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Original Research

Assessment of impact of desensitizing agents on the retention of crowns cemented with luting agents: a comparative study

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ABSTRACT:

Background: The choice of the optimal luting agent can be confusing, even for the most experienced clinician. Key factor to success is the choice of a proper luting agent and the cementation procedure. Hence; the present study was undertaken for comparing the impact of desensitizing agents on the retention of crowns cemented with luting agents. **Materials & methods:** A total of 40 freshly extracted mandibular molar teeth were selected. All the teeth were stored in normal saline till further use. All the specimens were divided into two study groups as follows: Group A: Glass ionomer cement (Control), and Group B: Glass ionomer cement (GC Tooth Mousse desensitizer). Crowns were fabricated and were subjected under universal force testing machine. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

Results: Mean tensile bond strength of group A specimens was 42.6 Kg while mean tensile strength of Group B specimens was 43.1 Kg respectively. While comparing statistically, non-significant results were obtained. **Conclusion:** Application of desensitizing agents might be designated during fabrication of crowns as it will not affect the retentive ability of the luting cements.

Key words: Luting agent, Desensitizing agent, Crown

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INTRODUCTION

The foremost goal of any clinician is providing the patient with a restoration which preserves the longevity and pulpal vitality of natural abutments of fixed partial dentures and regaining the lost function. A dental cement used to attach indirect restorations to prepared teeth is called a luting agent. A luting agent's primary function is to fill the void at restoration-tooth interface and mechanically lock the restoration in place to prevent its dislodgement during mastication. Depending on the expected longevity of

the restoration, a luting agent may be considered to be definitive (long term) or provisional (short term).¹⁻³

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

Key factor to success is the choice of a proper luting agent and the cementation procedure. Loss of crown

retention was found to be the second leading cause of failure of crowns and fixed partial dentures while a study listed uncemented restorations as the third leading cause of prosthetic replacement with failure occurring after only 5.8 years of service.⁷⁻⁹ Hence; the present study was undertaken for comparing the impact of desensitizing agents on the retention of crowns cemented with luting agents.

MATERIALS & METHODS

The present study was undertaken for comparing the impact of desensitizing agents on the retention of crowns cemented with luting agents. A total of 40 freshly extracted mandibular molar teeth were selected. All the teeth were stored in normal saline till further use. Thorough cleaning of all the specimens was done for removing surface deposits. Afterwards, the samples were stored in distilled water at room temperature. On the root surfaces, notches were created using diamond point. All the specimens were embedded in a metal mold partially filled with auto-polymerizing acrylic resin. Storing of the specimens was done in distilled water. Uniform taper was obtained by the design of a clamp which was able to secure a high-speed air-rotor hand piece. Constant taper of 6 degrees for the preparations was obtained. Before the application of desensitizing agents and cementation, the axial surface area of each prepared tooth was determined. The surface area of the preparation was measured by adapting a lead foil closely along the axial surface of the prepared teeth cut where the end overlapped and the length of the foil is measured. All the specimens were divided into two study groups as follows:

- Group A: Glass ionomer cement (Control), and
- Group B: Glass ionomer cement (GC Tooth Mousse desensitizer)

The impressions were made and were poured in Type IV die stone. The dies were recovered after one hour. Die hardener was applied on the finish line area to prevent abrasion by waxing instruments during the fabrication of the wax pattern. Adaptation of the margins was done followed by maintenance of wax coping. In the group 2, a generous layer of GC Tooth Mousse was applied on the prepared tooth surfaces using an applicator tip and left it undisturbed for a minimum of 3 minutes. Crowns were fabricated and were subjected under universal force testing machine. All the results were recorded in Microsoft excel sheet and were analyzed by SPSS software.

RESULTS

In the present study, a total of 40 freshly extracted molar were enrolled and were broadly divided into two study groups; Group A: Glass ionomer cement (Control), and Group B: Glass ionomer cement (GC Tooth Mousse desensitizer). Mean tensile bond

strength of group A specimens was 42.6 Kg while mean tensile strength of Group B specimens was 43.1 Kg respectively. While comparing statistically, non-significant results were obtained.

Table 1: Comparison of mean tensile strength

Tensile strength	Group A	Group B
Mean	42.6	43.1
SD	3.5	4.8
p- value	0.31	

DISCUSSION

The word ‘luting’ is derived from a latin word Lutum- which means mud. Dental luting agents provide a link between the restoration and prepared tooth, bonding them together through some form of surface attachment, which may be mechanical, micro-mechanical, chemical or combination. Luting agents may be definitive or provisional depending on their physical properties and planned longevity of the restoration.⁶⁻⁹ Hence; the present study was undertaken for comparing the impact of desensitizing agents on the retention of crowns cemented with luting agents.

In the present study, a total of 40 freshly extracted molar were enrolled and were broadly divided into two study groups; Group A: Glass ionomer cement (Control), and Group B: Glass ionomer cement (GC Tooth Mousse desensitizer). Mean tensile bond strength of group A specimens was 42.6 Kg while mean tensile strength of Group B specimens was 43.1 Kg respectively. While comparing statistically, non-significant results were obtained. Jalandar SS et al evaluated the effect of two desensitizing agents on the retention of cast crowns when cemented with various luting agents. Ninety freshly extracted human molars were prepared with flat occlusal surface, 6 degree taper and approximately 4 mm axial length. The prepared specimens were divided into 3 groups and each group is further divided into 3 subgroups. Desensitizing agents used were GC Tooth Mousse and GLUMA® desensitizer. Cementing agents used were zinc phosphate, glass ionomer and resin modified glass ionomer cement. Resin modified glass ionomer cement exhibited the highest retentive strength and all dentin treatments resulted in significantly different retentive values (In Kg.): GLUMA > Control > Tooth mousse. Retentive strength for glass ionomer cement were GLUMA > Tooth mousse > Control. For zinc phosphate cement the retentive strength were lowest GLUMA > Control > Tooth mousse. The use of GLUMA® desensitizer has no effect on crown retention.¹⁰

N H Yim et al 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). 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. Controlled crown surface areas reduced the variation in strength values permitting high discrimination among retention values of desensitizer/cement combinations.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

CONCLUSION

Application of desensitizing agents might be designated during fabrication of crowns as it will not affect the retentive ability of the luting cements.

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