



شبكة المعلومات الجامعية  
التوثيق الإلكتروني والميكروفيلم

# بسم الله الرحمن الرحيم



**HANAA ALY**



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# جامعة عين شمس التوثيق الإلكتروني والميكروفيلم

## قسم

نقسم بالله العظيم أن المادة التي تم توثيقها وتسجيلها  
علي هذه الأقراص المدمجة قد أعدت دون أية تغييرات



## يجب أن

تحفظ هذه الأقراص المدمجة بعيدا عن الغبار



**HANAA ALY**

**Assessment of tensile bond strength of two ceramic  
restoration materials comparing two immediate dentin  
sealing protocols versus delayed dentin sealing  
-An in vitro study-**

A Thesis submitted for partial fulfillment of requirements of  
the Master's degree of science in fixed prosthodontics, crown  
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## List of Abbreviations

<b>Abb.</b>	<b>Full term</b>
10-MDP .....	10-methacryloyloxydecyl dihydrogen phosphate
4-META.....	4-methacryloxyethyl trimellitate anhydrate
CAD/CAM.....	Computer aided manufacturing/ computer aided design
DBA .....	Dentin bonding agent
DDS .....	Delayed dentin sealing
FPD .....	Fixed-partial-dentures
HF .....	Hydrofluoric
IDS .....	Immediate dentin sealing
IRC.....	Indirect resin composites
ISO .....	International Organization for Standardization
MOD .....	Mesio-occlusodistal
MRS .....	Micro-Raman Spectroscopy
PICN .....	Polymer-infiltrated-ceramic-network material
UV.....	Ultraviolet

# 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. 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.<sup>1</sup>

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. Regarding the dental substrates, adhesive procedures are usually performed to achieve bond to dental enamel and dentin. Since the advent of adhesive dentistry, the composition of the materials and the clinical methods used for adhesion has changed.<sup>2</sup>

Most prosthodontics 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.<sup>3</sup>

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## Introduction

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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)<sup>4</sup>.

The primary advantage of immediate dentin sealing technique is to protect the tooth from the consequences of micro leakage by sealing the dentinal tubules that are vulnerable to bacterial invasion immediately after completion of the preparation. 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<sup>4</sup>.

Therefore, the early sealing of dentinal 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<sup>4</sup>.

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.<sup>5</sup>

Different variables have been studied to evaluate their influence on the outcome of this step including different ceramic materials, various

ways of sealed dentin refreshment, type of bonding agent, dentin depth, interaction with provisional restoration, type of impression material and many other variables<sup>6</sup>

Different conditioning methods were found to influence the bond strength of ceramic restorations regardless of the sealing method used.

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. IDS and DDS:

Successful adhesion to enamel has been achieved with relative ease. On the contrary, the development of predictable bonding to dentin has been more problematic. Only in the past decade have dentin bonding agents produced results that approach those of enamel bonding and have achieved a predictable level of clinical success with direct resin composite restorations<sup>7</sup>.

As earlier bonding agents achieved lower bond strengths when applied to dentin compared to enamel, the presence of dentin in a significant percentage of the luting interface was one of the main issues that made dentists skeptical about placement of indirect bonded restorations in the posterior region. The dentin-adhesive resin interface of indirect restorations has also been thoroughly investigated, and different luting procedures have been proposed.<sup>8</sup>

Management of the dental tissues between the preparation and provisionalization phase of restorative treatment plays a pivotal role in the success of indirect bonded restorations. In the development of these restorations, the exposed vital dentin immediately after tooth preparation is susceptible to insult from bacterial infiltration and micro-leakage during the provisionalization phase. Bacterial and fluid penetration through the exposed dentinal tubules can result in colonization of microorganisms, post-operative sensitivity, and the potential for subsequent irritation of the pulp.<sup>9</sup>