Utilization of laminate veneers for functional and esthetic recovery in situation of great teeh wear

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ABSTRACT

Introduction: Characterized by involuntary acts of clenching or grinding the teeth, bruxism can cause severe tooth wear. Despite being a challenging situation, the combination of conservative preparations, adhesive materials and acid-sensitive ceramics, minimally invasive ceramic restorations have been proposed as one of the rehabilitative options for patient with bruxism. The objective of this clinical case is to demonstrate the multidisciplinary esthetic-functional resolution of a patient with parafunctional habits and severe wear of the teeth using laminate veneers. ***Methods:*** In the present clinical case, the patient had early loss of the disocclusion guides, resulting in an inadequate occlusal pattern, and esthetic deficiency. After compensating the symptoms of bruxism by multidisciplinary approach, the correct management of the remaining structure was performed, in order to preserve the maximum healthy tooth structure and to maintain adhesion of the ceramic parts in enamel. ***Conclusion:*** The treatment with laminates may be a conservative option, besides allowing an esthetic result and recovering normal disocclusion guides of the mutually protected occlusion.

KEYWORDS

Ceramics. Mouth Rehabilitation. Bruxism.

INTRODUCTION

Oral rehabilitation using laminate veneers (LV) has become a routine practice in the dentistry. With excellent esthetics and long-term predictability.[1,2] LV are opposed to classical models of fixed-prostheses and traditional methods of tooth preparation, allowing a conservative treatment with minimal wear of the healthy dental structures.[1,3,4]

Many types of dental ceramic are available; however, for some ceramic systems there are a possibility of great adhesion with tooth structures and are reinforced with crystals of lithium disilicate and leucite being the most used actually. Therefore, besides the excellent optical properties, this type of reinforcement gives the material especially greater flexural strength and wear, even in thin ceramic parts such as LV, which have a thickness between 0.1 and 0.4 mm.[5]

Despite good clinical performance and considerable success rate,[1,6,7] with superior survival of 10 years,[1,8] these restorations are also susceptible to failure, being the most reported the incisal edge chipping and fracture of these parts.[9,10]

These clinical failures are also observed in patients with deleterious or parafunctional habits, such as dental clenching,[12,13] frequently found in patients with bruxism. These patients apply forces of great magnitude for a long time on the teeth. If there are ceramic restorations placed, the load is transferred to the ceramic resulting in a zone of stress, favoring the propagation of microcracks and its fracture, when the threshold of failure of the ceramic is exceeded. Bruxism is a parafunctional activity characterized by hyper function of the jaw lift muscles that causes the involuntary act of tightening or grinding the teeth,[13-15] consequently, the collapse of the tissues supporting the periodontium and exacerbated wear of the dental elements,[12] causing esthetic impairment, impairment of masticatory function and loss of disocclusion guides.[12,15]

Although, in the recent past, the treatments with all-ceramic restorations were contraindicated in patients with parafunctional habit,[14] such as bruxism, due to the high possibility of ceramic fracture, nowadays many clinical studies show that the use of veneers or laminate veneers can be used with greater clinical reliability in these patients, since the improvement of the mechanical properties and great adhesion of these materials.[1,16,17] In this way, the use of laminate veneers is an excellent alternative to recover the low vertical dimension of occlusion and the loss of the disocclusion guides,[11,14] since they minimize wear of the remaining dental structure, making it possible to recover the normal appearance of the occlusion. Therefore, the objective of this clinical case is to demonstrate the esthetic-functional resolution of a patient with parafunctional habits and severe wear of the teeth using laminate veneers.

MATERIALS AND METHODS

A 45-year-old female patient sought care at the oral rehabilitation clinic of the Araçatuba Dental School, Brazil, complaining about the appearance of her smile. After signing the Term of Authorization and Consent to the Diagnosis and Treatment, an anamnesis was performed, in which the patient was diagnosed as suffering from the parafunctional habit of grinding teeth (bruxism), caused by anxiety as a consequence of the professional activity that the same exerted. Subsequent clinical and radiographic examinations were performed, in which was observed wear in the incisal region of the anterior and occlusal teeth of upper premolars, mainly cusp tips, causing esthetic deficiency and inadequate occlusal pattern, due to the absence of disocclusion guides during protrusion and laterality movements of jaw (Fig 1 and 2). It was also observed that the vertical dimension of occlusion was not altered, due the molar teeth is intact.

Figure 1: Extra-oral photographic protocol, frontal and lateral views: (**A** and **B**) sealed lips, (**C** and **D**) discreet smile, and (**E** and **F**) wide smile.

Figure 2: Intra-oral photographs. (**A**) Maximum in habitual intercuspation; (**B**) Protrusion; (**C**) Left laterality disoclusion; (**D**) Right laterality disoclusion.

Initially it was suggested to the patient, a psychological treatment and increase of the physical activities to reduce the symptoms of the emotional stress. Concomitantly, a Michigan acrylic plaque was made to reduce electromyographic activities and restored the disocclusion guides. After the stabilization of the symptoms of bruxism, new impressions of the dental arches were made to obtain study cast models, being then mounted in a semi-adjustable articulator for the planning. Based on the mouth condition, it was initially proposed to perform dental bleaching by the technique "in office" with the hydrogen peroxide gel 35% (Whiteness HP, FGM, Joinville, SC, Brazil) and placement of ten lithium disilicate laminate veneers of on the teeth 15 to 25 to recover the shape and the occlusal balance of teeth and disocclusion guides. On the study models, the diagnosis of second left premolar was waxed to second right premolar of the upper arch. Then the mock-up was performed with bisacrylic resin (Protemp 4, 3M ESPE, Sumaré, SP, Brazil) to confirm if the shape and height of the teeth met the functional requirements and corresponded to the esthetic expectations of the patient (Fig 3).

"Nowadays many clinical studies show that the use of veneers or laminate veneers can be used with greater clinical reliability".

Figure 3: Frontal and lateral view of initial situation (**A** and **B**) and after the mock-up (**C** and **D**).

After analysis of the disocclusion guides and the approval of the patient, the minimally invasive preparations were carried out assisted by using silicone index guides, using diamond tips in normal granulation, fine and ultra-fine (KG Sorensen, Cotia, SP, Brazil) under refrigeration. Finishing and polishing with Soft-Lex Pop on disc (3M ESPE, Sumaré, SP, Brazil) (Fig 4). In order to avoid the inadequate wear of the healthy tooth structure and to maintain the adhesion of the enamel parts, the silicone index guides were used dynamically during dental preparation to double check (Fig 5).

Figure 4: Teeth reduction with extra-fine burs and discs (**A** and **B**). In **C**, the finalized teeth reduction, preserving the interproximal area.

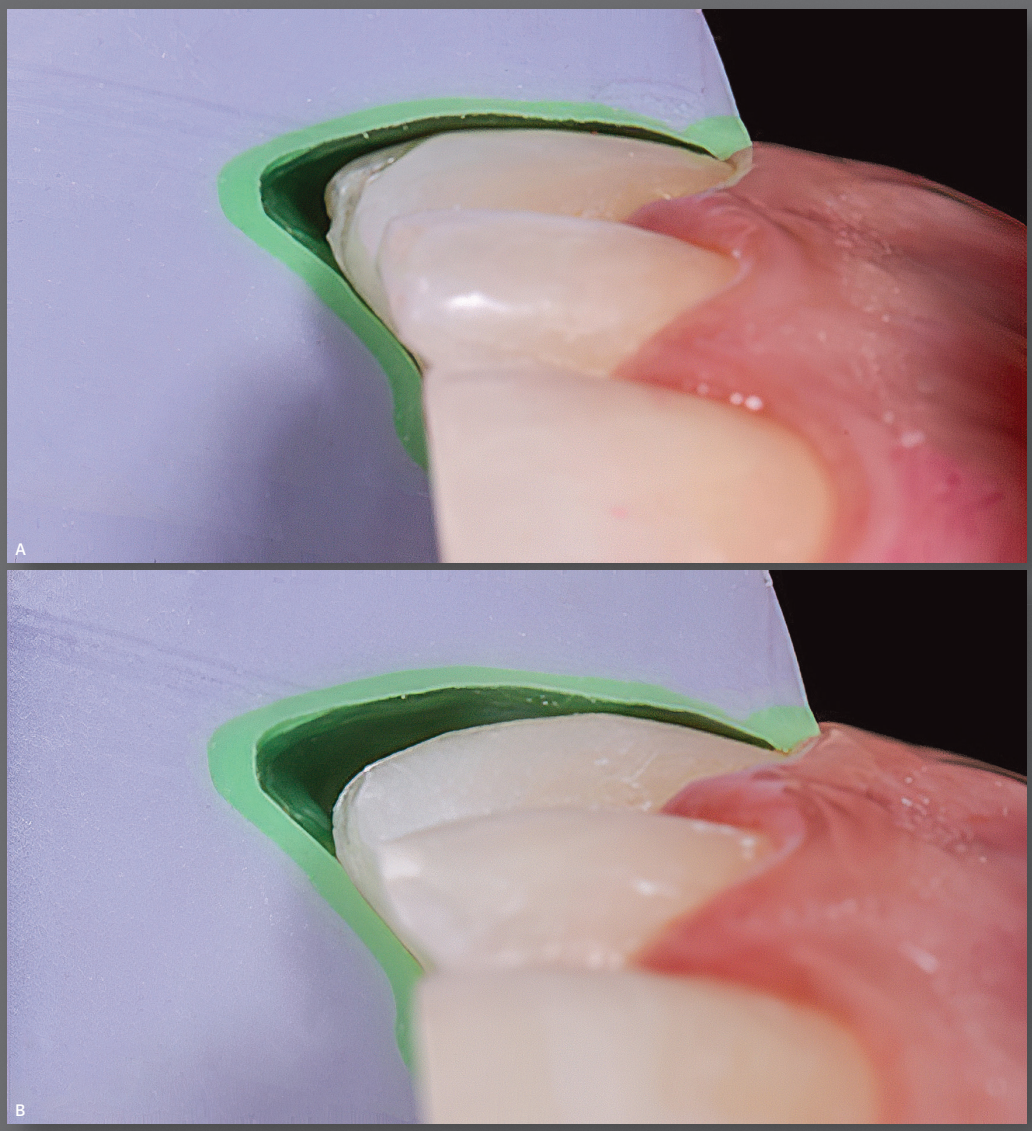


Figure 5: Silicone guide positioned to show the volume of the final restoration compared to the tooth surface, initial (upper left) and after preparation (upper right). This guide allows visualization of tooth areas that need to be reduced and the adequate space for restorations even before tooth preparation.

After, simultaneous impression using polyvinyl siloxane material (Express XT Penta, 3M) was done using double retraction cords (00 and 0, Ultrapack, Ultradent) and the double impression technique. Following, tooth selection shade was carried out by intraoral photographs, and send to the prosthetic technician. Pressed-lithium disilicate ceramic laminate veneers were made in all prepared teeth (Ivoclar Vivadent, Schaan, Liechtenstein) (Fig 6). An inspection of laminate veneers in dry condition was done to verify the adaptation. Following, the wet inspection using a transparent and B0.5 try-in pastes were used to simulate the final color (Relyx Try In, 3M).

Following, the internal treatment of the laminate veneers, was made: 1 - Etching with 9.5% hydrofluoric acid for 20 seconds. 2 - abundant washing with water jet and air drying; 3 - Etching with phosphoric acid 37% for 30 seconds, followed for abundant washing with air /

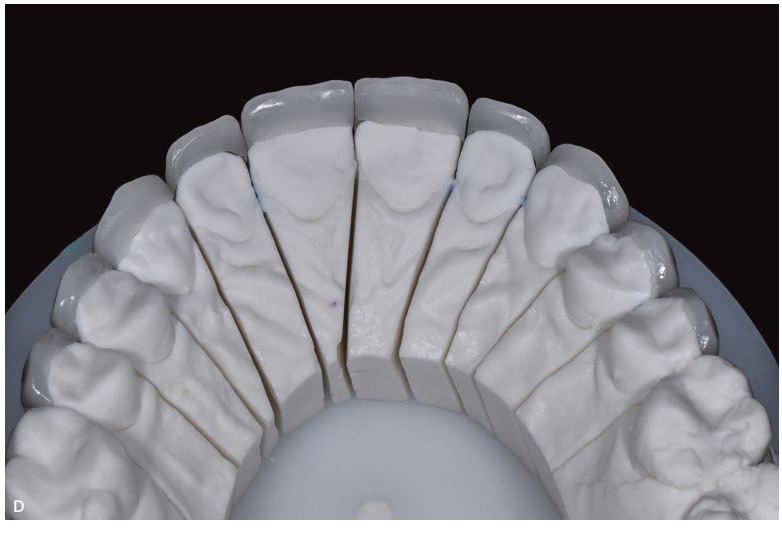
Figure 6: (**A**) Aspect of mold obtained by double impression technique; (**B**) Comparison between natural teeth length and laminate veneers length; (**C** and **D)** Visualization of laminate veneers in a buccal and palatine view.

water jet; 4 - Application of silane coupling agent and wait for 1 minute; 5 - Application of the adhesive system, followed by abundant air dry for all excess removal, and then followed for light-curing.

Following, after the prophylaxis (Clinpro, 3M), using a relative isolation from second premolar to second premolar, a selective dental enamel etching for 30 s was done with phosphoric acid 37% (UltraEtch, Ultradent, South Jordan, UT, USA) and the rinsed, and air dried. Following a universal adhesive system was active applied (SingleBond Universal, 3M ESPE, Sumaré, SP, Brazil), and not light cured. The excess of adhesive was removed by air-drying.

Then, cementation was performed using the resin cement (RelyX Veneer B0.5, 3M) and buccal face of each tooth was light-cured for 40 seconds using the standard mode (1000mW/cm^2), (VALO® Cordless, Ultradent, South Jordan, UT, USA), and then finally cured with high


C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power mode (1400mW/cm^2) for 3 seconds in each face. Previously and after photopolymerization, the excess of the resin cement was carefully removed from the cervical region with a disposable microbrush and periodontal curettes. Immediately after cementation, and removal of excess of resin cement, static and dynamic occlusal adjustment with articulating film paper was performed (accufilm, Parkell products Inc, USA). The usual maximal intercuspation and the mutually protected occlusion schemes was followed (Fig 7). Then, the ceramic surface was polished using rubber silicone polisher (Eve, Pforzheim, Germany). Finally, another rigid interocclusal acrylic plate (Michigan plate) was made to protect the teeth and ceramic restorations (Fig 8).


A


B

Figure 7: Intra-oral photographs after laminate veneers cementation showing the improvement of occlusion. **(A)** Maximum in habitual intercuspation; **(B)** Protrusion; **(C)** Left laterality disoclusion; **(D)** Right laterality disoclusion.

Figure 8: **(A-C)** Final esthetic results showing a harmonious, beautiful and self-confident smile.

DISCUSSION

Parafunctional habits contribute to the exponential increase of individuals with bruxism[15], and depending on the severity of these habits, changes in the occlusal pattern and even partial or total loss of the clinical crowns of the anterior and posterior teeth over time. Despite being a challenging scenario, through a multidisciplinary esthetic-functional planning it was possible to recover the dimension of the teeth, recover disocclusion guides and correctly restore the harmony of the stomatognathic system.[15,18]

Even with the accentuated wear of the incisal edges of the anterior teeth, in this clinical case among the variable options of rehabilitation treatment, was chose the LV made by lithium disilicate ceramic.[5] This restorations, recover damaged teeth with biomechanics similar to natural tooth, with good resistance to wear and fracture, and well reproduction of optical characteristics of translucency and fluorescence of dental enamel,[19] due to the low refractive index of the crystals of this ceramic.

The combination of conservative preparations and the use acid-sensitive ceramics and resin-based cementation materials allowed the preservation of healthy remaining dental structures and increased the adhesion of the ceramic to the dental enamel.[20-23] Furthermore, according to Sahyon et al, the use of a light-cured adhesive system prior to the insertion of the resin cement can result in higher mechanical properties, as well as, decrease of chromatic changes in the long term. The previous light cure of the adhesive can cause the volatilization of the solvents due to the gradual increase in the temperature of the photoactivation process, thus avoiding water sorption by the monomers present in the resin cement and a hydrolytic degradation of the cementing interface.[24-26]

In addition, the use of this type of restoration with minimum dental structure wear has been associated with good

clinical results in the long term.[1,22,27,28,29] Together with the preservation of the enamel, the design of the cervical termination and the incisal preparation also influences the longevity of the restorations,[9,10,30] being currently recommended at least knife-edge designs and a 45° bevel with the incisal to provides lower tension values, thus reducing the susceptibility to fracture.[9,17,20]

CONCLUSION

Based on this clinical case, is it possible to conclude that a ceramic laminate veneer was an excellent option for esthetic-functional resolution of severe teeth wear.

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