesthetically acceptable for patients[5,10]. The silver fluoride acts both in the inorganic portion of the dental structure and the organic portion; sodium fluoride being responsible for the mineral part, which is hydroxyapatite, and silver nitrate for the organic portion of proteins.

The reduction in the prevalence of cariogenic bacteria through cavity sealing and application of cariostatic agents is an important step that precedes the rehabilitating dental treatment. Therefore, the association between a cariostatic agent and an atraumatic restoring treatment is a therapeutic option of great value, especially in children with early childhood cavities.

The purpose of this paper was to show a clinical case of carious lesion treatment with Riva Star Aqua and Riva Self Cureglass ionomer restorative material.

Case Report

At the Clinic of Pediatric and Preventive Dentistry, at the "St. Panteleimon" University Dental Clinical Center in Skopje, a 6-year-old patient was admitted, who underwent a clinical examination and was diagnosed with occlusal carious lesions on the first and second lower right primary molars, classified according to ICDAS II as tooth 85 code 05 and tooth 84 code 04 (Picture 1). The clinical examination of the patient was performed in a dental office with visual inspection using a mirror and a probe for probing the carious lesions.

Picture 1. *Occlusal carious lesions on tooth 85 and 84*

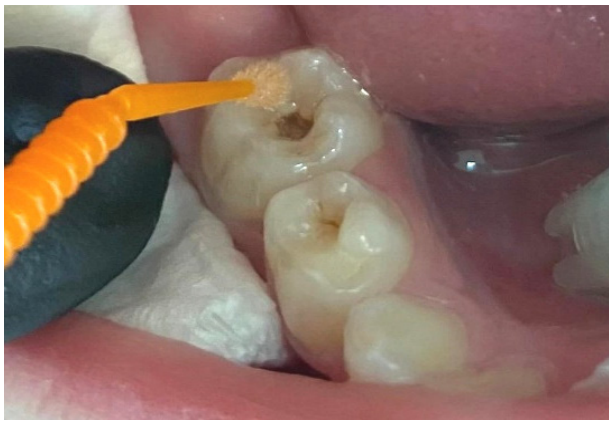
Picture 2. *Riva star aqua*

After discussing the possible treatment alternatives with the parents, the association of Riva StarAqua and glass ionomer cemen restoration was the procedure that was chosen to treat the carious lesions of the representative teeth (Picture 2).

According to the principles of Minimally Invasive Dentistry, selective caries removal was performed with manual instruments (dentin excavators); the cavo superficial margins of the cavity were kept free from carious tissue (Picture 2). It's important to point out that the restorative procedure was performed without local anesthesia, and with dental isolation with cotton rolls and an aspirator.

Application of Riva Star Aqua step 1 consisted of instilling one drop of silver fluoride on a non-absorbable pad and using a disposable brush applicator, teeth with carious lesions were treated with an active application of 60 seconds (Picture 3).

Next step was the use of Riva Star Aqua step 2, potassium iodide, by instilling two drops on a non-absorbable pad and, also with a disposable brush applicator, the carious lesions previously treated with silver fluoride were covered. The application of potassium iodide on silver fluoride, as a second step, contributed to the formation of a creamy white precipitate of silver fluoride which, after several applications of potassium iodide, neutralized and became clear (Picture 4). KI neutralizes the discoloration effect on teeth caused by silver ions.



Picture 3. *Application of AgF solution (Riva Star Aqua – step 1)*

Picture 4. *Use of Potassium Iodide (Riva Star Aqua - Step 2)*

After the application of Riva Star Aqua, restorations were placed on the treated teeth with glass ionomer cement (Picture 5) Riva Star Self Cure (SDI) to restore the shape and aesthetics of the tooth, and to enable easier control of the biofilm, (Picture 6).

Picture 5. *Clinical aspect of a placed glas ionomer restoration*

Picture 6. *Riva self-cure glass ionomer restoration cement*

Discussion

Although silver fluoride (AgF) applicationcan be considered a definitive treatment in posterior deciduous teeth, the desire for dental restorationis not unusual: par-

ents and patients want to recuperate teeth shape and aesthetics, while dentists aim to promote a better biofilm-control by cavity sealing.

Local treatment with Riva star aqua is important for preventing carious lesions in deciduous teeth. The principle of atraumatic work, the quick and easy application of the solution, without the need for local anesthesia is an easily acceptable method for children, especially for those who don't cooperate. Treatment of caries without the use of dental handpieces instruments minimizes the need for procedures that create aerosols, and by closing the cavity ensures the restoration of the shape and function of the tooth, and better control of the biofilm.

In dental caries treatment, especially in children who don't cooperate, children with disabilities who require sedation, it is a challenge to provide traditional restorative treatment. Many authors confirm that the use of Riva Star Aqua is a more effective, safer and more affordable option in the treatment of caries in children[8,11].

Compared to fluor protector (FP), the use of Riva star aqua and Riva star shows significantly higher antimicrobial activity. This is attributed to the ionic content of fluor and silver in AgF. These results confirm that both agents have antimicrobial activity against Streptococus mutans, and suggest that their higher potency is a more effective option for caries treatment[6]. Other authors, such as Hyunseok Lee, also confirm the great antimicrobial ability of AgF, compared to FP. AgF is comparable to ampicillin in its antibacterial effects against S. Mutans[7].

When treating occluso-proximal cavities, the shape of the lesion allows retention sites to remain, where there is growth and maturation of the biofilm, and despite the application of silver fluoride, carious lesions can progress, therefore it is necessary to close the cavity by placing a restorative material[8]. The use of these materials confirmed the efficacy of Riva star aqua and glass ionomer cement restorations in our patient as well. The principle of operation is considered acceptable by the patient, without fear and anxiety.

When AgF is mentioned, despite the aforementioned benefits, there are concerns about the possibility of restaining of teeth, restaining of the restoration margins, and possible non-acceptance by parents/children. This concern is unfounded, provided KI is used as a second step after the use of AgF (Riva star aqua), because tooth discoloration is reduced. It is an important advance that certainly widens the use of silver diamine fluoride, since the staining of teeth is greatly reduced. The possibility of purchasing both solutions together, inone single product, is an extra facility. This important data enables a wider use of Riva star aqua. According to Patel et al. the application of SDF, i.e. AgF, successfully stops dentine caries and it is 89% more effective than other agents for stopping the carious process, but the use of KI after SDF does not neutralize the repainting in its entirety[9]. However, according to Turton B et al. the use of KI resulted in a 6-times lower chance of developing black lesions on teeth compared to teeth treated with AgF or SDF alone[10].

In their study, Jiang et al. demonstrated that the physicochemical changes of dental tissue caused by pretreatment with AgFdid not affect the adhesive properties of glass ionomer cement restorations[2].

Minimally invasive preparation of the tooth, without the need for extensive removal of the carious lesion, using a cariostatic agent and atraumatic treatment with Riva Star Aqua and the possibility of quick and easy application is a therapeutic option of great value in many cases in dental practice[11].

Conclusions

The use of Riva star aqua and glas ionomer cement for restoration in primary molars has shown clinical success as a technique that allows prevention and prevents further progression of carious lesions, when used for treatment in children for restoring health and function of primary teeth.

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