COMMENTARY

LONG-TERM ANTIBACTERIAL EFFECTS AND PHYSICAL PROPERTIES OF A CHLORHEXIDINE-CONTAINING GLASS IONOMER CEMENT

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The atraumatic restorative treatment (ART) was developed about a decade ago to be implemented in less-developed places, where access to dental care is limited. This technique consists of the removal of the decalcified tooth tissue using hand instruments and restoration of the cavity preparation with an adhesive restorative material. For obvious reasons, glass ionomers (GICs) have been the restorative material of choice. GICs were developed in the 70s as a hybrid formulation of the aluminosilicate powder from silicates and the polyacrylic acid liquid from polycarboxylates. Its most attractive characteristics are the chemical bonding to the tooth structure and the ability to release fluoride. However, it has been shown that the inherent amount of fluoride contained in the material is released shortly after insertion, and recharging it with fluoride is imperative. For this reason, and because of some evidence questioning the clinical effect that GICs have on carious dentin, which is often left in the ART technique, chlorhexidine and other components have lately been added to their compositions. Chlorhexidine is a known antibacterial agent currently available in dentifrices, solutions, gels, and varnishes.

In the present study, different concentrations of chlorhexidine digluconate and chlorhexidine diacetate were added to a commercially available GIC (ChemFil Superior, Dentsply DeTrey, Konstanz, Germany). The antibacterial potential of the experimental compositions was tested against caries-related bacteria, and their physical properties were evaluated. All materials performed better than the proprietary material in the antibacterial assay. When the physical properties were evaluated, 0.5% chlorhexidine diacetate was the composition that performed more similar to ChemFil Superior; 1.25% chlorhexidine digluconate differed from ChemFil Superior in the working time test only, and this should not necessarily be seen as a limitation. All other compositions performed somehow poorer than the proprietary material in at least one of the tests performed.

Based on previous published studies, in a supposedly more stable composition, and on a long-term antibacterial effect, the authors selected 1.25% chlorhexidine diacetate-modified ChemFil Superior as the material of choice for further development. This composition showed a longer-term antibacterial effect than 0.5% chlorhexidine diacetate and 1.25% chlorhexidine digluconate. On the other hand, the 1.25% chlorhexidine diacetate composition had compressive strength approximately 20% lower than the proprietary material. Both these findings might be clinically irrelevant considering the closer results presented in this manuscript. Nevertheless, it has been demonstrated in this and previous studies that the inclusion of chlorhexidine in the composition of commercially available GICs might help prevent caries/secondary caries development. The effect that chlorhexidine may have on the bonding ability of GICs to tooth structures is yet to be determined.

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