AESTHETIC SOLUTION FOR CERAMIC RESTORATION ON CAST METAL CORE

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Palavras-chave: Cerâmica. Pinos Dentários. Coroa Dentária. Estética Dentária.

RESUMO

Introdução: A fim de satisfazer os anseios estéticos, da população, por mascarar as restaurações houve a busca pela evolução dos materiais restauradores possibilitando a introdução de materiais livres de metais. Porém trabalhos prévios que foram confeccionados com estruturas metálicas muitas vezes não podem ser removidos e, portanto, necessitam de artifícios para que possam ser mascarados, pois não há o desejo de uma total passagem de luz evitando a reflexão desses fundos escurecidos. Para estas situações, é necessário optar por um sistema cerâmico que apresente um grau de opacidade, sem perda de suas características de translucidez, refletância e saturação. **Relato do caso:** A paciente possuía uma coroa metalo-cerâmica sobre núcleo fundido no elemento 21, constatou-se radiograficamente que o núcleo não podia ser retirado, pois traria risco de fratura ao dente. Optou-se por utilizar uma cerâmica mais opaca de arcabouço para evitar a passagem de luz sobre o metal escurecido. O material de escolha foi à cerâmica de zircônia por apresentar alta resistência à flexão, permitindo que funcione como arcabouço para coroas unitárias. **Conclusão:** Com a correta aplicação de cerâmicas de cobertura sobre o casquete observou-se que é possível mascarar a cor acinzentada do metal através dos conhecimentos ópticos do material, a correta utilização dessas propriedades, opacidade e translucides, e um estreito contato entre dentista e protético.

Keywords: Ceramics. Post and Core Technique. Esthetics Dental.

ABSTRACT

Introduction: In order to satisfy the aesthetic desires of the population, by masking the restorations was the search for the evolution of restorative materials enabling the introduction of metal-free materials. But previous studies that have been made with metal structures often cannot be removed and therefore require devices that can be masked, because there is no desire for a total passage of light avoiding dim reflection of these funds. For these situations, you must opt for a ceramic system to provide a degree of opacity, without losing its characteristics of light transmission, reflectance and saturation. **Case report:** In case the patient had clinical a metal ceramic crown on the molten core element 21, it was confirmed radiographically the core could not be removed because it would fracture risk to the tooth. We chose to use an opaquer ceramic framework to prevent the passage of light over dark metal. The material of choice was zirconia ceramic by high flexural strength, allowing it to function as a framework for crowns. **Conclusion:** With the correct application of ceramic coverage on Caquetá noted that it is possible to mask the gray color of the metal through the knowledge of the optical material, the correct use of these properties, opacity and translucidus, and a close contact between dentists and prosthetic.

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INTRODUCTION

Patients are increasingly searching for restorations with more natural and harmonious appearance, which has reflected directly in both the improvement of restorative clinical procedures and the quality of materials and techniques applied, allowing the use of metal-free ceramic systems for producing crowns and fixed dental prostheses.[1,2]

However, intraradicular metal posts are used to this day and may be found in a great number of patients who opted for them because of the low cost. Hence, it is worth noting that these elements often do not need to be removed or that it is preferable not to remove them because of the risks associated, such as root fracture. With this is mind, dental ceramics become a good alternative to mask the color of posts with significant aesthetic disadvantages. These ceramics are characterized by the refractory nature, toughness, biocompatibility, and light transmission similar to the tissues composing the tooth structure.[3] Thus, using such systems allows providing patients with proper aesthetics associated with resistance and low wear rates.[4]

According to Yamamoto,[5] a constant complaint regarding metal-ceramic procedures regards to the opaque aspect of such restorations. This is because the depth of translucency is rather inferior to the natural tooth.[5] When used in metal cores or in elements with darkened dentin, the complete passage of light is not desired, preventing the reflection of such darkened background, which would result in loss of final aesthetic quality.[1,6] Then, a ceramic system with a degree of opacity is selected, without losing translucency, reflectance, and brightness (saturation) characteristics.[1,6]

The Lava All-Ceramic system™ (3M ESPE™) consists of zirconia crystals and uses CAD/CAM technology. It presents high flexural strength and may be indicated as a framework for both single crowns and fixed partial prostheses.[1,7] However, these ceramics are more opaque, which may be a disadvantage for anterior restorations with higher translucency.

Cementation requires a primer specific for zirconia, which is based on methacrylate. According to the manufacturer, such primer consists of acrylate phosphonic acid and reticulation agents. The resin cement systems that either use primer or are composed of phosphate monomers produce higher bond strength to zirconia.[8]

Therefore, the present study aims to present a clinical case of an aesthetic procedure on a cast metal core, performed so that the substrate color would not interfere negatively with the final color, obtaining good results and patient satisfaction.

CASE REPORT

Female patient, 40 years old, attended the Cosmetic Dentistry specialization clinic of the Pontifical Catholic University of Rio de Janeiro, RJ, Brazil, complaining of the color and aesthetics of the upper left central incisor (element 21). The clinical examination showed that the element was proclinated and presented a metal-ceramic crown on a cast metal core. Radiographs allowed verifying that the metal core presented correct adaptation and root portion of high caliber. Hence, it was decided not to remove the metal core because it could fracture the dental element (Figure 1).

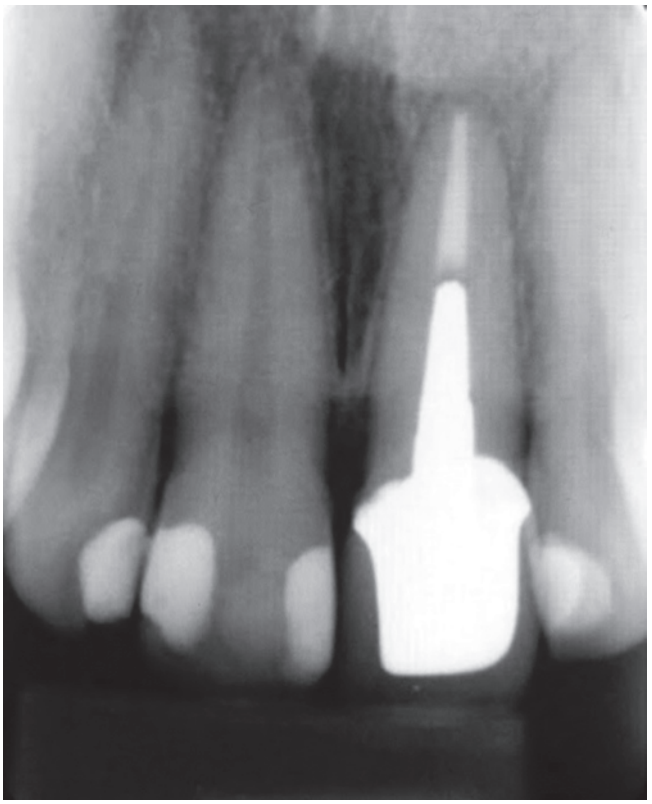

***Figure 1**: Radiograph showing the NMF installed in the root canal.*

Initially, at-home bleaching was performed before replacing the crown in question. The initial color was A3.5 for canines and A2 for the other teeth, based on the VITA classic scale (Figure 2).

Bleaching was performed with 16% carbamide peroxide (FGM Produtos Odontológicos), which was used at night for four weeks. Consequently, the color turned into A2 for canines and A1 for the other teeth.

The cast metal core was prepared to obtain an adequate buccal inclination and to allow determining a more defined chamfered finishing. Therefore, the 3131 diamond bur (KG Sorense) was used, obtaining a preparation with minimum thickness of 1.5 mm. Due to the inclination of the

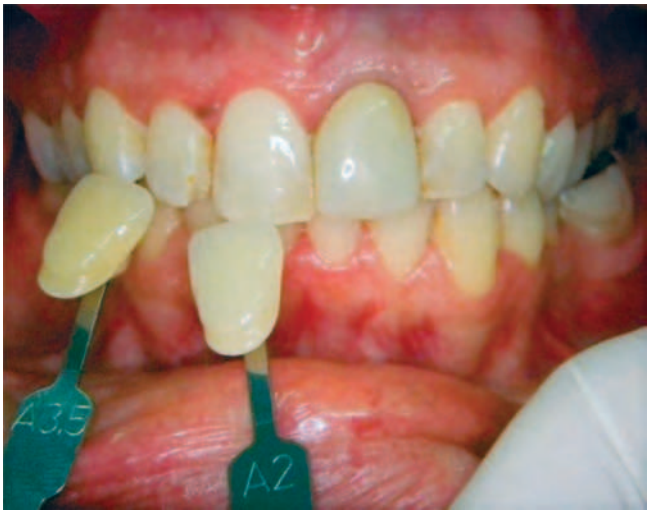

***Figure 2**: Initial image of the patient with the stains A3,5 and A2.*



***Figure 3**: Preparation done with chamfer finish.*

metal core, the wear was greater than the diameter of the diamond bur, resulting in a wear thickness of 2.0 mm. In the palate, in addition to the former, the 3168 diamond bur (KG Sorense) was used to produce the concave part of the preparation. Lastly, the preparation was refined with 3131F and 3168F burs (KG Sorense).

Molding was performed with addition silicone (3M ESPE™) in one step. The double wire (Ultradent Products, Inc) (numbers 0 to 000 with astringent) technique was used for gingival separation and the correct molding of the dental emergence profile. The antagonist was molded with alginate (Dentsply Ind. Com. LTDA) and the bite guide was produced with Occlufast registration silicone (Zhermack). All these information were sent to the laboratory for producing an individual tray in zirconia by the Lava system.

For color selection, the visual technique was applied aided by photographs. First, the color of the tooth base was selected using the VITA scale (Ivoclar Vivadent LTDA) (B1), but black and white photographs showed that tooth values did not match the color selected. Hence, the scale of bleached teeth (Ivoclar Vivadent LTDA) was used, selecting the 040 color palette.

Next, the scale of enamel shades was applied, in which translucency is selected first. At this moment, it was decided the element presented translucency OE1 in some parts and OE2 in others. In addition to both of these, which correspond to the largest part of the tooth, the shade was more violet in certain aspects, corresponding to OEV. In a small amount, OE5 was also found. The tooth body showed a caramel color corresponding to CTY, which was diluted to reach the pigmentation matching the tooth. In this case, only 2% of this pigment was used. Lastly, a small amount of SIY was placed in the tooth cervical. Considering all these choices of value, translucency, and color, a map was created of the dental element to produce a crown as similar as possible to the surrounding teeth.

Because ceramics are extremely fragile, the ceramic proof was performed carefully before cementation. After verifying adaptation and color with satisfactory results for both, the prosthetic product was cemented with adhesive cementation. The Multilink cement (Ivoclar Vivadent LTDA) was selected for having a primer based on methacrylate, which bonds better to zirconia. Hence, the piece was pre-etched with 10% hydrofluoric acid (Condac - FGM), washed,



***Figure 4**: Final photo with newly cemented crown and visible cervical term due to the initial gingival retraction.*



***Figure 5**: Final photo, after 5 years.*

and air-dried. The metal/zirconia primer (Ivoclar Vivadent LTDA) was applied for 180 seconds. The tooth was washed with water and air-dried. The Mix Multilink Primer A+B was mixed at the ratio of 1:1, applied on the tooth for 15 seconds, and air-dried. For the cement, a ratio of 1:1 of Mix Multilink was used, manipulating and placing it on the ceramic crown, which was then positioned in the tooth. Excesses were removed and 120 seconds were waited for the chemical polymerization of the cement, so the patient could be released. Figure 4 shows the success of the technique, considering that optimal aesthetic color results were obtained, despite the dark substrate. Figure 5 shows the result of the procedure five years later.

DISCUSSION

For a long time, cast metal cores were the preferred choice to obtain higher retention in endodontically treated teeth.[9] However, the high rates of root fracture associated with aesthetic problems, which include potential darkening of root and tooth cervical and the obstacle of light passage, reduced their use significantly.[9,10] In cases of hindered removal of pre-existing cast metal cores, the use of ceramics with different degrees of translucency, such as those with zirconia infrastructure, may represent a valuable aesthetic resource.[1,2]

Although metal-ceramic restorations present an extensive history of clinical successes, their substitutions with more aesthetic resources was encouraged. The appearance of adhesive dentistry and reinforced ceramics enabled the production of metal-free ceramic restorations, which are more resistant to feldspathic ceramics, therefore allowing the production of single elements due to the increased resistance along with the maintenance of optical and aesthetic properties.[2,5,11]

The ceramic systems may currently be classified in two groups: translucent and opaque/resistant.[12] The latter presents high fracture strength, but in order to obtain adequate aesthetics, a cover layer is used to hide the opacity and produce similar nuances of a natural tooth.[12]

Choosing the correct tooth color includes a subjective assessment and the use of photographs, color guide, and various light incidences. Even with all these resources, it will always be difficult to produce a restoration with identical optical performance to the natural dentition.[13] Touati et al.[14] considered translucency one of the hardest parameters for correct quantification and reproduction. However, this aspect should not be neglected, because it is an optical property with a decisive role in the light transmission phenomenon and it is essential for the natural appearance of the restoration.[14]

Another important factor for allowing this color mimicry is obtaining a preparation with adequate thickness for the different types of ceramics.[15] When reaching a minimum thickness of 2.0 mm for the ceramics, any material may be masked and the color difference is perceptible only with the use of specific devices.[15]

CONCLUSION

Adequately using more opaque or translucent ceramics, associated with the characteristics of color and shape reproduction obtained by the proper communication between dentist and prosthetist, generates satisfactory aesthetic solutions with predictable and lasting results.

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