بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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شبكة المعلومات الجامعية

التوثيق الإلكتروني والميكروفيلم

جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

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MONA MAGHRABY

Effect of Different Treatment Modalities on Surface Roughness and Shear Bond Strength of Veneering Composite to Polyetheretherketone-based Core Materials

-An in vitro study-

A Thesis submitted for partial fulfillment of requirements of the Master's degree of science in fixed prosthodontics, crown and bridge department, Faculty of Dentistry, Ain shams university.

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2020

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Acknowledgment

I would like to show my deep appreciation and respect to my supervisor, **Dr Marwa Wahsh,** Assistant Professor at the Fixed Prosthodontics department, Faculty of Dentistry, Ain Shams University, for her trust, warm encouragement, insightful guidance and valuable advises and suggestions that were crucial for the completion of this research.

My sincerest gratitude to **Dr Doaa Taha,** Lecturer of Fixed Prosthodontics, Faculty of Dentistry Ain Shams University for her endless support, patience, care and efforts. I'm deeply appreciative of her unwavering devotion and ingenious educational remarks provided for the execution of this work.

I would like to extend my appreciation and respect *to* ***Dr. Tarek Salah Morsi***, Professor and Head of Fixed Prosthodontic Department, Faculty of Dentistry, Ain Shams University.

Last but not least, I wish to express my sincere thanks to all my colleagues and staff members who offered valuable support and help along the way.

Dedication

First and foremost, I'd like to express my deepest gratitude to **ALLAH**, who gave me constant strength, faith and persistence to complete this study successfully.

I would like to dedicate this to my parents for their unwavering love and support in everything I do. To my sister, **Fadila**, you are the one I truly look up to.

And last but not least to my close friends, my support system, always by my side, cheering me on.

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Introduction

High performance polymer materials are progressively used in the fabrication of restorations using the computer aided design/computer-aided (CAD/CAM) and they have been suggested as optimal alternative to ceramics due to their favorable properties.[1] Resin based materials have enhanced properties: better stress distribution, greater fracture resistance and less wear of the opposing teeth. All these assets make them an alternative choice to glass ceramics.[2]

Polyetheretherketone (PEEK) was proposed as a valuable material for dental applications due to its biocompatibility, better mechanical properties and resistance to organic and inorganic chemicals.
Its radiolucency makes it compatible with imaging techniques.

Polyetheretherketone (PEEK) is a methacrylate-free, high-performance thermoplastic polymer consisting of aromatic benzene molecules, which are connected alternately by functional ether or ketone groups. [2] PEEK's use in dentistry is not limited to manufacturing interim abutments, implant-supported bars, and dental implants. It may also be considered as a material for fixed partial dentures (FPDs) due to the material's improved mechanical properties.[4]

However, the material's optical properties and low translucency are the major concerns, excluding its use as a monolithic restoration. Thus additional veneering resin is needed for PEEK-based restorations.

Nevertheless, PEEK's chemically inert behavior indicates a possible bonding problem at the PEEK core/veneering resin interface.[5]

In order to investigate the bond strength between PEEK frameworks and resin composites, various studies have been carried out. Largely, two approaches to achieve a strong bonding between resin composite and PEEK have been the focus of recent studies: the alteration of the PEEK surface and conditioning with an adhesive system to enable the chemical interactions.[9]

A variety of surface treatments have been proposed such as air abrasion, silica coating, etching the surface with sulfuric acid or piranha.

Laser irradiation has been suggested as an alternative method for surface treatment of PEEK.[12] Laser has been used to modify the PEEK surface for increasing roughness and wettability. Er:YAG laser is a generally used laser method for surface modification of dental materials. However, there is no consensus in the literature about the laser parameters for optimal bond strength of resin-based materials.[12]

Surface treatments arrange the PEEK surface for micromechanical bonding to resin; however, additional adhesives are essential in establishing a strong bond between PEEK and resin. Studies showed that the combination of an adhesive system with surface treatments might enhance the bond strength because mechanical treatments provide more functional groups to which the components of adhesives can bond.

The ongoing goal of several studies has been to achieve a clinically acceptable long term adhesion between PEEK and veneering composite.