

Original Research

Assessment of effect of desensitizing agents on retention of crown with luting agents: A clinical study

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ABSTRACT:

Background: To analyse the impact of desensitizing agents on retention of crown with luting agents. **Materials & methods:** 60 freshly extracted human premolar teeth were enrolled. Malformed, carious and deformed tooth specimens were excluded. Three groups were made: Group 1- control group, Group 2: With "seal and protect" agent and group 3: With "Tooth mouse" agent. All the samples in each group were kept together to form a cube within an index. Impressions of the prepared teeth were made using a simultaneous dual-mix technique with an addition silicone impression material. The crowns were subjected to a vertical dislodgement force until failure on a universal testing machine. **Results:** Mean bond strength of the specimens of group 1, group 2 and group 3 was 201.5 MPa, 192.5 MPa and 189.4 MPa respectively. Significant results were obtained while comparing the mean bond strength of the three study groups. **Conclusion:** Exposure to the desensitizing agent leads to mild reduction in the mean bond strength.

Key words: Desensitizing, Crown, Luting

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INTRODUCTION

Resin-based cements are currently used for the luting of all types of indirect restorations, including all ceramic crowns (ACC), due to their improved mechanical properties, bond strength and higher aesthetics compared to conventional luting agents like zinc phosphate, glass ionomer and polycarboxylate cements. However, luting resin-cements that require the use of adhesive systems involve several steps of application such as etching, priming and bonding that can render them technique sensitive. One of the most investigated self-adhesive cements and the first of this category to be launched to the dental market in 2002 is RelyX Unicem. The main characteristic of this material is that no pretreatment of the tooth surface is required.¹⁻³

Proper selection of a luting agent is a last important decision in a series of steps that require meticulous

execution and will determine the long-term success of fixed restorations. One hundred years ago this decision was easy with the availability of essentially only one luting agent, zinc phosphate cement. Currently, a plethora of luting agents is available. Now the choice of the optimal luting agent can be confusing, even for the most experienced clinician. Restorations of metal, porcelain fused to metal, low- and high-strength ceramics, full or partial coverage, require a prudent approach and the proper cement selection should be based on knowledge of physical properties, biological properties and other attributes of both restorative materials and luting agents.⁴⁻⁶ Hence; the present study was conducted for assessing the impact of desensitizing agents on retention of crown with luting agents.

MATERIALS & METHODS

The present study was conducted for assessing the impact of desensitizing agents on retention of crown with luting agents. 60 freshly extracted human premolar teeth were enrolled. Malformed, carious and deformed tooth specimens were excluded. Notching of the specimens was done buccolingually with a diamond point for retention followed by were mounted in auto polymerizing acrylic resin block. Crown preparation was one and all the preparations were terminated in dentin. Three groups were made: Group 1- control group, Group 2: With “seal and protect” agent and group 3: With “Tooth mouse” agent. All the samples in each group were kept together to form a cube within an index. Impressions of the prepared teeth were made using a simultaneous dual-mix technique with an addition silicone impression material. Wax pattern was made and casting was done and was retrieved. All the cementations were done on the same day, immediately following the application of desensitizing agents. The crowns were subjected to a vertical dislodgement force until failure on a universal testing machine. All the results were recorded and analysed by SPSS software.

RESULTS

Mean bond strength of the specimens of group 1, group 2 and group 3 was 201.5 MPa, 192.5 MPa and 189.4 MPa respectively. Significant results were obtained while comparing the mean bond strength of the three study groups.

Table 1: Comparison of bond strength

Bond strength (MPa)	Group 1	Group 2	Group 3
Mean	256.5	238.6	210.6
SD	35.2	29.1	25.1

Table 2: Statistical analysis

Comparison of bond strength	p- value
Group 1 Vs Group 2	0.002*
Group 2 Vs Group 3	0.012*
Group 1 Vs Group 3	0.028*

*: Significant

DISCUSSION

It is reported that approximately 1 to 2 million dentinal tubules are exposed during an average tooth preparation for receiving a posterior crown. There has been an extensive use of desensitizing agents over the past few decades due to introduction of newer agents and increased incidence of post-cementation sensitivity. The restorations luted with cements like zinc phosphate and glass ionomer result in partial removal of the smear layer owing to their acidic nature.⁵ The cement can displace an equal amount of dentinal fluid, which may cause excessive hydrostatic pressure leading to post-cementation sensitivity. The orifices of the exposed tubules can be sealed off with polymerizable products like dentin bonding agents or with non-polymerizable formulations, which do not

require light activation.^{7- 10} Hence; the present study was conducted for assessing the impact of desensitizing agents on retention of crown with luting agents.

Yim NH in another study, authors evaluated the effect of various dentin desensitizers and conventional cementing agents on the in vitro retentive strength of cast crowns. Freshly extracted human molars were prepared for a standardized crown preparation (26 degrees total convergence, 4 mm axial height) with a custom-made pantograph. Dentin desensitizers included none (control), a polymerizable material (All-Bond 2), and a nonpolymerizable desensitizer (Gluma Desensitizer). Cementing agents included zinc phosphate (Fleck's), glass ionomer (Ketac-Cem), resin-modified glass ionomer (Fuji II), and resin cement (Panavia 21). Twelve teeth were prepared for each test condition (144 teeth total). Individual castings were made from a base metal alloy (Rexillium III). Crowns were removed after storage at 26 degrees C for 48 hours at 100% relative humidity using a universal testing machine at a crosshead speed of 1.27 mm/min. The proportion of cement retained on the tooth and casting after debonding was quantified according to treatment. Statistical treatment included 1- and 2-way ANOVAs, followed by the Tukey-Kramer post hoc test at a preset alpha of 0.05. Results. Resin cement exhibited the highest retentive strength and all dentin treatments resulted in significantly different retentive values (All-Bond 2 (5.68 +/- 0.70 MPa) > control (4.67 +/- 0.48 MPa) > Gluma (4.12 +/- 0.37 MPa)). Retention of resin-modified glass ionomer was between the resin cement and glass ionomer groups: All-Bond 2 (3.46 +/- 0.26 MPa) > Gluma (2.81 +/- 0.15 MPa) = control (2.96 +/- 0.18 MPa). Conventional glass ionomer values were between those of Fuji Plus and zinc phosphate groups: All Bond 2 (2.23 +/- 0.20 MPa) = control (2.36 +/- 0.20 MPa) > Gluma (1.98 +/- 0.23 MPa). Zinc phosphate had the lowest retention values: control (1.68 +/- 0.08 MPa) > Gluma (0.81 +/- 0.11 MPa) > All-Bond 2 (0.67 +/- 0.14 MPa). The majority of cement was retained on the debonded tooth surface versus the casting, with the exception of zinc phosphate when used with dentin pretreatments.¹¹

Patil PG et al evaluated the effect of polymerizable and non-polymerizable dentine desensitizers on retention of complete cast crowns cemented with three different types of cements. Freshly extracted human molars (n = 90) were prepared for standardized crown preparation (6-degree taper 4-mm height). The axial surface area of each preparation was determined and specimens were distributed equally among groups (n = 10). Dentine desensitizers, cementing agents, glass ionomer cement and compomer cement. Teeth were prepared and individual castings were made using high noble porcelain-metal alloy. Castings were cemented, thermo-cycled and removed along the path of insertion using a universal testing machine. Tooth surface as well as inner surface of the casting was examined and nature of cement failure was

determined. Compomer cement exhibited the highest retentive strength and all dentine treatments resulted in significantly different retentive values. Zinc phosphate was the least retentive.¹² A possible reason for this could be that the bond strength of the desensitizers and dentin, and between the desensitizers and self-adhesive resin cement, was higher than that of the bond strength of the self-adhesive resin cement itself. This failure can be considered favorable in regard to the present study as the increase in bond strength caused by the application of desensitizers may have led to the obvious results.¹³⁻¹⁵

CONCLUSION

Exposure to the desensitizing agent leads to mild reduction in the mean bond strength.

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