How to clean the tooth surface before sealant application

A critical summary of Gray SK, Griffin SO, Malvitz DM, Gooch BF. A comparison of the effects of toothbrushing and handpiece prophylaxis on retention of sealants (published correction appears in JADA 2009;140[5]:516-517). JADA 2009;140(1):38-46.

Paul S. Farsai, DMD, MPH; Sergio Uribe, DDS; Katherine W.L. Vig, BDS, MS, DOrth, FDS, RCS

Systematic review conclusion. Sealant retention after tooth surface cleaning with toothbrush prophylaxis was similar to that associated with handpiece prophylaxis.
Critical summary assessment. A review considering the best available evidence compared two surface-cleaning methods and found no difference in long term (five-year) sealant retention. Higher rates of retention were evident in the toothbrush prophylaxis groups at the end of the first year after sealant placement.
Evidence quality rating. Limited.

Clinical question. For patients receiving dental sealants, does toothbrushing compared with handpiece prophylaxis increase the retention of sealants?

Review methods. The authors searched two electronic databases (PubMed and Cochrane) for studies published in English from 1966 through 2006 that compared results for retention or effectiveness of resin sealants after exposure with different surface-cleaning methods: toothbrushing and handpiece prophylaxis. The search was limited to human participants and English-language literature and to randomized controlled trials or clinical trials. They performed a second search for systematic reviews of the effectiveness of sealants by using the same databases for reviews published in English between 1990 and 2006 that documented surface-cleaning methods and sealant outcomes.

Main results. The initial search yielded only two studies that directly compared sealant retention rates according to surface-cleaning methods used. In the first study, researchers found no difference in retention of sealants between surfaces cleaned mechanically with pumice and those cleaned with air-water spray and a probe. In the other study, there was no difference in retention between surfaces mechanically cleaned with prophylaxis paste on a handpiece and those cleaned by dry brushing. The second search yielded four systematic

Dr. Farsai is an associate professor and the director, Evidence-Based Dentistry and Behavioral Sciences, Henry M. Goldman School of Dental Medicine, Boston University. He also is an evidence reviewer for the American Dental Association. Address reprint requests to Dr. Farsai at Department of General Dentistry, Henry M. Goldman School of Dental Medicine, Boston University, 72 E. Newton St., Robinson B-334, Boston, Mass. 02118-2526, e-mail "pfarsai@bu.edu".
Dr. Uribe is an associate professor, Department of Diagnostic Imaging, School of Dentistry, Universidad Austral de Chile, Valdivia. He also is an evidence reviewer for the American Dental Association.
Dr. Vig is a professor emeritus and the former chair, Division of Orthodontics, The Ohio State University, Columbus. She also is an evidence reviewer for the American Dental Association.

reviews; 10 studies evaluated in those reviews met the inclusion criteria. Handpiece prophylaxis was used in eight of the studies, and toothbrush prophylaxis was used in the remaining two studies. One-half of the eight studies involving the use of handpiece prophylaxis also involved the use of pumice, and one-half involved the use of prophylaxis paste. Of the two studies involving the use of toothbrush prophylaxis, one study involved the use of a fluoridated dentifrice and the other did not. The investigators in these two toothbrush studies reported no differences in the retention of the sealants.

The review authors generated a weighted summary retention by year after sealant placement for both types of studies, and they found that the rates in the two toothbrush prophylaxis studies at year one after sealant placement (94 percent retention) were greater than or equal to values for the eight studies (87 percent retention) that involved the use of handpiece prophylaxis. However, they observed no differences at years two through five.

Conclusions. Supervised toothbrushing of tooth surfaces before sealant application results in a similar level of retention as associated with traditional handpiece prophylaxis.

No sources of funding for this systematic review were listed.

COMMENTARY

Importance and context. Within the context of school-based dental sealant programs, supervised toothbrushing prophylaxis before etching produces results similar to those of handpiece prophylaxis performed by dental personnel. This approach to tooth cleaning may influence future clinical recommendations by the American Dental Association and the Centers for Disease Control and Prevention. A more cost-effective method of cleaning the tooth surface before placing sealants may have important implications in school-based dental sealant programs, and it could yield significant cost reductions for public health programs.

Strengths and weaknesses of the systematic review. The authors used appropriate research methods to search for background studies before conducting their research query regarding sealant retention, but their search was limited to only two databases and had biases toward English literature. Only two retrieved studies specifically compared surface-cleaning methods. Because published evidence was lacking, the authors performed an efficient method of screening for comparative data from related studies. In one study involving the use of handpieces, investigators reported notably low retention rates associated with one operator's work; the review authors eliminated results from this operator from the analysis. This introduced the notion of bias and increased the overall sealant retention rate among the handpiece studies. Although such selective elimination of results can create biases, the authors minimized bias by maintaining their adherence to their inclusion and exclusion criteria. A secondary search of four systematic reviews of sealant effectiveness yielded 10 studies. Special consideration should be given to this indirect evidence because the data retrieved, although useful and sufficient, were observational, dated and limited (multiyear data were not available) and, hence, presented in a weighted summary format.

Strengths and weaknesses of the evidence. In the two studies comparing surface-cleaning methods, evidence was unclear regarding the role of fluoride or oil in pumice, paste and dentifrices and their possible effect on the bond strength between the etched tooth surface and sealant material. Data regarding the presence or absence of oil-free or fluoride-free pumice and fluoride-free paste was limited or nonexistent; therefore, the review authors introduced potential confounders into the review. They stated that the outcome of interest was sealant retention, not sealant effectiveness, because the former would be less affected by confounders such as caries risk in various study populations. However, owing to the low yield, the authors had to include effectiveness studies, and they retrieved 10 studies (eight studies involving handpieces and two involving toothbrushes). These effectiveness studies did not compare surface-cleaning methods directly, but they provided sufficient methodological information to be included. In one study involving handpieces, notably low retention rates were associated with one operator's work, and the review authors did not take those results into account. This selective type of data exclusion also introduces biases in the weighted summary analyses. Future research should address these issues and other factors that could affect sealant

retention, including operator-related factors, material-related factors, methods used for material application and patient-related factors such as previous caries experience, compliance and oral hygiene.

Implications for dental practice. Dentists should not assume that for sealant retention, handpiece prophylaxis is better than supervised toothbrush cleaning by patients. With similar results between the two methods of tooth cleaning, school-based sealant programs may benefit from using the more cost-effective method. ■

Critical Summaries is supported by grant G08 LM008956 from the National Library of Medicine and the National Institute of Dental and Craniofacial Research, National Institutes of Health, Bethesda, Md.

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