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Effect of previsualization technique using visual eye modeling liquid on different types of veneering porcelain

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Abstract

Background: A new liquid binder was introduced to match the reflective index of the presintered porcelain powder; its aim is to previsualize the built up porcelain before firing making it easier for the ceramist to judge the precision of the shade matching.

Objective: This in-vitro study was conducted to view the effect of the visual eyes modeling liquid on: Color; Translucency and Biaxial flexure strength. On different types of veneering porcelain; Porcelain fused to metal, Porcelain fused to lithium disilicate and Feldspathic porcelain.

Methods:42 disc were prepared with measurements of 15diameter and 1.5mm thickness for the different veneering materials. Both with and without visual eyes.

Results: for translucency measurement; regardless of the ceramic type manufacture liquid showed higher translucency than visual eyes. While both color and flexure strength were the same. **Conclusion:** visual eyes modeling liquid affect the translucency but has no effect on either color or flexure strength,

Introduction and Review of literature

Shade communication and shade reproduction for a single anterior restoration is critical; because it's usually a mix of several shades and different degrees of translucencies. A new liquid binder was introduced to match the reflective index of the presintered porcelain powder; its aim is to previsualize the built up porcelain before firing making it easier for the ceramist to judge the precision of the shade matching.

Shade is an important factor because the color of the restoration shouldn't be distinguished from the natural tooth (1). A simple color difference may not be noticeable in multiunit cases but can never pass unnoticed in a single anterior restoration (2). Shade selection in the dental practice has always been an important and difficult task. Shades could be taken using visual and instrumental methods. Visual method has always been the most popular method, specially using the vita classic shade guide. Although there are many shade guides in the dental market. Matching these stock tabs with natural teeth is a challenge due to different factors like subjectivity, inter-batch shade variation, improper shade range distribution, and lack of standardization of different manufactures. Some authors prefer instrumental shade selection such as colorimeter, spectrophotometer and digital cameras with software. These instrumental methods although stable but they are not of high accuracy (3) **Edwin J.Riley et al in 1986** (4) stated that the clinician is faced with an "apples to oranges" comparison that prevent successful transition from dentist shade determination to technician fabrication. The first organic liquid binder was introduced 1985 in part of U.S. patent application Ser. No. 731,925 filled May 1985.it was invented to be used with porcelain powder specially to prepare heat sintered dental porcelain .

Visual eye is an organic optical liquid which can be used with any dental ceramic, of any coefficient of thermal expansion or firing temperature. It allow previsualization of color of the converted dental ceramic. It is a nontoxic, nonhazardous liquid, manufactured for external use only. (5)

Aim of the study:

This in-vitro study was conducted to view the effect of the visual eyes modeling liquid on different types of veneering porcelain; The null hypothesis of the present study was the previsualization technique would not affect the color, translucency and the biaxial flexure strength of the different types of veneering porcelain.

Material and Methods

In this study, three different ceramic systems were tested (porcelain fused to metal discs, layered IPS e.max press and feldspathic porcelain discs)

A total of 42 discs were fabricated for this study.

First fabrication of then veneering base was done. For the porcelain fused to metal 0.5 mm wax discs were prepared using Teflon molds and the casted. For the emax samples also 0.5mm wax discs were prepared to be pressed. Feldspathic refractory plates were prepared and degassed to support the feldspathic porcelain.

Second step was to prepare the porcelain to receive the visual eyes modeling liquid.

The red and blue dye of the dentin and enamel powder should be removed. Using a shallow tray an adequate amount of the dry ceramic powder is added and inserted in the furnace; the firing program(**Figure 1**) should be created according to each porcelain material.

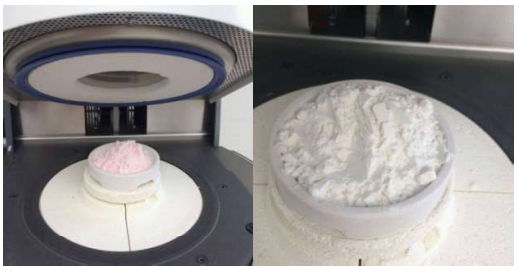

Figure 1: removing the food dye from the ceramic powder

Third step is Mixing and Firing the visual eyes with the ceramic powder by placing a small quantity of the ceramic powder and add visual eyes in a ratio of 15 drops per 1gm, mix with a spatula very well and absorb excess moisture with facial tissue. Apply mixture directly to the prepared sample.

The final step in preparing the samples is veneering stage**;** Every group of the porcelain fused to metal, IPS e .max and feldspathic was divided into two groups, layering with manufacture liquid and layering with visual eyes liquid. And veneered using different thickness Teflon molds(**figure2**) 1mm and 1.5. Thickness were checked using a caliber and finally polished and glazed.

Color and translucency measurement was done using a spectrophotometer; The apparatus used is a-Vis-NIR spectrophotometers manufactured according to a quality management system certified to ISO 9001. The biaxial flexure strength was done for the e.max and feldspathic samples.

This was done using piston on three balls technique in an Instron testing machine model 3345 England according to ISO 6872 specification for testing ceramic materials and data recorded using computer software bluehill version 3.3.

Results

Regardless of ceramic type; manufacturer's liquid showed statistically significantly higher mean TP than visual eye liquid.

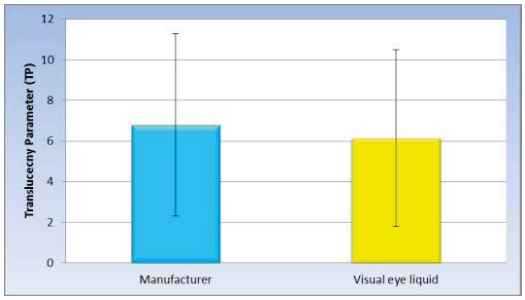

Figure (2). Bar chart representing mean and standard deviation values for TP of the two liquid types regardless of ceramic type

Regardless of ceramic type; there was no statistically significant difference between mean ΔE of manufacturer's liquid and visual eye liquid.

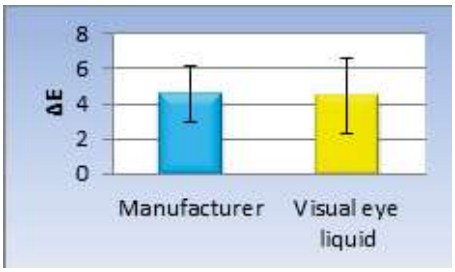

Figure (3). Bar chart representing mean and standard deviation values for ΔE of the two liquid types regardless of ceramic type

Regardless of ceramic type; there was no statistically significant difference between mean biaxial flexural strength of manufacturer's liquid and visual eye liquid.

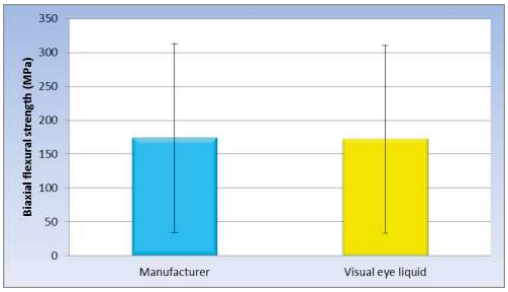

Figure (4). Bar chart representing mean and standard deviation values for biaxial flexural strength of the two liquid types regardless of ceramic type

Discussion

The results support the null hypothesis of this study because no signicant difference between the color, translucency and strength of the visual eyes samples with the manufacture liquid samples.

Comparison in translucency parameters between the different liquids (manufacture liquid and visual eyes liquid) for both porcelain fused to metal specimens and the emax specimens; the results showed that regardless of the ceramic type the manufacture liquid groups showed statistically significant higher mean of translucency than the visual eyes group. This may be because generally, the liquid binder has a refractive index which varies from about 1.4 to 1.6 and more typically around 1.49 to 1.56, such as 1.49 to 1.51. Thus, an individual organic liquid used with the present commercial dental powders may be employed where the liquid provides for the right index of refraction to match that of the porcelain powder to be employed or more commonly a combination of organic liquids is employed and a wide variety of organic liquids may be used in various miscible proportions.

Conclusion

Within the limitations of this study, the following conclusions were drawn:

Using the visual eyes modeling liquid affect the translucency of the veneering porcelain within limits

Using the visual eyes modeling liquid does not affect the color of the veneering porcelain.

Using the visual eyes modeling liquid does not affect the flexure strength of the veneering porcelain.

References

1. E.Klemetti, A.M.Matela, P.Haag,M. Kononen.Shade selection performed by novice dental professionals and colorimeter. Journal of oral rehabilitation 2006;33:31-35.

2. Aki Yoshida. All ceramic restorations :Material selection and opacity control for esthetically superior results. Quintessence of dental technology 2007;87-99.

3. Sascha Hein, Javier Tapia and Panaghiotis Bazos. eLABor:a new approach to digital shade management. The international journal of esthetic dentistry (vol 12) 2017;187-202.

4. Edwin J. Riley, Ian R. Sanderson and Ralph B. Sozio. Shade determination , communication and realization :a novel approach.Quintessence International (vol 17), 1986; 739-744.

5. Visual eyes modeling liquid. Emulation. User Manual.