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 Two Delayed Dentin Sealing Protocols versus Immediate Dentin Sealing on Tensile Bond Strength of Two Ceramic Restoration Materials

-A Thesis-

Submitted for 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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Dedication

This work is dedicated to …

My beloved parents, to whom I owe everything I ever did in my life and will achieve.

My dear brothers for always being there for me.

And my fiancé for his continuous support and encouragement.

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INTRODUCTION

The use of resin luting cements has increased in recent years. Resin cements provide better retention, esthetics and greater resistance to dissolution over conventional cements. They are essential for the cementation of indirect adhesive restorations such as inlays, onlays, veneers and all-ceramic crowns in providing strength to the bonded assembly[1]. Resin luting cements are, however, technique sensitive and their use demands a careful implementation of a series of steps including the application of enamel and dentin adhesives [1].

Cementation is a process dependent on several factors, such as the type of substrate, type of adhesive substance(s), humidity of the environment, and operator's ability in performing the bonding procedure. With regard to the dental substrates, adhesive procedures are usually performed to achieve bond to dental enamel and dentin[2]. Since the advent of adhesive dentistry, the composition of the materials and the clinical methods used for adhesion has changed[3].

Most prosthodontic adhesive restorations require a provisionalization phase. A considerable decrease in bond strength after cementation has been identified with eugenol-free formulations. This has been related to the obliteration of dentinal tubules with provisional material residues which avoid resin tag formation. Therefore, elimination of provisional luting agent (PLA) from the tooth surface is crucial. There have been different attempts to accomplish complete removal of PLA. Residual PLA was evident on dentin surfaces after cleaning with pumice and water[4].

Applying dental adhesive before impression making, called immediate dentin sealing (IDS) technique. It provides adhesion to a freshly cut dentin, which is suggested to be ideal for bonding. When the adhesive is applied only at the moment of definitive cementation, the approach is known as delayed dentin sealing (DDS)[5].

The primary advantage of immediate dentin sealing technique is to protect the tooth from the consequences of micro leakage by sealing the dentininal tubules that are vulnerable to bacterial invasion immediately after completion of the preparation [6]. Sealing of the dentinal tubules also reduces sensitivity by preventing hydraulic fluid flow within the dentinal tubules, which is responsible for post-operative sensitivity, thus improving patient comfort. It has been shown that cements can penetrate the dentinal tubules before the final setting and microorganisms and their by-products can also penetrate into the patent dental tubules post- operatively[5].

Therefore, the early sealing of dentininal tubules also may prevent collapsing of collagen fibrils and occlusion of dentinal tubules by provisional luting agent remnants. Moreover, by using adhesive containing fillers in IDS, more stable and homogeneous dentin-resin hybrid layer was acquired[5].

The clinical success of ceramic indirect restorations is attributed to the reliable bond between adhesive cementing systems (resin cements/bonding agents) and mineralized dental tissues[7]. However, as light intensity reaching the resin cement is strongly attenuated by either distance from the light source, or from the absorbing characteristics through the indirect restorative material[8], dual-cured resin materials have been developed.

Resin adhesives and resin cements are found in self-cure, light-cure and dual cure formulations. The degree of polymerization plays a vital role in determining the ultimate biological, physical and mechanical properties of the material. It is significant to establish a strong bond between restoration and dentin [(9)].

A significant increase in bond strength has been suggested when the adhesive was cured prior to application of the resin cement in indirect restorations. However, if the thickness of the polymerized adhesive layer is high, either generally or in localized areas, this adhesive pre-curing step could prevent complete seating of the indirect restoration [(1)]

Resin luting agent should provide bond strengths need to be sufficient to resist stress generated by its polymerization shrinkage. Bond strengths also depend on the adhesive capacity to various dental substrates. Adhesive capacity is normally evaluated *in vitro* by shear and tensile tests[(10)].

This study was performed to evaluate the interfacial quality of the indirect ceramic restorations and dentin surface sealed with different dentin sealing protocols.

REVIEW OF LITERATURE

1. Indirect restorations:

Over the last few decades, the development of new materials and advances in restorative techniques in adhesive dentistry have made possible reinforcement of weakened dental structure[11]. The strengthening effects of adhesive restorations have been examined in several studies. Teeth with wide mesio-occlusodistal (MOD) cavities restored with amalgam have frequently shown cusp failure due to the inability of this material to strengthen weakened cusps[12]. Bell and others showed that large MOD cavities restored with amalgam frequently develop cusp failure because cracks are propagated under constant functional occlusal forces. Thus, teeth with large cavities are usually restored with onlays instead of inlays[13], because when a significant amount of the tooth structure is lost, there is an increase in the fragility and susceptibility to fracture of the cusps[14].

Reinforcing effect of adhesive restorations have long been known. Conservative bonded restorations are more and more preferred to traditional metal restorations [15].

Upon a detailed biomechanical analysis of the remaining tooth structure, the tooth should be prepared minimally invasively, preserving as much sound tissue as possible, while removing any tooth parts with doubtful stability. In this sense, thin unsupported cusps must be reduced, as this will increase the durability of the restoration[16]. The most difficult steps in the fabrication of large direct posterior composite restorations are the creation of a correct form with good occlusal anatomy as well as of well-