

## Case Report

# Rejuvenating Aesthetics by Mixing Different Ceramic Stains

Nayar Islam, Devendra Chopra, Arvind Tripathi, Sumit Kumar Mishra

### ABSTRACT

The replacement of natural teeth, especially with single-tooth porcelain bonded to metal restorations of truly satisfactory esthetics, represents a challenge. Insertion of porcelain bonded to the metal restoration that not only possesses superior adaptation and compatible occlusion but also excels esthetically is the most satisfying events in prosthetic dentistry. Replication of natural tooth color and shade using stains is a creative approach that helps to conceal the color and opacity that result from the metal framework. The use of stains is a method that expands the potential of fabricating a restoration with more natural color and shade, which blends with natural dentition.

**Keywords:** Aesthetic, Ceramic Stains, Porcelain fused to metal, Grid chart

### INTRODUCTION

According to Glossary of Prosthodontics Terms, Esthetics is defined as 'the theory and philosophy that deal with beauty and the beautiful, especially concerning the dental restoration, as achieved through its form and color'. But Achieving symmetry of shape, color, value, texture, and translucency can be a challenging task. The metal-ceramic crown is one of the most popular restorations since it combines good esthetics with adequate strength, accurate fit, and long-term survival.<sup>[1]</sup> Esthetic problems with this type of restoration are related to the opaque porcelain layer used to mask the dark color and opacity of the underlying metal framework.<sup>[2]</sup> Proper soft tissue control, tooth preparation, a good understanding of materials and their application and clear communication with a skilled ceramist are necessary to achieve a predictable esthetic

outcome. Yet with meticulous design and exacting fabrication procedures with the use of different stains, optimal aesthetics can be achieved with a PFM crown.

### CASE REPORT

A 21-year old male reported to the Department of Prosthodontics with the complaint of abraded central incisors and discoloration & spacing with the same (Fig. 1). On further inception, no major systemic diseases or drug allergies were reported. The dental history revealed that the patient got his maxillary right and left central incisor fractured ten years back which were endodontically treated. An IOPA x-ray of maxillary central incisors reveals no periapical radiolucency about any of the teeth. Clinical examination showed the deposition of plaque and staining of teeth. During the treatment planning session, the patient was given the option of either orthodontic treatment,



Figure 1: Pre-operative view

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as to correct the spacing between his maxillary anterior teeth or endodontic treatment of anterior teeth followed by metal-ceramic restorations. Since the patient did not have any objection about the spacing between his anterior and wanted to maintain the natural spaces, he opted for metal-ceramic restorations. The occlusion was analyzed preoperatively, both clinically and with the aid of mounted models on a semi-adjustable articulator. A diagnostic wax-up was completed and then modified at the chairside. This was presented to the patient to assist in determining the course of treatment. The teeth were prepared by using modified shoulder diamond burs (coarse and superfine). The gingival retraction was done by placing a small impregnated retraction cord (Ultrapack #00, Ultra dent) which was impregnated with a hemostatic solution

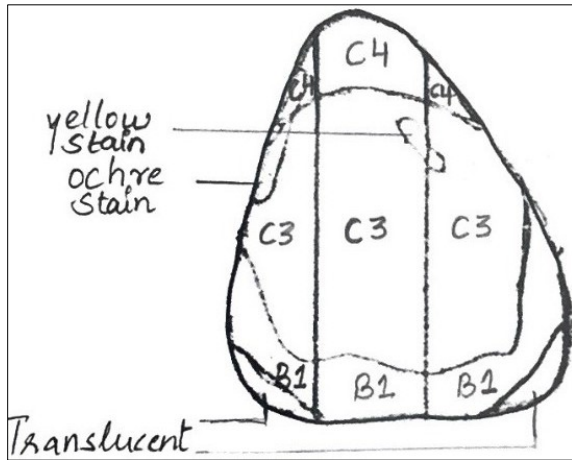


Figure 2(a): Grid Chart showing division of the tooth surface

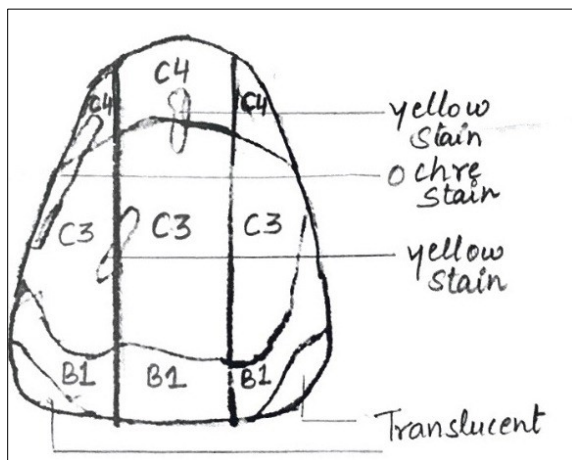


Figure 2(b): Grid chart showing different types of stains

Table 1: Stains used on 2/3<sup>rd</sup> of the crown surface

Company Name	Stain	Quantity
Ceramico 3	Yellow	45%
Ceramico 3	Black	5%
Ceramico 3	Ochre	45%
Ceramico 3	White	2%
Ceramico 3	Opaque modifier tan	3%

(Hemodent, Ultradent). The final maxillary arch impression was made with a combination of heavy and light viscosity polyvinyl siloxane. An impression of the opposing arch was also made with irreversible hydrocolloid (Jeltrate, Dentsply/Caulk). The Shade was determined with a shade guide (Vitapan 3D Master Vita Bad Sackingen, Germany). The patient was given provisional restorations which were made from polymethyl methacrylate material and were cemented with non-eugenol temporary cement.

**Laboratory Procedure:**

A detailed prescription was sent to the laboratory with maxillary and mandibular full-arch polyvinyl siloxane impressions, centric bite registration record, tooth shade selection and a detailed diagram of the teeth to be matched included dental characteristics such as enamel translucency patterns, locations of high Chroma, stains, hypo calcification patterns, craze lines, or stained cracks that were to be reproduced in the restoration [Fig. 2(a) and 2(b)]. Different shades and combinations of shades that were used are given in (Table 1). The body color or general color of the tooth itself is the main guide. A small portion of each stain is placed on the glass slab along with a drop of the glaze liquid. The colors are blended and painted directly on the crown. When the color of the stain has been satisfactorily

Table 2: Stains used on 1/3<sup>rd</sup> of the crown surface

Company Name	Stain	Quantity
Ceramico 3	Yellow	40%
Ceramico 3	Black	10%
Ceramico 3	Opaque modifier ochre	5%
Ceramico 3	Ochre	45%



Figure 3: Mixing of stains on a ceramic tray



Figure 4: Various stains available from Ceramco brand



Figure 5: Baked porcelain on the crowns

selected, it may be necessary to proceed similarly with stains used in incisal coloring (Table: 2) (Fig. 3 and Fig. 4). Finally, individual variations



Figure 6: Bisque trial



Figure 7: Right side view



Figure 8: Left side view

such as mottling, hairline checks, or gingival discolorations are completed and final restoration was cemented (Fig. 5). The bisque trial has been approved by the patient before the final glazing of the crowns (Fig. 6). Final cementation of the crowns done with glass ionomer luting agent (Fig. 7 and 8).

## DISCUSSION

While current trends in research and development show a preference for all-ceramic restorations because of their inherent esthetic advantages, metal-ceramic restoration remains the gold standard of predictability.<sup>[3]</sup> Selecting the proper shade and the color matching ceramic restoration to natural dentition continues to be one of the most perplexing and frustrating problems in fixed prosthodontics.<sup>[4]</sup> Stains may be used on porcelain to modify a shade which does not exactly blend with the other teeth or to add characteristic details such as mottling, cracks, gingival staining, or other striking details of color.<sup>[5]</sup> This approach enhances the dentist-ceramist team's ability to esthetically match metal-ceramic restorations to the natural dentition.

The clinical shortcomings of ceramic materials, however, such as brittleness, crack propagation, low tensile strength, wear resistance, and marginal accuracy, continued to limit their use.<sup>[6]</sup> Placement is contraindicated when there is reduced interocclusal distance, as with short clinical crowns, deep vertical overlap anteriorly without horizontal overlap or an opposing supra erupted tooth, as well as for cantilevers, periodontally involved abutment teeth, and patients with severe bruxism or parafunctional activity.<sup>[7]</sup>

Metal-ceramic restorations combine the accuracy and strength of cast metal with the esthetics of porcelain.<sup>[2]</sup> The combination of predictable strength and reasonable esthetics has continued to make traditional metal-ceramic restorations popular.<sup>[7]</sup> Stains may be used on porcelain to modify a shade which does not exactly blend with the other teeth or to add characteristic details such as mottling, cracks, gingival staining, or other striking details of color.<sup>[5]</sup> This approach enhances the dentist-ceramist team's ability to esthetically match metal-ceramic restorations to the natural dentition.

Monochromatic restorations machined from ceramic blocks have been scrutinized for their lack of individual characterization. Although customized characterizing of these restorations was shown to compete esthetically with layering techniques. Rarely will a shade guide tab be found

to match the natural teeth without modification of the ceramic restoration with mineral porcelain color modifiers or stains.<sup>[8]</sup>

Staining is not a solution to all problems involved in attaining natural shading. The color of the teeth to be matched must be carefully observed in a good light.<sup>[5]</sup> Sketches and diagnostic casts must be available at the time the porcelain is baked. One or more trial baking procedures may be necessary to arrive at a satisfactory formula for the required color.<sup>[5]</sup> When shade or color distribution is in question, glazing should be deferred until the crown has been observed in the patient's mouth.

## CONCLUSION

Metal ceramics are still used extensively, primarily due to their superior physical properties and acceptable esthetics. Esthetic porcelain-fused-to-metal restorations are dependent upon sound tooth preparation, careful color selection, and proper manipulation of materials. Discrepancies in the color of porcelain fused to metal do occur. However, the use of stains can eliminate many of these deficiencies.

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