بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

Durability of Bond Strength to Dentin Using Two Universal Adhesives in Two Different Modes and Different Degradation Conditions: An In Vitro Study

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Introduction

The success of the current esthetic restorations is greatly influenced by the quality of the bond between the tooth structure and the restorative material, so adhesive technology has been a subject of considerable research interest.[1]

The main challenge for dental adhesives is the complexity of the tooth structure where enamel and dentin differ greatly in their composition. Enamel is composed of hydroxyapatite (HAp) (96% by weight), besides water and organic material (4% by weight). On the other hand, dentin is composed of HAp (45% by weight) besides collagen and water (55% by weight). In addition, dentin is a substrate that undergoes age changes affecting its structure and chemical composition. So, it is clear that bonding to dentin is much more challenging and requires more complicated and time-consuming application procedures. Hence, the limited durability of resin-dentin bonds severely compromises the clinical longevity of tooth-colored restorations.[2],[3]

Besides, there are continuous attempts for simplification of adhesive protocols for a faster and less technique sensitive bonding procedures, so an adhesive system for all situations, referred to as 'universal' or 'multi-mode' adhesives have been introduced.[4] Universal adhesives represent the last generation of adhesives in the market.[5]

They can be applied either with the etch-and-rinse or the self-etch technique according to the clinician's preference, with claims by manufacturers that there is no compromise on bonding effectiveness to dentin when either bonding strategy is employed.[6] Moreover, they

can be used with different adherent substrates including enamel, dentin, metal alloys and ceramics.[7]

The pH of universal adhesives greatly influences the long term stability and durability of the bond strength to dentin. Universal adhesives can be classified according to the pH into "mild" (pH > 2) or "ultra-mild" (pH > 2.5) or intermediately strong (pH approximately 1.5). Generally, lower stability of bonding to dentin has been reported to intermediately strong universal adhesives after aging due to the high acidity of residual monomers that continue to demineralize the dentin and further weaken the adhesive interface.[5, 8]

The immediate bond strength of contemporary adhesives are quite satisfactory , however the long term durability upon aging is more critical and more clinically relevant.[9] So, artificial aging techniques have been used to simulate the changes in the oral environment, the most common of which are the water storage and thermocycling techniques. Water is thought to play a major role in degradation of dentin-resin bond. In long-term water storage experiments, degradation is accelerated by hydrolysis of hydrophilic resin components and by host-derived proteases with collagenolytic activity. In addition, the restorations are clinically subjected to repetitive expansion and contraction stresses caused by temperature fluctuations within the oral cavity. These stresses have been proposed to affect the bonded interface. In thermocycling, the bonded specimens are subjected to cyclic temperature changes through water immersion.[10]

There are insufficient data in the literature regarding the effect of different aging methods on the performance of universal adhesives.

Moreover, there is heterogeneity in the results of already conducted studies testing the long term durability of universal adhesives.[10-16]

Hence, this study was designed to evaluate the durability of two universal adhesives; mild and ultra-mild, in both etch-and-rinse and self-etch modes, after simulated in vitro degradation by long-term water storage and thermocycling.