Research & Table Clinic Day 2020 Structured Abstract

TITLE: Exposure Duration and Adhesive Cure Uniformity Under a Stainless Steel Bracket

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IS THIS A COMPETING PRESENTATION:
YES

SELECT RESEARCH / SCHOLARLY TOPIC:

CLINICAL SCIENCES (benchtop - Dental Materials, etc)

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TITLE:

Exposure Duration and Adhesive Cure Uniformity Under a Stainless-Steel Bracket

OBJECTIVES:

Determine the effect of curing light exposure on adhesive paste hardness underneath a simulated stainless steel bracket.

METHODS:

A bovine incisor was embedded in epoxy and the facial enamel was ground flat (2000 grit). A jig held the specimen on a universal testing machine (5844, Instron) and also secured a curing light guide end: 45°, 4mm from the bracket base. The pad of an orthodontic bracket (3X4mm) was reproduced as a highly polished, flat, stainless steel shaft. Bracket adhesive (Transbond XT, 3M Unitek) was placed on the enamel, and the flat base was lowered, creating a 100-micron thick layer. The bracket was exposed from the long sides (10mm tip, Ortholux Curing Light, 3M) for 3, 6, 9, or 12s, was maintained in place for 20 min, and then removed. The tooth and exposed adhesive was set on a precision X-Y positioning table on a different testing machine (5844, Instron). A Knoop indenter created an array of hardness indentations across the adhesive surface: COLUMNS:(Left-Left:Middle-Middle-Right:Middle-Right) ROWS:(Top, Middle, and Bottom). The hardness array was imaged in a microscope having a 10MP digital camera. The resulting image was processed, indentation dimensions transferred to a spreadsheet program (EXCEL), and hardness values were calculated. Within a single specimen, hardness values were averaged among ROW categories for every COLUMN location. Statistical analyses: (1) 1-way, repeated measures ANOVA within COLUMN categories for a single exposure duration, (2) 1-way ANOVA within a fixed ROW location among exposure times was performed. N= 5/exposure group, pre-set alpha 0.05.

RESULTS:

Hardness was not signifantly affected by ROW position within any exposure. 12-s exposure demonstrated significantly greater hardness at each ROW position.

CONCLUSIONS:

Exposure duration does not significantly affect uniformity of adhesive hardness under a stainless steel bracket. However, use of a 12-s exposure produces significantly higher hardness, regardless of ROW position.

LEARNING OBJECTIVES:

1. **1.** Understand the potential for differential in cure values underneath a stainless steel bracket
2. **2.** State the difference in adhesive hardness profile from outside (peripheral) towards the middle bracket area.
3. **3.** State the effect of curing light exposure duration on hardness of bracket adhesive