Evaluation Of Some Optical Properties and Color Reproduction Of Translucent Zirconium Oxide Ceramic Before and After Aging Using Three Different Shades Of Resin Cement.

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بسم الله الرحمن الرحيم

{وقالوا سبحانك لا علم لنا إلا ما
علمتنا انك أنت العليم الحكيم}

صدق الله العظيم

سورة البقرة {32}

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To the soul of my father

To my daughter

To my mother, my wife, and my brother

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Introduction

INTRODUCTION

In the last thirty years there was dramatical increase in patients' demands for superior esthetics and naturally appearing restorations. The demand to achieve a natural looking restoration is one of the most challenging aspects in dentistry. Successful aesthetic restorations require the integration of several factors as the individual's perception of color, the light source used for color evaluation, the surface and structural characteristics of both the tooth and the restorative materials used and knowledge of some basic principles of color perception.[1]

The apparent color of natural teeth is the result of the reflectance from dentin modified by absorption, scattering and thickness of enamel. Therefore, understanding of the optical properties of teeth is imperative for accurate and consistent color reproduction [2]. Color and its elements such as hue, value, chroma, translucency, opacity, light transmission, scattering, metamerism and fluorescence influence the esthetics of a dental restoration. The eye is able to distinguish easily between a natural tooth and an artificial one, even when there are minute differences in color and translucency where color and translucency are highly correlated properties of a ceramic crown.[3, 4]

Color matching of teeth is recorded through visual shade matching using commercially available shade guides or through instrumental color analysis. Commercially available shade guides contain a limited selection of colors when compared to those found in natural teeth and visual shade matching is affected by many external variables. Conversely, color measuring devices are efficacious to quantify natural tooth color and allow communication between technicians and dentists to be more uniform and accurate.[5, 6]

Dental ceramics with their properties of wear resistance, strength, toughness and esthetics are considered the preferred material to replace natural tooth tissue in prosthetic dentistry.[1] To meet the increased demands of patients and dentists for highly esthetic, biocompatible, and long-lasting restorations, several types of all ceramic systems have been developed.[7]

Leucite-based glass ceramics have generated considerable interest given their adequate strength properties, integration with the tooth structure from the bonding mechanism, and excellent esthetic features. The color of the heat-pressed ceramic restoration can be modified to match that of the natural tooth. Currently, a machinable version of the leucite-based ceramic blocks with different levels of translucency and shade are in use.[8]

Because of advances in computer aided design (CAD) and computer aided manufacturing (CAM) technologies; the high-strength ceramic systems have become increasingly popular. Zirconia, specifically yttria-containing tetragonal zirconia polycrystal (Y-TZP), with unsurpassed mechanical properties, has had its clinical applications expanded from single crowns and short-span FDPs to multiunit and full arch zirconia frameworks. As zirconia is relatively opaque and monochromatic in color, a layer of veneering ceramic is built on it to provide the restoration with the required esthetics. [9, 10]

In clinical service, the most frequent failure is the chipping of the veneer, while the high-strength zirconia substructure is mostly not affected.[11, 12] In specific clinical situations, such as when the occlusal or palatal space is limited or in cases where a patient's Para-functional activity (e.g., bruxism) may contraindicate this veneering application the use of unveneered zirconia ceramic seems to be an option for all-ceramic restorations.[13]

Recently nano-zirconia was introduced which allows the use of full contour zirconia restorations without the need for any veneering ceramic. These restorations were able to attract increasing attention because of their unique combination of optical and mechanical properties.[14] However its optical properties and color reproducibility remain in question.