AESTHETIC REHABILITATION OF THE "GUMMY SMILE" ASSOCIATED TO VIRTUAL PLANNING WITH "DIGITAL SMILE DESIGN" - DSD

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ABSTRACT

The smile has a great importance in the life of an individual, not only for aesthetic reasons, but also for psychological, social, emotional relationships and health reasons. Excessive gingival exposure during smiling - the gummy smile - is currently being considered as a factor unaesthetic before professionals and layman. There are several factors responsible for the gummy smile, among these the most common are altered passive eruption and vertical growth of the maxilla. For the implementation of a differentiated dental treatment seeks increasingly interact with virtual and photographic methods. Thus, the Digital Smile Design (DSD) is a virtual tool based on intra and extra oral photos, which aims to provide a preview of the treatment, as well as a multidisciplinary communication. In periodontology there are several surgical techniques designed to correct the gummy smile, all when well indicated feature a satisfactory aesthetic result. This study aims to demonstrate through a case report, the use of a virtual tool (DSD) used in planning a rehabilitation gingival aesthetics. This method is a viable alternative for the promotion of an aesthetically pleasing smile.

KEYWORDS: Periodontics, gum surgery, virtual planning.

1. INTRODUCTION

The aesthetic has always been seen as synonymous with beauty. The face, being the body part that attracts much attention in the first instance, must present nice morphological features. The constant quest for a beautiful smile is currently one of the reasons responsible for the high demand of the population for aesthetic dental treatment[1]. The reference standard of a smile considered ideal, is usually formed through the harmonious relationship between teeth, soft tissue and facial features[2]. The latest concept approached by visagism shows a concern relating to the facial features with the shape of the teeth and hence the type of the patient's smile. Thus, based on this concept, the kind of the smile might be able to indicate or suggest the type of personality of an individual[3].

There are several ways to measure and classify the type of smile. However, the most followed by most professionals, is employed by Garber & Salama (1996)[4]. In this way of evaluation, we use the position of the lower edge of the upper lip relative to the gingival margin of the maxillary anterior teeth to classify the type of smile. The features presented by gum tissues and diversity in patients occur due to genetic reasons[5]. In a recent literature review, Esfahrood *et al.* (2013)[6], highlight the different periodontal biotypes, respond differently to inflammation, surgical and restorative treatment and so it is very important to identify the tissue biotypes before the aesthetic treatment.

A frequent complaint among patients seeking dental office is currently dissatisfaction with the smile due to gummy smile, characterized by too much exposure to a range of gum (greater than 3 mm) in apiculture coronal direction during the act of smiling[7].

The etiology of the gummy smile is extremely important to determine the ideal type of treatment for different cases, being essential to the achievement of accurate anamnesis and clinical and radiographic examination[8]. The hyperactivity of the elevator muscles of the upper lip, dentoalveolar extrusion, short upper lip, excessive vertical maxillary growth, altered passive eruption, gingival hyperplasia drug are the main causative agents in the literature[9].

Dentistry recently gained a form of assistance in planning aesthetic, and can be applied with the periodontal surgical planning. This innovative technique, called Digital Smile Design (DSD) consists in using digital images of high quality, via digital photographs. Recently, Coachman *et al.* (2012)[10] presented the DSD that it is the use of images worked in PowerPoint or

Keynote software, able to help in the virtual dental plan. This technique consists of inserting lines and drawings on digital facial photos and intra patient's mouth. This procedure helps in the analysis, documentation and communication between professional and patient, encouraging understanding and visualization of the proposed treatment. Thus, after identifying the problem and correct virtual diagnosis to implement appropriate for case resolution technique.

Therefore, this work aims to present a Case Report in which the virtual planning was used as an aid in periodontal surgical planning in order to correct the gummy smile.

2. CASE REPORT

Patient with initial "S.S.D.B.", female, 25 years old, came to the dental office of University Paranaense - UNIPAR, complaining of dissatisfaction with your smile due to overexposure of the gingival tissue during the act of smiling. Clinical history was taken and it was found that the patient had no systemic involvement. Moreover periapical and panoramic radiographs, facial analyzes were performed, detecting the type of high smile, also called "gummy smile" (Figure 1).

Figure 1. Patient with "Gingival Smile".

We proceeded to the clinical examination and noted that the patient had short clinical crowns with large amount of attached gingiva: a gingival phenotype plan / thicker with gingival asymmetry. After clinical and periodontal evaluation, diagnosis passive rash associated with altered growth vertical of the maxilla (Figure 2).

The treatment proposed for the resolution of this case was periodontal surgery using the technique of internal bezel without osteotomy. Clinically there was a large gingival inflammation due to accumulation of dental plaque and calculus, which led to the need for adaptation of the oral environment through scaling and prophylaxis prior to esthetic periodontal surgery.

Figure 2. Short clinical crowns, gingival phenotype plan / thicker; gingival asymmetry, altered passive eruption accompanied by vertical growth of the maxilla.

The planning of the event was carried out with the aid of intra and extra oral photographs of the initial patient in the virtual planning technique DSD (Figure 3), with the goal of providing a better understanding and preoperative visualization of the proposed treatment.

Figure 3. Virtual planning of the technique DSD.

After obtaining the information of the characteristics of the patient's smile, through the DSD, the diagnostic waxing the surface of the working model was developed. Subsequently, we performed a mock-up, playing the final surgical outcome prior to surgery, providing patients with an accurate view of the proposed treatment, interacting with professionals. In this technique, via waxing of the model, we saw the amount of gum that will to be removed. A wall is made of silicone on the waxed model, and through it, a self-curing bisacrylic resin (Protemp 3M) who rebuilt the tooth structure, thus having a direct simulation of the patient's mouth. During the two days, the patient remained with the mock-up having the opportunity to evaluate the proposed design (Figure 4).

With the previously waxed model, a surgical guide was prepared, with the purpose of assisting in surgery, providing a reference to the incisions and following the gingival contour proposed. In view of the patient satisfaction with the simulation, has begun the surgical procedure.

Starting from the selected surgical technique followed the procedure with infiltrative anesthesia in the region of molars, premolars and incisors with complement on palate.

Figure 4. Mock-up in position.

Then, took place the trans-sulcular survey in order to ascertain the location of the bone crest and the realization of the bleeding for reference and comparison with previously manufactured surgical guide points.

Figure 5. Incision was prepared in the design of the surgical guide.

With the surgical guide into position the incision with the blade 15C was performed at 45° to the long axis of the tooth at the incisal to apical direction, starting from the right first molar to the left watching the drawing (Figure 5).

Figure 6. After removal of the collar gum.

After, an intra-sulcular incision and removal of the gingival collar we performed with a curette Mac Call 17-18. Subsequently a total flap was folded to check bone architecture, restoring the limits of biological space, followed by simple suture interpapillary, guaranteeing greater stability, approximation and coaptation of the tissue (Figure 6).

At the end of the procedure the patient was oriented about the care during the postoperative period. Was prescribed: antibiotic (amoxicillin 500 mg, 1 capsule every 8 hours for 7 days), antiinflammatory (nimesulide 100 mg, 1 tablet every 12 hours for 5 days), analgesics (acetaminophen 750 mg, 1 tablet every 8 hours for 3 days) plus a chemical control (0.12% chlorhexidine digluconate, 2 times a day for 7 days).
After 7 days, the patient returned to the clinic for suture removal and evaluation of post-operative healing process, according to Figure 7.

Figure 7. Suture removal after 7 days

The patient returned for follow-up 40 days after surgery, which underwent a restorative treatment for closure of diastema (figures - 8A and 8B).

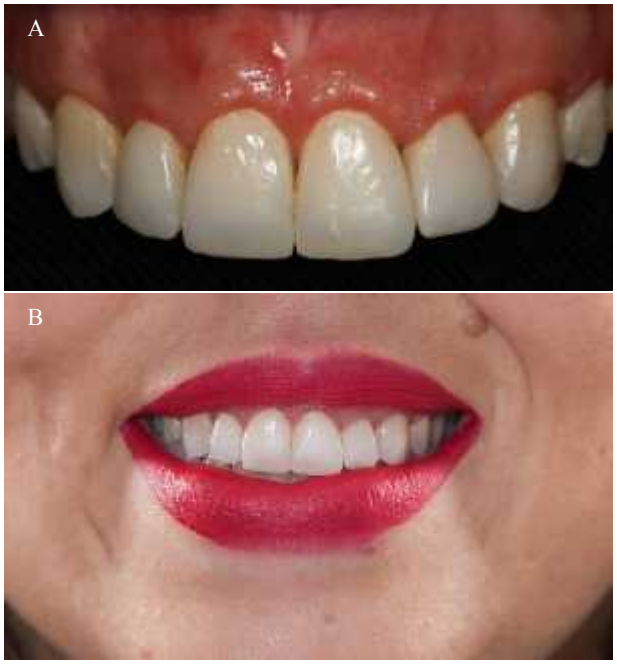

Figure 8. A: anterior and posterior restorations; **B:** final appearance.

3. DISCUSSION

The dental professional must submit a multidisciplinary knowledge to perform aesthetic procedures. The current periodontics has great contribution in planning and aesthetic association of dental specialties with photographic capabilities and computing represents an almost mandatory requirement for professionals involved with aesthetics. According Cairo *et al.* (2012)[11], the dentist must make a correct diagnosis and identification of possible etiologies of the patient's smile, evaluating quirks and ways of treatment.

Undoubtedly, during the aesthetic evaluation of the patient, the reference points described by Garber & Salama (1996)[4] are important to guide the aesthetic planning, as the incisal of the maxillary anterior teeth should follow the contour of the lower lip, the clinical crown the central incisors and canines have the same length, the length of the lateral incisors must be 1 or 2 mm shorter at the central and canines. Other information cited by Zanetti *et al*. (2007)[12] also deserve to be considered, for these authors, the complete harmony of the smiling also depends on the shape, texture and tooth and gum´s color as well as facial features such as facial contours, midline, labial line and interpupillary line.

Garber & Salama (1996)[4] classified four types of smiles as low, which is characterized by exposure of only 75% to less than the height of the clinical crown of the anterior superior teeth, the mean grin, which exposes the total height of the tooth along the interdental papillae or 75% of this, and high when the total height of the tooth is visualized and an amount of greater than 3 mm gingiva is exposed during smiling, which characterizes the so-called “gummy smile." These authors considered the exposure of the gingival margin of the maxillary incisors between 1-3 mm in the act of smiling as the standard more aesthetic smile. Based on this classification, the patients in this study had a high type of smile, and etiology of altered passive eruption it was excessive gingiva on the crown of the teeth, giving appearance of short teeth, associated with the vertical growth of the maxilla.

The knowledge and identification of gingival biotype represent an important stage for the correct diagnosis and treatment planning. The literature points to two gingival biotypes: flat/ thicker and dense fibrotic feature with less inequality between the buccal and interproximal gingival margin, with wide and thick gingiva and buccal massive bone contour related to teeth with square shape and high point of interproximal contact. Already the "thin/ festooned" biotype is characterized by a delicate gingival surface translucent appearance being that the papilla does not fill all the space of the interproximal niche, little thin gingiva and buccal bone contour, presence of fenestration and dehiscence related to teeth with triangular in shape and point of contact decreased in incisal or occlusal[13].

The fine/ festooned biotype gum tends to have an inflammatory response when subjected to physical trauma leading to the development of gingival recession. Already biotype plan/ thicker reacts to trauma with signs of inflammation and gengival[14] growth. The patient had gingival biotype plan / thicker supra-bony pockets.

Now, due to the established diagnosis and characteristics of the smile in question, it becomes easier to choose the type of proper technique for each situation. In patients with a gummy smile, the augmentation procedure crown may be a viable alternative in aesthetic rehabilitation. For Gusmão *et al.* (2006)[15] all surgical techniques and increased clinical crown, aims at the reduction of excessive gingival tissue by removing or repositioning of apical gum line. Pedron *et al.* (2010)[16] stated that periodontal surgeries are appropriate to restore the anatomical characteristics and the relationship between teeth and gum procedures.

For the choice of the appropriate surgical technique for a particular case, you should follow some important criteria such as: evaluating the need for osteotomy, identify the etiology of overexposure gum and locate the distance between the cementum enamel junction and bone crest and between cementum enamel junction to the gingival margin[17]. The case hereby presented in this article, both techniques of internal and external bezel could be used, however, opted for the technique, based on the literature, presented some advantages, such as correction of gingival height, access, when needed, to alveolar bone, feasibility suture ensuring a better healing with coaptation, and provide comfort to the patient during the post-operatório[18].

The DSD, commonly used in cases of prosthetic rehabilitation, proved to be versatile in this work and it allowed using it in virtual periodontal surgical planning. Therefore, this article seems to be one of the first to report a case of periodontal surgery previously planned and developed with the assistance of the DSD. This method, performed on digital images, transfer important information that can be used in the study model, where a diagnostic wax-up accordance with the planning provided[10].

This mechanism is intended as an aid in the treatment plan, providing a better understanding and motivation of the patient who can have a comprehensive view of before and after treatment, and facilitate interdisciplinary communication between dentist and prosthodontics. However, this method has the disadvantage additional cost equipment such as a computer and camera with its accessories, in addition to taking a larger clinical professional time spent to taking snapshots of the patient. But considering the pros and cons, it is believed that the safety and quality of planning as well as the final results

achieved with the use of the DSD method outweigh the additional costs.

4. CONCLUSION

The correct diagnosis of the etiology of "gummy smile" as well as the multidisciplinary knowledge of aesthetic and functional characteristics is of paramount importance to the treatment plan. The approach of helper methods aimed at restoring the "gummy smile" as the technique of DSD, with supporting technical mock-up and surgical guide, provide a differentiated and insurance planning. Thus, the technique of Digital Design Smile proved to be versatile, and can also be used in periodontal surgery planning.

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