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Planning the esthetic smile: a case report

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Resumo

A beleza e a harmonia das restaurações odontológicas estão controladas por alguns fatores que servem de parâmetros e auxiliam na reconstrução de um sorriso, a estes fatores chamamos de princípios estéticos. O objetivo deste trabalho foi descrever um caso clínico elucidando os principais princípios estéticos e ao mesmo tempo observando que estão todos interligados para a obtenção de um resultado estético satisfatório. Foi possível concluir com este relato de caso clínico, a devolução da harmonia do sorriso sobre o ponto de vista estético e funcional.

Palavras-chave: Planejamento; cerâmica; estética.

Abstract

The beauty and harmony of dental restorations are controlled by several factors that serve as parameters and help in the reconstruction of a smile, and these factors are called esthetic principles. The aim of this study was to describe a clinical case elucidating the main esthetic principles, and at the same time, observe that they are all interconnected in order to obtain a satisfactory esthetic result. Through this Clinical Case Report it was possible to conclude restoration of the harmony of the smile from the esthetic and functional points of view.

Keywords: Planning; ceramics; esthetics.

INTRODUCTION

The continuous advancement of Esthetic Dentistry is mainly attributable to the adhesive procedures and development of restorative materials that seek to reproduce the natural characteristics of the teeth[1].

The ability to recognize the anatomic characteristics of natural teeth enables the professional to reproduce them with restorative materials. In addition, the more naturalness one is able to incorporate into a certain prosthetic part or restorative procedure, the less perceptible it will be in the patient's mouth[2].

The normal anatomic shape of the teeth and their alignment in the dental arch not only assure efficient mastication, but also contribute to maintaining their integrity and the stability of their position[3]. The protective functional shape of dental crowns (role played by dental crowns) is characterized by anatomic details with functional significance and are recognized as being esthetic. As deformities of the smile, although superficial, limit an individual's social activities, they should be corrected whenever possible to restore his harmony and equilibrium, and re-integrate the individual into his social circle[4].

At the time of preparing esthetic planning it is important to evaluate facial harmony. Therefore, the individual's capacity to exhibit a pleasant smile depends directly on the quality of the teeth and gingiva that contain them, their conformity with the rules of structural beauty, as well as the relationships existent between the teeth and lips during the smile and their harmonious integration with the facial composition[5].

In seeking to find an agreeable composition in the smile, some factors of esthetic arrangement must be observed for guidance in performing clinical work, such as proportion, symmetry and perspective, used as guides for restorative treatments. One could say that the dental relationships and proportions in the anterior segment determine the equilibrium and esthetic perception of a smile[6]. In order to apply the requisites of symmetry in a clinical context, it is important to find the shape, color, texture and position that correspond to the teeth in the maxillary hemi-arches. Dominance refers-to the fact that the central incisors must be the dominant and most observed teeth. Knowing the predominance of the central incisors, it is recognized that the lateral incisors must have a proportionally smaller (62%) appearance in relation to the central incisors. Similarly, the proportional appearance of the canines in relation to the lateral incisors must be 62% smaller and coincident with the proportional appearance of the pre-molar. In relation to the central incisor, the canine proportionally appears to be 33% smaller[5].

For Magne, Belser[7], a didactic presentation of oral esthetics should primarily include the fundamental criteria related to the hard and soft tissues, which may easily be controlled, using an esthetic checklist. Both dental and gingival esthetics act in conjunction to provide a harmonious and balanced smile.

When esthetic reconstruction is planned, the clinician is in a position to make a logical diagnosis that approximates the end result to the initially established treatment plan, nevertheless, for some patients Restorative Dentistry is unable to solve all the problems, and intervention provided by other specialties is required[8-10].

Thus, the aim of the present article is to demonstrate the applicability of the principles of Esthetic Dentistry by means of a clinical case, pointing out the importance of adequate planning before performing the restorative procedures.

CLINICAL CASE REPORT

The patient O Z., a 29-year-old man, sought the Restorative Dentistry Specialization clinic of ABO Cascavel/PR, reporting dissatisfaction with the appearance of his smile, and wishing to replace the restorations in his anterior teeth (Figure 1).

On clinical examination his teeth were observed to be darkened, poorly positioned, with extensive, unsatisfactory restorations, in addition to alteration in the gingival contour. With the purpose of obtaining lasting esthetic treatment, it was decided to fabricate total crowns on elements maxillary right central incisor, maxillary left central incisor and maxillary left lateral incisor, taking into consideration that these teeth had extensive restorations on all the faces.

The diagnosis and treatment plan were made with the aid of radiographic exams, photographs and study models mounted in a semi-adjustable articulator.

After careful evaluation of the case, the following treatment plan was established: Endodontic treatment in the maxillary left central incisor; endodontic re-treatment in the maxillary right central incisor and maxillary left lateral incisor, as they were in an unsatisfactory condition and afterwards, the placement of glass fiber intracanal posts; gingivoplasty in the maxillary right central incisor; home dental bleaching in the two arches; preparation of the maxillary right central incisor, maxillary left central incisor and maxillary left lateral incisor for the placement of glass fiber posts and metal-free crowns; preparation for ceramic facets on the maxillary right lateral incisor and cosmetic recontouring performed with resin composite in the maxillary right canine and maxillary left canine after concluding the treatments in the other teeth.

Initially diagnostic waxing was performed, in an endeavor to restore the shape, proportion and adequate alignment of the anterior dentition (Figure 2).

The diagnostic waxing was tested in the mouth by means of a mock-up. Thus, an impression was made of the plaster model using polyvinyl siloxane impression material to transfer to the mouth the characteristics obtained by means of the diagnostic waxing. Thus, it was possible to check whether the length, alignment and anatomy of the teeth were adequate, and verify the patient's approval in order to begin with the treatment itself[5].

During periodontal evaluation, imbalance of the gingival margin of the maxillary right central incisor was found, and use of the gingivoplasty technique was indicated, with the aim of achieving a suitable gingival shape and architecture. After

Figure 1. Pretreatment view of the patient. Note the yellowish color and the presence of several defective restorations.

Figure 2. A diagnostic wax-up carried out to determine the desired restorative procedures.

waiting 45 days for healing to occur, dental bleaching was performed in the two arches by the home method, using trays with 16% Whiteness Perfect bleaching gel (FGM Produtos Odontológicos, Joinville, SC, Brazil), for 21 days. The result obtained with the treatment was bleaching from shade A4 to A1.

Once the color between the two arches was in perfect harmony, work began on the preparations, which were performed in accordance with the principles of metal-free restorations, oriented by guides obtained from the diagnostic waxing, and enabled selective wear to be performed.

Initially, a retractor wire #000 (Ultrapack/ Ultradent, Indaiatuba, SP, Brazil) was inserted into the gingival sulcus to withdraw the tissue and improve visualization of the cervical terminal during preparation. With the vestibular portion of the silicone matrix tested in the correct position, the work of making the preparations began.

Proximal wear was performed with a diamond tip 2200 (KG Sorensen, Cotia, SP, Brazil), eliminating the points of contact. After this, the more voluminous vestibular area was worn with a diamond tip 4138 (KG Sorensen, Cotia, SP, Brazil), the vestibular matrix was once more put into place and a more uniform space between the matrix and tooth was verified. The palatine guide was positioned for incisal reduction of 2 mm, and grooves were created to guide the wear process. A diamond tip 1014 (KG Sorensen) was used to create an outline for the cervical terminal. With the diamond tip MF3098 (KG Sorensen, Cotia, SP, Brazil) in position, vestibular and palatine guidance grooves were made, and when these grooves were joined the preparation was concluded. Finishing began with a diamond tip MF3098 and FF (KG Sorensen, Cotia, SP, Brazil) in a multiplier counter-angle, using medium grain abrasive papers (3M ESPE, St. Paul, MN, EUA) rounding the angles. A manual instrument was used to refine the cervical terminal, thus concluding preparation of the maxillary right central incisor. The same sequence was performed for all the other teeth. Preparation for the facet on the maxillary right lateral incisor was based on the same principle as that described for the total crowns, involving the proximal and vestibular faces, and incisal reduction.

In order to analyze the preparations, a silicone mold was made from the diagnostic waxing model which was cut in the mesiodistal direction using a scalpel blade, to make a gap in the middle third. During the preparations, the silicone guide was put in place again to check whether there had been sufficient wear (Figure 3).

The provisional crowns were previously fabricated from the waxed model, using Duralay acrylic resin in shade 66 (Figure 4). These were relined in the mouth with acrylic resin and kept in place with the aid of the silicone guide. After finishing and polishing, they were cemented to the previously prepared teeth with temporary cement (RelyX Temp/3M ESPE, St. Paul, MN, USA).

In the next session, molding was performed with addition silicone (Elite/Zermack, Via Bovazecchino, Italy) and gingival withdrawal was performed by the dual wire technique, using retractor wires #000 and #0 (Ultrapack/ Ultradent, Indaiatuba, SP, Brazil), the latter being imbibed in hemostatic solution. The #000 wire was kept inside the sulcus during molding, and only the #0 wire was removed. Molding was performed in a single step; that is, the light material was injected onto the preparations and after this, the heavy material onto the mold (Figure 5).

Figure 3. Using the silicon guide, check whether there had been sufficient wear.

Figure 4. The provisional crowns.

The color selection stage was performed with the color scale of the Vita Clássica (Vita Zahnfabrik. H. Rauter GmbH & Co, Bäd Sackingen, Germany) shade guide, with photographs and schematic mapping drawings to help the technician with adjusting the shade and verifying the texture.

The prostheses were fabricated with E-max all-ceramic system (Ivoclar Vivadent, Barueri, SP, Brazil) and cemented with Variolink II (Ivoclar Vivadent, Barueri, SP, Brazil) cement shade A1 (Figures 6 and 7).

DISCUSSION

Technological advancements in restorative techniques and materials have made it possible to perform procedures capable of re-establishing the functional, esthetic and biologic factors characteristic of dental tissues[11,12].

When analyzing the esthetics of the smile, it was possible to note that there was disharmony, or even complete absence of harmony with some of the basic principles applied in Dentistry. One could mention, for example, the fact that the teeth presented discoloring of a physiological nature, resulting from pigmentation, and of endodontic origin, in addition to extensive and unsatisfactory restorations in the anterior teeth. The central incisors differed between them in shape and length, and were shorter than the canines. The maxillary left central incisor and

Figure 5. The final preparations of teeth are shown.

Figure 6. The intraoral view of the final restoration.

Figure 7. The intraoral view of the patient 1 year after the treatment.

maxillary left lateral incisor presented alterations in position and alignment. Due to the shortening of the central incisors, the line of the smile was inverted. The gingival pattern was normal, however, photographic analysis showed asymmetry in the gingival contour of the maxillary central incisors.

As the patient's smile was in disagreement with many of the esthetic principles, planning was necessary to re-establish esthetics and function. This was possible using the basic principles of shape, symmetry, proportionality, color, position and alignment as a foundation.

It is known that the treatment plan must be prepared so that is allows a good prognosis to be formulated in the medium and long term, not only in esthetic terms, but also considering the biologic and functional aspects[13,14].

It is important to establish a logical sequence, making available the various possibilities of techniques and restorative materials to make the reconstruction of the anterior teeth more predictable[15]. In this regard, Greenberg, Ho[16], related that an individualized esthetic planning must follow a sequence of procedures in order to obtain the information essential to determining the clinical case. It is recommended that one should begin with a detailed clinical exam, followed by radiographs, photographs and study models.

In accordance with these proposals, after the initial exam, the study models were duplicated to perform diagnostic waxing with the purpose of facilitating visualization of the shape, position and proportion of the future restorations. Waxing is a facilitator of communication between the professional, technician and patient[16].

Interaction among the dentist/dental prosthesis technician (DPT)/patient in the preparation of planning is essential for a satisfactory end result[17]. Resources such as digital photographs and diagnostic waxing facilitate full understanding of the possible solutions that can be achieved, with the best prognosis being the goal at all times [18].

Dental preparations can be performed by the technique of controlling wear by the thickness of the diamond tip used, or by the intelligent preparation techniques. The former is the most traditional and most commonly used technique and has the disadvantage of greater difficulty in controlling the quantity of tissue to be worn.[19] Whereas the technique of making intelligent preparations was selected because of being more conservative and predictable as regards the thickness of wear. This technique is performed with the aid of individual silicone guides obtained from the diagnostic waxing, in which one seeks a more conservative approach during dental preparation, in order to perform selective wear only where there no space as yet for the restorative material[7].

A matrix guide was fabricated by means of an impression taken of the waxed model with the use of silicone material, which could be either addition or condensation silicone, however, it is recommendable to opt for a material with a high degree of rigidity[20]. According to the recommendation made by Behle[21], after the material has set, the matrix must be removed from the model, and with the aid of a scalpel blade No. 12 or 15 the vestibular portion must be cut on the incisal line (vestibular-incisal salience). It was possible to verify that the technique of wear guided by the matrix is safe, fast and precise, and it is worth spending time on planning, in order to guarantee a result that satisfies the both the patient's and professional's expectations. Another important factor to observe at the time of preparation is the cervical extension, as this is related to conservation of dental structure and/or esthetics and/or retention. This is because sub-gingival preparations involve greater wear, are more esthetic and provide greater retention, whereas supra-gingival preparations involve less wear, are less esthetic and provide less retention. It must be pointed out that sub-gingival preparations mean a maximum extension of 0.5 mm into the gingival sulcus, although some authors accept up to 1.00 mm. A preparation exceeding this distance will, in a short space of time, cause a gingival alteration,

which, if left untreated, could develop into loss of bone insertion. It is also of fundamental importance to define the cervical terminal, which in cases of negligence or error is sometimes directly or indirectly responsible for leakages that lead to loss of the restoration, and may be accompanied by pain, halitosis, esthetic problems and/or reduced masticatory efficiency[4].

The silicone matrix was also an important aid at the time of fabricating and relining the provisional crowns, as it allowed them to be kept in the correct position without the occurrence of their misalignment. It was found that this minimizes the need for repeating the work, in addition to greatly facilitating the predictability of the end result[22].

During the stage of the provisionals, the importance was noted of starting with reproduction of the characteristics of the natural teeth, to simulate the possible final desirable effects of the definitive restorative material. The provisional restorations were cemented with a eugenol-free cementation agent, as eugenol may interfere negatively in the process of polymer material bond to this substrate. The hydrogen atom present in the OH- radical of the eugenol molecule is transferred to the monomer radical of the polymerization reaction initiator, preventing the conversion of monomers into polymers, being capable of directly affecting the mechanical properties of the tooth/resin bond[14].

In the present study it was possible to observe that planning was fundamental, because by restoring the dominance of the central incisors the harmony of the smile was re-established. Therefore, the cosmetic recontouring of the canines initially proposed was discarded, as they no longer drew the observer's attention as much as they previously did. The patient declared his satisfaction with the shape and spatial disposition of the canines.

The information about the dental substrate color and the shade desired for the final work was passed on to the technician by means of photographs and schematic drawings, in which a chromatic map of the dental element was established[12]. The all-ceramic E-max system (Ivoclar Vivadent, Barueri, SP, Brazil) was selected because it has a lithium disilicate coping, which is capable of being acid etched, and thus improves the bond to the preparation. In addition, it is a feldspathic ceramic with high translucency that more easily mimics the tooth structure and reproduces it more faithfully[8].

When planning an esthetic reconstruction of the smile, it is indispensible for the professional to take into consideration some of the important characteristics, such as: Labial thickness, height of the smile line, gingival health, during the patient's clinical exam, in addition to evaluating the need for orthodontic treatment[23-25].

Integration of esthetic restorative treatment with the patient's lips and face are shown in Figure 7. Re-establishment of the anterior tooth dimensions was important to restoring the harmony of the patient's smile. Thus, the diagnostic waxing and restoration mock-up were fundamental tools for analysis.

CONCLUSION

It was possible to conclude that no technical procedure is sufficient by itself, and the professional should seek the most harmonious possible result by observing each individual. Intervention in the teeth should be performed according to the mouth and face that provide their support, which demands an artistic touch and a keen sense of observation, because esthetic dental treatment involves artistic and subjective components to create the illusion of beauty. One could say that Esthetics in Dentistry is dento-facial harmony, and above all, balance between the individual characteristics of each one, however, it follows some principles which, if respected, make it easier to obtain more satisfactory results both for the one who performs the work and for the one who receives it.

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