

Review Article

Gemstone of human personality: The smile

ABSTRACT

The science of smiling was initiated by Charles Darwin. He noticed that the causes, consequences, and manifestations of smiling are universal, whereas many other nonverbal body language behaviors such as gesture or touch differ between cultures and are therefore probably learnt. People express their emotions through smile and also it plays an important role in facial beauty. In this article, we will discuss various patterns of smile and factors influencing esthetics of smile.

Keywords: Buccal corridor, gingival display, posed smile, smile arc

INTRODUCTION

The value of a beautiful smile is undeniable^[1] as this is the first thing that is noticed about anybody. Recently, the topic of smile esthetics has become important for orthodontists because more orthodontic patients evaluate the outcome of treatment by their smile and the overall enhancement in their facial appearance.^[2]

Studying smile esthetics is difficult because of the inability to standardize a realistic model and alter the variables of interest.^[3] Hence, orthodontist should treat toward an ideal; however, the expectations of the patient must be considered because ideals of esthetics may vary.^[4] Wylie^[5] astutely wrote that the layman's opinion of the human profile is every bit good as orthodontists and perhaps even better since it is not conditioned by orthodontic propaganda. Due to these differences, the orthodontist may have some uncertainty in evaluating the profile of the patient and deciding the treatment plan that will satisfy the patient. Hence, in providing the highest standard of care for the patient, careful communication with the patient concerning esthetic expectations is essential and to design beautiful smile by orthodontic treatment, it is also essential to know principles that manage the balance between teeth and soft tissues during smile.

Neuromuscular smile patterns

Plastic surgeons identified the following neuromuscular patterns of smile [Figure 1].^[6,7]

Cuspid smile

It is seen in 31% of the population. In this smile pattern, levator labii superioris are dominating, they contract first exposing the cuspid teeth, then corners of mouth contract to pull the lips upward and outward.

Complex smile

It is found in 2% of population. The lips are typically visualized as two parallel chevrons. The levators of the upper lip, the levators of the corners of the mouth, and the depressors of the lower lip contract simultaneously, showing all the upper and lower teeth concurrently. This smile is characterized by the strong muscular pull and retraction of the lower lip downward and back.

SUKHPAL KAUR

Department of Orthodontics and Dentofacial Orthopaedics, Desh Bhagat Dental College and Hospital, Fatehgarh Sahib, Punjab, India

Address for correspondence: Dr. Sukhpal Kaur, Chandigarh Sirhind Road, Fatehgarh Sahib - 140 406, Punjab, India.
E-mail: docs284@gmail.com

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Commissure smile

It is the most common type of smile, seen in 67% of population. In this smile, the corners of the mouth are first pulled up and outward, followed by contraction of levators of the upper lip to show the upper teeth and gingival scaffold.

CLASSIFICATION OF SMILE BY ACKERMAN AND ACKERMAN

Posed or social smile

It is voluntary and need not be elicited by emotion. This is unstrained, static expression and can be sustained. The lip animation is fairly reproducible, similar to the smile that may be rehearsed for photographs [Figure 2].

Unposed or enjoyment smile

It is natural, expressing authentic human emotions. It is elicited by laughter or great pleasure and is involuntary. It is dynamic in the sense that it bursts forth but not sustained [Figure 2].^[8]

CLASSIFICATION OF SMILE BY TJAN

High smile

In this smile pattern, the total cervicoincisal length of the maxillary anterior teeth and a continuous band of gingiva are visible [Figure 3].^[9]

Average smile

This type of smile reveals 75%–100% of crowns of the maxillary anterior teeth and the interproximal gingiva [Figure 4].^[9]

Low smile

This smile displays <75% of crowns of anterior teeth [Figure 5].^[9]

PARAMETERS INFLUENCING ESTHETICS OF SMILE

Smile arc

Smile arc is the relationship between the curvature of the incisal edges of the maxillary anterior teeth and the curvature of upper border of the lower lip.^[10] When curvature of incisal edges of maxillary anterior teeth is parallel to the curvature of lower lip, it is called as consonant smile arc [Figure 6], and if these are not parallel to each other, smile arc is nonconsonant [Figure 7]. Hulsey^[11] confirmed the hypothesis of Frush and Fisher that smiles with flatter smile arc (nonconsonant) are less attractive. Parekh *et al.*^[3] also reported that both laypeople and orthodontists prefer smiles with parallel smile arcs.

Buccal corridor space

The buccal corridor is the space created between the buccal surface of the posterior teeth and the lip corners when the patient smiles^[10] [Figure 8]. It is measured from the mesial



Figure 1: (a) Cuspid smile. (b) Complex smile. (c) Commissure smile



Figure 2: Posed and unposed smile



Figure 3: High smile

line angle of maxillary first premolar to the inferior portion of commissures of lips.^[12] Ioi, *et al.*^[13] found that both orthodontists and dental students prefer broader smiles with minimal buccal corridor space. Tikku *et al.*^[14] and Parekh *et al.*^[3] also found that excessive buccal corridor spaces are less attractive to both orthodontists and laypersons. However, some studies reported that there is no influence of buccal corridor space on smile esthetics.^[15-17]

Gingival display

Gingival display also influences esthetics of smile. Geron and Atalia^[18] concluded that esthetic range for upper gingival exposure on smiling and speech was up to 1 mm and esthetic range for lower incisor exposure was with no gingival exposure. Attractiveness decreased with increased gingival display of upper and lower teeth during smile and speech. Hulsey and Mackley^[10,11,19] demonstrated that minimal gingival display is more esthetic. Gingival display of 0, 1 and 2 mm has the highest score for attractiveness, and different educational backgrounds of evaluators did not influence their perception.^[20,21] Hence, gingival display should be considered along with other parameters in determining the treatment.

Midline discrepancy and midline diastema

Ideally, the dental midline should be in alignment with the facial midline but usually it does not [Figures 9]. Janson^[22] *et al.* recommended that discrepancy up to 2.2 mm is acceptable. According to Kokich *et al.*^[23] discrepancies, up to 4 mm may remain undetected. Slight midline discrepancy can be corrected by restorative dentistry but for large discrepancy, ideal treatment is orthodontic treatment. Large midline diastema [Figures 10] also has negative impact on smile esthetics.^[24,25] In Indian population, acceptable threshold for diastema is up to 1.5 mm and in Africans, diastema up to 2–3 mm is esthetically acceptable.^[26,27] Soft-tissue attachment preventing the closure of midline diastema should be checked before treatment.^[28]



Figure 4: Average smile



Figure 6: Consonant smile arc

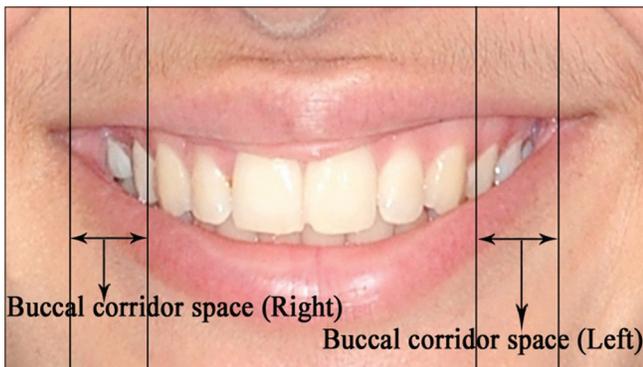


Figure 8: Buccal corridor space

Length and width of teeth

According to Edward Larren, the length of central incisor in the esthetic zone should be between 10.5 and 12 mm. It is recommended that lateral incisors be shorter than central incisors by 1–2.5 mm and canines be shorter than central incisors by 0.5–1 mm.^[29] The height/width proportions of individual teeth and the tooth width in relation to each other are also important for smile esthetics. Most studies specify that the central incisors have about 8:10 width/height ratio.^[12] For the best esthetics, the apparent width of the lateral incisor should be 62% of the width of the central



Figure 5: Low smile



Figure 7: Nonconsonant smile arc

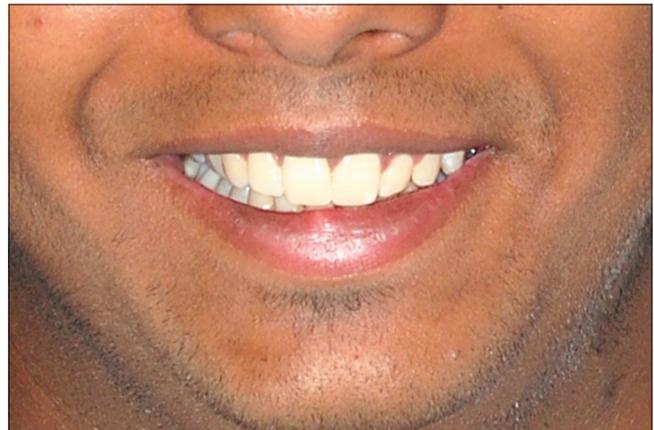


Figure 9: Midline discrepancy

incisor, the apparent width of the canine should be 62% of the lateral incisor, and the apparent width of the first premolar should be 62% of canine from the frontal examination. This ratio of recurring 62% proportions is referred as the “Golden proportions”^[11] [Figure 11].

Tooth shade and color

Tooth color is also important for facial appearance, so there is increasing consumption of both professionally and consumer-applied tooth-whitening products.^[30] Approximately, a third of adults in the USA are unhappy with the tooth color.^[31] Progressive change in shade of teeth from the midline to posterior is important for an attractive and natural appearing smile. The maxillary central incisors tend to be the brightest in the smile, the lateral incisors less, the canines are the least bright, and first and second premolars are more closely matched to the lateral incisors. They are lighter and brighter than the canines.^[11]

Contacts, connectors, and embrasures

Contacts are areas where two adjacent teeth exactly touch and connector is broad area where adjacent teeth appear to touch.^[31] There is an esthetic relationship exists between the interproximal connectors of anterior teeth and length of central incisors that is 50-40-30 rule.^[32] This rule states that the ideal connector zone between maxillary central incisors should be 50% of the length of central incisor and between maxillary central and lateral incisor it should be 40% of the length of the central incisor, and between maxillary canine and lateral incisor it should be 30% of the length of the central incisor^[33] [Figure 12]. The incisal embrasures are triangular spaces incisal to contact points. Ideally, there should be natural display of embrasures with progressive increase in size from the central incisor to canine.^[34] The individuality of the incisors will be lost if incisal embrasures are not placed properly. Too deep incisal embrasures will tend to make the teeth to look unnaturally pointed. As a rule, distoincisor corner of tooth is more rounded than its mesioincisor corner.^[35]

SMILE SYMMETRY

Smile can be asymmetric due to transverse cant of the maxillary occlusal plane or asymmetric smile curtain [Figures 13 and 14]. Transverse cant of occlusal plane can be due to different amounts of tooth eruption on the right and left sides or skeletal mandibular asymmetry, resulting in compensatory cant of maxilla. In an asymmetric smile curtain, there is difference in the relative positioning of the corners of the mouth in the vertical plane.^[11] This asymmetry of smile curtain can be assessed by the parallelism of the commissural and pupillary lines. Different elevation of the upper lip in



Figure 10: Midline diastema

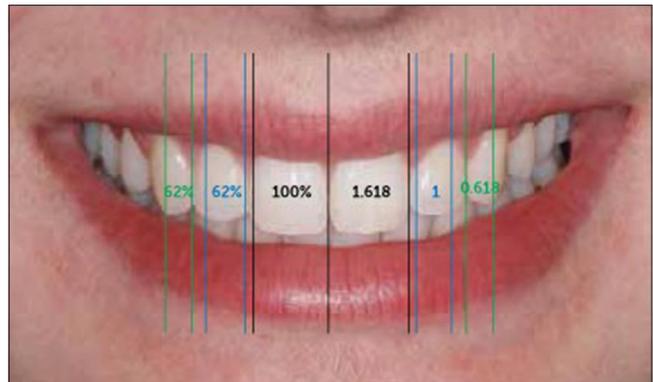


Figure 11: Golden proportions of width of teeth

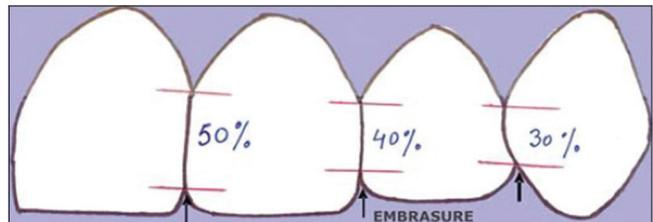


Figure 12: Progressively decreasing size of connectors and increasing size of embrasure from centrals to posterior teeth

an asymmetric smile may be due to deficiency of muscular tone on one side of the face.^[11] Myofunctional exercises have been advised in such cases to overcome this deficiency and restore smile symmetry.^[11,36] It is poorly assessed in static photographic images and is best seen in digital video clips.^[37]

GINGIVAL HEIGHTS, SHAPE, AND CONTOUR

Proportional gingival heights make the dental appearance normal and attractive. Gingival height of central incisor is highest, gingival height of lateral incisor is 1.5 mm lower, and canine gingival margin is at the level of central incisor gingival margin. Gingival shape is curvature of gingiva at the margin of tooth. The gingival shape of maxillary central incisor and canine should be elliptical and gingival shape of maxillary lateral incisor should be symmetrical half oval or half circle.

Gingival zenith is most apical point of gingival tissue. It should be located distal to the longitudinal axis of maxillary centrals and canines and gingival zenith of maxillary lateral incisors should coincide with longitudinal axis^[38] [Figure 15].

CONCLUSION

In our modern competitive society, a pleasing appearance often means the difference between success and failure in both our professional and personal lives. Therefore, the current trends in orthodontics place greater emphasis on smile esthetics. Hence, orthodontists should make every effort to develop a harmonious balance that will produce the most attractive smile possible for each patient being treated. Furthermore, it is of great importance to understand and appreciate the perception of what is esthetic among a

population to provide dental care successfully. The above discussion suggests that various elements of smile directly affect esthetics of smile. Therefore, smile analysis must be an integral part of orthodontic diagnosis and treatment planning.

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Conflicts of interest

There are no conflicts of interest.

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Figure 13: Asymmetric smile due to occlusal cant



Figure 14: Asymmetric smile due to asymmetric smile curtain

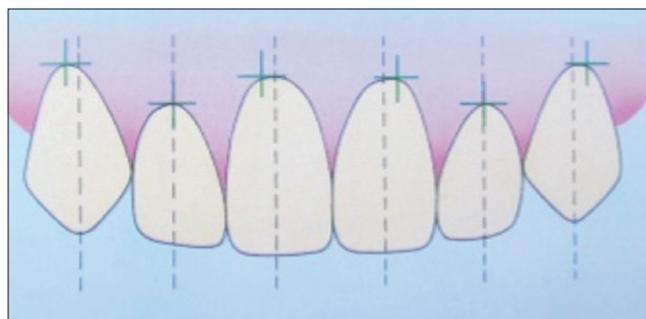


Figure 15: Position of gingival zenith in maxillary anterior teeth

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