CASE REPORT

Two types of ceramic veneers in the rehabilitation of trauma-darkened maxillary central incisor: a case report

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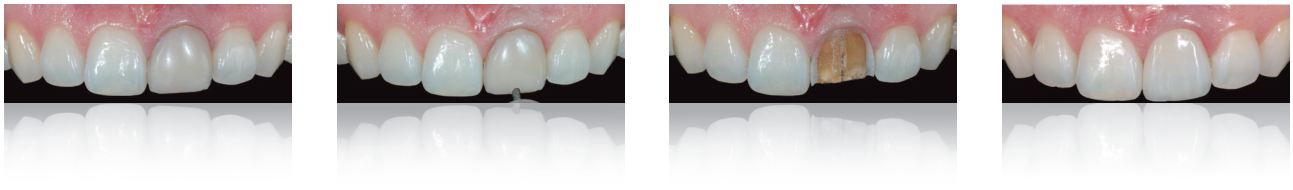

https://doi.org/10.14436/2447-911x.17.2.176-195.oar

Submitted: July 22, 2019

Revised and accepted: March 12, 2020

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How to cite: Betiol EAG, Esber CE, Lacerda WF, Berger G, Petrauskas A, Reggiani RD. Two types of ceramic veneers in the rehabilitation of trauma-darkened maxillary central incisor: a case report. J Clin Dent Res. 2020 May-Aug;17(2):176-95.

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The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

Patients displayed in this article previously approved the use of their facial and intraoral photographs.

ABSTRACT

Darkened anterior teeth compromise smile aesthetics, so rehabilitating them aesthetically and functionally has become one of the biggest clinical challenges for the dental surgeon. The development of adhesive dentistry, associated with the ability of dental ceramics to condition, guaranteeing the high quality of the bonding of these materials to the dental tissues, has made the treatment with ceramic laminates have high satisfaction rates, not only due to the natural optical characteristics initially achieved, but mainly by maintaining the effect obtained over the years. Objectives: The present study aims to compare the aesthetic result between two facets, with different vitreous ceramics, through a clinical case report of a trauma 21 darkened tooth rehabilitation. Methodology: A single darkening upper central incisor was prepared to receive a ceramic laminate. During the laboratory phase, two laminates were made of different materials, one in feldspar ceramic, and the second with a lithium disilicate base and feldspar ceramic covering it. Both pieces were tested and the one with the most naturalness was cemented. Results: Both pieces presented satisfactory results during the tests. Together with the patient, the lithium disilicate part was selected for cementation. Conclusions: The two techniques presented can generate aesthetically satisfactory results, using quality preparation, impressions and dental laboratories.

Keywords:

Dental Porcelain. Tooth Discoloration. Dental Veneers.

INTRODUCTION

The susceptibility to trauma is higher in the anterior teeth, due to positioning of anterior teeth in accidents such as car crashes, falling from standing position when stumbling. This prevalence can lead to important aesthetic consequences in the smile, such as tooth darkening due to loss of pulp vitality over time, fractures of varying extensions and tooth extrusion.[1]

Pulpal necrosis after trauma can lead to discoloration after trauma and should be treated as soon as possible to avoid internal resorption of the dental element.[2] Some discoloration can be challenging and aggravated with only one central incisor involved.

Some studies[3,4] point to the use of internal bleaching to treat this type of impairment. However, this therapy poses risks of external root resorption when its steps are not performed correctly.[5] One of the limitations of bleaching endodontically treated teeth is the recurrence of the initial color.[5]

One option to be considered by dental surgeons is the use of ceramic veneers to cover the aesthetically unfavorable substrates. The choice of material must meet the aesthetic, structural and biological requirements of the patient in addition to the mechanical principles to provide restoration durability.[6]

Among the materials available in the market that meet these requirements, we have feldspathic ceramics and lithium disilicate, which have good aesthetic characteristics, physical and mechanical properties suitable for treatment with veneers. Both have been used by professionals with a high satisfaction rate and little or no adverse effect on periodontal health.[7,-15]

The present study aims to compare the aesthetic result of the two materials through a case report of a rehabilitation of the tooth 21 darkened by trauma.

CASE REPORT

Patient B.K.S.R., 29 years old, female, presented to the Dental Prosthesis Specialization clinic with the following main complaint: darkened tooth in the anterior region. (Figures 1 to 3) During anamnesis and radiographic examinations, it was observed that tooth 21 (upper left central incisor) had suffered trauma for about 15 years and the endodontic treatment was performed 3 years later (Figure 4). It also presented unsatisfactory composite restoration in the bucal region. The patient was instructed on the use of internal bleaching to improve the color of the tooth and also warned of its potential risks of internal reabsorption and recurrence of dark coloration. Thus, she chose the restorative treatment with ceramic veneers.

Figure 1: Resting lips.

Figure 2: Patient's smile.

Figure 3: Incisor's buccal volume.

Figure 4: Initial radiography.

Initially, clinical and radiographic examinations, molding for the study model and intra and extra-buccal photographs were performed (Figures 5 to 7).

Figure 5: Intraoral initial aspect.

Figure 6: Shade selection.

Figure 7: Study cast model

Tooth preparation for the ceramic veneer was started by making the orientation groove in the incisal and the bucal surface with a 3216 burr (KG Sorensen, Brazil), in the cervico-incisical direction, following the inclinations of the tooth. Then, maintaining a preparation thickness of 1.2 mm, the entire buccal surface was prepared (Figures 8 to 14). The incisal reduction was performed with the 3216 burr (KG Sorensen, Brazil), reducing 2 mm. With a multiplier 1:5 (NSK, Japan) and 3216 burr a 0.5 mm sub gingival finishing line was made. All preparation, finishing line and polishing was performed under microscopic magnification (DF Vasconcelos, Valenca/RJ, Brazil).

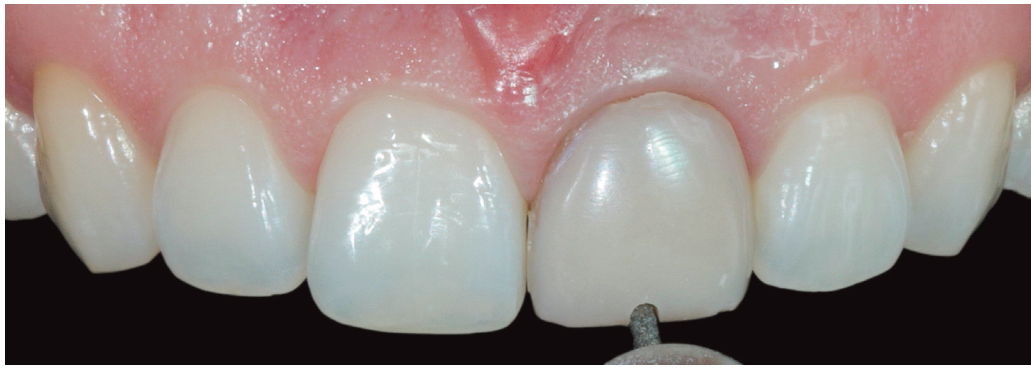

Figure 8: Preparation beginning

Figure 9: Incisal edge being prepared.

Figure 10: Buccal groove finished.

Figure 11: Half preparation finished.

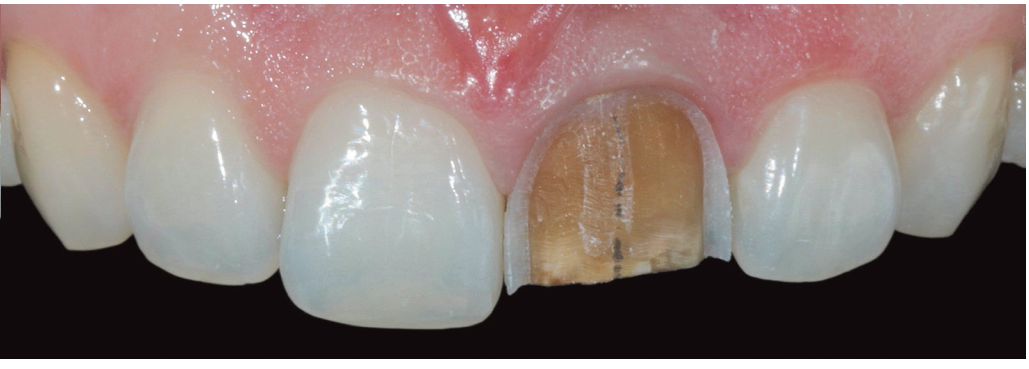

Figure 12: Preparation concluded.

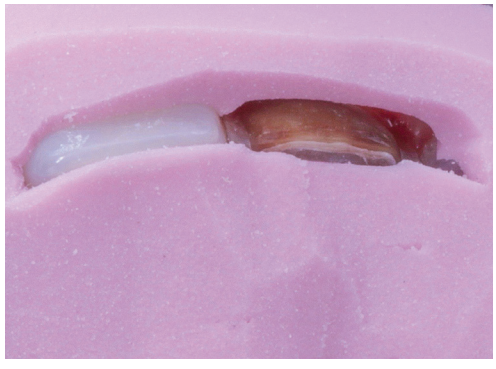

Figure 13: Buccal preparation guide.

Figure 14: Buccal and incisal preparation guide.

In order to better visualize and copy the finishing line of the preparation, gingival retraction was done by the double cord technique. A retractor cord (#000, Ultrapack, Ultradent, USA) was inserted, followed by the second, larger, cord (# 00, Ultrapack, Ultradent, USA) (Figure 15 and 16).

Addition silicone (Variotime, Kuzer, Germany) was used for higher fidelity, increased gypsum casting time and the need to make more than one working model (Figure 17). Tray selection was made so that there was enough space for the silicone. The putty was manipulated, applied to the tray simulta-

Figures 15 and 16: Retraction cord positioned.

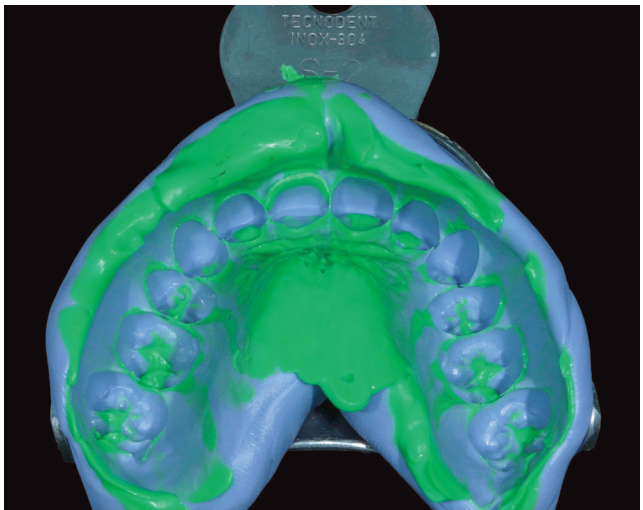

Figure 17: Adition silicone impression

neously to the injection of the fluid silicone paste, in accordance with the manufacturer's instructions. The larger retractor cord (# 00) was removed simultaneously with the injection of the light material into the gingival sulcus, preserving its retraction.

Color was selected according to the Vita Classical shade guide (Wilcos, Brazil), aiming to evaluate the color pattern of the cervical, middle and incisal thirds of the adjacent tooth and the substrate.

37% phosphoric acid attack (Condac37, FGM, Brazil) was applied for 15 seconds, washing for 30 seconds, dried with absorbent paper and Single Bond (3M Espe, USA) was applied only at a central point of the tooth (Figure 18 and 19) prior to the completion of the provisional.

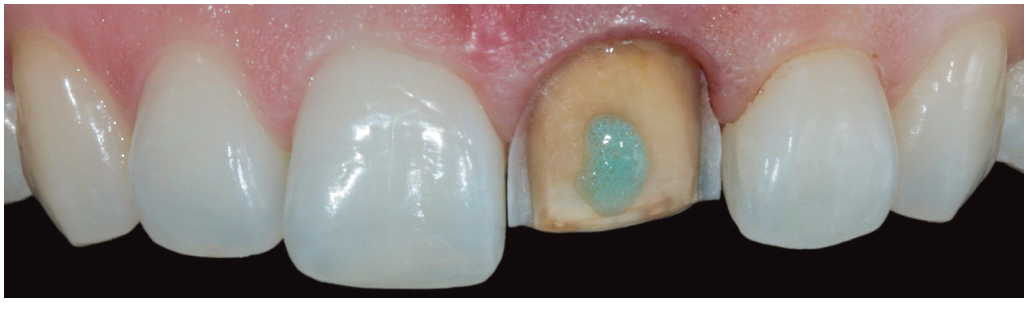

Figure 18: Etching only in the center of buccal surface.

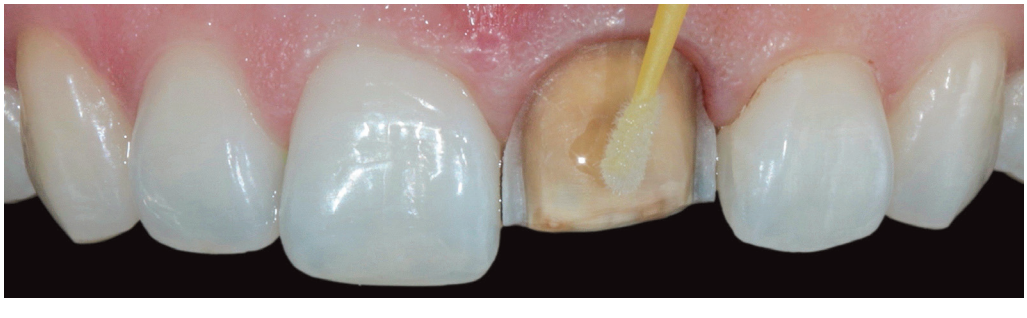

Figure 19: Bond system application.

The preparation of the provisional veneer was done by the technique of inserting composite resin (Z350, B1/WD, 3M Espe, USA) into the transparent silicone index (Transil, IvoclarVivadent, Schaan, Liechtenstein) made prior to the preparation (Figure 20 and 21). The refinement of the anatomy, finishing and polishing were performed with diamond polishing burrs (FF) with a multiplier (NSK, Japan).

Figure 20. Transparent mock-up for provisional crown.

Figure 21: Provisional cemented

Impressions were sent to the laboratory requesting that two ceramic veneers were manufactured (Figure 22). The first one was based on feldspathic ceramics (IPS Design IvoclarVivadent, Schaan, Liechtenstein) and the second was based on injected lithium disilicate and later stratified with feldspatic ceramic (E-max Ceram, IvoclarVivadent, Schaan, Liechtenstein).

Figure 22: Ceramic veneers.

In the next session, the provisional restoration was removed and the two ceramic veneers were tested with Try-in light-curing glycerin paste, (Neutral and Warm, Variolink Esthetic LC, IvoclarVivadent, Schaan, Liechtenstein) for the analysis of shape, color and adaptation of the veneers (Figures 23 to 26). After clinical and photographic evaluation with the patient, both ceramic veneers presented satisfactory aesthetic results with a little to none difference in color, even when raising the value of the resin cement. The chosen piece for cementation was the lithium dissilicate one in combination with Warm Variolink Esthetic LC resin cement .

Figure 23: Feldspathic veneer test with cement in Neutral shade.

Figure 24: Feldspathic veneer test with cement in Warm shade.

Figure 25: Lithium disilicate veneer test with cement in Neutral shade.

Figure 26: Lithium disilicate veneer test with cement in Warm shade.

The preparation of the selected piece was initiated by conditioning with 5% hydrofluoric acid (Condac porcelana, FGM, Brazil) for 20 seconds (Figure 27), followed by abundant rinsing for 60 seconds with air jet and water. The silane agent (Monobond, Ivoclar Vivadent, Schaan, Liechtenstein) was vigorously rubbed for 60 seconds (Figure 28), dried and the adhesive system was applied (Tetric N-Bond Ivoclar Vivadent, Schaan, Liechtenstein) (Figure 29).

Figure 27: Lithium disilicate etching.

Figure 28: Silane application.

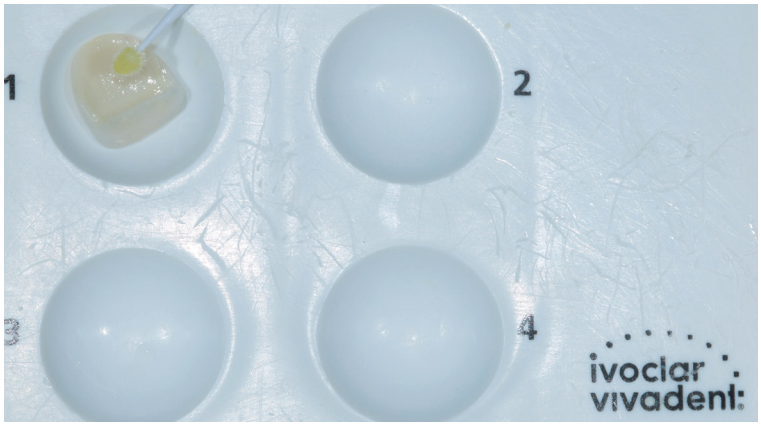

Figure 29: Bond system application.

The conditioning of tooth 21 was initiated by the insertion of retractor cord (Ultrapack, Ultradent, USA), prophylaxis with Consepsis Scrub (Ivoclar Vivadent, Schaan, Liechtenstein), surface blasting with aluminum oxide (Bio-Art, Brazil) to increase of microretetion, placement of transparent polyester strip (Airon, Maquira, Brazil) to protect adjacent teeth and maintain proximal contact, 37% phosphoric acid attack (Condac37, FGM, Brazil) 30 seconds, abundant washing for 60 seconds, drying with absorbent paper, application of the adhesive system (Tetric N-Bond Ivoclar Vivadent, Schaan, Liechtenstein) and mild drying for removal of the excesses.

Resin cement Variolink Esthetic LC (Ivoclar-Vivadent, Schaan, Liechtenstein) was used in the Warm shade previously selected with the Try-in system, applying a layer inside the piece and taking it in position. The excesses were removed with brush and floss. Photoactivation was performed for 60 seconds on each surface of the tooth with a Led photopolymerizer (Bluephase N - Ivoclar Vivadent, Schaan, Liechtenstein).

Adjustments were made in occlusion and in the movements of protrusion and laterality. The result of the process can be seen in Figures 30 and 31.

Figure 30: Cemented lithium disilicate veneer.

Figure 31: Final result.

RESULTS

Both materials presented satisfactory aesthetics. These results were evaluated mainly with visual aspects, such as color similarity, tooth shape and adaptation of the veneers. After the dental surgeon approval, the patient's opinion was asked. Both agreed with slightly better results with the lithium disilicate veneer.

DISCUSSION

Vitreous ceramics are presented in several commercial brands, both used in this case, have excellent mechanical properties, with flexural strength varying from 125 mPa to 480 mPa) for lithium disilicate and 50-110 mPa for feldspathic ceramics, thanks to its glass matrix , which makes it necessary to have a good adhesive cementation on a suitable substrate,[9] preferably enamel. This fact gives, after adequate cementation, both ceramics greater fracture resistance due to the better distribution of the masticatory forces.

It is known that adhesion differs depending on the substrate being used for the treatment. Better results can be observed in the presence, if possible, of enamel.[16-19] The resin used in laboratory studies showed adequate resistance to enamel and enamel and dentin, a fact that demonstrates the importance of tooth preparation, in which, even when greater wear is required, due to coloration, for example, sufficient amount of enamel must be maintained so that there is no loss of adhesion to the tooth.

A study by Ge et al.[20] showed that the thickness of enamel and ceramic influence in a similar way the resistance to fracture of the veneer, increasing the resistance the greater its thickness. In addition, through fractography tests it has been shown that both works almost identically under load. The thickness of the piece used in the case reported in this study grants the patient the treatment of their main complaint, the darkening, without damaging the dental resistance, since the cemented piece has a high fracture resistance.[20]

Aesthetic improvement in anterior teeth can be achieved with two types of materials, feldspathic ceramics and lithium disilicate.[9,10] Its long-term results are favorable, longer than directly restorations with composite resins and have few side effects on periodontal health[5]. The ceramics are indicated for veneers restorations,[11] presenting a high durability of up to 91% in 12 years.[12] Such factors make them the material of choice when seeking aesthetics and function in a treatment.[6] Studies evaluating the clinical success of IPS e.max Ceram reported a 95% rate over a 5-year follow-up period. As for the IPS d.SIGN, used in the veneer without the lithium disilicate base, there was no significant wear in ceramic crowns in a period of 3 years.

The feldspathic veneers rely on the manual skill of the technician who will sculpt them, so it is essential to exchange information between the dental surgeon and the prosthesis laboratory.[16] Due to their low flexural strength, there is a greater need for caution during the handling of the veneers, both for surgeon and lab technician. The feldspathic ceramics can have thicknesses of 0.5 mm without structurally compromising the piece.[6]

The addition of lithium disilicate in vitreous ceramics brings greater resistance and is compared to feldspathic as the aesthetic characteristics of prosthetic pieces.[17] The process of confection of the pieces in lithium disilicate guarantees smaller porosities in its structure, when compared to the feldspathic ones,[18] both in the injected and milled. Its minimum thickness varies from 0.8 mm in the middle region and 0.3 mm in the preparation margins,[9] consistent with the reported case.

The final color of ceramic restorations is determined by the combination of the color of the tooth (underlying substrate), thickness of the ceramic laminate, and color of the cement[21]. In the case reported, both pieces had a high opacity base, aiming to cover the darkened substrate that the tooth presented, varying in material and thickness for the feldspathic ceramic stratification, which may make the lithium disilicate base piece more challenging for the lab technician.

CONCLUSION

Rehabilitation of a central incisor may be challenging, and tooth discoloration adds to its difficulty. In the selection of which material should be used dentists must consider the amount of enamel present, substrate color, veneers thickness, possible aesthetic results and limitations, such as translucency and opacity. Both materials presented in this case can be used to achieve satisfactory aesthetics, presenting practically identical results.

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