Comparison of shear bond strength of two current adhesive systems to enamel, dentin and dentinoenamel junction region using two load application methods (in vitro study)

A thesis
Submitted to the Council of the College of Dentistry at the University of Baghdad in Partial Fulfillment of the Requirements for the Degree of Master of Science in Conservative Dentistry

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June
2008

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Abstract

Recent advance in enamel and dentin adhesive technology have resulted in the emergence of many new adhesive system for tooth restoration. Some of these newly introduced systems are; the two step total-etch (one bottle) wet bonding systems and the newest system the all-in-one system which combine etching, priming and bonding into a single application.

This in vitro study was conducted to evaluate and compare the bonding of current resin adhesives to the enamel, dentin and the region approximating the dentin-enamel junction (DEJ), with two resin adhesive systems. Bond strength was assessed by two different shear bond test methods namely; the wire and the blade methods for stress application.

Forty sound human premolar teeth recently extracted for orthodontic purpose were selected. These teeth have been polished, cleaned carefully and then embedded in acrylic block exposing the crown surface.

Then they have been sectioned through occlusal surface from the middle coronal region using Strures Minitom device to obtained flat smooth surface which include enamel, dentin, dentinoenamel junction (DEJ). The teeth were randomly divided in two groups, according to the bonding agent used, which are:

Group1: Swiss TEC SL-bond (5^{th} generation).

Group2: Adper Prompt L-Pop adhesive (6^{th} generation).

Each tooth region was bonded with one of the adhesives systems, and resin composite, and then stored in (37ºC) water for 24 hours. The specimens were submitted to shear bond strength (SBS) test which was done by the Instrom testing machine applying shearing force, so as the specimen is subjected to a shear bond test making its corresponding

reading by units of (Newton/mm^2). Each group was subdivided into two subgroups according to type of load application method (the wire and blade methods).

The subgroups that to be tested by the wire method were subjected to shear bond strength test, thin stainless steel orthodontic wire (diameter 0.25mm) was looped around the resin cylinder making contact with half of the cylinder base and held flush against the resin/tooth interface.

The subgroups that to be tested by the blade method were subjected to shear bond strength test with specially designed chisel-shape rod applied at the interface.

The data were analyzed statistically using analysis of variance test (one-way ANOVA) and student t-test. The result revealed that there is significant difference between the bonding agents, group (one) SL-bond demonstrated higher and more consistent bond strength values than the group (two) prompt L-Pop (two step all-in-one system), also there was statistically significant differences of shear bond strength values observed between the dentinoenamel junction (DEJ) region, enamel and dentin. Dentinoenamel junction (DEJ) has a lower SBS value than enamel and dentin in both groups and also in both test methods used.

The wire method showed bond strength values of much greater reliability in result than the blade method.

Test method used can significantly affect result in the shear bond testing of bonding agent.