The Effect of The Reaction Layer Formed During The Pressing Technique on Microtensile Bond Strength of Resin Cement to Two Lithium Disilicate Materials

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بسم الله الرحمن الرحيم

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

صدق الله العظيم

(آيه٣٢ سورة البقره)

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Dedication

I would like to dedicate this work to my parents and beloved wife for their support.

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Introduction

Esthetic dentistry is concerned with restoring the natural teeth appearance by direct and indirect means of restoration. It is a very challenging and demanding field of dental science.

In the past few years, esthetic dentistry has witnessed advancement in both dental materials and techniques. The dental ceramics is used routinely in modern dental practices. This is due to the great qualities it offers as a dental restorative material in terms of esthetics, physical and mechanical properties.

Glass ceramics are highly translucent because of the glassy phase present at the grain boundary that forms non-porous structure and the crystals that reduce light scattering. They have higher crystalline content than powder porcelain so they have higher mechanical properties and reduce crack formation. They are durable and can be bonded to tooth structure by resin cements. Their fabrication is easier than that of the traditional ceramics. They don’t shrink much after firing. Then, two generations of pressable ceramics were introduced which are *Leucite reinforced glass ceramics* (IPS Empress 1) and *Lithium disilicate glass ceramic* (IPS Empress 2).

Lithium disilicate glass ceramics commonly used type of dental ceramics nowadays in dental practice is used to restore anterior and posterior teeth. It provides high esthetic properties for anterior teeth and high physical and mechanical properties for posterior teeth restorations.

Introduction

The 1st generation is the *IPS Empress2* which was introduced as SiO_2-Li_2O by Ivoclar Vivadent (AG, Schaan, Liechtenstein). The 2nd generation that was also launched by Ivoclar Vivadent is the *IPS e.max*, in which the translucency and the physical properties were improved through different firing process

Nowadays, there are other lithium disilicate ceramics in the market as Rosetta SP press and Rosetta SM .

Lithium disilicate materials are supplied in two forms, pressing type and milling CAD/CAM type. The pressed lithium disilicate ceramics enable ceramic restorations with thin marginal thickness and a slight higher strength compared to milled ceramics .This is considered a huge advantage for the fabrication of very thin types of restorations.

Dental ceramics are used in wide range of fixed dental restorations such as, laminate veneers, inalys, onlays, vonlays, endocrowns, crowneers, crowns and bridges .The smile makeover and dental smile designs required thin type of dental restorations. These restorations may require a minimal or no reductions to the natural tooth structure.

These restorations depend on the adhesiveness to the natural tooth structure therefore dental markets supplies many types of adhesive materials such as light cure resin cement, dual cure resin cement and self cure resin cement.

Unfortunately, the pressing type technique is accompanied by a phenomenon known as the reaction layer. Some manufacturers claimed that their lithium disilicate glass ceramics has a least reaction layer.

Review of Literature

It's out of discussion that ceramic restorations are the treatment of choice in cases that requires esthetic considerations. This led to a continuous modification in their composition, microstructure and processing in order to achieve a satisfactory level of clinical performance[1].

Dental Ceramics

In the past decades, ceramic materials improvement has paced significantly and their usage have been more abundant. It was due to their biological compatibility, translucency, fluorescence and chemical stability. They also have a coefficient of thermo-linear expansion close to dental composition, as well as compression and abrasion resistance. These properties enable it to perfectly mimic the appearance of natural teeth.[2].

Several definitions have been considered to describe and define ceramics. The traditional definition refers to the term *ceramic* as any product made from a nonmetallic inorganic material usually by firing at a high temperature to achieve desirable properties. The more limiting term *porcelain* points to a specific compositional range of ceramic materials originally made by mixing kaolin (hydrated aluminosilicate), quartz (silica), in addition to feldspars (potassium and sodium aluminosilicates), and firing at high temperature[3 4 5] . On the other hand, the 2013 version of the ADA Code on Dental Procedures and Nomenclature[6] defines the term porcelain/ceramic as pressed, fired, polished, or milled materials containing predominantly inorganic