

Original Research

Comparison of fracture resistance of pulpotomized and composite- restored primary molars

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ABSTRACT:

Background: To evaluate and compare fracture resistance of pulpotomized and composite- restored primary molars. **Materials & methods:** A total of 30 extracted primary molars were enrolled. They were divided into three groups of 10 equally based on their sizes. The cavities were prepared and were restored as in group 1 cavities were filled with amalgam. In group 2, the cavities were filled with conventional composite and in group 3, the bulk fill composite was used. The stress was applied to the specimens. The load was applied vertical to the occlusal surface of teeth until fracture. The result was analysed using SPSS software. **Results:** A total of 30 extracted primary molars were enrolled, 10 in each group. Comparison of the fracture resistance values of specimens revealed statistically significant differences among groups ($P = 0.01$). For amalgam, the mean fracture resistance was 1308.47 N. The mean fracture resistance for incremental composite was 1278.22 N. In group 3, the mean value of resistance was 1865.62 N. This shows that group 3 has the highest resistance followed by group 1. **Conclusion:** Bulk- Fill Composite is the best restorative material to be used in pulpotomy procedures.

Keywords: composites, amalgam, fracture.

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INTRODUCTION

Dental caries is a major health problem still exhibiting a very high prevalence in 2021 in children all around the globe. Due to various reasons (lack of proper dental education, lack of access to dental care, "silent symptomatology", etc.), treatment is often initiated when the progression degree has reached a deep, cavitory stage, often with pulp involvement.¹ The main objective of pulp therapy in primary dentition is promoting the health of the teeth and their supporting tissues to maintain the proper functions of the orofacial complex (mastication, speech, aesthetics) and ultimately to retain the teeth in their position to preserve arch length.^{2,3} In paediatric dentistry, pulpotomy is a conservative clinical procedure commonly performed in primary molars with extensive caries, which implies removal of the coronal pulp and preservation of the radicular pulp. The rationale is based on the healing ability of the remaining pulp tissue following surgical amputation of the affected or infected coronal pulp.⁴ After having achieved haemostasis, the exposed pulp stumps are

covered either with a pulp-capping agent that promotes healing or with an agent to fix the underlying tissue.⁵

When primary molars undergo pulpotomy, their fracture resistance minimizes because of extensive loss of tooth structure.⁶ Due to the undeniable importance of time required for the restoration of primary teeth, materials and techniques enabling a suitable restoration in the shortest time possible are high on demand.⁷ When different treatment approaches exist for the restoration of primary teeth, clinicians choose a treatment based on procedures that are cost-effective and evidence-based.⁸ Restoration of choice in these teeth is the stainless steel crown because tooth is preserved from fracture, leakage chance decreased, and provided a biological seal.⁹ A new generation in composite resins is presented to decrease the chair time of the conventional restorative procedure.¹⁰ The "bulk-fill" composite introduced to decrease the polymerization shrinkage stress (major disadvantage of composite resin). Hence, this material can be used in a single layer (up to 4 mm), it is an

alternative to restorations in the dental practice.¹¹ When the practitioner inserts this material in a single layer, the time required to accomplish the procedure can be lessened, thus contamination risk alleviated and longevity of restoration enhanced.¹² Hence, this study was conducted to evaluate and compare fracture resistance of pulpotomized and composite- restored primary molars.

MATERIALS & METHODS

A total of 30 extracted primary molars were enrolled. They were divided into three groups of 10 equally based on their sizes. The cavities were prepared and were restored as in group 1 cavities were filled with amalgam. In group 2, the cavities were filled with conventional composite and in group 3, the bulk fill composite was used. The stress was applied to the specimens. The load was applied vertical to the occlusal surface of teeth until fracture. Data was collected and the Chi- squared test was done. The result was analysed using SPSS software.

RESULTS

A total of 30 extracted primary molars were enrolled, 10 in each group. Comparison of the fracture resistance values of specimens revealed statistically significant differences among groups ($P = 0.01$). For amalgam, the mean fracture resistance was 1308.47 N. The mean fracture resistance for incremental composite was 1278.22 N. In group 3, the mean value of resistance was 1865.62 N. This shows that group 3 has the highest resistance followed by group 1.

Table: mean fracture resistance

Group	Mean resistance
Amalgam	1308.47
Conventional composite	1278.22
Bulk-fill composite	1865.62

DISCUSSION

In vital teeth, the failure risk of restoration is less than the restorations which performed in pulpotomized teeth.¹² Resin composites, glass ionomers, or compomers are going to be more favorable than amalgam in operative dentistry of primary teeth.¹³ To choose the most suitable material for filling primary pulpotomized molar, there is inadequate strong evidence. Resin composites could be pleasing in the matter of esthetics and also they can make bond to the structure of teeth.¹⁴ Light-cure resin composites reduce the necessity to preparation of additional retention and they could set fast.¹⁵ The depth of polymerization in light-cured resin composites is limited to 2 mm. The incomplete polymerization could cause depletion in mechanical and biological characteristics of composites. Bulk-fill composites are recommended to use in 4- or 5-mm increments. The use of the bulk-fill composites provides an easier restorative procedure and reduces the chair time in teeth with deep and wide cavities. They could make the cusp strain and shrinkage stress lessen and raise

the fracture resistance.¹⁶ Hence, this study was conducted to evaluate and compare fracture resistance of pulpotomized and composite- restored primary molars.

In the present study, a total of 30 extracted primary molars were enrolled, 10 in each group. Comparison of the fracture resistance values of specimens revealed statistically significant differences among groups ($P = 0.01$). For amalgam, the mean fracture resistance was 1308.47 N. A study by Ghajari MF et al, was done to assess the fracture resistance of pulpotomized primary molars restored with incremental and bulk-fill composite application techniques. The mean fracture resistance was 1291.47 ± 603.88 N in the amalgam, 1283.08 ± 594.57 N in the Tetric N-Ceram incremental, and 1939.06 ± 134.47 N in the Tetric N-Ceram bulk-fill group. The difference in this regard between Group 3 and Groups 1 and 2 was statistically significant ($P = 0.019$ and $P = 0.035$, respectively).¹⁷

In the present study, the mean fracture resistance for incremental composite was 1278.22 N. In group 3, the mean value of resistance was 1865.62 N. This shows that group 3 has the highest resistance followed by group 1. Another study by Mohammad N et al, fifty primary first and second molars were collected for their study. All the groups were compared by the ANOVA one-way test which indicated that there were statistically significant differences among the five groups. Nanocomposites can be considered to be the best restorative material in terms of fracture strength among amalgam, miracle mix, cermet, and resin-modified glass ionomer cement.¹⁸

El-Kalla and García-Godoy, in their study on fracture resistance of pulpotomized primary molars, concluded that in comparison with amalgam, bonded restorations significantly increased the fracture resistance of primary molars.¹⁹ Monga et al., in their study on endodontically treated premolars, showed that composite significantly increased the fracture resistance of teeth compared to amalgam; these results are in contrast to our findings.²⁰

CONCLUSION

Bulk- Fill Composite is the best restorative material to be used in pulpotomy procedures.

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