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Original Research

Glass ionomer cement as restorative material

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ABSTRACT:

Background: To evaluate glass ionomer cement as restorative material. **Materials & methods:** A total of 20 teeth were divided into different groups. Extracted teeth were included in the present study. Each experimental group consisted of 10 embedded teeth. All resin and glass ionomer cements were mixed and applied to the enamel in accordance with the manufacturers' instructions. They were classified as according to material EQUIA forte and EQUIA fil. The data was collected and evaluated. Results obtained were carefully studied an compared. Complete analysis was done using SPSS software. **Results:** A total of 20 teeth were enrolled. The teeth were divided into two categories EQUIA forte and EQUIA coating and 10 teeth in each group. The mean stress at maximum load for EQUIA forte was 194.86 and for EQUIA coating was 168.22. **Conclusion:** EQUIA forte has better stability and resistance.

Keywords: glass ionomer cement, restoration

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INTRODUCTION

Glass ionomer cement (GIC) is a self-adhesive restorative material.[1]Chemically, it is a combination of fluoro-aluminosilicate glass powder and polyacrylic acid liquid. It is a versatile material and has a broad spectrum of uses in restorative and pediatric dentistry. It exhibits a potent anti-cariogenic action.GIC was first described in the literature by Wilson and Kent in 1972 and has evolved gradually since then to improve its properties and broaden its uses. It is used for the cementation of fixed dental prosthesis (FDPs), orthodontic bands and brackets, and as liners or bases, as core build-up material, to restore carious and non-carious lesions, as pit and fissure sealant, and for atraumatic restorative technique (ART). [2]

Glass-ionomer cements belong to the class of materials known as acid-base cements. They are based on the product of reaction of weak polymeric acids with powdered glasses of basic character. [3] Setting occurs in concentrated solutions in water and the final structure contains a substantial amount of unreacted glass which acts as filler to reinforce the set cement. The term "glass-ionomer" was applied to them in the earliest publication, but is not strictly correct. The proper name for them, according to the International Organization for Standardization, ISO, is "glass polyalkenoate cement", but the term "glass-ionomer" (including the hyphen) is recognised as an acceptable trivial name, and is widely used within the dental profession. [4,5] Glass-ionomers have various uses within dentistry. They are used as full restorative materials, especially in the primary dentition, and also as liners and bases, as fissure sealants and as bonding agents for orthodontic brackets. The adhesion of glass-ionomers to the surface of the tooth is an important clinical advantage. Glass-ionomers are prepared from poly(acrylic acid) or related polymers, and this substance has been known to promote adhesion, because of the adhesion of the zinc polycarboxylate cement. [6] The advantage conferred by their adhesion was exploited many years ago, when glass-ionomers were proposed for the repair of cervical erosion lesions and as pit and fissure sealants. [7] Hence, this study was conducted to evaluate glass ionomer cement as restorative material.

MATERIALS & METHODS

A total of 20 teeth were divided into different groups. Extracted teeth were included in the present study. Each experimental group consisted of 10 embedded teeth. All resin and glass ionomer cements were mixed and applied to the enamel in accordance with the manufacturers' instructions. They were classified as according to material EQUIA forte and EQUIA fil. The data was collected and evaluated. Results obtained were carefully studied an compared. Complete analysis was done using SPSS software.

RESULTS

A total of 20 teeth were enrolled. The teeth were divided into two categories EQUIA forte and EQUIA coating and 10 teeth in each group. The mean stress at maximum load for EQUIA forte was 194.86 and for EQUIA coating was 168.22.

Table: Glass ionomer cement as restorative material

Groups and Materials	Mean stress at maximum load (MPa)	P- value
EQUIA forte coating	194.86	0.13
EQUIA coating	168.22	

DISCUSSION

The glass ionomer cement (GIC) was developed with the objective to produce a restorative material that would possess the desirable properties of silicate cements and polycarboxylate cement. Conventional GICs have certain properties that make them useful as a restorative material of choice. However, some deficiencies like attack by moisture during the initial setting period, short working time, long setting and maturation time, have low fracture toughness, and exhibit lower wear resistance have limited their use to areas which are not subjected to masticatory stresses. [8]Hence, this study was conducted to evaluate glass ionomer cement as restorative material.

In the present study, a total of 20 teeth were enrolled. The teeth were divided into two categories EQUIA forte and EQUIA coating and 10 teeth in each group.One of the study by BrzovicRajic V et al, determine compressive strength of new restorative materials over a longer period of time, materials were analysed under simulated conditions where cyclic loading replicated masticatory loading and thermocycling simulated thermal oscillations in the oral cavity. Four groups of samples (n=7)—(1) EquiaFil (GC, Tokyo, Japan) uncoated; (2) EquiaFil coated with Equia Coat (GC, Tokyo, Japan); (3) Equia Forte Fil (GC, Tokyo, Japan) uncoated; and (4) Equia Forte Fil coated with Equia Forte coat (GC, Tokyo, Japan)—were subjected to cyclic loading (240,000 cycles) using a chewing simulator (MOD, Esetron Smart Robotechnologies, Ankara, Turkey). Compressive strength measurements were performed according to ISO 9917-1:2007, using the universal mechanical testing machine (Instron, Lloyd, UK). Scanning electron microscope (SEM) analysis was performed after thermocycling. There were no statistically significant differences between EquiaFil and Equia Forte Fil irrespective of the coating ($p<0.05$), but a trend of increasing compressive strength in the coated samples was observed. [9]

In the present study, the mean stress at maximum load for EQUIA forte was 194.86 and for EQUIA coating was 168.22. Another study by Almuhaiza M et al, studied glass-ionomer cements (GICs) are mainstream restorative materials that are bioactive and have a wide range of uses, such as lining, bonding, sealing, luting or restoring a tooth. Although the major characteristics of GICs for the wider applications in dentistry are adhesion to tooth structure, fluoride releasing capacity and tooth-coloredrestorations, the sensitivity to moisture, inherent opacity, long-term wear and strength are not as adequate as desired. They have undergone remarkable changes in their composition, such as the addition of metallic ions or resin components to their composition, which contributed to improve their physical properties and diversified their use as a restorative material of great clinical applicability. The light-cured polymer reinforced materials appear to have substantial benefits, while retaining the advantages of fluoride release and adhesion. Further research should be directed towards improving the properties, such as strength and esthetics without altering its inherent qualities, such as adhesion and fluoride releasing capabilities. [10]Sealants of various types are placed in fissures of molars, either primary or permanent, to prevent caries developing by preventing the fissure from being colonised by plaque and pellicle.[11] Glass-ionomer was proposed for this application as long ago as 1974. [12]Since this time, many studies have been carried out to compare the effectiveness of glass-ionomer cements and composite resin sealants. They have generally determined the relative retention rates, and mostly they have found that glass-ionomers are inferior in this respect.[13] However, when caries rate is considered, glass-ionomers prove to be as effective or superior to composite resins.[14]This may be due to retention of the cement deep within the fissure and also because of the anti-caries effects of the fluoride released by the cement. [15]

CONCLUSION

EQUIA forte has better stability and resistance.

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