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Aesthetic rehabilitation with ultra-thin ceramic veneers - Case report

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Abstract— *The evolution of the ceramic systems increasingly seeks to meet the aesthetic and functional needs of the restorations, providing composites with greater tenacity, translucency and resistance to traction and flexion, increasing the longevity of the restorations. Concomitantly with the development of restorative materials and minimally invasive techniques, professionals combine digital tools to improve visualization of aesthetic problems, create possible solutions and accurately guide clinical and laboratory procedures to achieve predictable results. Thus, in this case report we aimed to describe the changes in facial expression, through ultrathin ceramic laminates in patients with the main complaint of dissatisfaction with the aesthetic appearance of their smile. The team of professionals followed all the clinical steps required, from digital planning, restorative testing, mock up, the choice of material and the cementation of the restorations. In this way, it was possible to obtain satisfactory aesthetic results, through the choice of a highly personalized treatment, with adequate materials and planning the patient's needs.*

Keywords— ***Dental aesthetics, Ceramics, Dental prosthesis, Dental Veneer.***

I. INTRODUCTION

In the last decades, the facial beauty has been shown with enormous importance in the most varied areas of life in society. Despite the subjectivity of the concept of beauty pattern, the aesthetics industry together with the media and the contemporary community establish body and facial patterns that are increasingly demanding and difficult to achieve through the overvaluation of the phenotype (FRESE; STAEHLE; WOLFF, 2012).

The increasing search for improvement in the appearance of teeth is one of the main reasons why the patient has sought treatment in dental offices (CÖTERT; DÜNDAR; OZTÜRK, 2009).

These treatments have provided satisfactory results due to the advance of conservative restorative techniques, combined with the development of new materials. Thus, modern dentistry has been improved in less invasive and more efficient clinical procedures capable of promoting a harmonization of the smile with an aesthetic and functional balance (HWANG et al., 2012; KORKUT; YANIKOĞLU; GÜNDAY, 2013).

Thus, the ideal model proposes to obtain a smile with white teeth, aligned in the arch, with a balance between the white architecture (teeth) and the pink architecture (gingival tissue) and free from any wear and tear, such as dental trauma, changes in color, shape, structural abnormalities, and position of anterior teeth. In all these changes, getting a beautiful smile is always the main goal ((BHUVANESWARAN, 2010).

In this context, ceramic laminates represent a restorative modality of minimally invasive approach with clinically satisfactory results as changes in color, shape or positions preserving the remaining tooth (WOLFF et al., 2010).

The manufacture of ceramic laminates includes the most varied types of reinforcing crystals that allow the production of thinner, highly esthetic and more wear resistant coatings (MORAES et al., 2018).

With the evolution of the reinforced ceramic pieces and the adhesion system, it has become possible to develop very thin venners with thickness ranging between 0.3 and 0.5 mm (SHETTY et al., 2011).

The most commonly accepted name in the scientific literature for these types of facets is dental contact lens, where through a small wear on the dental structure, a porcelain layer (PINI et al., 2012).

Thus, restorations with minimally invasive ceramic laminates in recent years has become a widely accepted, predictable procedure for longevity regarding periodontal

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response and patient satisfaction (SHETTY et al., 2011; KORKUT; YANIKOĞLU; GÜNDAY, 2013).

The aim of this study is to describe the alteration in facial expression, with the change in harmony and the relationship between the anterior teeth, through ultrafine ceramic laminates associated with two visualization techniques prior to the rehabilitation treatment: the mock up test, and digital planning.

II. CASE REPORT

General profile of the patient

A 45 year-old male patient, who reported dissatisfaction with her smile, with no relevant systemic medical history, was treated in the Dental Center of Itabuna, Brazil.

Clinical findings

Extra-oral examination of the patient revealed an asymmetrical commissural plane and smile alterations (Fig.1A). The intraoral examination showed stable occlusion, slight anterior-lower crowding and wear of the edges of the maxillary central incisors, change in color, shape and size (Fig.1B-C). In addition, mild attrition were observed in the central incisors, height 10.02 mm (Fig.1D

Fig.1: *A - Extra-oral evaluation of altered smile line; B - Intraoral view during occlusion; C - Frontal close-up view before treatment; D - Height of the maxillary central incisors measured using a digital caliper.*

After clinical, radiographic, photographic examination and the digital smile designer evaluation (DSD) was done through the preparation of study models waxing (Fig.2A-B). Based on our evaluation, a conservative treatment approach was proposed through the manufacture of indirect laminates of lithium disilicate in the central, lateral, and canine incisors.

Therapeutic intervention

The first step of the treatment was the alginate (Hydrogum 5, Zhermack, Badia Polesine, RO, Italy) molding to obtain diagnostic waxing, which served as the basis for the creation of an addition silicone matrix (Express XT, 3M ESPE, St. Paul, Mn, USA) for performing the mock-up assay. The silicon matrix was customized with a scalpel blade for cervical contouring that provided a precise mock-up without excess. For the mock-up the silicon matrix was filled with bisacrylic resin (Protemp 4, 3M ESPE, St. Paul, MN, USA) and brought into position. It was observed that the customization of the cervical contour facilitated the removal of the excesses of the provisional material. Then the custom matrix and the resin layer were removed with cotton soaked in alcohol. The mock-up was finalized after total removal of the excess with scalpel blade. A conservative preparation for ceramic laminates was performed with a fine-grained diamond drill (# 1012 and # 2135F, KG Sorensen, SP, Brazil), followed by finishing the preparation with multilaminated drills (# 118L, Angelus Prima Dental, Londrina, PR, Brazil) and flexible abrasive discs (Sof-lex, 3M ESPE, St. Paul, MN, USA). Gingival Retraction Cord was obtained using wire retractor (Ultrapak # 000, UltradentSouth, South Jordan, UT, USA). The ceramic color was designated by the color scale co-mo Blitting 3 (Ivoclar A-D, Ivoclar Vivadent, Schann Liechtenstein) (Fig.2C). The spacing wires were removed and the molding was performed with addition silicone in the one-step molding technique. The heavy silicone was inserted into the tray and then the fluid was first applied onto the teeth and then into the tray. After 5 minutes, the tray was removed and checked. Interocclusal registration was performed with silicone for occlusal registration (Scan Light, Yller, Pelo-tas, RS, Brazil). In the laboratory, the scanning of the plaster model was carried out to make the digital model, and then the digital planning of the ceramics and subsequent milling of the pieces were done. Lithium disilicate ceramics were used (IPS e.max Press, Ivoclar Vivadent, Schann Liechtenstein). The low-grade Opaque White color was selected and confirmed using test paste to simulate the color of the cement (Allcem Veneer APS Try-In, FGM, Joinville, SC, Brazil). The internal surfaces of the laminates were conditioned with 10% hydrofluoric acid for 20 seconds (Condac Porcelana, FGM, Joinville, SC, Brazil). As superfícies foram lavadas com água e a seguir foi aplicado ácido fosfórico a 37% durante 60 segundos (Condac, FGM, Joinville, SC, Brasil) e novamente lavadas. The laminates were silanized with a silane coupling agent (Prosil, FGM, Joinville, SC, Brazil). The enamel was conditioned with 37% phosphoric acid for 30 seconds (Condac, FGM, Joinville, SC, Brazil), while the adjacent teeth were protected (Isotape, TDV Dental, Pomerode, SC, Brazil). The adhesive agent (Scotchbond,

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3M ESPE, St. Paul, Mn, USA) was applied over the enamel. The photopolymerizable resin cements (Allcem Veneer APS, FGM, Joinville, SC, Brazil) were used in the ceramic veneers. The excess cement was removed with a brush (KG brush, KG Sorensen, SP, Brazil), and each surface was photopolymerized for 60 seconds by a light emitting light-curing radiator of 1200 mW /cm^2 (Radii-Cal, SDI, Bayswater, Australia). The excess cement was removed and the finishing and polishing was done on the edges of the ceramic. The occlusal contacts were marked, and the protrusion and laterality movements were checked. The final appearance is shown in Figure 2D.

Fig.2: A – Dental design, B – Ideal dental design; C - Color selection Log; D - Frontal view close-up after treatment.

III. DISCUSSION

Dental treatments for performing aesthetic procedures have as main objective to achieve a design that corresponds with the functional, aesthetic and emotional needs of the patient (COACHMAN et al., 2014).

In recent years, the increasing search for highly personalized treatments has provided the development and improvement of new techniques and materials that meet the expectations of the dental surgeon and the patient (VENEZIANI, 2017).

Therefore, the predictability in the dental treatment has become very important as it provides the planning of cases through studies, changes, plaster models, waxing and photographs. Some tools such as the use of digital smile design (DSD) together with the mock up technique, in the planning and execution of aesthetic rehabilitations, allows to develop a treatment plan and use it initially as a product sale, guaranteeing patient confidence and credibility (MEEREIS et al., 2016).

Thus, the methodology used in this study showed that ultra-thin ceramic laminates associated with previous visualization techniques were capable of altering the facial expression, harmony and relationship between the anterior teeth, providing an improvement in the patient's self-esteem.

A combination of the intraoral mock-up and the mathematical parameters allowed more predictable results because it took into consideration the initial and final color desired for the tooth by calculating the required thickness of the ceramic system selected to achieve this color and the height and width of central incisors (SCHMIDT et al., 2011).

It is also necessary to consider the type of material used in the making of the facets and their implications on the results obtained. In this case the ceramics reinforced by lithium disilicate were used due to their satisfactory mechanical properties, greater resistance to bending, without losing the aesthetic characteristics (FUZZI et al., 2017).

Another relevant point is the color and shape of the restorations with ceramic laminates, in this case report, which were obtained with the least wear in the tooth structure.

In summary, it is necessary to emphasize that in order to achieve aesthetic excellence, it is not enough to only use good materials and techniques, that is, a correct diagnosis and adequate planning, should be considered as a primordial and indispensable stage.

IV. CONCLUSION

Thus, it is possible to conclude that the design proposed by the team of professionals provided a highly personalized treatment, that is, all steps were chosen correctly which made the results satisfactory for the professionals and the patient.

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