Effect of different dentin substitute materials on fracture resistance of MOD, endodontically treated maxillary premolars. An in vitro study

Thesis submitted to Operative Dentistry Department, Faculty of Dentistry, Ain Shams University in the partial fulfillment of the requirements of Master Degree in Operative Dentistry

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2019

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Acknowledgment

First of all I would like to thank **God** Almighty for giving me the strength to accomplish this work.

I would like to express my deep gratitude to:

Dr. Omaima Hassan Ghallab Professor and Head of Operative Dentistry Department, Faculty of Dentistry, Ain Shams University for her valuable guidance, her efforts and help in this research, for her time and knowledge which she gave to me and lastly for her great morals, kindness and respect we learnt from her.

I would also like to express my deepest thanks and gratitude to **Dr. Mohammed Nasser** Lecturer, Operative Dentistry Department, Faculty of Dentistry, Ain Shams University, for his continuous support during preparation of this work.

I would like to thank all the **members of the Operative Dentistry Department** Ain Shams University, for their valuable help and co-operation.

Dedication

To my caring Mother for all her prayers,

To my Father for his unlimited support and effort,

…my wife for all her support, time and love.

My son Omar and my daughter Mariam for all happiness and lovely moments they offer to us

To all my family and my friends who stand beside me.

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Introduction

Fractures are more common in teeth after endodontic treatment due to decreased coronal and root dentin and loss of axial walls. One of the main factors of extraction of endodontically treated teeth is non-restorable fracture. Endodontically treated premolars have increased risk of fracture among all teeth. [1]Several techniques and materials have been used for restoring endodontically treated teeth including resin composite which considered the most preserving approach in restoring teeth especially in large cavities.[2]

Polymerization shrinkage of resin composites especially in large cavities reduces the clinical performance of the restoration. Polymerization shrinkage results in stresses in in restoration tooth interface and in the tooth structure. Such polymerization shrinkage stresses is unfavorable as it leads to deformation of tooth walls, cuspal deflection and enamel cracks.[3] Cuspal deflection leads to changes in the occlusion, cracks and tooth fracture. The cuspal deflection is affected by the shape and size of the cavity, polymerization shrinkage, placement technique, and the use of a flowable liner. Flexibility of the tooth increases as the size of the cavity increases. Also, large cavities require a greater bulk of composite material, which means more polymerization shrinkage stresses, thus more cuspal deflection. [4]

Beside layering technique another method to reduce the polymerization shrinkage stresses is application of flowable resin composite as an intermediate layer, which can absorb polymerization shrinkage stresses produced by the subsequent layer of resin composite with higher modulus of elasticity, so can reduce the stress at the tooth-filling interface.[5] The need for fast restoration process of deep cavities encouraged the new generation of flowable composites known as bulk fill flowable composites to appear in the