

DIRECT COMPOSITE RESIN VENEER USING OPACIFYING PIGMENTS FOR ANTERIOR AESTHETIC REHABILITATION OF DISCOLORED TEETH: CASE REPORT

FACETA DIRETA DE RESINA COMPOSTA UTILIZANDO PIGMENTOS OPACIFICADORES PARA REABILITAÇÃO ESTÉTICA ANTERIOR DE DENTE ESCURECIDO: RELATO DE CASO

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ABSTRACT

The esthetic treatment of teeth with discoloration is a major challenge in restorative dentistry. In this sense, the use of composite resin veneering techniques associated with the use of opacifying stains allows restorations to be made using a direct technique, which results in less wear to the tooth structure during preparation. Thus, the present study presents a clinical case of a direct composite resin veneer using an association of three opacifying pigments. A 54-year-old male patient presented with severe color change on the central upper left incisor, a report of dental trauma, endodontic treatment, and contraindication for a new internal bleaching protocol. In order to make the direct resin veneer, a mixture of three opacifiers in a fluid consistency was used. To check the value of the applied layer of the mixture, black and white photographs were taken. Layering proceeded with translucent resin layers for the palatal base, opaque dentin resin and translucent achromatic resin for the enamel. As a result, the function and efficacy of the use of the association of opacifying pigments was verified in the resolution of the case. A reevaluation was performed 30 days and 7 months after the restorative procedure, when the color stability of the restoration was verified. This case allows to conclude that using composite resin layering technique associated with the use of opacifying pigments brings satisfactory and favorable aesthetic results through a direct technique, performed in a single clinical session and with high predictability.

Keywords: Composite resins; Tooth discoloration; Dental aesthetics; Case reports; Dyes; Dental veneers

RESUMO

O tratamento estético de dentes com alteração de cor é um grande desafio na Odontologia Restauradora. Nesse sentido, a utilização de técnicas de estratificação com resina composta associada ao uso de pigmentos opacificadores permite que seja possível restaurar por meio de uma técnica direta, que resulta em um menor desgaste da estrutura dental durante o preparo. Dessa forma, o presente trabalho apresenta um caso clínico de faceta direta de resina composta utilizando associação de três pigmentos opacificadores. Paciente do sexo masculino, 54 anos, procurou atendimento apresentando alteração de cor severa do dente 21, relato de trauma dental, tratamento endodôntico e contraindicação de novo protocolo de clareamento interno, sendo sugerido, como plano de tratamento, a restauração direta com resina composta. Para a confecção da faceta direta de resina, foi utilizada uma mistura de três opacificadores na consistência fluida. Para verificar o valor da camada aplicada da mistura, foram feitas fotografias em preto e branco. A estratificação prosseguiu com camadas de resina translúcida para a base palatina, resina opaca de dentina e resina acromática translúcida para o esmalte. Como resultado, constatou-se a função e eficácia do uso da associação de pigmentos opacificadores na resolução do caso, em seguida, foi realizada uma reavaliação após 30 dias e 7 meses do procedimento restaurador, quando verificou-se a estabilidade de cor da restauração. Concluiu-se, portanto, que a utilização da técnica de estratificação de resinas compostas associada a utilização de pigmentos opacificadores traz resultados estéticos satisfatórios e favoráveis por meio de uma técnica direta, realizada em sessão clínica única e com alta previsibilidade.

Palavras-chave: Resinas Compostas; Descoloração de dente; Estética dentária; Relatos de casos; Corantes; Facetas dentárias

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INTRODUCTION

The darkening of single teeth has been a huge challenge for restorative dentistry, and usually leads to the need for esthetic restorations with extensive wear of the tooth structure. In this sense, the success of restorative treatment is determined by functional and aesthetic principles, and the search for suitable materials that meet these requirements must consider the importance of an integration between the restoration, dental tissues, and optical phenomena (1).

The first treatment option for teeth with altered color is tooth bleaching, characterized as an effective, low cost, and non-invasive treatment. The choice of technique depends mainly on the type of color change of the tooth substrate and whether the tooth is vital or non-vital (2,3). In situations of severe discoloration, in which bleaching alone is not enough to provide the patient with desirable chromatic characteristics (4,5), more invasive procedures are indicated. These procedures include composite resin restorations and indirect restorations as ceramic veneers or full crowns. The broad combination of available techniques and the difficulty in obtaining the ideal color result in clinical questions about how to solve esthetic issues with safety and predictability of the colorimetric result (6,7).

Currently, composite resin procedures make it possible to restore anatomical details of the natural dentition that make the restorations almost imperceptible to the human eye. Thus, the restorative technique and the understanding of the application of layered resin, combined with the perception of the interaction of light with the dental tissues, allow results with a high aesthetic level (8). The literature shows great heterogeneity in the longevity of composite resins in anterior teeth, due to the small number of clinical studies with long follow-up periods. However, among the risk factors that can influence the survival of restorations are patient factors (e.g. caries risk, parafunctional habits, number of revisions per year, socioeconomic status), dentist factors (different operators, operator experience), and tooth/restoration factors (endodontic treatment, tooth type, number of restored surfaces) (9-13).

Among the available strategies for veneering with composite resin in masking teeth with marked color change, opacifying stains have been used as an effective and minimally invasive alternative, allowing less tooth wear to achieve masking of the darkened substrate. Thus, considering that the result of a composite resin restoration can vary according to the background color, choosing the appropriate materials capable of blocking and transmitting light becomes one of the most complex steps in restorations of darkened teeth (14-16).

Thus, this article aims to describe a clinical case of an indication for a direct composite resin veneer for aesthetic treatment of a discolored tooth, using opacifying pigments for masking the substrate.

CASE REPORT

A 54-year-old male Caucasian patient, in good general health, came to the Dentistry Clinic of the Navy Central Dental Clinic seeking esthetic treatment due to darkening of the central upper left incisor (Figure 1). During the anamnesis, the patient reported a history of dental trauma in the mentioned tooth more than 20 years ago, with endodontic treatment and unsuccessful internal tooth whitening, and a new protocol was contraindicated.



Figure 1 - Initial photographs

After clinical and radiographic analysis of the tooth structure, the substrate color change, satisfactory endodontic treatment, and the absence of an intraradicular retaining pin were verified. Considering there was enough structure for a direct restoration, the proposed treatment plan was to make a direct composite resin veneer. The Informed Consent Form was signed by the patient and the present case report was approved by the Research Ethics Committee of Hospital Naval Marcílio Dias under Protocol no. 131151/2022.

For the restorative procedure, infiltrative anesthesia was performed, modified absolute

isolation adapted to the case and insertion of retractor wire (Ultrapack® #000, Ultradent, Utah, USA) in the gingival sulcus to promote separation and protection of the gingival tissue during the preparation. Then, the element preparation was performed with the help of a rounded end and spherical truncated cone diamond tip (Reference 4138 and 1014, KG Sorensen, São Paulo, Brazil). Diamond tip diameter no. 4138 (1.8 mm) was used to guide the wear for the veneer preparation (approximately 0.9-1.0 mm) and incisal reduction was performed, considering the severe color change of the substrate.

Restorative procedures were performed after prophylaxis with pumice stone powder and water, followed by total acid etching using 37% phosphoric acid (Ultra-Etch®, Ultradent, Utah, USA) for 15 seconds, surface washing with water and subsequent drying. The Adper Scotch Bond Multipurpose Adhesive System (3M ESPE, Minnesota, USA) was used for adhesive layer, according to the manufacturer's instructions. Initially, a layer of primer was actively applied for approximately 10 seconds, followed by a blast of air to evaporate the solvent. Then, the adhesive layer was applied and an air jet was blown to disperse the adhesive and polymerized for 20 seconds with the VALO® photoactivator (Ultradent, Utah, USA) (Figure 2).



Figure 2 - Clinical aspect after tooth preparation and adhesive procedure

Layering was started with a layer of high translucency resin for freehand fabrication of the palatal base (Forma® color Transparent, Ultradent, Utah, USA). Next, a mixture of three opacifying pigments was applied to mask the color-changed tooth substrate (Figure 3). Approximately one drop of each of the opacifiers was mixed in a plastic dappen jar so that they could be applied with the aid of a brush no. 1 curved (Cosmedent, Chicago, USA). To measure the amount of opacifier applied, black and white photographic records were taken with each application of the mixture on the dental substrate, in order to verify the value of the layer applied and the masking capacity. The opacifiers used were Creative Color Opaquer Pink® and Creative Color Opaquer® in colors A1-B1-L0 and A2-A2.5 (Cosmedent, Chicago,

USA) (17). Afterwards, the body of the restoration was made with opaque dentin resin (HerculitePrécis® color A3D, Kerr, USA) (Figure 4). In the incisal third, grooves were made for the reproduction of the dental mamelons present in the natural tooth. Between the mamelons, a translucent resin (Filtek Z350XT® color BT, 3M ESPE, Minnesota, USA) was inserted to reproduce the incisal opalescence. The layer corresponding to the enamel was made with a layer of translucent achromatic resin (EsteliteOmega® color MW, Tokuyama, Japan), to increase the passage of light in this region and allow a greater naturalness of the restoration (16) (Figure 5).



Figure 3 - Clinical aspect after application of the opacifying pigments



Figure 4 - Clinical appearance after application of dentin layer



Figure 5 - Clinical aspect after application of translucent achromatic resin layer

At the end of the procedure the restoration was finished with carbide multilaminated burr (Reference 7404 and C48L, Jota, Florianópolis, Brazil) and with the abrasive disc sequence Sof-Lex Pop-On® (3M ESPE, Minnesota, USA). The occlusal fit and

excursive movements were checked with carbon paper for articulation (Accufilm®, Parkell, New York, USA). Polishing was performed with polishing rubbers (FlexiCups®, Cosmedent, USA), diamond spiral-shaped disc (A.S.A. P® pink color 3-6 micron, Cosmedent, USA) and felt disc (FlexiBuff®, Cosmedent, USA) associated with polishing pastes of different microcrystalline diamond particle sizes (Diamond Polish® 1µm and 0.5 µm, Ultradent, Utah, USA) and finished with aluminum oxide-based polishing paste (Enamelize®, Cosmedent, Chicago, USA).

The patient reported a high level of satisfaction with the immediate transformation and aesthetic rehabilitation of his smile that can be observed in the figure 6. Reevaluation visits were performed 30 days and 7 months after the restorative procedure (Figures 7 and 8), and the maintenance of the restoration integrity and polish was observed.



Figure 6 - Immediate final clinical aspect



Figure 7 - Clinical aspect after 30 days of the restorative procedure



Figure 8 - Final appearance 7 months after the restorative procedure

DISCUSSION

Chromatic changes in anterior teeth are frequent complaints from patients seeking aesthetic solutions. These changes can affect one or more teeth, and the involvement of only one element is a great challenge, due to the technical difficulty in obtaining the expected final color. Thus, the choice of the appropriate treatment plan should respect the following principles: minimal intervention, optimize tooth shape and provide aesthetics (18,19).

To achieve a good esthetic result, besides mastering the technique used, it is important to know the optical behavior of resin materials. Composite resin restorations in anterior teeth are usually capable of reestablishing the aesthetics, form, and function of the tooth, and the restorative concepts are directly related to the concepts of preserving the dental structure (8).

Although the masking of darkened teeth is influenced by several factors, making it difficult to determine the factor that most influences the result, the incorporation of resin pigments in composite resin restorations can interfere in the optical characteristics of the outcome, so that the thickness of material deposition and, consequently, dental wear decreases, making the restorative procedure less invasive than the conventional one for cases of dental discoloration (20).

Opacifiers are highly pigmented resin materials containing metal oxides that are responsible for their potent opacification capacity, characteristic shade, and saturation. The ability to mask the background effect by the complex interaction between absorption and scattering can be achieved by adding opacifiers to the composite resin, such as titanium oxide or aluminum oxide. Opacifying pigments are available in a fluid consistency (e.g. Creative Color®, Pink Opaquer®, Cosmedent, Chicago, USA), as a base-catalyst paste (e.g. Dual-Cured Opaquer® Bisco, Chicago, USA) or as a powder-liquid (e.g. Sinfony Opaquer®, 3M ESPE, Minnesota, USA) (14, 21-22).

Among opacifiers, different products offer different opacification abilities and while some can effectively mask a darkened substrate with as little as 0.1mm of material thickness, others may require two or more layers (21,22). In this sense, the use of opacifiers in fluid consistency allows a material of high opacity with reduced thickness to be used, which favors the masking of the discolored substrate without compromising the use of resin layers of dentin, effect, and enamel, important for layering and aesthetic result as close as possible to the natural tooth (16,20). Thus, the opacity level of an opacifier should be such that it only partially blocks light. In some cases, the use of the opacifier may be limited unless they are mixed with opacifiers of varying colors, which could

make the process unpredictable (22-23). While colors A1-B1-LO and A2-A2.5 have similar values and little difference in chroma, PINK has much higher value and, in some cases, can be used alone on darkened teeth (24).

Thus, the combination of composite resin layering techniques associated with the use of opacifiers to use a logical protocol of selection and application in the fabrication of direct veneers for masking darkened teeth can provide favorable esthetic results, as well as associating with a greater preservation of the dental structure when compared to full ceramic crowns, shorter clinical time for execution and greater ease of repair (1, 16).

CONCLUSION

The correct application of the layering technique is capable of minimizing color discrepancies and the use of opacifying pigments offers a satisfactory aesthetic result in masking cases of marked discolorations, aiding in the dental surgeons' clinical routine and increasing the predictability of satisfactory results.

The authors declare that there are no conflicts of interest.

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