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Case Report

Aesthetic Outcome of Feldspathic Veneers: A Clinical Report

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Abstract

Ceramic veneers are well known as a conservative treatment option for anterior teeth presenting wear, discolorations or shape anomalies.

The high esthetic outcome offered by the ceramic laminate veneers are the most important reasons of their indications. In recent years, an increased number of ceramic materials have become available for veneer's fabrication, with the outcomes of each material supported by literature of varying degrees of scientific rigor.

The reproduction of a final color that matches the patient's teeth shade is one of the biggest challenges met with ceramic veneers, since the color of the ceramic restorations depends on several factors such as the basic color of the used ceramic, the thickness, teeth's color and the cement color. The feldspathic ceramics offer the highest esthetic value compared to all the other systems.

Feldspathic porcelain veneers have a remarkable 10-year survival rate of up to 95 percent after being bonded to enamel.

However, a major concern with the feldspathic ceramics was their low mechanical resistance.

Nowadays, the feldspathic blocks for CAD CAM systems allows matching the optical outcome of the original feldspathic veneers and the strength offered by the CAD CAM ceramic restorations.

In this case report article, we will show a step-by-step procedure of CAD/CAM feldspathic veneers fabrication for an esthetic rehabilitation of dento dental disharmony.

Keywords: Aesthetic; laminate veneers; feldspathic ceramic; macrodontia; CAD-CAM

Introduction

Macrodontia or megalodontia is a dental anomaly that causes teeth to be bigger than average It has a prevalence of 0.03 to 1.9% in permanent with a predominance of incisors and canines [4].

The functional and aesthetic problems caused by macrodontia depends on the size and morphology of the affected teeth [5].

Treatment is mainly intended to meet esthetic and psychological needs of the patient, rather than functional ones.

Ceramic veneers is a valuable therapeutic option when teeth have minor color, shape or position modifications mainly due to the excellent properties of the available ceramics and constant breakthroughs in adhesive technologies [9].

When correctly indicated and executed, Ceramic veneers offer excellent aesthetic results thanks to the ceramic properties, and the possibility of being held in low thicknesses, without injuring the resistance or the aesthetics of the material [9].

Thereby, a current comeback to traditional feldspathic ceramic veneers has developed with CAD-CAM techniques and feldspathic blocks [10].

The clinical success of feldspathic veneers depends on the correct indication and the appropriate application of the available materials and techniques, confirming to the aesthetic and functional needs [2, 3].

The purpose of this case report was to describe a sequence of clinical steps, from planning to cementation, in a case of aesthetic correction using feldspathic ceramic veneers.

Case presentation

A 24-year-old-male patient presented to our department with chief complaint of an exaggerated length of maxillary central incisors and desired to have his teeth aesthetically corrected.

Treatment planning

After the anamnesis, an intra-oral examination was conducted. It showed that the patient presented a satisfactory oral hygiene and an important height of the central incisors compared to the laterals and the rest of teeth.

We also noticed a central diastema between the two central incisors (figure 1).

Figure 1: Intraoral view showing the patient's bite. ***Figure 2:*** Preoperative intraoral view propulsion.

The static occlusion examination revealed an exaggerated overbite in the intercuspal position.

When the forward movement of the mandible was performed, only the central incisors were in contact taking the entire load, while all the rest of teeth are separated (figure 2).

The panoramic radiography confirmed the size disharmony between central incisors and the rest of teeth (figure 3).

Figure 3: The panoramic radiography of the patient.

A diagnostic wax-up of the upper model was performed (figure 4), and based on it, silicon guide was made to create the mock-up, guide the enamel preparation (figure 4).

The same silicone guide will also be used to make provisional veneers with bis-acryl resin after preparation is performed.

Figure 4: Diagnostic wax-up.

A 1 mm reduction was first made on the incisal edges of both central maxillary incisors.

After the patient expressed agreement on the final shape of the teeth on the mock-up, an aesthetic rehabilitation treatment was indicated, consisting of laminated veneers, with 4 feldspathic ceramics in teeth 11, 12, 21 and 22.

Figure 5: Diagnostic mocku-up with self-cured temporary composite material.

Teeth preparations

Incisal preparation was designed with a palatal chamfer to optimize the bonding surface.

A diamond bur kit for laminate veneers was used.

First, Horizontal and vertical depth grooves were cut into the teeth with depth cutter diamond bur Every groove was marked with a graphite pencil. Then, a tapered shape bur was used to complete vestibular reduction until every marked groove was removed (figure 6).

A one point five mm in the incisal edge were reduced added to the first 1 mm reduction, followed by the proximal chamfer in a palatal position to the midline papilla (figure 7).

Figure 6: Horizontal depth grooves were cut on the teeth and marked with a graphite pencil.

Figure 7: intraoral view of the preparations.

Impression procedure and fabrication of laminate veneers

A retraction cord was placed into every sulcus of the prepared tooth and a double impression technique with polyvinylsiloxane impression material was performed:

First an impression was made using putty material. Internal relieves were created in the impression to provide space for the fluid material.

After 5 min, the putty impression charged with fluid material. While simultaneously removing the cord, the fluid material was inserted into the gingival sulcus until it filled all preparations and occlusal faces of the adjacent teeth.

The impression was then washed in running water and air dried. The correct reproduction of the structures was verified.

A 3D Master shade guide was used for shade matching. 2M1 shade value was selected (figure 8).

Figure 8: Evaluation of the shade matching.

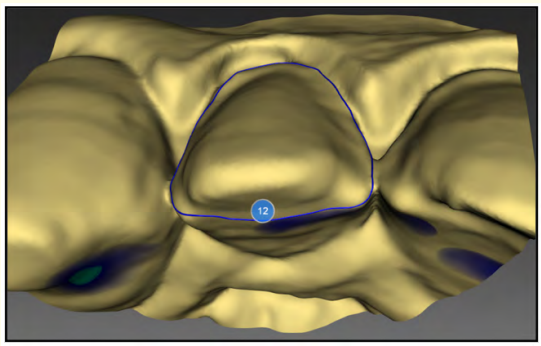

Figure 9: The veneers' computer assisted design at the dental laboratory.

Provisional restorations were made using bis-acryl composite resin with a silicone mold that had been made previously on the cast from the diagnostic wax-up.

Special care was given to remove excess material from the cervical margins to avoid inflammation of the gingival tissue.

The impression with the preparations was casted with type IV dental stone. The prepared, mandibular and diagnostic wax-up casts were sent to the dental laboratory.

CAD/CAM was performed after a scan of the casts via a milling machine (CerecinLab, Sirona) at the dental lab (figure 9).

The software used for the restorations design process was ExoCad Dental-CAD, which created four veneer restorations from tooth 12 to tooth 22 (figure 10, 12).

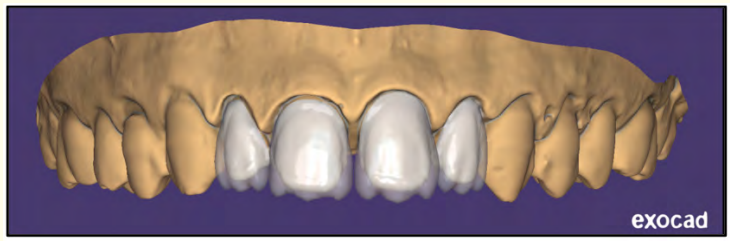

Figure 10: Digital model and the conception of the four veneers.

We opted for the Vitablocs Mark II for their fine-structured feldspar ceramic blocks provided for different computer-aided design/computer-assisted manufacture (CAD/CAM) systems (figure 11).

Figure 11: Milled Feldspathic CAD-CAM block.

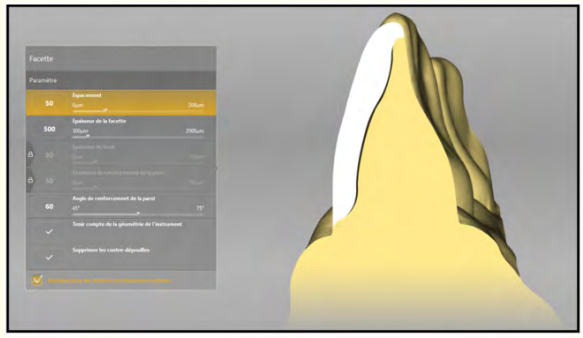

Figure 12: Screenshot showing the thickness of the veneers.

Then, the cut-back technique was used for a better characterization of the incisal third by layering feldspathic ceramics with different shades.

Try-in Procedure

The shape and marginal adaptation of the laminate veneers were evaluated on the prepared cast (Fig.13, 14).

Figure 13: Feldspathic porcelain veneers veneers finalized on the prepared cast.

Figure 14: The translucency of the fabricated veneers.

The provisional restorations were removed and the preparations cleaned.

The marginal adaptation of the laminate veneers was evaluated individually on the preparations.

Each restoration was tested into their corresponding preparation for fitting. Try-in pastes were used to select the color of the resin cement, always in consideration with the patient needs and expectations.

In this case, the yellow resin bonding of the Variolink N professional Set was used (figure 15).

Figure 15: Checking the color of restorations using the yellow resin bonding paste.

Cementation procedure

The treatment surfaces can be divided into two: (a) the treatment surface of the laminate veneers and (b) the treatment surface of the tooth preparations.

This procedure was done under rubber dam isolation, which ensures the quality of bonding and allows clean and visible surfaces for cementation.

Treatment surface of laminate veneers

The internal surfaces of the porcelain restorations were etched with 4.5% hydrofluoric acid (IPS Ceramic Etching Gel; IvoclarVivadent) for 90 s, then washed under running water and air dried. They were then cleaned with 37% phosphoric acid for 60 s, washed under running water and air dried (figure16, 17).

A silane coupling agent (Monobond; IvoclarVivadent) was applied, according to the manufacturer's instructions.

Figure 16: The conditioning of the veneer with 4.5 % hydrofluoric acid.

Figure 17: The chalky white color after conditioning.

Treatment surface of the prepared teeth

A phosphoric acid etching gel at 37% was applied in all the prepared surfaces for 30 seconds, and the acid was rinsed off with water for 30 seconds.

A thin layer of adhesive was applied in the tooth surface, gently air-dried, and light-cured for 20 seconds (figure 18).

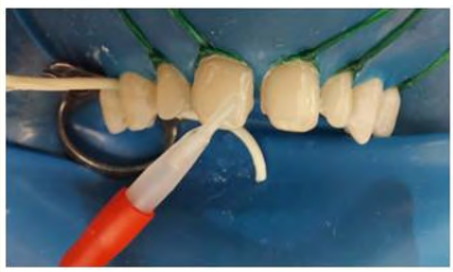

Figure 18: Rubber-dam isolation and treatment of the enamel surface for bonding.

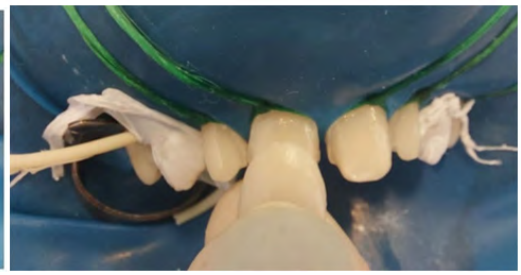

Figure 19: The veneer placement.

The resin cement of choice in this case is a light curing agent.

The veneers were taken out from the pad and charged with resin cement and then positioned with continuous digital pressure into their correspondent tooth. The excess of cement was removed with a brush and light-cured for 5 seconds to ensure the positioning and fitting of the restoration (figure 19).

Finally, a thin layer of glycerin was putted into the interphase and then light-cured again for 60 seconds in every side of the tooth to ensure the elimination of the oxygen inhibition layer.

The final excesses were removed using a probe and a dental floss.

The maximum intercuspation occlusion was adjusted with diamond burs in areas marked with articulating paper. The laterality and propulsion of mandibular movements was checked.

The adjusted surfaces were polished using polishing rubber and the proximal surfaces were finished with finishing strips.

Figure 20: Frontal intraoral view showing four bonded ceramic veneers a week after bonding.

Figure 21: Lateralextraoral vie aftercementation.

Discussion

Isolated macrodontia that affects the maxillary central incisor, as described in this case, is a rare dental anomaly with an incidence of 0.03%. The aesthetic problem caused by this anomaly can have a deep impact on the patient's psychosocial development [4, 5].

Various treatment options have been described in literature for the management of macrodontia such as enameloplasty, direct composite resin stratification and ceramic veneers [5].

Composite resin can be also a chairside solution, offering an immediate aesthetic result, to correct dental anomalies. This treatment option is less costly than other indirect approaches [12].

Several colors and opacities are available, making it possible to reproduce natural tooth shape and color.

However, composites are subject to alterations. The shade and texture of the material change with time [12].

On the other hand, for the last 30 years, ceramic veneers have confirmed to be a successful treatment option for teeth with shape and color anomalies in esthetic areas [9].

When correctly-planned and indicated, Ceramic veneers provide excellent esthetic results thanks to the ceramic biocompatibility to the periodontal tissues and the aesthetic value of the material.

Following a 15 years retrospective clinical observation, an excellent success rate of approximately 93% was reported.

Nevertheless, some failures were reported with veneers such as fracture and debonding, especially in cases with unfavorable occlusion.

As a result, the long-term clinical success depends on the mechanical properties. Therefore, veneers should be subjected to minimal occlusal load and favor the restoration of esthetic over function [9].

In this case report, after the reduction of the incisal edge, the problem of long path in propulsion was solved, same as the deep bite, so we could indicate laminate veneers.

For many years, feldspathic ceramics have been the gold standard materials to provide optimal esthetic results for porcelain veneers.

Feldspathic ceramic veneers, when bonded to enamel substrate, have a very high 10-year survival rate that can reach 95% [2, 10].

Nowadays, many ceramists find difficulties in sculpting powder/liquid porcelains to elaborate the original feldspathic veneers. This creates a limit because the esthetic value exhibited in these restorations depends on the ceramist's aptitude to incorporate translucency and depth of color into the restoration [2].

Recently, the fabrication methods of ceramic veneers have improved into the computer assisted design and computer assisted milling technology (CAD/CAM).

CAD/CAM is used to concept and fabricate porcelain laminate veneers in the dental office or in the laboratory. As a result, moretime efficient, predictable, and adapted restorations may be produced compared with traditional techniques.

In addition, the mechanical properties of CAD/CAM materials are excellent thanks to the advantages of industrially fabricated homogenous blocks.

So, the appearance of feldspathic blocks for CAD CAM systems allowed matching the optical outcome of the original feldspathic veneers to the strength offered by the CAD CAM ceramic restorations.

However, ceramic veneers processed through CAD/CAM systems are usually monochromatic and lack characterization of the incisal edge of the anterior teeth such as translucency and well-defined mamelons [8].

So, the cut-back technique was selected for a better personalization of the incisal edge. This technique allows the correction of texture, shape and color, by layering feldspathic ceramics with different shades to obtain a tridimensional effect [8, 11].

The goal of an aesthetic rehabilitation in maxillary area is to guarantee mimicry to the natural teeth in shape and color.

Therefore, the choice of the adequate ceramic and the manufacture procedure must be considered according to the clinical case. Nevertheless, we should focus to the importance of optimized cervical adaptation and mechanical resistance of the ceramic veneers.

Conclusion

In conclusion, choosing technology and adequate materials, respecting clinical sequence lead to a perfect functional and aesthetic result, while remaining conservative with respect to the dental structure by using feldspathic ceramic veneers.

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