

OVERVIEW Evidence for the Efficacy of Various Methods of Treating White-Spot Lesions after Debonding of Fixed Orthodontic Appliances

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(Editor's Note: In this new quarterly column, JCO provides a brief overview of a clinical topic of interest to orthodontists. Contributions and suggestions for future subjects are welcome.)

Fixed orthodontic appliances tend to encourage the accumulation of dental plaque, increasing the risk of decay. The incidence of incipient enamel caries or white-spot lesions adjacent to bands and brackets has been estimated by various sources to be between 15% and 85%.¹ For example, Øgaard and colleagues reported that 61% of the children in their low-caries-risk study group developed white spots during orthodontic treatment, despite a comprehensive preventive program of topical fluoride applications.²

Although a certain saliva-mediated remineralization normally takes place, application of topical fluoride is commonly advocated, and significant reversals have been demonstrated both in vitro and in vivo.³⁻⁶ Visible damage may persist in some cases (Fig. 1), however, and it is obviously in the interest of both patients and orthodontists to find the most cost-effective ways to avoid or ameliorate such side effects.

This article will examine the evidence for the efficacy of various methods of managing early, non-cavitated smooth surface enamel lesions after treatment with fixed orthodontic appliances.

Overview

A search for relevant English-language literature in the PubMed database (U.S. National Library of Medicine, www.ncbi.nlm.nih.gov.) revealed a lack of recent randomized controlled trials on the topic. Therefore, we decided to extract relevant information from the recent systematic review conducted by the RTI/UNC Evidence-Based Practice Center.⁷ This report identified seven studies, with a total of 11 evaluations of preventive measures. Although the trials indicated that fluoride may well reduce demineralization, the evidence for the efficacy of any given method, with the exception of fluoride varnishes, was judged to be insufficient due to the small number of studies and lack of statistical testing.

The evidence for the effectiveness of fluoride varnishes in patients at risk for caries was rated as fair.⁷ These varnishes are commonly used as fluoride supplements in Scandinavia.⁹ Because they contain a high concentration of fluoride (22,600ppm) that is released slowly, they can be administered at extended intervals without depending on patient cooperation. A chairside assistant can apply a fluoride varnish after thoroughly cleaning and drying around the bracket bases during orthodontic treatment, or more easily at retention checks on enamel surfaces with clinical signs of decalcification.

Based on the RTI/UNC report, Newbrun has recommended a treatment regimen for patients at moderate risk for caries that applies well to orthodontic retention patients.⁸ In addition to

semiannual professional application of a fluoride varnish, the patient should use a fluoridated toothpaste (1,500ppm F) twice daily and a .05% sodium fluoride mouthrinse (230ppm F) for one minute once a day. If the patient is treated more than twice a year, a fluoride varnish should be applied at each visit.

We would like to emphasize that the lack of scientific evidence regarding the efficacy of various methods does not mean that these measures have no value. Rather, it should be regarded as a call for further investigation. New diagnostic methods are now available or under development to improve the detection and monitoring of changes in enamel mineral content.³

In addition, the vast amount of clinical experience with various methods of fluoride application should not be overlooked. The efficacy of fluoride depends on the concentration, frequency, and duration of application, as well as the fluoride compound used. In general, the greater the cariogenic challenge, the more fluoride and the more frequent application are needed. Nevertheless, factors such as practicality, cost, and compliance must also be taken into consideration.

There is no doubt that regular use of fluoridated toothpaste is the most cost-effective way to provide frequent low doses (1,000-1,500ppm) of fluoride. Patients should be instructed not to rinse with water after brushing to retain as much fluoride as possible.

A more controversial question, however, is whether the fluoride mouthrinse could be omitted from the home-care program. Blinkhorn and colleagues have clearly shown that the combined use of fluoride toothpaste and daily fluoride mouthrinses did not produce any additional benefits compared to the use of either product by itself.¹⁰ Therefore, considering the cost and compliance requirements, we argue in favor of prescribing only fluoride toothpaste.

Conclusion

To facilitate remineralization after debonding of fixed orthodontic appliances, the principle of combining professional low-frequency, high-dose topical fluoride applications with a high-frequency, low-dose home-care program seems justified. There is, however, an urgent need for randomized controlled trials to evaluate the efficacy of various methods of managing white-spot lesions related to orthodontic treatment. •

FIGURES



Fig. 1 Gingivitis and white-spot formation after debonding of orthodontic attachments.

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