

**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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Table of Contents

Dedication	iii
Acknowledgement.....	iv
List of Tables.....	vi
List of Figures	vii
List of Abbreviations.....	x
Introduction	1
Review of literature	3
Aim of the study	32
Materials and Methods	33
Results	60
Discussion	73
Summary	85
Conclusions	89
Clinical Recommendations.....	90
References	91
Arabic Summary	93

List of Tables

Table 1: Materials used in the study	33
Table 2 : Comparison between groups regarding microleakage	62
Table 3: Descriptive statistics between groups regarding microleakage.....	65
Table 4: Comparison of polymerization shrinkage results (Mean values $\pm$ SDs) between both groups	71

List of Figures

Figure 1: Materials used in this study	34
Figure 2: ZOE paste used in the study.....	35
Figure 3: Glass ionomer cement used for luting SSC	35
Figure 4: 37% phosphoric acid etch used in the study.....	35
Figure 5: Total etch adhesive used in the study.....	36
Figure 6: Self etch adhesive used in the study	36
Figure 7: Nano-ceramic composite	36
Figure 8: Flowchart representing different groups for microleakage testing	38
Figure 9: Cavity preparation for pulpotomy	40
Figure 10: Finished cavity	41
Figure 11: A Tofflemire matrix holder with 0.5 mm metal matrix strip was adapted to the tooth.....	42
Figure 12: ZOE paste filled the entire cavity	42
Figure 13: Tooth reduction for SSC preparation	46
Figure 14: Stainless steel crown cemented to the prepared tooth	47
Figure 15: Acid etch application.....	47
Figure 16: Total etch adhesive application	46
Figure 17: SDR application	47
Figure 18: Finishing and polishing	47
Figure 19: Self etch adhesive application.....	47
Figure 20: Nano-ceramic composite application	48
Figure 21: Completed 42 samples.....	49
Figure 22: Machine used for thermocycling of teeth.....	50
Figure 23: Tooth sectioning.....	54
Figure 24: Stereomicroscope	54
Figure 25: The illustration of microleakage grading scale used	55

Figure 26: Representative microscopic image showing dye penetration score 0(x35) from group 1.....	55
Figure 27: Representative microscopic image showing dye penetration score 0 (x35) from group 3 sub group 3a.....	57
Figure 28: Representative microscopic image showing dye penetration score 1 (x35) from group 2 sub group 2b	58
Figure 29: Representative microscopic image showing dye penetration score 2 (x35) from group 2 sub group 2a.....	54
Figure 30: Representative microscopic image showing dye penetration score 3 (x35) from group 3 sub group 3b	55
Figure 31: Representative microscopic image showing dye penetration score 4 (x35) from group 2 sub group 2a.....	55
Figure 32: Image of custom made split Teflon mold with strain gage in place ..	55
Figure 33: Light curing of composite placed in the mold.....	58
Figure 34: Setting for testing strain by strain gage	58
Figure 35: Column chart comparing marginal leakage scores means values between all groups.....	66
Figure 36: Stacked column chart of the frequency of distribution of marginal leakage scores for all groups as function of dye penetration scores (%).....	67
Figure 37: Column chart of distribution frequency of marginal leakage scores for group 1 as function of dye penetration scores (%)	68
Figure 38: Column chart of distribution frequency of marginal leakage scores of subgroup 2a as function of dye penetration scores(%)..	68
Figure39: Column chart of distribution frequency of marginal leakage scores for subgroup 2b as function of dye penetration scores (%).....	69
Figure 40: Column chart of distribution frequency of marginal leakage scores of subgroup 2a as function of dye penetration scores(%).....	69
Figure 41: Column chart of distribution frequency of marginal leakage scores for subgroup 3b as function of dye penetration scores (%).....	70

Figure 42: A column chart of polymerization shrinkage mean values between both groups	72
Figure 43: Linear chart showing polymerization shrinkage mean values as function of time for both groups.....	72

List of Abbreviations

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
cm ²	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 multi-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

Introduction

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 modalities, used in restoration of pulpotomized primary molars, including: Stainless steel crowns, Multi Increment Restorative composite resin, and Bulk Fill Flowable Restorative

Introduction

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

Review of Literature