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TITLE: Interfacial Characteristics of BIOfactor MTA and Biodentine with Dentin

ABSTRACT BODY:

Objectives: Physical and chemical reactions between dentin and calcium silicate-based materials are expected to occur when these materials are used in perforation repair process. The objective of this study was to characterize the interface between dentin and MTA-Angelus (Angelus, Londrina, Brasil), Biodentine (Septodont, France) and BIOfactor MTA (Imicryl, Konya, Turkey) using Scanning Electron Microscopy (SEM) and Energy Disperse X-Ray Spectroscopy (SEM-EDS).

Methods: A total of fifteen dentin segments of 1.5 mm thickness were obtained from previously extracted single-rooted human teeth. Canal lumens were instrumented with diamond burs, and the smear layer was removed. The specimens were then randomly filled with MTA-Angelus, Biodentine or BIOfactor MTA (n=5) and were placed in distilled water for 28-days at 37°C. The samples were processed for SEM and three images from each specimen were randomly selected and examined. The samples were further subjected to SEM-EDS analysis to determine principal elemental composition of the material, dentin, and interfacial area. Elemental mapping was performed with each element being marked in a different color.

Results: Interfacial layer was evident in approximately 70% of SEM images in both MTA-Angelus and BIOfactor MTA samples. In the Biodentine group, interfacial layer was observed on more than half of the SEM micrographs. Tungsten was present only in MTA-Angelus-dentin interface while ytterbium was detected on BIOfactor MTA- dentin interface. Calcium levels in the interfacial layer between BIOfactor MTA and dentin were higher than levels in both dentin and cement. Silicon was evident in all material-dentin interfaces.

Conclusions: A distinguishable interfacial layer was observed in most of the samples within the BIOfactor MTA, MTA-Angelus and Biodentine groups. The elemental constitution of the interfacial layer was different from that of the materials in all groups. BIOfactor MTA as a novel root repair material exhibited promising characteristics.

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