

## CONCEPT USING DIGITAL SMILE DESIGN IN DENTISTRY RESTORATIVE

### UTILIZAÇÃO DO CONCEITO DIGITAL SMILE DESIGN NA ODONTOLOGIA RESTAURADORA

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#### Resumo

Devido ao avanço da Odontologia digital, a técnica Digital Smile Design (DSD) vem ganhando credibilidade por parte dos profissionais e pacientes. O planejamento de tratamentos restauradores estéticos e funcionais torna-se mais previsível com sua utilização. Este relato de caso apresenta uma paciente com queixa estética do tamanho e forma dos seus dentes anteriores, associada a grande exposição gengival. Fotografias foram auxiliares importantes no planejamento da intervenção odontológica. Estas serviram para análises faciais, desenhos de linhas de orientação e de formas dentárias mais adequadas. Utilizou-se um software chamado Keynote, capaz de gerenciar fotos, criar medidas, linhas retas e curvas, facilitando o planejamento de uma nova proporção dental. Ao término deste processo a paciente pode observar, pelo auxílio das fotografias, o novo sorriso que foi construído virtualmente. Desta forma, tornou-se mais fácil, por parte dela, a aceitação do plano de tratamento, possibilitando que a mesma faça uma prova do seu novo sorriso com a realização do mock-up.

**Palavras-chave:** Estética Dentária. Planejamento. Sorriso.

#### Abstract

Due to the advancement of digital dentistry, the Digital Smile Design (DSD) technique has been gaining credibility on the part of professionals and patients. The planning of aesthetic and functional restorative treatments becomes more predictable with its use. This case report presents a patient with aesthetic complaint of the size and shape of her anterior teeth, associated with great gingival exposure. Photographs were important assistants in the planning of dental intervention. These were used for facial analysis, drawings of guidelines and more suitable dental forms. A software called Keynote was used, capable of managing photos, creating measurements, straight and curved lines, facilitating the planning of a new dental proportion. At the end of this process, the patient can observe, through the help of photographs, the new smile that was built virtually. That way, it became easier for her to accept the treatment plan, allowing her to make a test of her new smile with the mock-up.

**Keywords:** Dental Aesthetics. Planning. Smile.

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## INTRODUCTION

Aesthetics are deeply linked with human history, and thus of great concern to individuals since it provokes feelings of social approval or disapproval (1). Thus, the number of patients seeking aesthetic treatments has increased, especially in dentistry, leading to advances in techniques and tools in related areas (2).

Consistent aesthetic results require well-founded planning based on medical interviews on the psycho-emotional analysis of the patient and the professional's scientific knowledge about dentofacial aesthetics, dexterity, and required manual ability (2,3).

Technical-scientific development stimulated the search for better materials and techniques, which contributed greatly to aesthetic procedures starting from the diagnosis and planning stages (4).

Among such developments currently available is digital smile design (DSD), a multi-purpose tool that can strengthen diagnosis, improve communication, and increase predictability during treatment. The tool draws references on extra-and intraoral photographs, expanding visualization and helping the restorative team to evaluate the limitations and risk factors of a given case (e.g., asymmetries, disharmonies, and violations of aesthetic principles) (5,6).

The software allows the professional to design a blueprint of a diagnostic wax mold according to the patient's will before the crafting of the material. This strategy allows the professional to discuss the case with the patient, so what the patient expects or wants from the treatment and what the professional visualizes for the resolution of the case can be aligned. As such, this procedure differs from the simplest procedures that use only the plaster models, diagnostic wax molds and verbal explanations (5,7).

The simplicity of handling DSD, its low cost and the fact that no special equipment are required have given prominence to it. The technique consists of analyzing the facial and dental proportions of each patient, and their relationships with teeth, lips, and gums through digital photographs and videos from va-

rious angles. Following, these information are organized into a simple slideshow software (Keynote – Mac or PowerPoint – Windows), and the digital smile is designed by drawing on the photos following a specific sequence (8,9).

Therefore, DSD provides aesthetic diagnosis, improved professional-patient relationship, interdisciplinary communication between the team's professionals, patient motivation, economy of time and materials, and mainly, acceptance of treatment by the patient (10).

The objective of this study was to present the functioning of the tool with a clinical case.

## CASE REPORT

This case was based on the use of DSD applied to the patient "LSC", 29 years old, female, complaining about the size and shape of her teeth, associated with large gingival exposure during the smile and dissatisfied with aesthetics. It was then proposed to the patient – a dental student herself – a virtual case planning with the DSD tool instead of the traditional method, which would consist in the preparation of a diagnostic wax mold in an initial plaster model of the patient, made by a dental prosthetics technician. With the patient's consent, we took photographs and crafted initial models, measured teeth proportions, and concluded that her gingival smile was due to excess tissue, covering part of the anatomical crown of the teeth thus making them shorter.

The first step in treatment planning, even before performing the crown extensions, was to use DSD to reach the ideal position and proportions that best fit the harmony of the patient's smile. The Keynote software was used to manage photos, create measurements, straight lines and curves, which facilitates the planning of a new dental proportion. At the end of this planning, the patient could observe the intra-oral design in a mock-up, providing her with an early proof of her new smile. Designed virtually, the mock-up works as a "restorative test" made of bis-acryl resin with the aid of a silicone wall made from the diagnostic wax model, allowing the patient to preview the result of the treatment without any dental wear.

Figure 1 shows the patient's smile, then the DSD proportion ruler that best fits the size of the new teeth and the completed DSD. Figure 2 shows that it would only take a slight addi-

tion of incisal edge and the greatest improvement would be in the cervical direction of the teeth, reducing the gingival line and increasing tooth length.

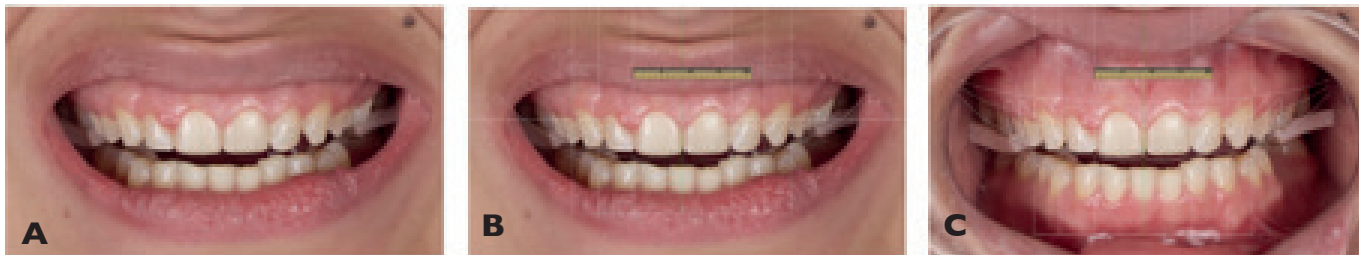


Figure 1 - A- initial photography; B- interdental proportion ruler; C- Digital Smile Design.

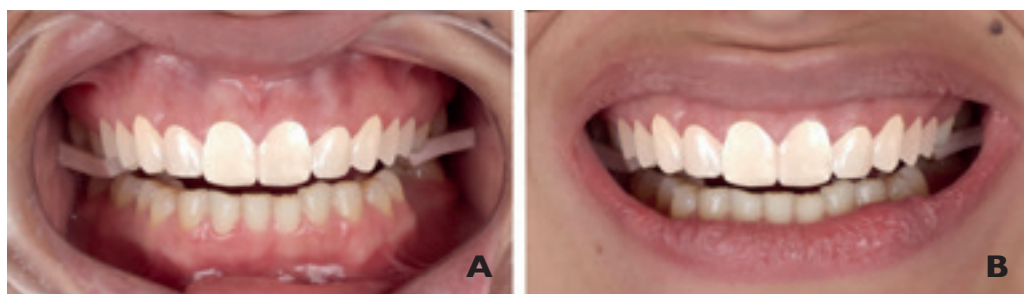


Figure 2 - A- intraoral digital simulation; B-new smile of the patient.

After applying DSD, the file was sent to the dental prosthesis laboratory for development of the virtual wax model (Figure 3), which was made on the scan of the initial mo-

del (Figure 4), based on the width and height measurements given by DSD. The virtual wax model was then printed. (Figure 5).

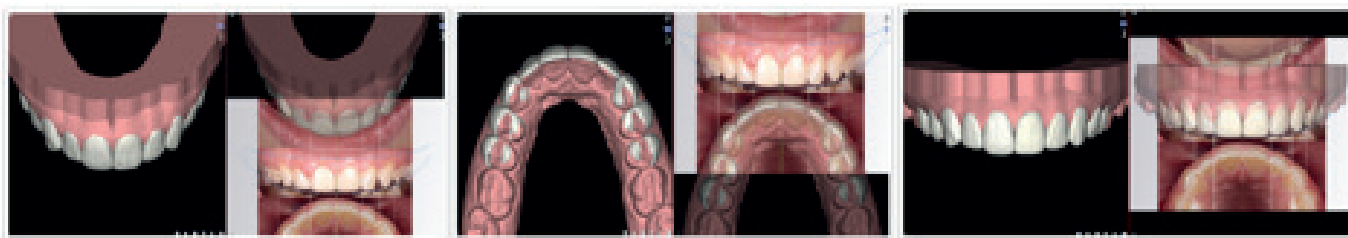


Figure 3 - "12-o'clock" view, Occlusal view and Front view of the virtual wax model.

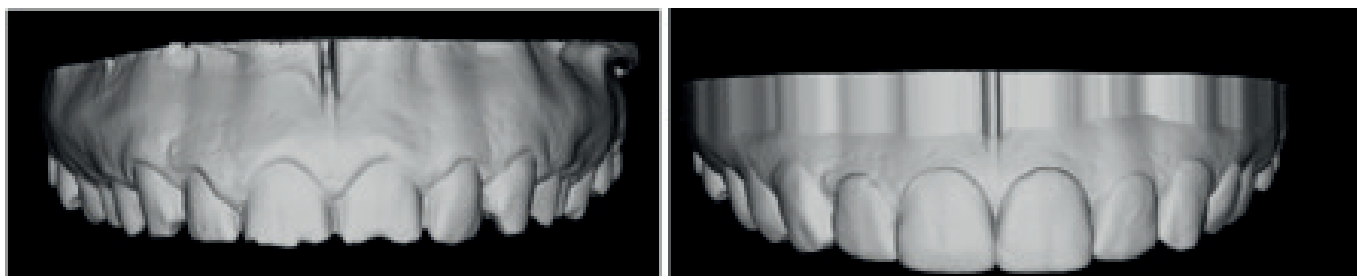


Figure 4 - Scanned image of the initial model and the virtual wax model.



**Figure 5** - Virtual wax model printed.

A mock-up was crafted based on this model, working as a restorative test for an early prognosis on the teeth, before any interven-

tion. This allowed for a planning assessment with the patient (Figure 6) to move forward with the treatment.



**Figure 6** - Lips at rest highlighting the new incisal length and smile with the new dental shape (mock-up in bis-acrylic resin).

## DISCUSSION

This case report showed that the use of virtual planning made the treatment proposal easier and provided better predictability of the results. According to Coachman et al. (2011) (10), the DSD is a flexible conceptual tool that can strengthen diagnosis, improve communication, and enhance predictability during the treatment.

Other studies also reported the benefits of using this method, as it aids in choosing the best technique for treatment, decreases time of analysis, makes the treatment sequence more logical and direct, reduces consumption of materials and consequently cost, and allows the comparison of each phase of planning, with the images of “before” and “after” to verify whether they are in accordance with the proposed case (11,5).

No reports have stated that the technique is complex or disadvantageous so far. Kina

and Bruguera (2008) (12), agree that previous knowledge of each component of the smile is important for a perfect work. Designing a smile requires sensitivity, common sense, and extensive training when drawing each component ideally. The professional is thus responsible for both the knowledge of dental anatomy, and of the characteristics and principles of dentofacial harmony while planning. However, the professional must consider the patient in an individual way and with unique afflictions failing to do so can lead to errors or the application of mechanisms that do not work on all types of face (12).

According to Coachman et al. (2012) (5), DSD is a simple technique that requires only common software – i.e., Power Point for Windows and Keynote for Mac – and a regular digital camera. These programs enable the clear and dynamic measurement and comparison of the height and width of dental elements.

The digital flow creates time gains and is more efficient when compared to conventional treatment (13,14). The traditional method uses a plaster model for planning the new smile although diagnostic wax modeling is used in patients seeking rehabilitation treatment, this technique is not routinely used in dental offices because it is time consuming and does not result in immediate benefits (15). Therefore, the traditional smile design method is time consuming and restricts information, limiting the creation of a pleasant smile to the patient's eyes. This is why the virtual method was chosen, as it provides a better view of restorative clinical factors, from the simplest to the most complex some factors can go unnoticed with only the clinical examination, photos and study models DSD is also faster (5,10).

Therefore, DSD provides: aesthetic diagnosis, improved professional-patient relationship, interdisciplinary communication between the team's professionals, patient motivation, economy of time and materials, and mainly, it was a powerful marketing tool that facilitate treatment acceptance (10,16).

## CONCLUSION

Using DSD during the planning phase made it easier to present the treatment that will be performed to the patient, as well as to understand their aesthetic desires, since DSD gathers the fundamental information to enable the final restoration.

The authors declare that there is no conflict of interest or disclosures of any economic or natural interest that could be compromising if known after this article is published.

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