

Optical Assessment of Marginal Sealing Performance around Restorations Using Swept-Source Optical Coherence Tomography

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Abstract : Background and purpose: The resin composite has become the main material for the restorations of caries in recent years due to aesthetic characteristics, especially with the development of the adhesive techniques. The quality of adhesion to tooth structures is depending on an exchange process between inorganic tooth material and synthetic resin and a micromechanical retention promoted by resin infiltration in partially demineralized dentin. Optical coherence tomography (OCT) is a noninvasive diagnostic method for obtaining cross-sectional images that produce high-resolution of the biological tissue at the micron scale. The aim of this study was to evaluate the gap formation at adhesive/tooth interface of two-step self-etch adhesives that are preceded with or without phosphoric acid pre-etching in different regions of teeth using SS-OCT. Materials and methods: Round tapered cavities (2×2 mm) were prepared in cervical part of bovine incisors teeth and divided into 2 groups (n=10): first group self-etch adhesive (Clearfil SE Bond) was applied for SE group and second group treated with acid etching before applying the self-etch adhesive for PA group. Subsequently, both groups were restored with Estelite Flow Quick Flowable Composite Resin and observed under OCT. Following 5000 thermal cycles, the same section was obtained again for each cavity using OCT at 1310-nm wavelength. Scanning was repeated after two months to monitor the gap progress. Then the gap length was measured using image analysis software, and the statistics analysis were done between both groups using SPSS software. After that, the cavities were sectioned and observed under Confocal Laser Scanning Microscope (CLSM) to confirm the result of OCT. Results: Gaps formed at the bottom of the cavity was longer than the gap formed at the margin and dento-enamel junction in both groups. On the other hand, pre-etching treatment led to damage the DEJ regions creating longer gap. After 2 months the results showed almost progress in the gap length significantly at the bottom regions in both groups. In conclusions, phosphoric acid etching treatment did not reduce the gap length in most regions of the cavity. Significance: The bottom region of tooth was more exposed to gap formation than margin and DEJ regions, The DEJ damaged with phosphoric acid treatment.

Keywords : optical coherence tomography, self-etch adhesives, bottom, dento enamel junction

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