

Original Research

Evaluation of sile bond strength of complete veneer cast metal crowns using various luting agent

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ABSTRACT:

Background: To assess the tensile bond strength of complete veneer cast metal crowns using various luting agent.

Materials & methods: 40 samples were made and 20 samples were allotted for each luting agent to test the. Caries free maxillary first premolar teeth of approximately similar sizes were selected, cleaned, and stored in distilled water. The teeth were mounted in the auto polymerizing acrylic resin block measuring 1 cm × 1 cm × 4 cm. The teeth were embedded in the acrylic block 2 mm below the cement enamel junction. The mounted teeth were prepared following the principles of tooth preparation. Luting of the crowns was done according to respective study groups. In Universal Testing Machine, tensile strength was evaluated. **Results:** Mean tensile strength among specimens of the zinc phosphate cement group and resin cement group was 1.774 MPa and 8.415 MPa respectively. Significant results were obtained while comparing the mean tensile strength among the specimens of the two study groups. **Conclusion:** Resin cements exhibited higher tensile strength in comparison to zinc phosphate cement.

Key words: GIC, Tensile strength

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INTRODUCTION

The use of the stainless steel crown (SSC) with improved mechanical properties has become a common and reliable practice for the management of primary teeth with extensive caries. Retention value plays a significant role to ensure a successful restoration when applying these crowns. Various factors contribute toward this feature, such as proper marginal adaptation within the undercuts; design of the tooth and marginal seal; crown length and surface area.¹⁻³

One key factor on which the success of such restorations depends is utilization of proper luting cement; the material that fills the space between the tooth and the restoration, resulting in retention and adhesion. The desired properties for luting cement materials are as follows: biocompatibility, low solubility in oral fluids, appropriate marginal seal, minimal film thickness, low viscosity, easy manipulation, and sufficient working time with rapid set. High tensile strength, maximum compressive and

retentive strength, as well as proper adhesion to tooth/restoration are other crucial factors which contribute to the overall success of a luting cement.⁴⁻⁶Hence; the present study was conducted for evaluating tensile bond strength of complete veneer cast metal crowns using various luting agent.

MATERIALS & METHODS

The present study was conducted for evaluating tensile bond strength of complete veneer cast metal crowns using various luting agent. Two luting agents were used in the present study, Zinc phosphate cement and Resin cement. 40 samples were made and 20 samples were allotted for each luting agent to test the. Caries free maxillary first premolar teeth of approximately similar sizes were selected, cleaned, and stored in distilled water. The teeth were mounted in the auto polymerizing acrylic resin block measuring 1 cm × 1 cm × 4 cm. The teeth were embedded in the acrylic block 2 mm below the cement enamel junction. The mounted teeth were prepared following

the principles of tooth preparation. All the dimensions were predetermined to achieve the standardization of the preparation. Occlusal reduction was done. Impressions of prepared teeth were made with polyvinyl siloxane impression material and wax patterns were invested and casted. After verifying the fit, they were finished and polished. Luting of the crowns was done according to respective study groups. In Universal Testing Machine, tensile strength was evaluated.

RESULTS

Mean tensile strength among specimens of the zinc phosphate cement group and resin cement group was 1.774 MPa and 8.415 MPa respectively. Significant results were obtained while comparing the mean tensile strength among the specimens of the two study groups.

Table 1: Tensile strength comparison

Group	Mean	SD
Zinc phosphate cement	1.774	0.848
Resin cement	8.415	2.117
p- value		

DISCUSSION

Retention is an important factor for long term clinical success of crowns. The smear layer formed on prepared teeth serves as a contaminant and prevents adequate penetration of luting agent into the tooth surface, which in turn affects the retention of crowns. Conditioning of the surfaces to remove the smear layer and, thereby, promoting the bond strength has been proposed.⁶⁻⁹ Hence; the present study was conducted for evaluating tensile bond strength of complete veneer cast metal crowns using various luting agent.

Mean tensile strength among specimens of the zinc phosphate cement group and resin cement group was 1.774 MPa and 8.415 MPa respectively. Significant results were obtained while comparing the mean tensile strength among the specimens of the two study groups. Anne G et al assessed the effect of dentin conditioners and luting cements on the retention of full metal crowns. Sixty recently extracted caries free molar teeth were prepared using airtor hand piece mounted to a surveyor with a custom made jig, to obtain a standardized 26° total convergence and 4 mm of axial height. Individual crowns were fabricated using base metal alloy. Thus; prepared specimens were divided into six groups: 1) Two groups with no dentin conditioning (Control groups A and B), 2) Two groups, dentin conditioned with 10% polyacrylic acid conditioner (First test groups C and D), and 3) Two groups, dentin conditioned with 17% Ethylenediaminetetraacetic acid (EDTA) (Second test groups E and F). Groups A, C, and E were cemented with conventional glass ionomer whereas Groups B, D, and F were cemented with resin-modified glass ionomer. The mean retentive (tensile) strength of Group A specimens was 2.26 ± 0.15 MPa, Group B

specimens was 2.71 ± 0.15 MPa, Group C specimens was 12.26 ± 0.67 MPa, Group D specimens was 14.28 ± 1.47 MPa. Similarly, Group E specimens was 5.23 ± 0.62 MPa, and Group F specimens was 7.36 ± 0.51 MPa. Retentive (tensile) strength required to dislodge the metal crowns was higher with the combination of resin-modified glass ionomer luting cement and 10% polyacrylic acid dentin conditioner.¹¹ Parisay I et al evaluated the retentive strength of SSC cemented with four different luting cements. A total of 55 extracted primary first molars were selected. Following crown selection and cementation (one with no cement and four groups cemented with resin, glass ionomer, zinc phosphate, and polycarboxylate), all the specimens were incubated and thermocycled in 5°C–55°C. Retentive properties of SSCs were tested with a mechanical test machine. First dislodgement of each specimen and full crown removal were recorded. The results of the study showed that the specimens cemented with zinc phosphate exhibited higher retentive strength as compared to glass ionomer and polycarboxylate. Zinc phosphate cement showed the most promising results; thus, it can be preferably used for cementation of the teeth with no grossly broken down crowns.¹²

CONCLUSION

Resin cements exhibited higher tensile strength in comparison to zinc phosphate cement.

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