ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 10, pp.59830-59833, October, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

FACTORS AFFECTING SMILE DESIGN- A REVIEW

***Dhakshinamoorthy Malarvizhi, Karthick Arumugam, Radhakrishnan Mensudar, NewBegin Selvakumar Gold Pearlin Mary and Nagarajan Geethapriya**

Department of Conservative Dentistry and Endodontics, Sree Balaji Dental College & Hospital, Bharath University, Narayanapuram, Pallikaranai, Chennai – 600100, Tamil Nadu, India

ARTICLE INFO

Article History:
Received 07th July, 2017
Received in revised form
22nd August, 2017
Accepted 17th September, 2017
Published online 31st October, 2017

Key words:

Proportions,
Esthetics, Smile Analysis.

ABSTRACT

Our society gives high value to the personnel appearance of a person. The dentist plays an important role in fulfilling the patients expectation. With the advancement of new techniques and materials, wide varieties of treatment options are available to the dentist in restoring and improving the patients smile. There are various proportions and analysis which aids the dentist in achieving it. The analysis of surrounding soft tissues also plays a major role in achieving a pleasing smile. Even the signs of aging can be masked by elective dental treatments and conservative restorative procedures, such as bonding and porcelain veneers.

Citation: Dhakshinamoorthy Malarvizhi, Karthick Arumugam, Radhakrishnan Mensudar, NewBegin Selvakumar Gold Pearlin Mary and Nagarajan Geethapriya, 2017. "Factors affecting smile design- a review", *International Journal of Current Research*, 9, (10), 59830-59833.

INTRODUCTION

Dentistry has always focused on the importance of dental esthetics but recently the patients as well as dentists have emphasized on esthetic dentistry because the society gives a high value to a person's appearance. Because of this change in perception, the focus of dental practice has changed from restoring carious teeth to treating healthy teeth and creating an esthetic smile. Therefore, esthetics should be defined as the patient's perception of "visually pleasing or satisfying" and the clinician's assessment of acceptable anatomic architecture coupled with proper function of the masticatory system (Brisman, 1980) The main aims of aesthetic dentistry are to modify the teeth and achieve pleasing proportions and to create a dental arrangement that is in harmony with the surrounding soft tissues. A smile analysis, thus determines the proper esthetic appearance of the smile in relation to the facial symmetry, lip line and phonetics. Smile design is thus, the application of smile analysis to bring one's true potential into reality. Advancements in technology and availability of newer and better restorative materials have allowed meeting this new demand in improving the smile of the patient.

Corresponding author:* **Dhakshinamoorthy Malarvizhi,
Department of Conservative Dentistry and Endodontics, Sree Balaji Dental College & Hospital, Bharath University, Narayanapuram, Pallikaranai, Chennai – 600100, Tamil Nadu, India.

Principles in smile design theory

Designing a smile may involve four important principles, namely, facial esthetics, gingival esthetics, micro esthetics and macro esthetics. Facial esthetics involves the facial and muscular considerations. Photographs taken before and after treatment help to determine the facial component of esthetics. Gingival health and appearance determine the gingival esthetics. Microesthetics involves the specific anatomy of each tooth with consideration to the specific incisal translucency, characterization, lobe development and incisal haloing. Macroestheitcs is the relationship of the teeth to the surrounding soft tissue and patient's facial characteristics. Before establishing treatment plan, there are various proportions which aids in smile analysis.

Divine Proportion

Pythagoras in 530 BC proposed the golden number, represented by the Greek symbol Δ. The reciprocal of Δ is 0.618 and is termed as the Golden or Divine proportion (Gillen *et al*., 1994). It was believed that the objects whose features conform to this ratio were perceived to have innate beauty. If all the objects conform to this ratio, we would be surrounded by clones. Hence, repeated or recurring ratios are more significant than a specific ratio.

Dental Proportions

The height of the central incisor should be 1/16 the height of the face from ideal hairline to the chin and that the width of the ideal central incisor should be 1/16 the interzygomatic width (Oschsenbein *et al*., 2005).

Golden Proportion

Levin used the golden proportion to relate the successive widths of the anterior teeth as viewed from the frontal. "The width of the central incisor should be multiplied by the value defined as the golden proportion, which is 0.618, or approximately 62%. The resultant width of the lateral incisor should be multiplied by 62% to give the width of the canine as viewed from the frontal (Figure 1,2) (Levin, 2005)

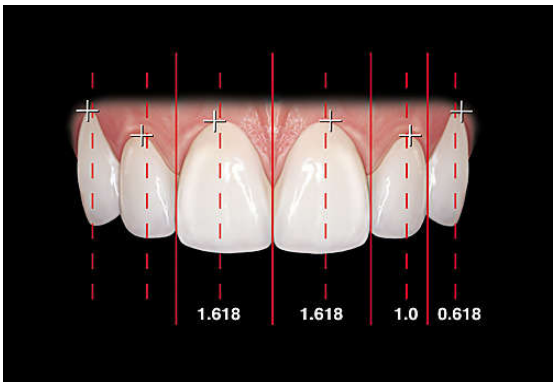

Figure 1. Golden proportion

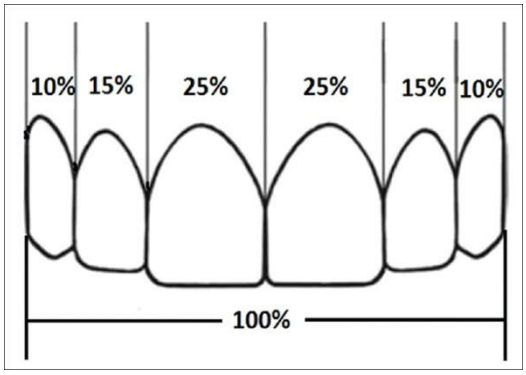

Figure 2. Golden percentage

Repeated Ratio

Lombardi described the use of a "continuous proportion or repeated ratio which has been established between the width of central and lateral incisor and is continued in the ratio of the placement of the remaining teeth and spaces." The proportion of the width of the central incisor and the lateral incisor should be consistent between the width of the lateral incisor and the canine and from the canine to the first premolar moving distally. The ratio between the width of the central incisor and the lateral incisor should be applied consistently to define the desired ratio between the lateral incisor and the canine (Lombardi, 1973).

Recurring esthetic dental (red) proportion

The RED proportion states that the proportion of the successive widths of the teeth as viewed from the frontal should remain constant as one move distally.

Instead of accepting the proportion already defined by the widths of the central and lateral incisors, the dentist can define his or her desired RED proportion. The use of RED proportion gives greater flexibility (Lombardi, 1973; Wagner *et al*., 1996)

Width –to –Height Ratio

Another important proportion that needs to be evaluated is the width-to-height ratio of the central incisor (Mathews, 1997) The preferred width –to – height ratio of the central incisor has been reported to be in the range of 66% to 80%.

Facial Image View Evaluation (FIVE)

Dental photography is essential in evaluating a smile as the photographs help to measure the dimensions and proportions of the teeth. An image taken parallel to the facial plane and at least 8 inches away from the teeth should be used to minimize distortion. The use of a photograph to evaluate and measure the relative tooth dimensions of a smile is called facial image view evaluation. A common dimension of a central incisor is measured first on the photograph and then on the cast (Silnes, 1980). The cast dimension is divided by the image dimension to compute a conversion factor, which correlates the size of the image to the actual size of the teeth. The height of the central incisor is preferred, but the width of the central incisor can be used if the gingival margin is not totally visible. The photographic image widths and heights of the anterior eight teeth are measured and recorded.

The photographic measurements are multiplied by the conversion factor to give the FIVE dimensions. The further distal the dentist moves, the greater is the discrepancy between the FIVE and the cast dimensions.

Red Smile Design

The ideal width and height of a central incisor can be determined using the equation

$\{$(FIVE width of the anterior 6 teeth) / $2(1+ RED + RED^2)\}$ = width of central incisor

(The RED should be expressed as a decimal <1)

(Width of central incisor / Width-to-height ratio) = height of central incisor

(The width-to-height ratio should be expressed as a decimal <1) (Levin, 1997). The following features should be analysed to determine the relationship of teeth to the surrounding soft tissues.

Smile Line

According to Tjan *et al*, there are three types of smile line, namely, low, average and high. (Tjan, 1984) This is evaluated by analyzing the amount of exposure of upper anterior teeth during smiling. Low smile line is one when there is not more than 75% of exposure of anterior teeth. 75-100 % exposure of anterior teeth and interproximal papillae is called average smile line whereas high smile line is when there is complete exposure of anterior teeth along with gingival display (Figure 3). A smile is considered esthetic only when there is exposure of anterior teeth with along with approximately 1 mm of gingival tissue.

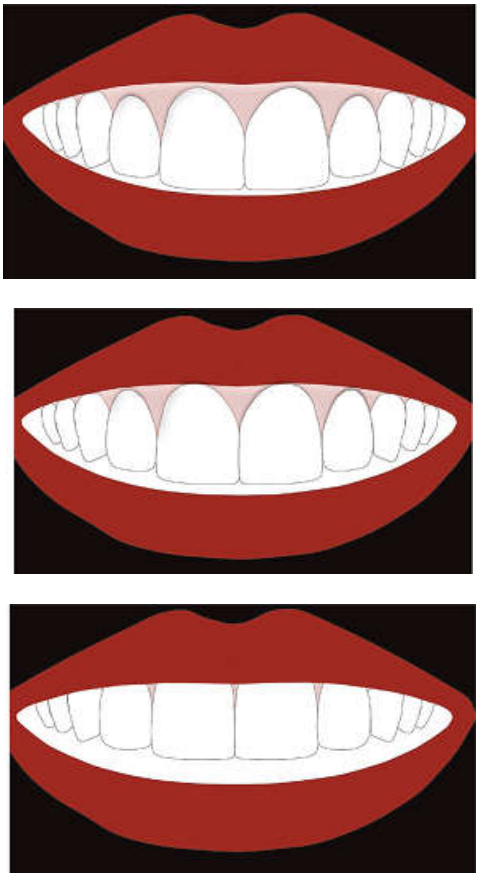

Figure 3. Smile Line

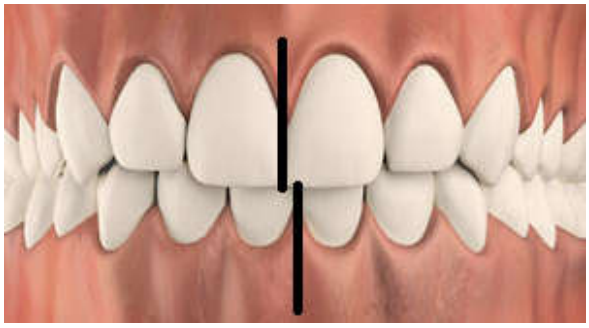

Figure 4. Interincisal vs midline

Excessive gingival display (more than 3 mm) is not an ideal smile. can be defined as one that exposes the maxillary teeth completely, along with approximately 1mm of gingival tissue (Allen, 1988)

Interincisal Line vs. Midline

The interdental papillae between the maxillary central incisors is considered the most reliable reference point for determining the midline. When doing restoration for anterior teeth position of midline is considered (Figure 4). (Kokich, 1993)

Smile Width

The amount of exposure of the anterior teeth during smiling due to movement of lips should be determined. In patients with wider smile, restorations even in the posterior region should be conservative and esthetic (composite or ceramic).

Analysis of Gingival Tissues

Symmetry of gingival margins has an important role in esthetic dentistry (Kois, 1994).

The gingival margins of maxillary lateral incisors should be in a coronal position compared to that of maxillary central incisors and canines. Orthodontic correction may be required in some cases. If there is slight disharmony, it can be corrected with gingivectomy.

Esthetics and Function

Achieving esthetics with a compromise on the functional component is no longer considered ideal. Esthetic appearance in conjunction with appropriate function is the objective of esthetic dentistry (Pietrobon, 1997). Whenever esthetic treatment is planned, a proper case history should be taken to get an idea on patients' expectations. Thorough clinical examination along with radiographs and photos will help the clinician to have a proper knowledge on the current clinical condition. Interdisciplinary approach would enhance the appearance of esthetic smile. Psychological status of the patient should also be evaluated before instituting any procedure.

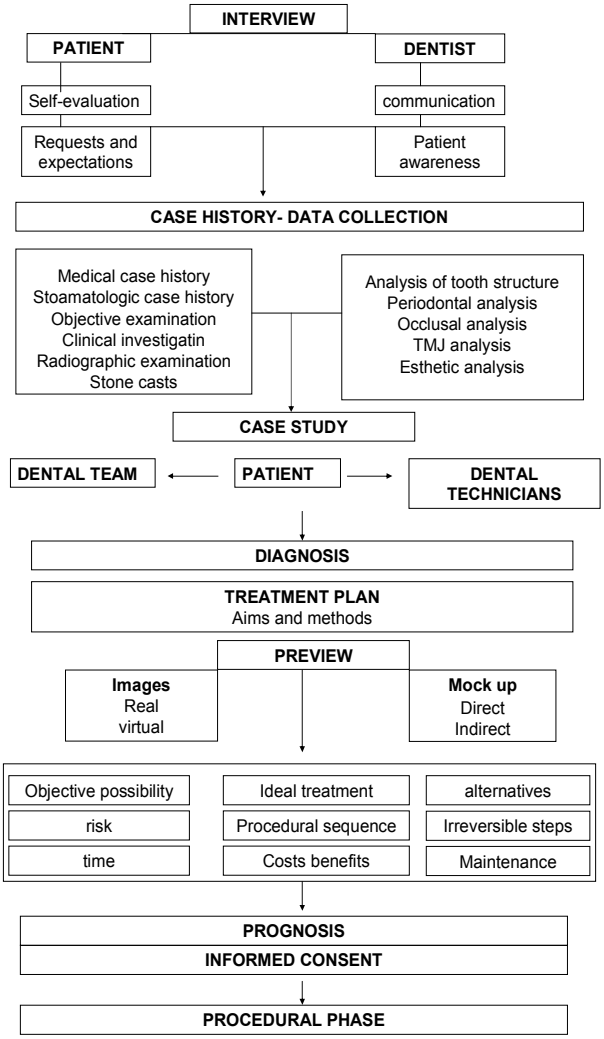

Figure 5. Treatment planning (Fradeani, 2008) above the flowchart

Conclusion

Careful evaluation and rational approach by the clinical would help to analyze the harmony of dental and facial tissues to the surrounding soft tissue and to achieve an esthetically pleasing smile without a functional compromise.

REFERENCES

Allen, E.P. 1988. Use of mucogingival surgical procedure to enhance esthetics. *Dent Clin North Am.,* 32: 307-330.

Brisman, A.S. 1980. Esthetics: a comparison of dentists and patients concepts. J Am Dent Assoc. 100: 345-52.

Esthetic Rehabilitation in fixed prosthodontics: Prosthetic Treatment- A Systematic Approach to Esthetic, biologic, and functional integration. Mauro Fradeani, Giancarlo Barducci Publisher: Quintessence Pub Co; 1 Edition (September 30, 2008)

Gillen, R.J., Schwartz, R.S., Hilton, T.J., Evans, D.B. 1994. An analysis of selected normative tooth proportions. *Int J Prosthodont.,* 7:410–7.

Kois, J.C. 1994. Altering gingival levels: The restorative connection Part 1: *Biologic variables J Esthet Dent.,* 6: 3-9.

Kokich, V. 1993. Esthetics and anterior tooth position: an orthodontic perspective, part II: vertical position. *J Esthet Dent.,* 5(4):174–8.

Levin EI. 1997. Dental esthetics and the golden proportion. *J Prosthet Dent.,* 40: 244-52.

Levin. 2005. The golden proportion. *J Prosthet Dent.,* 40: 244–252.

Lombardi, R.E. 1973. The principles of visual perception and their clinical application to denture esthetics. *J Prosthet Dent.,* 29:358–82

Mathews, T.G. 1997. The anatomy of a smile. *J Prosthet Dent.,* 39;39-44.

Oschsenbein, C., Ross, S. 1999. A reevaluation of osseous surgery. *Dent Clin North Am.,* 13: 87 102.

Pietrobon, N., Paul, S. 1997. All ceramic restorations: A Challenge for anterior esthetics. *J Esthet Dent.,* 9: 179-186.

Silnes, J. 1980. Fixed Prosthodontics and periodontal health. Dent Clin North Am; 24: 317-329.

Tjan, A.H.L., Miller, G.D. 1984. Some esthetic factors in a smile. *J Prosthet Dent.,* 51: 24-28.

Wagner, I., Carlsson, G., Ekstrand, K., Odman, P., Schneider, N. 1996. A comparative study of assessment of dental appearance by dentists, dental technicians and laymen using computer-aided image manipulation. *J Esthet Dent.,* 8:199–205.

****