

Comparing the Gap Formation around Composite Restorations in Three Regions of Tooth Using Optical Coherence Tomography (OCT)

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Abstract : Background and Purpose: Swept source optical coherence tomography (OCT) is an interferometric imaging technique that has been recently used in cariology. In spite of progress made in adhesive dentistry, the composite restoration has been failing due to secondary caries which occur due to environmental factors in oral cavities. Therefore, a precise assessment to effective marginal sealing of restoration is highly required. The aim of this study was evaluating gap formation at composite/cavity walls interface with or without phosphoric acid etching using SS-OCT. Materials and Methods: Round tapered cavities (2×2 mm) were prepared in three locations, mid-coronal, cervical, and root of bovine incisors teeth in two groups (SE and PA Groups). While self-etching adhesive (Clearfil SE Bond) was applied for the both groups, Group PA had been already pretreated with phosphoric acid etching (K-Etchant gel). Subsequently, both groups were restored by Estelite Flow Quick Flowable Composite Resin. Following 5000 thermal cycles, three cross-sectionals were obtained from each cavity using OCT at 1310-nm wavelength at 0°, 60°, 120° degrees. Scanning was repeated after two months to monitor the gap progress. Then the average percentage of gap length was calculated using image analysis software, and the difference of mean between both groups was statistically analyzed by t-test. Subsequently, the results were confirmed by sectioning and observing representative specimens under Confocal Laser Scanning Microscope (CLSM). Results: The results showed that pretreatment with phosphoric acid etching, Group PA, led to significantly bigger gaps in mid-coronal and cervical compared to SE group, while in the root cavity no significant difference was observed between both groups. On the other hand, the gaps formed in root's cavities were significantly bigger than those in mid-coronal and cervical within the same group. This study investigated the effect of phosphoric acid on gap length progress on the composite restorations. In conclusions, phosphoric acid etching treatment did not reduce the gap formation even in different regions of the tooth. Significance: The cervical region of tooth was more exposing to gap formation than mid-coronal region, especially when we added pre-etching treatment.

Keywords : image analysis, optical coherence tomography, phosphoric acid etching, self-etch adhesives

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