

Comparative evaluation of retention of conventional pit and fissure sealant versus flowable composite- An In-vivo Study

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Citation of this Article: Dr. Shikha A Patel, Dr. Deep Devendrabhai Patel, Dr. Radhika J. Kachhadiya, Dr. Himani Janakbhai Patel, Dr. Nidhi Radadia, Dr. Rucha Thakkar, “Comparative evaluation of retention of conventional pit and fissure sealant versus flowable composite- An In-vivo Study”, IJDSIR- March - 2021, Vol. – 4, Issue - 2, P. No. 102 – 105.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aim: The aim of the study is to compare and evaluate retention of conventional pit and fissure sealant and flowable composite.

Material and method: A randomized controlled clinical trial was done after obtaining ethical committee approval and informed and written consent. The study was performed on 40 young permanent mandibular first molar teeth divided into two equal groups; Conventional pit and fissure sealant group and flowable composite group. All patients were clinically evaluated for retention after 3, 6 months of application and retention was assessed based on Simonsen’s criteria.

Results and Conclusions: Flowable composite was relatively better retained than sealant at 6 months' follow-

up although results were statistically insignificant. Future studies should aim with longer follow up.

Keywords: pit and fissure caries, pit and fissure sealants, Flowable composite

Introduction

Pit and fissure caries account for approximately 80%–90% of all caries in the permanent posterior teeth and 44% in the primary teeth.¹ Pit and fissure sealant acts on the susceptible teeth by micromechanically bonding to the tooth preventing access by cariogenic bacteria to their source of nutrients, thus reducing the risk of caries in those susceptible pits and fissures.²

Dental sealants are resin or glass ionomer cement (GIC)-based flowable materials, which are applied to occlusal

surfaces of the teeth as a preventive measure to prevent the teeth from developing caries, especially in children, and to those teeth which are more prone to dental caries.³ Retention is one of the most important prerequisites for pit and fissure sealants.⁴ Debris and pellicle might not be removed by conventional prophylaxis and etching; therefore, air abrasion for fissure preparation has been advocated for sealant retention.⁵ Thus, the purpose of this *in vivo* study was to compare the retention of conventional pit and fissure sealant (Prime Dent) to flowable resin composite (Filtek™ Z350XT, 3M ESPE) on occlusal pits and fissures of all first permanent molars with and without air-abrasion over a 6-month follow-up.

Material and method

The present study consisted of 40 permanent mandibular first molars in 20 children of age 6-8 years who visited the department of pedodontics and preventive dentistry. Completely erupted caries free permanent mandibular first molar teeth were included in the study. Partially erupted teeth and teeth with cavitations or with any pathology were excluded from the study. Following the approval from the ethical committee of the institution, all subjects were verbally informed and written informed consent was taken for participation in the study. All teeth were isolated with rubber dam and then divided into two equal groups: Group I – Conventional Pit and fissure sealant group; Group II- Flowable composite group. The fissures were etched using 37% for 30s then rinsed for 10s using air water spray of the three-way syringe and dried using oil-free compressed air with a hand pump air pressure syringe. After ensuring a frosted appearance of the enamel at the fissure entrance sealant was applied according to the respective group. All teeth were clinically evaluated for retention after 3 months and 6 months of application. The retention rate was assessed based on the criteria proposed

by Simonsen; [C: complete retention, P: Partial retention, M: Missing (no retention)].

Result

The study was performed on 40 young permanent mandibular first molar teeth divided into two equal groups; Conventional pit and fissure group and flowable composite group. All patients were clinically evaluated for retention after 3, 6 months of application and retention was assessed based on Simonsen’s criteria. Both groups shown complete retention after 3 months interval (Table no. 1). On six month evaluation only one tooth shown partial retention in group I and all tooth of group II shown complete retention (Table no. 2). Intergroup comparison of both the group at 3 and 6 month interval was found to be statistically not significant (Table no 3, 4).

Table no 1: Retention at an interval of 3 months

Groups	N	Retention at 3 months No. (%)		
		Complete	Partial	Missing
Group I	25	25 (100%)	0	0
Group II	25	25(100%)	0	0

Table no 2: Retention at an interval of 6 months

Groups	N	Retention at 3 months No. (%)		
		Complete	Partial	Missing
Group I	25	24 (100%)	1 (4%)	0
Group II	25	25 (100%)	0	0

Table no 3: Intergroup comparison for retention score at an interval of 3 months

Groups	N	Mean	SD	P value
Group I	25	1.0000	0.0000	> 0.05
Group II	25	1.0000	0.0000	

Table no 4: Intergroup comparison for retention score at an interval of 6 months				
Groups	N	Mean	SD	P value
Group I	25	1.0400	0.2000	> 0.05
Group II	25	1.0000	0.0000	

Discussion

The initial cost of preventive measures like sealants are estimated to be higher than that of restorative materials, but in the long term they prove to be more cost-effective as the tooth would be maintained in a state of health.⁶

Pit and fissure sealant has been described as a resin material placed into the pits and fissures of caries susceptible teeth that micromechanically bonds to the tooth, preventing access by cariogenic bacteria to their source of nutrients.⁷

Deep pits and fissures are inaccessible with pumice prophylaxis or acid etching, thus affecting the ability of the sealant to isolate these fissures.⁸ Air abrasion was initiated by Robert Black, is a nonrotary method of cutting and removing dental hard tissue. It shows better bonding of enamel and dentin surfaces. With flowable and nanofilled composites, it is easier to restore cavities which do not confer with GVBlack's specifications.⁹

One of the reasons for selecting the sealant material (Filtek™ Z350XT, 3M ESPE) was that it is an Flowable composite. This was supported by Rock et al. (1990) who use a split-mouth design concluded that an unfilled light-cured resin-based sealant was significantly better retained than a filled one. An unfilled resin would penetrate deeper into the fissure system because of its lower viscosity and therefore would, perhaps, be better retained. Reddy et al. (2015) in his study found that flowable composites show relatively better retention on mandibular teeth which is in accordance to the our study.¹⁰

Conclusion

Based on the results of this study, the following conclusions were drawn:

1. At six month evaluation period, flowable composite shown better retention than that of conventional pit and fissure sealants which was statistically not significant.
2. From present study it was seen that flowable composite can opt as an alternate to conventional pit and fissure sealants. However, further long-term in vivo research may be necessary evaluating other material properties to validate its use as a suitable sealant alternative.

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