

SMILE DESIGNING: A REVIEW

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ABSTRACT

Smile is a jewellery that can be easily adorned by a person. It enhances the beauty of an individual. Aesthetics is what matters most as it is the visible perception of an individual. The primary goal of aesthetic treatment should be patient's satisfaction and the end result of the treatment should fulfil the patient's expectations. The major innovation in the field of dental prosthetics is the emergence of computer aided design and computer aided manufacturing (CAD/CAM) technology, which allows to obtain remarkable results. Digital Smile Design helps in creating smile through a simulation and preview the final result of the proposed treatment. Digital technologies allow accurate treatment planning and facilitate the obtaining of aesthetic, functional and predictable prosthetic outcome.

Keywords: Smile design, aesthetics, digital smile design, golden proportion, cosmetic dentistry, CAD/CAM

INTRODUCTION

In our modern competitive society, a pleasing appearance often depicts the difference between success and failure in both our professional and personal lives.⁴ Aesthetics is the major concern for patients seeking prosthetic treatment.¹ Recent advances in cosmetic dentistry have increased public awareness of dental aesthetics. Currently there has been a shift from conventional treatment goals, such as ideal occlusion and cephalometric standards, to include goals involving principles of micro aesthetics and soft tissue harmony. Therefore, many dentists are incorporating various smile design protocols in their daily practices to meet the increasing aesthetic demands of their patients. Smile design involves many aspects such as scientific and artistic principles that are combined collectively to give patient a beautiful smile. In an endeavour to give the patients a beautiful smile, dental surgeons need to go beyond the boundaries of conventional dentistry and acquire a vision, set of artistic and communicatory skills which helps them to achieve the level of accurate detail.

ANATOMY OF SMILE

The anatomy of the smile forms an essential part of dentistry. It involves close understanding of all elements of the oral region. The smile is mainly expressed in the oral region and eyes. The oral region involves the corners of the mouth, upper and lower lips and the anterior portion of the cheeks (Fig. 1).²

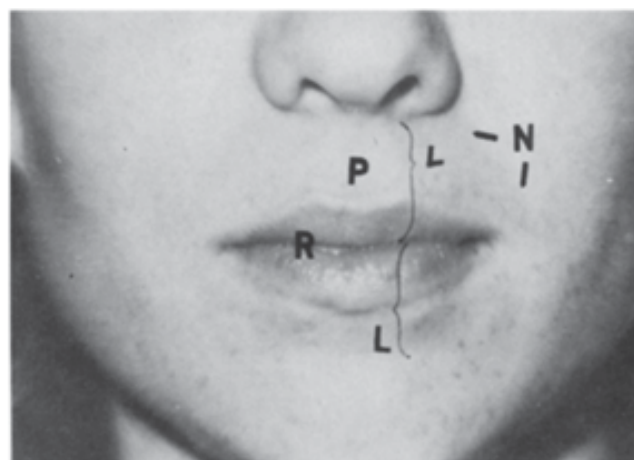


Fig. 1. The oral region. (L), the lips; (N), the nasolabial groove; (P), the philtrum; and (R), the red zone of the lips.

Figure 1: The oral region- (L): the lip, (N): Nasolabial groove, (P): Philtrum, (R): the red zone of the lips

Muscular Basis of smile

There are five groups that contribute to the anatomy of a smile (figure 2).³ These groups are as follows:

1. The elevator muscles of the upper lips that are involved are quadratus labii superioris and caninus. The major muscle that is involved is the levator labii superioris.
2. The elevator muscles associated with the corner of the mouth is zygomaticus major and buccinator.
3. The depressor muscles of the corner of the mouth- triangularis risorius and buccinator.
4. The depressor muscle of the lower lip is quadratus labii

inferioris and the mentalis.

5. The orbicularis oris.

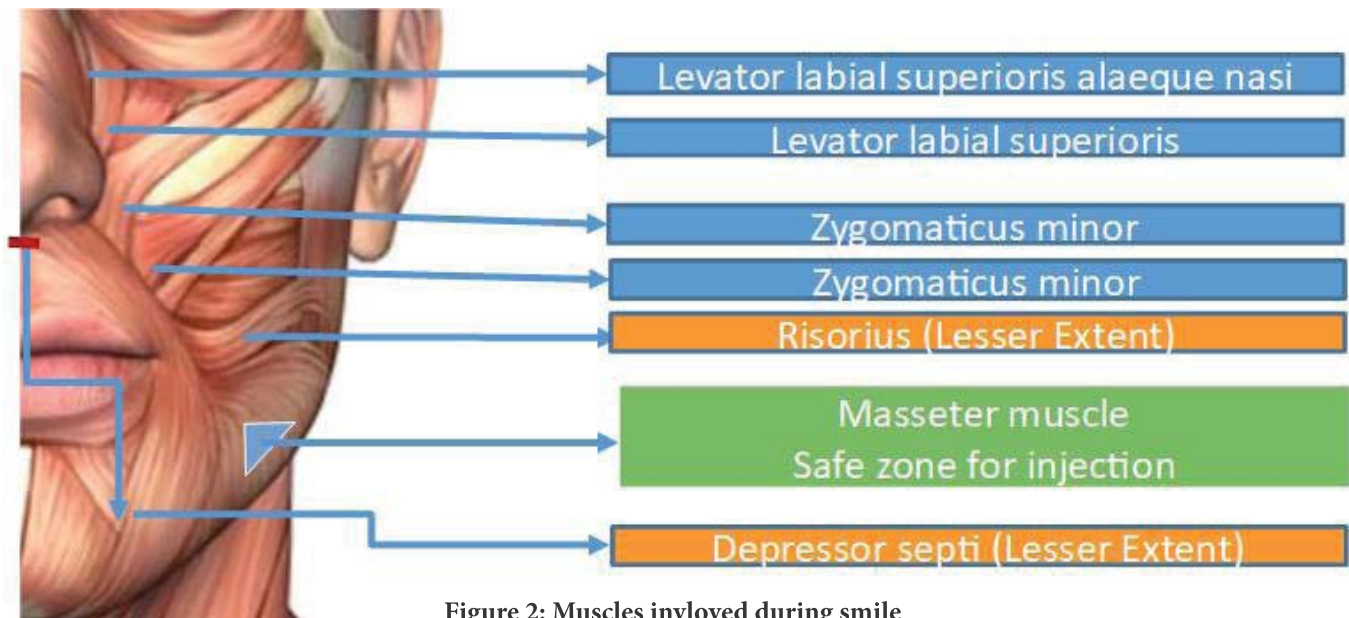


Figure 2: Muscles involved during smile

To create a harmonious smile the dentist must maintain or create the normal curvature of the facial anatomy.

While designing the smile, the aesthetic principles⁵ and components (Lip line, smile arc, upper lip curvature, lateral negative space, smile symmetry, frontal occlusal plane, dental components, gingival components)^{6,7} along with physical components are the major tools for efficient outcome.

DIGITAL SMILE DESIGN

Smile designing is an irreversible procedure, so it is difficult to convince and educate patient's through conventional smile design technique but DSD has overcome this disadvantage. It is very easy to motivate and educate patient by developing and showing the smile digitally and it helps them to visualise it before the commencement of the treatment by virtually creating and presenting new smile design. The DSD is a software which is used more commonly now, is dependent on various photographs and videography protocols and software analysis.⁸ DSD comprises of software that allows easy communication between smile designers, technician and with patients. DSD is a multidisciplinary approach and has spread widely not only in prosthetic rehabilitation but also has major role in other branches of dentistry such as Orthodontic, Periodontics etc.¹³

Now-a-days Digital Smile Designing is emerging out to be the future of dental practice worldwide. It's a major advancement in modern dentistry in changing smile designing procedures.

The DSD concept evolved in 2007 and over the years has grown distinctly. It has already made its path in the market of Aesthetic Dentistry globally and most of the dentists and dental technicians have been guided to use it across the world. Progression of DSD in the past two decades, there is continuous growth of smile designing concepts which has changed from physical analogue to designing digitally that has progressed from 2D-3D. Earlier, hand drawing on the photos of the patient were commonly used to educate and motivate the patients about the outcome of the treatment. Now it has completely changed into a digital photograph on the computer with the help of DSD software. The pictures can be edited whenever required to achieve the final design.



Figure 3: Digitally designed smile

► The upper lip length at rest and smile is checked and verified to evaluate gingival visibility.

► The smile curve is assessed by relating the incisal edge curvature of the anterior maxillary teeth, and the dental contour is designed according to the proportions of the lower lips and the anterior-posterior curvature of the teeth. This facial photograph is then edited to analyse the intraoral image.

Three reference lines are marked on the teeth - a straight horizontal line is marked from the tip of one canine to the tip of the other canine, another horizontal line on the incisal edges of the central incisors and vertical line is drawn passing through the interdental midline.

Another lines like gingival zenith can be made by joining lines of gingival and incisal battlement for a full dental examination. The teeth dimensions can be adequately obtained by one of the methods such as Golden proportion, Pound's theory, recurring aesthetic dental proportion, dentogenic theory.

A digital ruler is required to do required changes. Changes are edited according to the aesthetic requirements and individual perceptions. After the changes are made, new smile design is obtained, that can be digitally shown to the patient for feedback and appreciation. The mock up is created after the smile design is approved and can be evaluated aesthetically in the patient's mouth. The mock up also allows visualization of phonetics during evaluation period

ADVANTAGES OF DSD

- Aesthetic diagnosis
- Communication
- Feedback
- Patient management
- Education

Aesthetic Diagnosis

While assessing patient's aesthetic demands many important components should be overlooked. A digital photography and digital analysis protocol allows the dentist to visualize and analyse the areas that patient may not notice clinically. It allows easy drawing of reference lines and shapes over extra- and intraoral digital photographs.

Communication

Traditionally, dental technician has major role in smile designing. The technician performs all necessary procedures,

and follows the instructions and guidelines provided by the dentist. The dentist communicates with the technician about the patient's personal preferences. With the valuable information, the dental technician fabricates wax-up, maintaining anatomical features within the parameters provided, including the planes of reference, facial and dental midlines, incisal edge position, lip dynamics, basic tooth arrangement, and incisal plane. This information is transferred from the wax-up to the try-in phase through a mock-up or provisional restoration. The design of the definitive restorations should be developed and tried-in as soon as possible to guide the treatment sequence. Efficient treatment planning helps the entire dental team identify any challenges and reduce total treatment time.

Feedback

The DSD offers advantage of precisely assessing the results obtained during every treatment phase. It allows the dentist to analyse the treatment provided. With the help of the software any changes can be made according to patient's satisfaction. The dentist and the dental technician also gain feedback from the patient regarding tooth shape, size, arrangement, and colour to carry out any necessary refinements. It allows constant double-checking to provide the best result and provides a great learning tool for the entire interdisciplinary team.

Patient Management

The DSD has been proven to be a great aid in motivating the patient, to help explain issues related to treatment and an evaluative tool by comparing before and after photographs. Moreover, the data from previous treatments can be helpful to demonstrate treatment possibilities during patient consultation. The dentist can discuss the severity of the case, treatment protocol, and prognosis.

Education

The earlier preformed cases can be saved and can be shared with patients and colleagues. The patient's can better understand the concepts.

DISCUSSION

It is evident from the discussion that the smile created by dentist should be aesthetically acceptable and functionally sound too. It is dentist's duty to carefully evaluate, analyse and provide the best treatment to his/her patients. To provide efficient outcome, smile must be understood, recorded, and

analysed. The smile designing done by dentist has to be as conservative as possible. The aim has to be less reduction of tooth structure and greater aesthetics and durability.

CONCLUSION

Dentistry is an ever-changing science and recent advancements like digital smile designing have been introduced to obtain an efficient result. The digital smile designing is an excellent creation in analysing the aesthetic problems of the patient. It offers advantage in helping the patients to preview the treatment outcome before the final result and also helps clinicians for proper treatment planning. Although it has few limitations like high cost and difficult handling, it has proven to show accurate results.

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