CASE REPORT

Minimally invasive preparations: Contact lenses

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Abstract

Conservative aesthetic dental treatment methods have been increasingly requested in clinical practice, especially when the anterior region presents aesthetics problems, such as pigmentation, malpositioning, and problems of proportion and size of the teeth. Thus, this work aims to conduct a brief literature review on esthetic restorations with minimally invasive preparations and describe step by step, by reporting a case, the clinical protocol to be followed by the professional for making dental contact lenses. Currently, what is more conservative in aesthetic treatments are ceramic fragments, usually made of lithium disilicate ceramics, which are 0.2-0.5 mm thick and, therefore, require minimal tooth preparation. Such treatment was selected for a male patient aged 17-year-old who was admitted in the Aracatuba Dental School, Universidade Estadual Paulista, complaining of unsatisfactory aesthetics due to dental problems of size and proportion. The achieved result was very satisfactory for both the patient and professional. We conclude that the contact lenses are currently the best treatment option for elective aesthetic cases, since they are an extremely conservative rehabilitation that faithfully mimics the dental structure and shape, besides being a very predictable treatment.

Keywords
Ceramics, dental, dental porcelain, diastema, esthetics

Introduction

Conservative or minimally invasive aesthetic dental treatments have been increasingly required by patients, especially when the anterior region presents pigmentation, malpositioning, spacing, problems of proportion and size of the teeth, alignment and dimensional positioning in the arcade.[1-4]

The ceramic materials evolution, as well as advances in techniques for adhesive cementation, contributed to a plethora of aesthetic treatments with metal-free prostheses, which simulate natural teeth and have good resistance, besides enabling more and more conservative preparations.[4-8]

Currently, the use of contact lenses, which are nothing more than thin ceramic fragments, is an extremely aesthetic solution for presenting excellent optical properties, and considered one of the most conservative treatments for oral rehabilitation, with little or no tooth preparation, which happens to be one of its greatest advantages. For such reasons, allied to high rates of clinical success, this treatment has been increasingly used, with good acceptance by patients.[8-10]

Furthermore, studies indicate that when the correct clinical steps are performed this treatment has shown an appropriate longevity and predictability.[9,10,12]

Thus, this paper aims to describe, by reporting a case, step by step of the clinical protocol to be followed by the professional for dental contact lenses fabrication.

Case Report

In February 2013, a 17-year-old male patient sought the Aracatuba Dental School, Universidade Estadual Paulista, complaining of poor aesthetics due to size and proportion problems of upper front teeth, as shown in Figure 1.

Initially to study the case, diagnostic impressions were performed using condensation silicone (Zetaplus, Zhermack Badia Polesine, Rovigo, Italy), in which was poured Type III dental stone (Gesso-Rio, Orlando Antonio Bussioli – ME, Rio Claro, Brazil) to obtaining model and diagnostic wax-up.

Through the mock-up technique, which consists of an aesthetic trial, it was possible to verify if the waxing corresponded to the professional and the patient expectations. To perform this trial, first an extra hard silicone guide (Zetalabor, Zhermack, Badia Polesine, Rovigo, Italy) was prepared in diagnostic waxing shape and it was filled with nanoparticulate bisacrylic resin (Protemp 4, 3M, Chapecó, Brazil), shade A2. The assembly
was then taken into position over patient teeth, which had been previously isolated with Vaseline. After 3 min the guide was detached, excesses were carefully removed and finish was performed with a diamond burr 1190F (KG Sorensen, Cotia, Brazil). Potential failures and bubbles were filled with fluid resin (Filtek Z350 XT Flow, MN, the United States of America). The result was shown to the patient and his responsible, therefore, approved for completion of treatment [Figure 2].

In order to obtain a clearer and aesthetic color, providing an even more satisfying end result, three sessions of laser bleaching were performed in office with hydrogen peroxide at 35% (DMC, Plantation, FL, the United States of America) associated with home bleaching with carbamide peroxide 16% (FGM, Joinville, SC, Brazil), 2 h per day over 1-week.

Thus, the preparations for the central and lateral incisors, canines, and premolars receive the pieces were performed using a diamond burr 2135 F (KG Sorensen, Cotia, Brazil). It should be noted that conservative preparations were performed, the interproximal areas were very mildly reduced, the sharp edges were rounded and the vestibular faces lightly flattened, removing no more than 0.2 mm of enamel [Figure 3].

Addition silicone (Express XT, 3M, Chapecó, SC, Brazil), with heavy and light body by simultaneous molding technique, was used for impressions of prepared teeth using gingival retraction cord # 000 (Ultrapak, Ultradent Products, South Jordan, UT, the United States of America) without hemostatic, which was removed at the time of performing molding. The mold was poured with Type IV dental stone (Durone, Dentsply, Petrópolis, RJ, Brazil) to obtain the master cast and to ceramic pieces manufacturing. Besides the master model, the model with diagnostic waxing was also sent to the laboratory (Romanini, Londrina, PR, Brazil) as well as photos of the patient’s smile.

After pieces finalization [Figure 4], a clinical trial to select the color of cement was made, using try-in pastes (Variolink Veneer, Ivoclar Vivadent AG, Schaan, Principality of Liechstein, Switzerland), and color x0 was selected. Then, the preparation of pieces and dental substrate for permanent cementation started. The interior of the pieces were etched with hydrofluoric acid 10% (Dentsply, Petrópolis, RJ, Brazil) for 20 s, washed, and dried, 37% phosphoric acid was applied for 1 min, and pieces were washed and dried, then Silane (Monobond S, Ivoclar Vivadent AG, Schaan, Principality of Liechstein, Switzerland) was applied. Prophylaxis of prepared teeth was performed with pumice and water, with the utmost care to avoid possible bleeding, and etching for 30 s with 37% phosphoric acid (Dentsply, Petrópolis, RJ, Brazil), after washing and drying,
the adhesive application was performed (Dual Excite, Ivoclar Vivadent AG, Schaan, Liechstein, Switzerland) on teeth surface without light curing.

The resin luting cement (Variolink Veneer, Ivoclar Vivadent AG, Schaan, Liechstein, Switzerland) previously selected was manipulated and applied into the internal surfaces of the piece, which was held in position, with a brief light curing in order to remove the excesses by using a microbrush. This procedure was initiated simultaneously by the pieces of the central incisors, followed by the other elements. After all pieces in position, the final polymerization was carried out for 60 s on each side of dental elements. Possible occlusal interferences were checked with the aid of carbon paper (Accu-Film II Parkell, Farmingdale, NY, United States), and the necessary adjustments were made.

The remaining excesses were eliminated with excesses remover (SS White Duflex, Juiz de Fora MG, Brazil), adhesive application was performed (Liquid Strip, Ivoclar Vivadent AG, Schaan, Liechstein, Switzerland), and then margins light curing of all elements were performed for 40 s.

Upon contact lenses installation [Figure 5], the patient was informed about maintaining oral hygiene and proper care. Monitoring was carried out once a month, for 3 months and every 6 months, for 2 years [Figure 6].

Discussion

Treatment of choice

As a solution to the lack of aesthetics of this case, treatment using ceramic fragments of lithium disilicate has been proposed. Although, there are other options, this was the treatment of choice for presenting excellent optical properties, enhanced translucency and better mechanical properties due to adhesive cementation. Moreover, this treatment is currently the most conservative that exists, even in comparison to the composite resin or porcelain veneers.[9,10,13]

Primarily, the main problem in relation to direct restorations, such as composite resin veneers, is the color change that material can undergo in a short time, besides other disadvantages such as high surface roughness and high incidence of marginal slivers and fractures, while the porcelains exhibit good color stability over time and excellent mechanical strength after the cementing to the dental substrate.[1,14]

Aesthetic trial

Due to the high treatment cost and patient’s expectation regarding the resolution of an aesthetic problem, most often, elective, a trial simulating the final result must be performed before the execution of an irreversible procedure, in order to show the patient what is being proposed, and to identify possible required changes. Thus, we chose to perform a diagnostic waxing followed by an aesthetic trial with mock-up technique, which allowed to assess the treatment predictability and ensure better outcomes for our patient.[15]

Factors related to the restoration of color

There are many factors that influence the color rehabilitation. It is known that due to ceramics thinness and optical factors, such as translucency and opalescence, the dental substrate and cement color are directly related with the final result. Thus, laser bleaching was performed in association with home bleaching in order to achieve a more aesthetically satisfactory coloration.[1,9]

Not only the choice of cement color, but also the type to be used, directly influences the outcome of the restoration final coloration, particularly in the medium and long-term. It is known that the dual cements are photo and chemically activated, what is responsible for the color change over time. Hence, such cements are not the most suitable for these restorations.[16]

Thus, in this case, a light cured resin luting cement was used (Variolink Veneer, Ivoclar Vivadent AG, Schaan, Principality of Liechstein, Switzerland). Due to the thinness of prosthetic piece, the light is able to focus and catalyze the cement without any functional impairment, ensuring higher color stability over time.
Conservatives preparations

The preparations were extremely conservative and basically restricted to an interproximal slight decrease, vestibular planning, and sharp edges removal, which could hinder the restoration adaptation. The tooth structure preservation has many advantages, since there is no need of anesthesia or postoperative sensitivity and especially, the cement adhesion to the enamel presents more efficient and reversible, facilitating the acceptance of the treatment by the patient.[8,11] Some authors claim that an extremely conservative preparation, as reported here, without a subgingival termination, would not be so appropriate, since this may result in restoration over-contouring in cervical and proximal regions, and a higher risk of failure due to gingival inflammation and secondary caries.[3,11,13]

However, as observed in Figure 5, over-contouring problems have not been observed in our patient, because this specific patient has teeth reduced in size without the need of further removals. Other cases must be individualized and analyzed to determine the appropriate amount for tooth structure removal, thus, avoiding over-contouring and/or coloring problems.[11]

Final procedures

After installation, a meticulous occlusal adjustment was conducted in opening and closing, as well as in excursive moves (lateral and protrusive) with carbon (Accu-Film II Parkell, Farmingdale, NY, the United States), to avoid excessive stress on the ceramic restoration, as well as on the teeth.

It is also an extremely important that dental surgeon clearly advises the patients regarding hygiene and the care needed with food, especially concerning tougher foods, to avoid the risk of fractures and detachments.[3]

In the current case, after a year of prosthesis installation, during a control, a slight gingival inflammation was observed, and brushing and oral hygiene were reinforced. The patient returned to periodic controls every 6 months for maintenance and verification of the prosthesis and adjacent periodontal analysis. It’s possible to verify the success of the rehabilitation after 2 years of installation in Figure 6.

Conclusion

It is concluded that contact lenses are currently the best treatment option for elective aesthetic cases, because it is an extremely conservative rehabilitation and mimic quite closely the dental structure. This is a treatment with great predictability, since clinical steps are duly respected. It is noteworthy that it is dental surgeon responsibility to explain the patient the advantages and disadvantages of treatment, as well as the type of care that this rehabilitation requires.

References
