

Sealing of preventively enlarged fissures

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The occlusal fissures of 156 permanent first molars in 63 children, 7–8 years of age, were sealed with a chemically polymerizing material (Dellion®). Deep and narrow fissures were opened up with a pointed diamond before etching and sealing. The treatment was performed by untrained dental students. The patients were called back for treatment every 6 months. 2/3 of the patients were followed up for a period of 2½ years. After that period the retention of sealants was 93% (74 sealants) in ground deep fissures and 88% (28 sealants) in unground shallow fissures.

Key-words: Fissure sealing; caries prevention

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The use of resin sealants for protecting fissures has been adopted with great enthusiasm, mostly due to the very good results of the first clinical studies (2, 3, 9, 11). The success may, however, have been influenced by the fact that the investigators themselves or specially trained operators applied the sealants. The widely spread use of sealants by less trained operators has shown the shortcomings of the method (1, 14, 15). Deep and narrow ("sticky") fissures (Fig. 1) which are easily attacked by caries are the ones particularly needing protection with a sealant. Such fissures are, however, the most difficult to seal properly. They develop caries fast, difficult to detect at an early stage since the shape and width of the fissure does not allow inspection of the bottom with a probe. Although there are conflicting opinions about the conse-

quences of "sealing in" carious tissue (6, 7, 16), it cannot be considered good clinical practice.

In order to fill a fissure with a sealant, the fissure has first to be emptied of debris, etc. This cannot be done by conventional means (pumice and water) when the fissure is deep and narrow. The sealant will adhere to the etched enamel only if it is completely dry. When compressed air is blown on enamel next to a sticky fissure, moisture from the fissure will prevent complete drying of the enamel. One method of solving these problems is to open up the fissure with, for example, a rotating diamond point before the sealant is applied (5, 8, 10, 12, 13) (Fig. 2). Diluted composite resin has been recommended as a sealant for these fissures because of the higher abrasion resistance of such a material as compared

with a transparent resin (10, 17). On the other hand, the area around occlusal fissures is usually not susceptible to abrasion. The unfilled sealant may be expected to abrade only as long as it is too high in occlusion. This fast abrasion can be considered an advantage. Furthermore, inspection through a transparent sealant is easy.

The purpose of the present work was to follow up the results when untrained operators preventively opened up fissures and sealed them with an unfilled resin material.

MATERIAL AND METHODS

Originally 63 children aged 7–8 years from the same school in Turku were treated by dental students at the Institute of Dentistry, each student taking care of one patient only. A total of 156 permanent first molars were sealed. Deep fissures were opened up by widening the notch of the fissures (Fig. 2) with a flame type, pointed diamond ($\text{Ø} = 0.8 \text{ mm}$) using ultra-high speed. This procedure made it possible to reach the bottom of the fissure with the probe. Care was taken neither to penetrate into the dentin nor to enlarge the fissure more than necessary (Fig. 2). Additional cleaning of the enamel was performed with a paste of pumice and water. Shallow fissures were cleaned with the paste only. The teeth were then etched with phosphoric acid and sealed with Delton® (Johnson & Johnson, USA) according to the manufacturer's instructions.

In cases where the enamel was contaminated with saliva after etching, the enamel was cleaned again with pumice and water and then etched once more before applying the sealant. The sealants were checked twice a year and about 2½ years after the application of the sealant 43 patients came back when called in for a check up. Most of the children who did not turn up had moved from the Turku area.

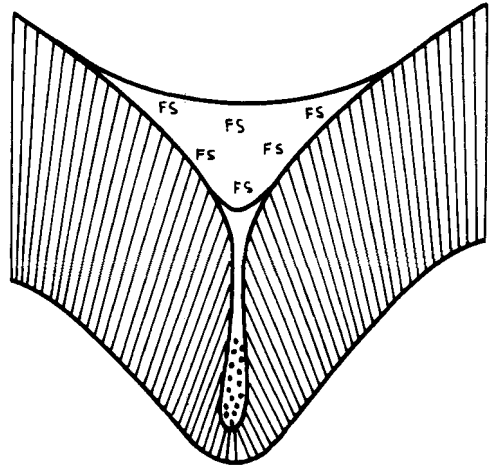


Fig. 1. Schematic drawing of sealed, deep and narrow fissure (FS = fissure sealant).

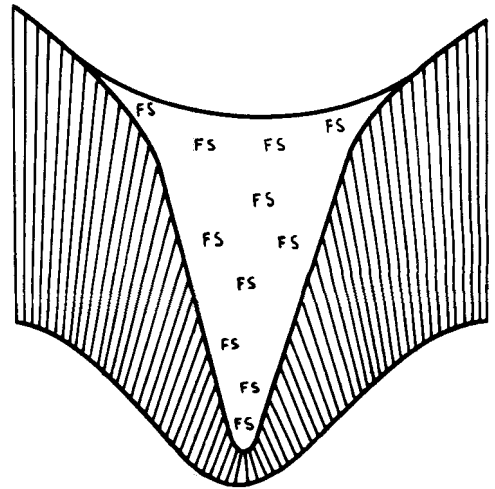


Fig. 2. Schematic drawing of a sealed, preventively cleaned fissure.

RESULTS

During the observation period of 2½ years few of the sealants were lost (Table 1). Furthermore, in only one case could signs of abrasion be observed, although the students had in some cases overextended the opening up of the fissure. The surface of the sealant gradually became dull, but the material remained transparent, thus allowing inspection through

Table 1. Sealant retention during 2½ years

| | Sealed teeth | Retained | Partially lost | Totally lost | Abraded | Filled |
|------------------------------------|--------------|----------|----------------|--------------|---------|--------|
| Preventively enlarged fissures | 74 | 69 (93%) | 3 | 0 | 1 | 1 |
| Fissures cleaned with pumice-water | 32 | 28 (88%) | 2 | 0 | 0 | 2 |

the sealant. During the observation period three sealants had been replaced with amalgam fillings for unknown reasons. No clear difference between the retention of sealants in the two groups was observed.

DISCUSSION

Each student treated one child only in order to make the influence of operating variables by untrained operators as great as possible. In spite of this, few sealants were lost during the 2½ year period compared with the results of some earlier studies (1, 15, 16). According to the clinical experience of the authors, the chemically polymerizing material was easier to handle than the UV-light activated material which had been used in most earlier studies. The easy handling may be one of the reasons for the good results of the present study. This is also confirmed in a study where Delton gave better results than Nuva-Seal (4). However, the good results may be better explained by the fact that about two thirds of the fissures were considered deep and narrow, and were thus preventively opened up before sealing, which allowed a plug of resin to be formed (Fig. 2) instead of a thin layer of varying thickness (Fig. 1). It must be expected that such a plug would adhere better to the ground and etched surface of the enamel rather than the thin layer to the occlusal surface, often incompletely cleaned before etching with pumice-water only. Thus the risk of microleakage is also reduced when the fissure is preventively enlarged.

The results show that opening up "sticky" fissures before sealing them is a useful method, even when performed by untrained operators. Furthermore, the results indicate that regardless of whether the fissures are enlarged or not, the abrasion resistance of an unfilled resin is sufficient, and that the transparent material offers the possibility to continuously inspect the bottom of the fissure through the sealant.

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