Cara Smile: Use of Planning Software to Facilitate Esthetic Dental Treatment in a Case

Abstract
Treatment of the anterior teeth is challenging. Computer resources and software are available to facilitate a digital smile approach, thus allowing the dentist to plan and predict an aesthetic result for a patient, particularly when an integrated multidisciplinary approach is necessary. Digital smile design has emerged as a tool in cosmetic dentistry that helps both professionals and the patient to visualize the result, in addition to facilitating a discussion between the two before establishing a final treatment decision. Here, we present a case involving a 27-year-old female who underwent multidisciplinary treatment initiated by digital planning using specific software, namely Cara Smile. The patient presented with complaints of maxillary tooth malalignment, staining, and fractures. To obtain the correct width-to-height ratio, a simulated gingival procedure was performed in the software. Gingivectomy was performed using digital simulation, and 90 days after surgery, cast and wax-up models maintaining the previously planned width-to-height ratio for the maxillary anterior teeth were made. Esthetic crowns and veneers were fabricated using the digital planning protocol. Therefore, Cara Smile is useful to facilitate the diagnosis through digital photos, improve communication between the various professionals involved in treatment, and guide the predictability of treatment and patient acceptance.

Keywords: Ceramic, dental occlusion, dental veneers esthetic dentistry, periodontics

Introduction
Digital smile planning is a tool that provides a diagnostic image; improves communication between the dentist, patient, and technician; and enhances the predictability of the result. In the process of digital planning, the professional, patient, and technician can measure, in detail, the characteristics that may have gone unnoticed during clinical examination. It also allows for the devotion of a fixed amount of time to the execution, demonstration, and discussion of a treatment plan.

The protocol for digital planning involves a systematic sequence of pictures and lines that allow the involved individuals to assess the diagnosis and determine the risks and limitations of the proposed treatment procedure, including the possibility of asymmetries, discrepancies, and/or disagreements within the correct dentofacial parameters (the esthetic appearance of the mouth region, in addition to the eye and nose area, is the impressive element for facial esthetics). Several software titles (two-dimensional-Digital Smile System, Digital Smile System Srl; Smile Design components of the Cerec and inLab software, Nemo DSD 3D) are available for digital planning. A simple option that will allow rapid and efficient analysis should be chosen to optimize the work done by the team.

The Cara Smile (Heraeus-Kulzer), a new software available in the market, is a specific software developed for digital smile planning. It can be downloaded from the company’s website, and it has a different cost in each country. It features a tutorial that reveals and teaches the user how to use the program, which is simple and easy, and has a graphical interface that is pleasant for the user. This form of digital planning is different from conventional planning because it allows the patient to visualize tentative images of the result.

Worn and fractured incisors, previous restorations, and stained teeth can result in a negative effect on the smile. In addition, gingival esthetics are also important (gingival health, emergence profile, and gingival contour). Therefore, the esthetics of both

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the teeth and gums should be assessed to facilitate proper diagnosis, ensure effective communication within the team, and achieve predictability of treatment outcomes.\[^{3,4}\] The concept of digital planning can thus be used to facilitate interventions for improving the esthetics of a smile.\[^{4}\] Digital smile designing involves a multipurpose conceptual protocol that provides the following advantages: provision of digital photos to establish a diagnosis, improvement of communication among the involved team members, increase in the effectiveness of case presentation, and achievement of predictability of treatment outcomes and patient acceptance.

Here, we present a case involving a 27-year-old female who underwent multidisciplinary treatment initiated by digital planning using specific software, namely Cara Smile. Therefore, the objective of this study was to present a clinical case involving multidisciplinary treatment initiated by digital planning using specific software (Cara Smile) to facilitate the diagnostic through digital photos, improves communication between the periodontal and restorative professionals and guide predictability, and patient acceptance.

**Case Report**

In January 2016, a 27-year-old female with good general health presented to the clinic of a dental specialist (FUNORTE– Brasília) with complaints of malalignment, staining, and fracture of restored teeth in the maxilla. The patient’s history was documented and clinical and radiographic examinations performed, which showed root resorption in the maxillary anterior teeth and old restorations. Composite resin restorations associated with marginal inflammation, excessive gingival contouring, and subgingival margins were observed. The caries risk was considered to be low. Maxillary and mandibular models were fabricated, and photographs (a front-facing photograph while smiling and an intraoral photograph of the maxillary teeth) were obtained (Canon 70D, ISO 100; F22; 1/125s) for the case study. Prophylaxis, including initial periodontal scaling and root planning, was performed during the same session [Figures 1a–d and 2]. Oral hygiene instructions were given.

Cara Smile (for Macintosh; Heraeus-Kulzer), which can be downloaded from the company’s website, was used for digital planning. The home page recorded the patient information (name, E-mail address, age, and telephone number). The front-facing photographs and intraoral photographs of the maxillary teeth were added on the next page. The program allows additional photos to be inserted; however, this was not necessary for the primary planning procedure.

The following two lines were drawn for reference: A vertical line indicating the facial midline [Figure 1e] and

![Figure 1: Initial smile of a 27-year-old woman with complaints of malalignment, staining, and fracture of the maxillary anterior teeth (a-d). Images prepared using Cara Smile during the preparation of the digital plan, initial extraoral photographs showing the facial midline (e). Interpupillary line, horizontal (f). Reference line following the curvature of the lower lip (g). A clipping of the smile with the upper and lower lips aligned (h). Transfer lines, calibration, and dental contours at the left side (i). Final digital smile simulation (j), and final digital smile simulation with different shades for the teeth (k). Many effects can be manipulated in the software to planning the new smile](image-url)
a horizontal interpupillary line [Figure 1f]. Subsequently, a reference line following the curvature of the lower lip was drawn [Figure 1g]. The program allows the operator to select different languages, and the selection can be changed during the execution of a sequence. The following page includes a clipping of the smile with the upper and lower lips aligned [Figure 1h]. Using the reference lines (average face, the smile, and labialis), the teeth can be drawn by changing their lengths and widths (mesiodistal length can be obtained by measuring the maximum distance between the mesial and distal contact points of the tooth on a line parallel to the occlusal plane), as shown in Figure 1i. Figure 1i shows an increase in the length of the teeth on the right side of the image and causing the gingival zenith (the most coronal point of the gingiva) to be at a tangent to the edge of the upper lip. This suggested the need for periodontal surgery. The result was visualized on the final page of the program [Figure 1j and k]. The program allowed the operator to replace and adjust the previous steps if any additional changes are required.

While presenting the digital plan using Cara Smile to the patient, some points could be more easily explained and understood. The first point was the need for periodontal surgery to increase the length of the teeth. The second point was the need to address more than six teeth. The program also allowed modification of the saturation of the simulation, which enabled adjustment of the tooth whiteness. Waxing of the models was completed following the presentation of the digital plan.

The model was used to create a surgical guide. The periodontal osteotomy was performed using this guide. During the 3 months of healing, metallic cores were placed in the four maxillary incisors due to excessive crown loss. Waxing was performed again after the healing period. The color was selected using the VITA shade guide. Then, the mock-up was prepared using bis-acryl resin composite (Structur 3 Voco) to evaluate the size and shape of the waxing.

The maxillary canines and the first premolars were prepared for facets. The thickness of tooth structure removed for crowns and facets was 1.5 and 1.0 mm, respectively. A small cervical demarcation was made to mark the point of termination of indirect restorations. The preparations were completed by finishing and polishing the teeth using diamond burs (W and H, Wilcos). A displacement cord was inserted into the gingival sulcus (Pro Retract 0000; FGM), and an impression was recorded using polyvinyl siloxane (Express XT, 3M/ESPE); [Figures 3 and 4]. Provisional restorations were prepared with bis-acryl resin (Structur 3 Voco).

Ceramic crowns and laminates were fabricated using IPS e.max Press (Ivoclar Vivadent); [Figure 5]. After obtaining approval from the patient, the internal surfaces of the facets and crowns were etched using hydrofluoric acid for 20 s (Condac Porcelain 10% FGM), followed by rinsing for 20 s and drying with syringe air applied three times. A coat of a silane agent, Prosil (FGM), was applied, and a bonding agent, Ambar (FGM), was applied 60 s later.

The teeth were conditioned with phosphoric acid (37%) for 30 s; subsequently, the surface was rinsed with water and dried. Overdrying dentin can jeopardize adhesive bonding. One layer of the bonding agent Ambar (FGM) was applied to the teeth. Then, the adhesive system was applied,
followed by a gentle stream of air. The cement (All Cer
color E-bleach; FGM) was applied on the inner surface of
the restorations, which were then placed in their respective
positions [Figure 6]. Excess cement was removed with a
microbrush and floss. Each restoration was polymerized for
120 s using Radii-cal (SDI). The polymerization schedule
was the same for facets and crowns because the same
ceramic material was used for both types of restorations.

Occlusal adjustments were made with rubbers for
ceramic (Zzag), and the planned amount of disocclusion
and laterality was achieved. The result is shown in
Figures 7 and 8. Occlusal stability and the esthetic
appearance of the restorations were satisfactory at 18
months after the treatment [Figures 7, 8 and 9].

Discussion

Communication between patients and the professionals
involved in their treatment is fundamental.[5] In the present
case, Cara Smile was used to reveal the possible results of
periodontal surgery and further restorative treatment to the
patient. Patients often cannot understand or visualize their
final treatment outcomes during a verbal discussion with
the clinician. We were also able to present the number of
teeth requiring treatment to the patient through the digital
drawings. Patients often question the number of teeth
indicated for restorative treatment due to the resultant costs
of the procedure. However, in patients with a wide smile,
exclusion of the premolar from the treatment plan results
in a large buccal corridor, which causes a disharmonious
smile.[6] Several patients also demand whiter teeth. Cara
Smile allows the clinician to present drawings with
different hues; hence, the patient has a better vision of the
appearance of his or her teeth with a more natural color.
Thus, the digital planning of restorative treatment can be
used to convince patients about the proposed treatment. The
patient and the family, including those living in different
cities, can take their time to assess these digital photographs
for days or weeks before treatment initiation; this is not
possible with the conventional method involving acrylic
resin mock-ups, which can cause gingival inflammation.

The Cara Smile software can be “downloaded” from the
company’s website and has a different cost in each country.
However, this is the only additional cost incurred by the
professional and the patient. Nowadays, dental laboratories
use these softwares to prepare an effective treatment plan;
however, they charge a certain amount for this service. The
dentist can avoid this by learning how to use the digital
planning system with the tutorial provided on the website.

Several techniques for restoring teeth are available,
including the use of glass fiber pins and metallic cores.
Quartz or glass fiber posts are compatible with root
structure and esthetic for final restorations. Hence, the
dentist can choose by his preference and ability for direct
or indirect procedures. In this case, bonding achieved
with cast materials will be by mechanical resistance
all around the crown. The long-term clinical success,
stability, and durability of these approaches are established in the literature. In the present case, a pressable glass ceramic (IPS e.max Press) was used to fabricate both facets and crowns. This ceramic is reinforced by lithium disilicate, and it offered excellent optical and mechanical properties to negate the effects of the metal cores placed in the incisors of our patient. Lithium disilicate particles are added to glass-based ceramics to improve their resistance to fracture without compromising their optical properties. If teeth were short, it could have been restored with composites. However, due to the extensive tooth destruction, cast posts and crown were the choice instead of composites. Currently, veneers and porcelain crowns offer predictable and successful restorative options, with an estimated survival of approximately 20 years.

Gurel et al. revealed the use of a mock-up for preoperative evaluation and as a tool for diagnosis, similar to the present case. We used a mock-up after the digital simulation to provide the patient with more information during and after the diagnostic phase and before clinical intervention and surgery. The guide used for the mock-up can also be used for manufacturing provisional restorations.

Gingival health should always be assessed before restorative treatment. Preoperative prophylaxis and scraping, if necessary, will facilitate the process of surgery. In addition, well-recorded measurements will facilitate the process of cementing, thus improving the periodontal health in the long term.

Softwares designed to facilitate the technique, decrease the chair time, and improve the outcomes of treatment in the field of dentistry are being increasingly marketed and reported in the literature. However, previously knowledge for correct planning is needed. It is not possible to achieve results without the scientific knowledge. The software is a tool to facilitate the visualization of the treatment by a dentist, dental technician, and patient. A guideline known as the golden proportion can be used to establish adequate width distribution of anterior teeth. Tooth proportion is also affected by incisogingival tooth length, and hence, gingival contouring should be evaluated as well. In these situations, the width-to-height ratio of 0.75:0.78 in the maxillary anterior teeth could be used to obtain wax-ups and a surgical guide, resulting in a more predictable esthetic outcome. Similar planning was used in the present study for width and height. Normal contacts between the occluding surfaces of the maxillary and mandibular teeth, without significant occlusal interferences should be also observed.

Conclusions
The findings from this case suggest that Cara Smile is an effective digital planning software that assists dentists, patients, and technicians at the stage of planning (facilitating diagnosis) and discussing the case (improving communication between the involved team members). This enables all those involved to visualize the tentative results and increases patient acceptance of the treatment, particularly when multidisciplinary treatment, as required for the present case, is warranted.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest
There are no conflicts of interest.

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