

Regional bond strength of dentin bonding systems to pulp chamber dentin

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I. Objectives

The purpose of this study is to evaluate the regional bond strengths of three dentin bonding systems to pulp chamber dentin of endodontially treated teeth.

II. Material and Methods

45 caries-free human molars were used in this study. Initially, the teeth were embedded in epoxy resin using acrylic ring. For control group, the teeth were sectioned to remove occlusal enamel using a Low speed diamond saw (Isomet, Buhler, USA) and exposed dentin surface was ground with #600-grit SiC paper. For experimental groups, access cavity preparation was performed and then stored in 5% NaOCl for 1 hour. The teeth were sectioned to expose axial wall and pulpal floor of pulp chamber respectively. Three dentin bonding systems were applied to each dentin surface according to manufacturer's instruction: Scotchbond Multi-Purpose (SM; 3M, USA), Single Bond (SB; 3M, USA), Clearfil SE Bond (SE; Kuraray, Japan). Then Z-100 (3M, USA) was filled and light-cured for 40 sec. Prior to testing, the teeth were stored in 37°C distilled water for 24 hours. The teeth were serially sectioned and trimmed to give a bonded surface of 1mm² (hour-glass shape) and subjected to micro-tensile bond strength test in Universal testing machine (EZ Test, Shimadzu, Japan) at a cross-head speed 1mm/min. For the evaluation of the morphology at the resin/dentin interface, SEM examination (S-2300, Hitachi, Japan) was also performed. The data was statistically analysed using ANOVA/Newman-Keuls multiple comparison test at 95% significance level.

III. Results

1. The micro-tensile bond strengths of all dentin bonding systems were decreased in order of control group, axial wall group, and pulpal floor group.
2. In control group, SM and SB showed significantly higher bond strengths than SE ($p < 0.05$).
3. SM and SB showed significantly lower bond strengths in axial wall and pulpal floor group than control group, but only pulpal floor group showed significantly lower bond strength than control group in SE ($p < 0.05$).
4. In axial wall and pulpal floor group, there were no significant difference between dentin bonding systems.
5. In SEM observation, axial wall and pulpal floor group which were treated with 5% NaOCl showed smoother bonding interface than control group.

IV. Conclusions

This study suggests that the procedure of endodontic treatment can adversely affect the adhesion to dentin and self-etching system is less affected than wet bonding system which needs total etching procedure.