Assessment of Color Reproduction and Translucency of Monolithic All Ceramic Crowns of Three Margin Configurations using Two Different Cements

Thesis

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Dedication

I lovingly dedicate this thesis to

My Dear Parents

Bassily & Iman

&

My beloved Wife

Barbara

For their endless

Love, Support and

Encouragement

Acknowledgment

First of all, I would like to thank **God** for this accomplishment.

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Introduction

The ultimate goal of the restorative dentist is to restore a missing tooth structure to its natural form, function, and appearance at an acceptable level so as to positively impact the patient's self-esteem.

Ceramics have been advocated as the material of choice for superior esthetics and for matching the natural dentition. Clinically, it is important that ceramic restorations reproduce the translucency and color of the natural teeth as well as the size, shape and surface texture. (1)

In order to achieve a favorable shade match of a restoration, three major elements of color; hue, chroma, and value have been conventionally considered. Moreover, a fourth element, translucency has become an important factor for the clinical selection of restorative materials. Translucency is the property of a substance that permits the passage of light, but also disperses the light. The translucency of a restorative material provides an added “lifelike” vitality and a natural appearance to the completed restoration. (2)

The popularity of metal-ceramic restorations is largely due to predictable strength achieved with reasonable esthetics. The drawback of such restorations is increased light reflectivity because of the opaque porcelain needed to mask the metal substrate. All-ceramic materials offer an esthetic advantage as they can be made to match natural tooth structure accurately in terms of color, surface texture, and translucency. (3; 4)

Computer aided design / computer aided manufacture (CAD/CAM) technology has been used to fabricate infrastructures of all-ceramic restorations such as lithium disilicate and zirconia based ceramic materials. Zirconia has many advantages such as biocompatibility, low bacterial adhesion, traditional cementation and perfect mechanical properties but its main disadvantage is the high degree of crystalline content and so it appears opaque, that is why zirconia cores always need to be veneered with a more translucent material. (5)

Recently, polycrystalline translucent zirconia has attracted increasing attention because of its unique combination of mechanical and optical properties. Nano-crystalline materials are expected to achieve better translucency due to the decrease in light scattering. So more investigations are needed regarding the ability of accurate color reproduction of these monolithic materials. (6)

<u>Review of Literature</u>

I. <u>Color and Translucency</u>

A. <u>Color</u>

The color of an object is a complex result of its surface properties, its transmission properties, and its emission properties, all of which contribute to the mix of wavelengths in the light leaving the surface of the object. The color of an object depends on both the physics of the object in its environment and the characteristics of the perceiving eye and brain. Perception of color involves the participation of three factors that can effectively exist: (7)

The Object to be observed may have different physical behaviors in relation to the incident light. Some objects not only reflect light, but also transmit light or emit light themselves, which also contribute to the color.

The Observer can be visual or instrumental. Changes in color perception may occur based on age, duration of exposure of the eye, fatigue or illness related to color, such as color blindness.

Light source or illuminant, which may be a natural or artificial light source. According to its origin, light can change the perceived color of an object. When light interacts with a tooth, it may be reflected, scattered, or transmitted concurrent with the scattering of photons. The shade of dentin (the primary source of tooth color), enamel structure (thickness and translucency), tooth dimension, and surface texture