بسم الله الرحمن الرحيم

MONA MAGHRABY

شبكة المعلومات الجامعية

التوثيق الالكتروني والميكروفيلم

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التوثيق الإلكتروني والميكروفيلم

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MONA MAGHRABY

The Effect of Different Silica Coating Techniques on Bond Strength of Resin Cement to Ultra-translucent Zirconia

Thesis

Submitted for the Partial Fulfillment of the Master Degree Requirements in Fixed Prosthodontics, Faculty of Dentistry, Ain Shams University

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Tijan Youssef Abouzaid

Dedication

This work is dedicated to …

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List of Contents

List of Tables

Table No.	Title	Page No.

List of Figures

List of Figures (CONT....)

List of Figures (CONT....)

INTRODUCTION

Many all-ceramic systems have been introduced for the general practitioner with various compositions, properties and indications. The introduction of computer-aided–design and computer aided manufacturing (CAD/CAM) technology has provided us with high strength ceramic like zirconia. Zirconia or zirconium dioxide (ZrO_2) is a modified yttria (Y_2O_3) tetragonal polycrystal (Y-TZP). Yttria was added to stabilize the crystal structure transformation during firing at high temperature and to improve the physical properties of zirconia. [(1)]

Meanwhile, there is a major complication of veneering zirconia which is the chipping (cohesive failure) or cracking. So, as an alternative, monolithic crowns or full anatomic crowns made from ultra-translucent zirconia were introduced. Ultra-translucent zirconia has a significantly higher degree of translucency, thus providing greatly improved esthetics. The higher translucency is achieved by slight changes of the yttria (Y_2O_3) content (5 mol% or more instead of the conventional 3 mol %), which is used to stabilize the tetragonal zirconia phase, causing a higher amount of cubic phase particles. [(2)]

The dental team faces questions and decisions to choose the appropriate system and means of cementation. Several ceramic types demand different surface treatments and cementation procedures that will contribute to long-lasting restorations. Some zirconia restorations should be cemented with resin luting agents. These include zirconia restorations with limited mechanical retention that depends on resin bonding like resin-bonded fixed partial prostheses, bonded inlays/onlays, laminate veneers and crowns to teeth with short clinical crowns. So, the success of resin bonding

depends on the proper selection of resin cements and adequate treatment of tooth and restoration bonding surfaces. [1], [2]

The integrity and longevity of the tooth-cement ceramic interface are considered important factors for decreasing the risk of fracture of the restoration. The bond is usually created via two mechanisms: micromechanical attachment by air particle abrasion, silica coating or etching (hydrofluoric acid or phosphoric acid), and chemical bonding by silane coupling agent. [3]

The surface conditioning methods of the ceramic and the type of the luting cements have been proven to have a great influence on the bond strength of all ceramic restorations. However, the composition and the physical properties of zirconia differ from silica-based ceramics because it is a non-silicate ceramic. So, it requires alternative bonding techniques to achieve a strong, long term and durable bond. Recently, many techniques are being used clinically to address this problem and other approaches are under investigation. [4]

Many silica coating techniques have been performed to improve bonding of zirconia as tribochemical silica coating technique, application of sodium silicate solution and Tetraethyl orthosilicate (TEOS) sol-gel technique. In the oral conditions, saliva and repeated thermal changes continuously degrade and hydrolyze the ceramic-resin interface. Hence, the current study was designed to assess the effect of different surface treatments on the morphology topography and elemental composition of ultra-translucent zirconia. In addition to the latter's bond strength to resin cement. [3], [4], [5]