

In vitro Caries Inhibition in Enamel Adjacent to Ion-releasing Resin Composite

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Abstract

Objectives: To evaluate the nanohardness, mineral loss and lesion depth of the enamel adjacent to different restorative materials in conjunction with artificial caries induction.

Methods: Thirty-six human premolars with a prepared cylindrical cavity of 2 mm in diameter and depth. The specimens were randomly divided into 6 groups according to the restorative materials: Fuji IX GP[®](GI), Cention N(CN) and Clearfil[™] AP-X ES-2(RC) and adhesive systems: Clearfil[™] SE bond X(CSE) and Adper[™] Scotch-bond[™] multi-purpose (SBMP). Group 1; GI, Group 2; CN, Group 3; CN+CSE, Group 4; CN+SBMP, Group 5; RC+CSE and Group 6; RC+SBMP. All restored specimens were subjected to 14 days artificial caries induction then sectioned to two cross-sectional specimens ($n=12$). Nanohardness was evaluated at the depths of 10, 60, 110 and 160 μm from the enamel surface. Mineral loss and lesion depth of the enamel was evaluated at 10, 260, 510 and 760 μm from the tooth-restoration interface. Nanohardness data were analyzed using Wilcoxon-signed rank and Kruskal-Wallis test ($p<0.05$). Mineral loss and lesion depth data were analyzed using one-way ANOVA and Dunnett T3 ($p<0.05$).

Results: At the depth of 10 and 60 μm , the dissolution of enamel surface was observed for RC groups. At the depth of 10 μm , the nanohardness between the groups of GI and CN without adhesive showed no significant difference. At the distance of 10 μm from the tooth-restoration interface, the mineral loss and lesion depth of GI group showed no significant difference compared to those of the CN group.

Conclusions: Use of ion-releasing resin composite without adhesive exhibited a caries inhibition effect which was comparable to that of glass ionomer material.

Keywords: caries inhibition, ion-releasing resin composite, lesion dept, nanohardness, mineral loss