



Research Article

SMILE ETHETICS IN DENTISRTRY

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ABSTRACT

The perception of aesthetics varies from person to person and is influenced by personal experiences and social environment. Classical cultures of Greece and Rome based their standards of beauty on set rules of proportion and composition.

KEYWORDS:Beauty, esthetics, smile design, smile proportions.

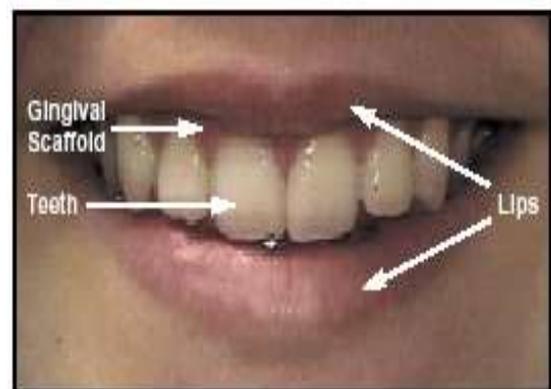
INTRODUCTION

The divine proportion or the Golden ratio was of great importance in Greek art and literature. Phidias, a Greek sculptor, used the Golden ratio so often in his work that the number 1.618 [Golden ratio] was given. In the literature, the divine proportions were first mentioned about AD 300 by the Greek mathematician Euclid in his second and perhaps well known book, Elements. He described the construction of Golden proportions which can be largely recognised by Egyptian pyramids from the 3rd Millennium BC. Some examples of divine proportions are the Parthenon, the Dionysian procession and Leonardo da Vinci's painting of MonaLisa. A more accurate mathematical approach came from Fibonacci in 12th century. The smile which is essential to express friendliness, agreement, appreciation and to convey compassion and understanding should not be ignored in diagnosis and treatment planning.

ANATOMY OF SMILE

The perioral musculature can be classified into 3 groups.

Group I muscles
Orbicularisoris, Buccinator, Levatorangulioris, Depressor, Angularioris, Zygomaticus major, Risorius
Group II muscles
Levatorlabiisuperioris, Levatorlabiisuperiorisalaquenasi, Zygomaticus minor
Group III muscles: Depressor labiinferioris, Mentalis, Platysma



Within this framework, the components of the smile are the teeth and the gingival scaffold. The soft-tissue determinants of the display zone are

1. Lip thickness,
2. Intercommissure width,
3. Interlabial gap,
4. Smile index (width/height),
5. Gingival architecture.

MUSCULAR BASIS OF SMILE

1. The first stage raises the upper lip to the nasolabial fold by contraction of the levator muscles originating in the fold and inserting at the upper lip.
2. The second stage involved further raising superiorly of the lip and the fold by three muscle groups:

The levatorlabii superior muscles of the upper lip, originating at the infraorbital region,

- The zygomaticus major muscles
- Superior fibers of the buccinators

CLASSIFICATION OF SMILE



POSED SMILE

Unposed smile also called as Enjoyment smile or Duchenne smile in honour of the scientific pioneer. It is involuntary and is induced by joy or mirth.



UNPOSED SMILE

Types of posed smile: 1. Strained, 2. Unstrained

If Upper lip coverage tends to increase with age, and therefore the percentage of "gummy smiles" may be greater among younger age groups and smaller among older adults.



HIGH SMILE

Average smile : This type of smile reveals 75-100% of upper incisors and inter dental papilla



AVERAGE SMILE

3. Low smile: The *low* smile displays <75% of the maxillary incisors in the full smile and may be found in about 20% of a population.



Computer imaging also is useful in counselling and communicating with patients because it allows presentation of treatment options that are difficult to present verbally. The measurements for smile are based on Philtrum height, Commissure height, Interlabial gap, Amount of incisor show at rest, Amount of incisor display on smile, Crown height, Gingival display, Smile arc etc.

Mini-esthetics

The smile framework. The smile framework is bordered by the upper and lower lips on smile animation and includes such assessments as excessive gingival display on smile,

inadequate anterior tooth display, inappropriate gingival heights and excessive buccal corridors.

Tooth - Lip Relationships

It is important to evaluate not only the characteristics of the face, but the relationship of the dentition to the face. This can begin with an examination of symmetry in which it is particularly important to note the relationship of the dental midline of each arch to the skeletal midline of that jaw (i.e. the lower incisor midline related to the midline of the mandible, and the upper incisor midline related to the midline of the maxilla)

The Smile Arc

The smile arc is defined as the contour of the incisal edges of the maxillary anterior teeth relative to the lower lip during a social smile for best appearance, the contour of these teeth should match that of the lower lip. If the lip and dental contours match, they are said to be consonant.

Dental Appearance

Micro-aesthetics

This includes the assessment of tooth proportions in height and width, gingival shape and contour, connectors and embrasures, black triangles and tooth shade.

Tooth Proportions

The smile of course, reveals the maxillary anterior teeth, and two aspects of proportional relationships are important components of their appearance the tooth widths in relation to each other, and the height/width proportions of the individual teeth.

Height - Width Relationship

The range in height-width relationships for maxillary central incisors is shown in note that the width of the tooth should be about 80% of its height. Gingival Heights, Shape and Contour: Proportional gingival heights are needed to produce a normal and attractive dental appearance generally, the central incisor has the highest gingival level, the lateral incisor is approximately 1.5mm lower and the canine gingival margin again is at the level of the central incisor.

Commissure height

The commissure height is measured from a line constructed from the alar bases through subspinale and then from the commissures perpendicular to this line. The difference between philtrum height and commissure height decreases from adolescence to adult life

Interlabial gap

The interlabial gap is the distance in millimeters between the upper and lower lips. A more than 4-mm interlabial

gap is outside the normal range and is considered lip incompetence.

Amount of incisor display at rest: The amount to upper incisor display at rest is a critical aesthetic parameter because one of the inevitable characteristics of ageing is diminished upper incisor display at rest and on smile.

Crown height and width.

The vertical height of the maxillary central incisors in the adult is measured in millimeters and is normally between 9 and 12 mm, with an average of 10.6 mm in men and 9.6 mm in women. The age of the patient is a factor in crown height because of the rate of apical migration in the adolescent. The width is artificial part of smile display in that the proportion of the teeth to each other is an important factor in the smile. Most references specify the central incisors to have about an 8:10 width/height ratio.

Gingival display

The aesthetically acceptable amount of gingival display on smile varies, but one must always remember the relationship between gingival display and the amount of incisor shown at rest.

Smile arc.

The smile arc is defined as the relationship of the curvature of the incisal edges of the maxillary incisors and canines to the curvature of the lower lip in the posed social smile. The ideal smile arc has the maxillary incisal edge curvature parallel to the curvature of the lower lip on smile, and the term consonant used to describe this parallel relationship.

The clinical relevance of this study

Most children with lip incompetency at age 6 experience self-correction by age 16. Lip competence is important not only in terms of esthetics but also stability of overjet correction.

In this age group 6-8, when it looks as though that the incompetency is due to short lips whereas it is just incomplete soft tissue growth.

YOUNGER AGE



OLDER AGE





EIGHT COMPONENTS

Eight components of a balanced smile: They are

- Lip line
- Smile arc
- Upper lip curvature
- Lateral negative space
- Smile symmetry
- Occlusal frontal plane
- Dental components
- Gingival components

The etiologies of a gummy smile are:

- Vertical maxillary excess
- Short philtrum height
- Excessive smile curtain
- Short anterior crown height

5. Uprighted or detorqued upper incisors

Vertical maxillary excess and gingival smile line(gsl)

Upper lip length

Lip elevation

Vertical maxillary height

Crown height

Vertical dental height

Incisor inclination

SMILE ARC

The smile arc is the relationship between a hypothetical curve drawn along the edges of the maxillary anterior teeth and the inner contour of the lower lip in the posed smile. (JCO MAR 2005)

The smile arc from the frontal view is the relationship of the curvature of the incisal edges of the maxillary incisors and canines to the curvature of the lower lip in the posed social smile.

SMILE ARC

Smile arc can be consonant or non-consonant. Smile arcs are found to be flatter in orthodontically treated patients resulting in a 'Denture mouth appearance'. The smile arc can be unintentionally flattened during orthodontic treatment by the following three techniques.

Over intrusion of maxillary incisors

if the maxillary incisors are over intruded to correct an overbite or a gingival smile without considering or monitoring the incisor-lip position at rest, the smile arc may be flattened. Indiscriminate use of Utility arches or arch wires with accentuated curves can not only flatten the smile arc but can also result in low lip line at rest and during smiling.

Bracket positioning

the same bracket height should not be used for parallel, flat and reverse smile arcs. If optimal smile arc aesthetics to be achieved, the bracket position must take into account the relationship of the incisal edges to the lower lip curvature for each individual patient. In a reverse smile arc patients, the brackets should be positioned higher than usual on the maxillary central incisors and progressively lower on the lateral incisors and canines.

Cant of the occlusal plane

Extra oral forces, inter maxillary elastics, and orthognathic surgery can affect the cant of the occlusal plane. If the maxillary occlusal plane is canted upward anteriorly, for instance, the incisal edges will move away from the lower lip, resulting in a non-consonant smile arc.

Arch form: The patient's archform

and particularly the configuration of the anterior segment will greatly influence the degree of curvature of the smile arc. The broader the archform, the less curvature of the anterior segment and the greater the likelihood of a flat smile arc.

LIP CURVATURE

The upper lip curvature is assessed from the central position to the corner of the mouth in smiling.

There are three types of curvatures:



- Upward -when the corner of the mouth is higher than the central position
- 2.Straight - when the corner of the mouth and the central position are at the same level,
- Downward-when the corner of the mouth is lower than the central position.

transverse dental projection. A molar to molar smile is considered normal in orthodontics which is considered as unrealistic looking smile in prosthodontics. Research has shown that premolar extraction does not lead to arch constriction or widening of buccal corridors. It is heavily influenced by antero posterior position of maxilla relative to lip drape. Moving the maxilla forward will reduce the negative space because a wider portion of the arch will come forward to fill the inter commissure space. In smiling the width of the mouth increases by as much as 30%. therefore an excessive transverse lip extension in smiling would theoretically produce a wider buccal corridor.

Smile symmetry

It is the relative positioning of the corners of the mouth in vertical plane which can be assessed by the parallelism of the commissural and pupillary lines. Although the commissures move up and laterally in smiling, studies have shown a difference in the amount and direction of movement between right and left sides. A large differential elevation of the upper lip in an asymmetrical smile may be due to a deficiency of muscular tonus on one side of the face. Myofunctional exercises are advocated to overcome this defect and restore smile symmetry. An oblique commissural line in an asymmetrical smile can give an illusion of a transverse cant of the maxilla or a skeletal asymmetry.

Frontalocclusal plane

The frontal occlusal plane is represented by a line running from the tip of the right canine to the tip of the left canine. A transverse cant can be caused by the differential eruption of maxillary anterior teeth or a skeletal asymmetry of the mandible. This relationship of the maxilla to the smile cannot be seen on intraoral images or study casts and smile photographs can also be misleading. Therefore, clinical examination and digital video documentation are essential in making a differential diagnosis between smile asymmetry, a canted occlusal plane and facial asymmetry. Having the patient bite on a tongue blade or a mouth mirror in the premolar area during the clinical examination is a good way to recognize an asymmetrical cant of the maxillary frontal occlusal plane.

DENTAL COMPONENTS

The first six components of the smile considered the relationship between the teeth and lips and the way the lips and soft tissue frame the smile. A pleasant smile also depends on the quality and beauty of the dental elements it contains and their harmonious integration. Dental components of the smile include the size, shape, color, alignment and crown angulation (tip) of the teeth, the midline and arch symmetry.

GINGIVAL COMPONENTS

The gingival components of the smile include the color, contour, texture and height of the gingivae. Inflammation, blunted papillae, open gingival embrasures and uneven gingival margins detract from the aesthetic quality of the smile. The space created by a missing papilla above the central incisor contact point, referred to as a “black triangle” may be caused by root divergence, triangular teeth or advanced periodontal disease. Orthodontic root paralleling and flattening of the mesial surfaces of the central incisors, followed by space closure will lengthen this contact area and move it apically toward the papilla.

CONCLUSION

In our modern competitive society, a pleasing appearance often means the difference between success and failure in both our professional and personal lives. A charming smile can open doors and knock down barriers that stand between us and a fuller, richer life. The concepts of smile esthetics are not new, but are too often overlooked in orthodontic treatment planning. The components of the smile should be considered not as rigid boundaries but as artistic guidelines to help orthodontists treat individual patients who are today, more than ever, highly aware of smile esthetics. It is important for orthodontists to make every effort to develop a harmonious balance that will produce the most attractive smile possible for each patient being treated.

REFERENCES

- [1] Flanary C, The psychology of appearance and psychological impact of surgical alteration of the face. In : Bel H, ed *Modern Practice in Orthognathic and Reconstructive Surgery* Philadelphia, Pa ; Saunders, 19
- [2] Feingold A Good-looking people are not what we think. *Psychol Bull.* 1992;111:304-341.
- [3] Moskowitz M, Nanyar A Determinants of dental esthetics -a rationale for smile analysis and treatment. *CompendContinEduc Dent:* 1995;16;1164-1166.
- [4] Kenealy P, Gleeson P, Frude N, Shaw W. The importance of the individual in the “causal” relationship between attractiveness and self-esteem. *J Community Appl Soc.* 1991;1;45-56.
- [5] Luteijn F, Starren J, van Dijk H. *Manual to the Dutch Personality index (NPV).* Lisse, TheNetheriands: Swets en Zeitlinger; 2001.
- [6] Neumann LM, Christensen C, Cavanaugh C. Dental esthetic satisfaction in adults. *J Am Dent Assoc.* 1989;118;565-570.
- [7] Isiksal E, Hazar S, Akyalcin S, Smile esthetics: Perception and comparison of treated and untreated smiles. *Am J Orthod DentofacOrthop* 2006;129;8-16.
- [8] Moore T, Southard KA, Casco JS, Qian F, Southard TE. Buccal corridors and smile esthetics. *Am J OrthodDentofacOrthop* 2005;127;208-13.

- [9] Maulik C, Nanda R. Dynamic smile analysis in young adults. *Am J OrthodDentofacOrthop* 2007;132;307-15.
- [10] Parekh SM, Fields HW, Beck M, Rosenstiel S. Attractiveness of variations in the smile arch and buccal corridor space as Judged by orthodontists and laymen. *Angle Orthodont* 2006;76;557-63.
- [11] Roden-Johnson D, Gallerano R, English J. The effects of buccal corridor spaces and arch form on smile esthetics. *Am J OrthodDentofacOrthop* 2005;127;343-50.
- [12] Ritter DE, Gandini LG, Pinto Ados S, Locks A. Esthetic influence of negative space in the buccal corridor during smiling. *Angle Orthod.* 2006;76;198-203.
- [13] Ghafari JG. Emerging paradigms in orthodontics-an essay. *Am J OrthodDentofacialOrthop.* 1997;111;573-580.
- [14] Snow SR. Esthetic smile analysis of maxillary anterior tooth width; the golden percentage.*J Esthet Dent.* 1999;11;177-184.
- [15] Naylor CK. Esthetic treatment planning; the grid analysis system. *J EsthetRestor Dent.* 2002;14;76-84

