

The Significance of Clinical Follow-up of Fissure Sealants: A Mini Review

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Abstract

Recently, it becomes important the early detection and treatment of dental caries preserving tooth structure as much as possible, and preventive applications for caries progression in pediatric dentistry. Preventive oral health programs which are pursued successfully provide the decline of dental caries prevalence especially in developed countries. However, it is evident that the decline is not equal on the all tooth surface, as the significant reduction on smooth surface caries nevertheless; the incidence of occlusal caries is high. Pits and fissures on the occlusal surface of teeth are prone to caries formation and the most affected surfaces from caries. Fissure sealant application is admitted the most effective approach to prevent the formation of caries on pits and fissures of molar teeth. Clinical and radiographic checks of the surfaces to which fissure sealant is applied should be done at regular intervals. There is a consensus that success will increase when regular checks of the sealants are made.

Keywords: *Pit and Fissure Sealants; Molar Teeth; Follow-up*

Introduction

Pits and fissures on the occlusal surfaces of the teeth are the most susceptible to caries development [1]. First permanent molar is the early erupting teeth in permanent dentition. The process these teeth are susceptible to caries is the long-term eruption period. During this process, the enamel is not be matured completely, and generally, parents are unaware the just erupting new teeth. Furthermore, it is difficult for children to brush the all surface of new erupting teeth effectively. They are exposed to caries development due to the early eruption and also the complex morphology [2].

In pediatric dentistry, pit and fissure sealant is very important among the caries prevention practices. Fissure sealant application is admitted the most effective approach to prevent the formation of caries on pits and fissures of molar teeth [3]. Pit and fissure sealant applications aim to transform pits and fissures that are suitable for the food accumulation and bacterial colonization into smooth surfaces that can be cleaned easily. Sealant material acts as a physical barrier inhibit to entry of bacteria and nutrients by the penetration into pits and fissures [4].

Fissure sealant applications are considered to be the most effective method to prevent cavities in pits and fissures of the molar teeth. The adhesion between the sealant and the enamel and so long-term retention are the most important criteria for the evaluation of success [5].

The application of fissure sealant is required clinical and radiographic checks at regular intervals [6]. The time between periodic examinations should be determined according to the time-varying risk factors of the patient and the interproximal caries formation [7]. It is stated that the loss of the fissure sealant is at the highest level immediately after application and in the first 6 months [2,8,9]. There is a consensus that success of the sealants will increase with regular controls [10,11]. The long-term success and retention of sealants is correlated with the resistance to microleakage [5,12].

Review of the Literature

Küçükylmaz, *et al.* [13] evaluated the retention and integrity of the fissure sealants over a period of 24 months using two different fissure sealants and a flowable composite as a sealant. The flowable composites with an adhesive was found superior to others. In a similar study, conducted by Erdemir, *et al.* [14], it was found no significant differences between these materials. Unal, *et al.* [15] applied three different resin based fissure sealants containing amorphous calcium phosphate (ACP), fluoride and fluoride-free to the deciduous teeth. The sealants were examined in terms of presence of marginal integrity, discoloration and caries for 24 months. There was no significant difference between the groups in terms of marginal discoloration and integrity; ACP and fluoride-containing fissure sealants were found to be more effective in terms of caries prevention.

Gorseta, *et al.* [16] performed clinical follow-up for 12 months in a study evaluating the clinical success of conventional glass ionomer cements and resin-based fissure sealants and found similar success rates.

Liu, *et al.* [17] aimed to investigate the clinical success of two different fluoride-releasing fissure sealants, resin based and glass ionomer based. There was no difference between two materials in terms of the caries prevention while the resin based fissure sealant was found superior in the way of retention at intervals of 6 months for 24 months.

Hasanuddin, *et al.* [18] applied resin and glass ionomer based fissure sealant to the permanent molar teeth with mild and medium fluorosis, that were prepared conventional acid etching and fissurectomy and examined in terms of retention and caries formation at regular intervals for 12 months. The retention rates were significantly higher in the resin-based fissure sealant group with fissurectomy.

Guler, *et al.* [19] evaluated the permanent molar teeth which were applied glass ionomer and ormoser based fissure sealants in respect of retention, marginal integrity, caries prevention for 24 months. The glass ionomer based sealant was found more effective on the prevention of caries while there was no difference in the retention and marginal integrity.

Holmgren, *et al.* [20] examined the clinical success of a high viscosity glass ionomer sealants for a period of 6 years. It has been reported that the fissure sealants were efficient in the caries inhibition.

Lygidakis, *et al.* [21] evaluated the retention rates of two different fluoride-releasing fissure sealants, with and without filler, for 4 years. The sealant with filler exhibited higher retention values.

Karaman, *et al.* [22] applied a filler-free fissure sealant to the molar teeth etched with acid or with self-etch adhesive, and evaluated for retention and new caries formation at 12-month intervals for 2 years. The acid etched group was found to be clinically more successful. In another study, the acid etched group was found to be more successful where the tooth were prepared in the same manner but the nano filler fissure sealant was used [23].

Karaman, *et al.* [24], in a different study, applied resin-based fissure sealant after adhesives to the enamel surfaces prepared with acid and Er, Cr: YSGG laser and evaluated the clinical successes at 6-month intervals for 24 months. Although there is no significant difference between the two groups, it was stated that laser may be an alternative to acid.

In a similar study comparing acid and self-adhesive bond, the permanent teeth were evaluated and the self-adhesive group was found to be more successful. This result has been reported to depend on the property of self-adhesive bond to be less susceptible to moisture [25].

Lygidakis, *et al.* [26], in a different study, performed resin based fissure sealant to hypomineralized molar teeth with acid etching or adhesive system. At 4 years of follow-up, retention rates were reported to be higher in the group using the adhesive system.

Dhar, *et al.* [27] implemented resin and glass ionomer based fissure sealants to the enamel surfaces with and without etching. The rates of retention and new caries formation were assessed at 6-month intervals for 2 years. The group applied resin based fissure sealant with etching was found to have the highest value.

Antonson, *et al.* [28] evaluated the molar teeth performing resin and glass ionomer based fissure sealants in terms of marginal integrity, discoloration and new caries formation for 24 months. At the end of 24 months, there was no difference between the two materials in terms of marginal integrity; while discoloration and new caries development rates were lower in the glass ionomer based fissure sealant group. Especially in the case where saliva contamination risk, the glass ionomer based sealants have been reported to be a good option.

Oba, *et al.* [29] examined two different flowable composite and a resin based fissure sealant for 2 years. At the end of the study, the retention rates were higher in the resin-based fissure sealant group.

Yilmaz, *et al.* [30] investigated three different fissure sealants, compomer, ormocer, resin based, in terms of retention, marginal integrity, caries formation for 2 years. There was no significant difference between the groups with regard to marginal integrity and caries formation, while compomer based fissure sealant exhibited the lowest retention rate. Similar results were obtained in similar studies evaluating compomer and resin fissure sealants [31,32].

In a study, the molar teeth applied resin, resin modified glass ionomer based fissure sealants and a flowable composite were followed for 2 years. It was stated that resin modified glass ionomer based sealant exhibited more effective results in terms of long-term bacterial inhibition activity while retention rates were found to be higher in other groups [33].

In several studies comparing the clinical success of fluoride-containing and fluoride-free resin based fissure sealants, it has been reported that the fluoride-free sealants exhibited higher retention rates [34,35].

Pardi, *et al.* [36] evaluated the clinical success of conventional and resin based glass ionomer fissure sealants for 5 years. After 5 years, it was reported that both materials were effective in caries prevention.

The studies which aimed to investigate the clinical success of resin and resin modified glass ionomer based fissure sealants indicated that resin based fissure sealants have been found to be more successful [37,38].

There are many studies evaluating the clinical success of resin based and glass ionomer based fissure sealants. Resin based sealants were found superior with respect to the long-term studies evaluating the clinical success of two materials; while glass ionomer based sealants were found superior in terms of caries prevention [2,39-44].

Conclusion

Clinical and radiographic checks of the surfaces to which fissure sealant is applied should be done at regular intervals. The time between periodic radiographic evaluations should be determined according to the time-varying risk factors of the patient and the caries condition of the interfaces of the teeth. It is stated that the loss of fissure is at the highest level immediately after application and in the first 6 months. There is a consensus that success will increase when regular checks of the sealants are made.

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