The Effect of Flowable Bulk Fill Vs Multi Increment Composite on Microleakge and Polymerization Shrinkage Strain in Pulpotomized Primary Molars

Thesis

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Dedication

This work is dedicated to

My father

My backbone who without his, continuous support and encouragement I wouldn't have been standing here today

My mother

My role model, without her prayers and encouragement I would have never made it

My brother

My lifetime best friend

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ADA	American Dental Association
ANOVA	Analysis of variance
BISGMA	Bisphenol glycol methacrylate
BFRBC	Bulk fill flowable resin based composite
CEJ	Cemento-enamel junction
C-factor	Configuration factor
cm2	Centi- meter square
CI	Confidence interval
CS	Cusp strain
DC	Degree of conversion
EBADMA	Ethoxylated Bisphenol A Dimethylacrylate
FDA	Food and Drug Administration
GIC	Glass ionomer cement
G	Group
g	Grams
HEMA	Hydroxyethyl methacrylate
IRM	Intermediate restorative material
LED	Light emitting diode
mm	Milli-meter
mW	Milli-watt
min	Minutes
Mpa	Mega Pascal
MOD	Mesial-occlusal-distal
nm	Nano-meter
PGSS	Post gel shrinkage strain
sec	Seconds
RBC	Resin based composite
SEM	Scanning electron microscope
SD	Standard Deviation
SDR	Smart dentin replacement
SSCs	Stainless steel crowns
SPSS	Statistical Package for Social Science
TEGMA	Triethylene glycol dimethacrylate
UDMA	Urethane dimethacrylate
VSSCs	Preveneered stainless steel crowns
WT%	Weight percent
ZOE	Zinc oxide and eugenol
°C	Degree centigrade
µm	Micrometre
µstrain	Microstrain
MS	Mutans Streptococci

Introduction

Introduction

The restoration of pulpotomized primary teeth has always been a challenge between durability and esthetics, the later being the parents' main concern regarding the restorative material used for their children's teeth. Among esthetic materials, glass ionomers have been traditionally used to restore children's teeth, owing to their acceptable esthetic and mechanical properties, the limited number of steps needed for their placement, and their fluoride releasing properties.(1) Unfortunately, they showed many drawbacks concerning their esthetic and mechanical properties as the high solubility of the material and breakage of the material interproximally, which makes it loses its contact with the neighboring teeth over time leading to failure and its consequences.(2)

Composites, which are known for their high mechanical and esthetic properties gained more attention as a restorative material than glass ionomers specially when restoring deep cavities. Despite the advantages of composite resins over glass ionomers, yet their use in pediatric dentistry has always been limited, being a highly technique-sensitive material and a muli-step process that requires longer chair time, does not match the requirements of a restorative material used on children.

Unlike traditional composites, which are typically placed in maximum increments of 2 millimeters (mm), bulk-fill composites are designed to be placed in a 4 mm single increment, or sometimes greater, to save time which is valuable in the practice of pediatric dentistry. However

the 2mm increment technique is used to minimize the polymerization shrinkage and gap formation between the restoration and tooth interface.[3]

Polymerization shrinkage of resin composites remains a clinical concern due to the associated residual stresses that are thought to play a role in marginal failure, microleakage and recurrent caries. Shrinkage stress may also induce tooth deformation and cohesive failures within the material or dental structure, which can lead to postoperative sensitivity.[4]

Adherence of the restorative material to the cavity walls to prevent microleakage is one of the most important characteristics for it to be considered as an ideal material.[5]Microleakage is defined as the chemically undetectable passage of bacteria, fluids, molecules or ions between the cavity walls and restorative materials[6].This seepage can cause hypersensitivity of restored tooth, tooth discoloration, recurrent caries, pulpal injury and accelerated deterioration of the restorative material[7].

Microleakage is determined today by many in vivo and in vitro techniques such as; staining, which, is the most common one[7]. Microleakage performance may be useful for comparative assessment of materials and selection of restorative materials with adequate marginal seal that is directly related to the success and longevity of the restorations[6].

Therefore this study was designed to assess the microleakage of different treatment modialities, used in restoration of pulpotomized primary molars, including: Stainless steel crowns, Multi Increment Restorative composite resin, and Bulk Fill Flowable Restorative

composite resin, using two different adhesive techniques, and to compare between the polymerization shrinkage strain of the two types of composite.

Review of Literature