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Strategies to Ensure SUCCESSFUL SEALANT PLACEMENT

A NEW TECHNIQUE AIMS TO OBTAIN THE CLEANEST PITS AND FISSURES POSSIBLE, IMPROVING SEALANT EFFECTIVENESS .

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Sealants are one of the most effective strategies to prevent occlusal caries on posterior teeth. The etching-bonding of composite material to enamel is one of the strongest bonds achievable in dentistry. A recent Cochrane review indicates that sealants can reduce decay in posterior teeth by 11% to 51%.[1] The longer the sealant is retained on the tooth and the deeper the sealant's penetration, the more effective it is in preventing decay.[2] However, the bond of the sealant is predicated on securing a clean tooth, both on the enamel and in the fissures, in addition to ensuring the sealant material flows well into the tooth's pits and fissures. Multiple techniques for cleaning or preparing the fissures have been presented, including pumice, air abrasion, and the use of a round bur.[3,4] The purpose of this article is to present a new technique based on a previous research project and clinical experience to obtain the cleanest tooth fissures possible, and allow the sealant to penetrate and bond well into the tooth's pits and fissures.

TECHNIQUE

Typically, a sealant does not involve any tooth preparation. According to the Code on Dental Procedures and Nomenclature (CDT), a sealant is reimbursed with code D1350. If the tooth is prepared to open the fissures, such as with a ¼ round bur, then the new CDT code is D1351 for a preventive resin restoration (sometimes called a "caries biopsy").[5–7] This sealant technique will focus on cleaning the grooves chemically without any mechanical debridement.

In order to clean the grooves without preparing the tooth, a bristle brush with nonfluoridated flour of pumice is typically used.[8] However, this pumice does not penetrate the fissures well.[9,10] It has been shown that hydrogen peroxide will penetrate the grooves and kill bacteria.[11–14] Evidence has also shown that hydrogen peroxide will remove biofilm and improve gingival scores in bleaching.[15,16]

Sealant technique success is dependent on obtaining proper isolation in order to avoid saliva contamination of the tooth. This isolation can be accomplished with a dental dam, cotton rolls, and suction, a well-trained dental assistant, or with the combination "mouth prop and suction" devices.

The first step in this new sealant technique is to use chemical means to clean the plaque and debris by using 3.5% over-the-counter hydrogen peroxide applied with a cotton swab to remove the plaque and kill the bacteria in the fissures (Figure 1, page 20). One drop of hydrogen peroxide will bubble and foam when placed in contact with the fissures (Figure 2, page 20). After the bubbling and foaming are completed—usually 5 seconds to 10 seconds—the tooth can be rinsed vigorously (Figure 3, page 20).

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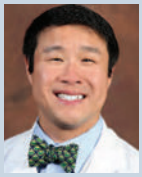

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FIGURE 1. Place one drop of over-the-counter 3.5% hydrogen peroxide on the tooth with a cotton tip applicator.

FIGURE 2. Observe the bubbling and cleansing reaction from the contact of hydrogen peroxide as plaque and bacteria are removed.

FIGURE 3. After 5 seconds to10 seconds of bubbling by the hydrogen peroxide, use air-water spray to rinse vigorously for another 5 seconds to 10 seconds.

After isolating and cleaning the tooth, the next step is to etch the tooth enamel, using conventional phosphoric acid (Figure 4). Because the fissures are narrow, the clinician should use an explorer to "stir" the etchant, so there are no air bubbles over portions of the enamel, which might prevent an adequate etch (Figure 5). For uncut enamel, the etching time is 30 seconds and the rinsing time is 30 seconds. Then the tooth is suctioned with high-volume suction, and dried with an air syringe (Figure 6).

The challenge at this point in the procedure is removing all the moisture from the etched fissures so the composite resin material can bond well. A second, new recommendation is to remove moisture with a "water chaser" or prime-and-dry material (Figure 7). This watery material penetrates the grooves and displaces the water much in the same manner as a dentin primer penetrates dentin and displaces the water.[17] Then the water chaser is air-dried to facilitate evaporation, resulting in clean, well-etched dry enamel (Figure 8). A hydrophilic sealant can then be placed.

For the application of the sealant, a minimum amount is applied (Figure 9). Capillary action of the dry enamel tends to draw the sealant into the fissure. The unset sealant still needs to be somewhat stirred with an explorer or application tip to pop or remove any air bubbles (Figure 10). Once the sealant is smooth and bubble free, then it is light cured.

The final step in the process is to evaluate the occlusion. Although some patients will "wear in" a high sealant over time, there is the potential for creating sensitivity or pain if the occlusion is not addressed. The potential for debonding in thin areas of the sealant is also possible. One final new recommendation to adjust occlusion is to use a slow-speed latch-type round bur, either a #4 or #6 (Figure 11). The slow-speed latch-type round bur will not cut enamel, but will remove composite. This slow-speed handpiece bur provides a way to adjust occlusion on the restoration without changing the natural tooth occlusion. Use of this bur can both remove any excess material and smooth the restoration.

DISCUSSION

One question with the use of hydrogen peroxide is whether the oxygen in the hydrogen peroxide will reduce the bond strength of the sealant to the etched enamel. After traditional bleaching of teeth with hydrogen peroxide in a tray, the clinician must wait at least 2 weeks for the oxygen in the tooth to dissipate or there will be a

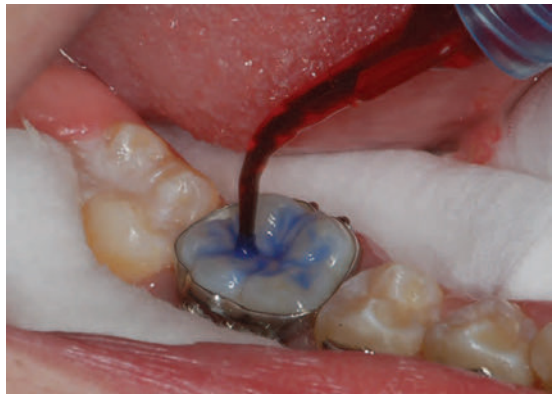

FIGURE 4. Etch the uncut enamel with phosphoric acid for 30 seconds (cut enamel only needs 15 seconds). A brush applicator can minimize bubbles.

FIGURE 5. If no brush applicator, use the explorer tip to "stir" the etchant to avoid trapping air bubbles in the narrow fissures, thus preventing the etchant from contacting and etching all of the enamel.

FIGURE 6. After etching for 30 seconds, rinse vigorously for 30 seconds to remove the etchant and debris. The cotton rolls can also be suctioned dry to avoid having to replace them.

FIGURE 7. Apply one drop of the "water chaser" to displace the moisture from the narrow fissures.

FIGURE 8. Air dry the enamel to evaporate the water chaser and provide a clean, dry surface for bonding.

FIGURE 9. Apply the sealant conservatively with a small brush tip to avoid trapping air.

FIGURE 10. If no brush tip, stir the sealant quickly before curing to remove air bubbles from the narrow fissures.

FIGURE 11. Cure the sealant, then adjust the occlusion using a latch-type round bur (#4 or #6) in a slow speed handpiece to avoid cutting any enamel and changing the natural occlusion.

reduction of 25% to 50% in bond strength of the composite to the tooth.[18] However, this 2-week delay is not appropriate for the sealant technique. During traditional bleaching, the incorporation of oxygen into the tooth occurs when the peroxide is on the tooth 30 minutes or longer, not 10 seconds to 30 seconds as in this suggested sealant technique.

In a previous research project, carbamide peroxide and hydrogen peroxide materials were tested for their short-term applications' effect on bond strengths when used to remove stains from bovine teeth.[19] The study reported the carbamide peroxide results when 10% carbamide peroxide was applied for 10 seconds, 20 seconds, and 30 seconds compared to a control. There was no statistical difference in the bond strengths in any of the treated groups compared to the control bond strength. Ten percent carbamide peroxide is equivalent to 3.5% hydrogen peroxide. This 3.5% concentration is approximately the same concentration used in over-the-counter hydrogen peroxide products applied in this new technique. An additional product used in the research but not reported in the paper was 40% hydrogen peroxide. Again, there was no difference in the bond strengths between the 40% hydrogen peroxide and the control samples when left on the enamel for up to 30 seconds. Hence both 10% carbamide peroxide and 3.5% hydrogen peroxide can be used for short-term application to remove stains or clean teeth without any detrimental effect on the bond strengths of the resultant composite resin material.

CONCLUSIONS

The use of 3.5% hydrogen peroxide for a short-term application to clean the occlusal surface and fissures of a tooth and kill bacteria in the fissure, as well as the use of a water chaser to displace moisture, can aid in placing well-bonded sealants in patients. Adjustment of the occlusion on the sealant can be safely achieved with a slow-speed latch-type round bur, which will not damage the enamel or remove natural tooth contacts. Additional research may be needed to support this new clinical technique. D

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