Effect of smear layer thickness and chlorhexidine application on shear bond strength of resin composite bonded to normal dentin utilizing one step self-etch adhesive

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

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B.D.S **(2009)**

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(2018)

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا إِنَّكَ أَنتَ الْعَلِيمُ الْحَكِيمُ

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ACKNOWLEDGMENT

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

I wish to express my greatest thanks and feeling of gratitude to ***Prof. Mokhtar Nagy Ibrahim,*** Professor of Operative Dentistry, Faculty of Dentistry, Ain Shams University, for his countless hours of reflecting, reading, encouraging, and most of all patience throughout the entire process.

I am extremely grateful to ***Dr. Omaima Hassan Ghallab,*** Associate Professor of Operative Dentistry Department, Faculty of Dentistry, Ain Shams University for her valuable suggestions and scientific supervision.

I wish to express my sincere thanks to ***Dr. Ahmed Ahmed Laithy Hassan***, Lecturer of Operative Dentistry, Faculty of Dentistry, Ain Shams University, for valuable guidance, encouragement and providing me with all the necessary facilities for the research.

DEDICATION

I am dedicating this thesis to ***Prof. Mokhtar Nagy*** who have meant and continue to mean so much to me. Although he is no longer of this world, his memories continue to regulate my life.

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To my mother, who continues to learn, grow and develop and who has been a source of encouragement and inspiration to me throughout my life, you have actively supported me in my determination to find and realize my potential.

I also dedicate this thesis to my friends who have supported me. I will always appreciate all they have done especially ***Dr. Hebatullah Mahmoud*** for support, encouragement and helpful suggestions, I will be forever thankful to you.

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Abbreviation	Refer to
BIS-EMA	Bisphenol a polyethylene glycol dietherdimethacrylate
BIS-GMA	Bisphenol a glycidyl methacrylate
CHX	Chlorhexidine
HEMA	Hydroxy ethylmethacrylate
MDP	Methacryloyloxydecyl dihydrogen phosphate
PEGDMA	Polyethylene glycol dimethacrylate
Sic	Silicon carbide paper
SL	Smear layer
TEGDMA	Triethylene glycol dimethacrylate
UDMA	Urethane dimethacrylate
μTBS	Micro Tensile Bond Strength

INTRODUCTION

Bonding to dentin is considered one of the major challenges due to the structural variations of normal dentin.[1] Cutting in dentin impart meanwhile quality of roughness, which may alter dentin wetness and permeability. The degree of surface roughness varies according to the type of cutting tools used, such as carbide burs, diamond abrasives points and air abrasive cutting equipment's. [2]

Smear layer is generated from dentin cutting during cavity preparation by rotary instruments acting as a pathway of microleakage. To obtain strong adhesive bonding of the restorative materials to dentin and enamel, smear layer must be removed or altered. This could be done by acids or chelating compounds, however, removal and/or modification of smear layer and superficial selective demineralization of dentin, followed by penetration and polymerization of adhesive monomers result in hybrid layer formation.[3]

The primary way that dentists treat the clinical signs of infection caused by caries is through the surgical removal of the diseased parts of the tooth structure and closing the area with an inert filling material. However, still, no criteria are available to judge if the carious tissue is completely removed. During preparation, the excavation of the colored and softened dentin cannot remove all the bacteria from the cavity.[4]

Failure to mechanically remove the infected tooth structure and achieve complete sterilization of the cavity preparation can lead to micro-leakage, increased pulp sensitivity, pulpal inflammation, and secondary caries thus, necessitating replacement of the restoration.[5]

After removal of the carious dentin, it is important to eliminate any remaining bacteria that may be present on the cavity walls, in the smear layer, at the enamel-dentin junction, or in the dentinal tubules.[6] An antibacterial