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Research

Comparative Evaluation of Shear Bond Strength of Cention N and Glass Ionomer Cement - An In Vitro Study

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Abstract

Aim: This study compared the shear bond strengths of glass-ionomer cement (GIC) Type IX and Cention N.

Materials and Methods: To assess the shear bond strength, 40 samples each of GIC Type IX and Cention N were evaluated. Sample cylinders with dimensions of 4 mm in diameter and 4 mm in height were bonded to the buccal surface of teeth to evaluate the shear bond strength in a universal testing machine with a crosshead speed of 1 mm/min.

Results: The shear bond strength of Cention N in comparison to GIC Type IX was statistically highly significant ($P < 0.01$).

Conclusion: The results reached to a conclusion that shear bond strength of Cention N as compared to GIC Type IX was superior.

Keywords: *Cention N, Glass-Ionomer Cement, Restorative dentistry, Shear bond strength*

Introduction

Dental caries is a chronic disease of the teeth which demineralizes the enamel and dentin because of organic acids produced from bacterial fermentation of carbohydrates. It is a multifactorial disease which is mostly determined by diet, plaque, and host factors such as tooth surface, saliva, and pellicle.[1,2]

Dental caries is a problem for physicians despite a variety of preventive measures and due to lack of oral awareness, particularly in pediatric patients. One of the main procedures that young children require is the restoration of carious teeth.[3,4] Due to the shorter lifespan of the teeth and the lower biting pressures of young children, restoration in the primary dentition differs from restoration in the permanent dentition.[5]

Finding the optimal restorative substance is a never-ending challenge. Development and interest in esthetic dentistry have grown recently. The field of esthetic dentistry has been substantially broadened by adhesive procedures. Modern dentistry has undergone a revolution thanks to the development of composite resins by Dr. Bowen and the advent of glass ionomers by Wilson and Kent.[6] With the newer materials demonstrating equivalent properties to the composite resin materials, the glass ionomer's poor wear characteristics, aesthetics, and slow setting reaction have been greatly modified.[7]

Cention N (Ivoclar), a recently launched, tooth-colored, basic filling material, is an on-going effort to find the best restorative material. It is basically a subgroup of the composite resin and is a "alkasite" UDMA-based restorative material like compomer or ormocer. It has optional added light-curing property and self-curing powder/liquid; thus it can be used for bulk placement in retentive preparations with or without the use of an adhesive.[8,9]

The literature contains very few investigations on Cention N because it is a recently introduced substance. Because of this, the objective of this in vitro study is to compare the shear bond strengths of GIC IX and Cention N to primary molars.

Material and Method

For the purpose of assessing the shear bond strength, samples of GIC Type IX (Group 1) and Cention N (Group 2) were prepared using 40 extracted primary molars with an intact buccal surface. The samples were created using a straw that had been cut into a cylinder with a 4 mm diameter and a 4 mm height. They were then adhered to the buccal surface of the tooth in accordance with the manufacturer's instructions. The samples were then thermocycled for de-molded, and finishing was done using finishing burs. For shear bond strength estimation, the samples were embedded into acrylic blocks of dimensions 2 cm × 2 cm. The samples were embedded to a height so that 2 mm of the sample was above the acrylic block. Following this, the samples were stored in distilled water for 24 hr. Testing of shear bond strength was done by mounting the samples in a universal testing machine with a crosshead speed of 1 mm/min. Statistical Package for the Social Sciences (version 20) was used to analyze and conduct statistical research on the acquired data (IBM SPSS Statistics.)

Result

Table 1 displays the shear bond strengths for both the GIC Type IX and Cention N groups. The findings imply that, when compared to GIC Type IX, the values for Cention N's shear bond strength are statistically very significant (P <0.01).

Table 1: Mean Shear Bond Strength.

Group	Mean Shear Bond Strength	P value
Group I Type IX GIC	8.34 ± 0.18 MPa	P <0.01

Discussion

Since many years ago, several restorative materials have been employed to restore missing tooth structure and preserve form, function, and aesthetics. For many years, dental amalgam has been a great and adaptable restorative material. The inevitable use of mercury, which may be viewed as damaging to the patient's health, lack of adhesion to the mineralized tissues, lack of aesthetics, and other disadvantages are just a few of the negatives of amalgam restorations. As a result, there is always a need for restorative materials that have better qualities than amalgam, including as biocompatibility, fracture resistance, good aesthetics, and strong adhesion to different tooth surfaces.[10]

One of the primary objectives of adhesion is to achieve a strong, durable, and predictable union between restorative material and tooth structure. Bonding enhances a restoration's retention and stabilization without significantly removing healthy tooth structure. Large undercuts and additional retentive aids are not necessary anymore. Adhesive restorations strengthen deficient tooth tissue by more effectively transmitting and dispersing functional stresses across the bonded surface. Marginal gaps owing to polymerization shrinkage stress are prevented by strong adherence between the tooth and the restorative material.[11]

In the present study, shear bond strength of the restorative materials was tested as these play an important role in withstanding the forces of mastication. tooth. The results in the present study have concluded that the shear bond strength of Cention N was significantly higher than that of GIC Type IX. The cause of an increased shear bond strength was the fact that UDMA, DCP, an aromatic aliphatic-UDMA, and PEG-400 DMA communicate (cross-link) during polymerization and provide good long-term stability may be the cause of Cention N. The major element of the monomer matrix is UDMA. It has a strong mechanical composition and a moderate viscosity. The great flexural strength is a result of the strongly cross-linked polymer structure. In addition to its excellent strength, Cention N is a popular restorative material in pediatric dentistry because to its dual-cured process, fluoride ion release, calcium and hydroxide ion release, low polymerization shrinkage, and remineralization ability.[12]

Conclusion

The findings of this study strongly support the recommendation that Cention N be used as a restorative material for young dental patients since its mechanical qualities are shown to be much higher than those of GIC Type IX. To better explore it as the best restorative material, additional in vivo research is warranted with a much larger sizes and over longer periods in clinical settings.

Conflict of Interest

The authors declare no conflict of interest.

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