



SMILE DESIGNING - A REVIEW

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ABSTRACT

In modern times, we are living in an esthetically governed society. Often the difference between success and failure lies in the facial expression affecting both our personal & professional lives. Scottish physiologist Charles bell (1774-1842) was quoted as remarking that the thought is to the word that the feeling is to the facial expression. He pointed out in 1806 that a smile could convey a thousand different meanings, yet it is the most easily recognized expression. And because the mouth is one of the focal points of the face, it should come as no surprise that the smile plays a major role in how we perceive ourselves, as well as in the impressions we make on the people around us. The article presents a review on smile designing and its future implications.

Key words: smile designing, esthetics, buccal corridor, negative space, curves, lip line

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INTRODUCTION

The smile is dependent on the musculature and the presence of the teeth. An attractive or pleasing smile clearly enhances the acceptance of the individual in the society where he belongs and the character of the smile influences to the great extent the attractiveness and the personality of the individual. But every person is not fortunate enough to have a beautiful smile. [1] The answer to the above problem is the esthetic dentistry which has developed leaps and bounds with the latest technologies

and materials. A Prosthodontist is probably the best person to identify the qualities of an ideal smile. Further he can also change the quality of smile with the recently available innovative techniques and the state of art restorative materials and to plan restorations in harmony with the existing smile within acceptable limits.

LITERATURE REVIEW:

CLASSIFICATION OF SMILE (Solomon E.G.R.) [2]

1) Depending on the nature of labial mucous membrane

- a) papilla smile
- b) Gingival smile
- c) Mucosa smile

2) Dependent on the lip component

- a) Straight smile

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- b) Convex smile
- c) Concave smile

DEFINITION: Glossary of Prosthodontic terms. January 1999. Esthetics 1. Pertaining to the study of beauty and the sense of beautiful. Descriptive of a specific creation that results from such study; objectifies beauty and attractiveness and elicit pleasure. 2. Pertaining to sensation. Esthetic reshaping Modification of the surfaces of teeth to improve appearance Esthetics (adj. 1798) The branch of philosophy dealing with beauty. In dentistry, the theory and philosophy that deal with beauty and beautiful, esp. with respect to the appearance of a dental restorations, as achieved through it's form and or color. Those subjective and objective elements and principles underlying the beauty and attractiveness of an object, design or principle.

Dental Esthetics The application of the principles of esthetics to the natural or artificial teeth and restorations. (GPT 1999)

Esthetic Dentistry can be defined as the art and science of dentistry applied to create or enhance beauty of an individual within functional and physiological limits. [3]

Cosmetic dentistry is application of the principles of esthetics and certain illusionary principles, performed to signify or enhance beauty of an individual to suit the role he has to play in his day-to-day life or otherwise.

Smile designing is a process whereby the complete oral hard and soft tissues are studied and evaluated and certain changes are brought about which will have a positive influence on the overall esthetics of the face. These changes are governed by the principles of esthetic dentistry. Hence, a good smile design would naturally and effortlessly blend with the rest of the face to provide an esthetic and functional complex "A well designed smile is a product of consolidated efforts accomplished by accurate diagnosis, methodical treatment planning, use of advanced materials and contemporary techniques rendered by the skilled dentist". Physical attributes of the elements of the dento-facial composition. [4]

The artistic parameters to be considered for essential beauty and those which are subtly present in natural beauty form the fundamental principles of esthetics. Understanding these artistic parameters of beauty and correlating them to the dento-facial complex will enable the dentist to appropriately scale esthetics in any dento-facial composition. Composition means the act of combining elements or parts to form a whole. There are various physical attributes of the elements of a composition that impart the esthetic value. The various physical attributes of the elements of a composition are:

Unity or oneness: "It gives different parts of the composition the effect of a whole". Unity can either be static, when repeated shapes or designs are seen as in inanimate things, like the composition of crystals; or dynamic and changing as in living beings. Unity between different parts of the face, and teeth is essential to give the effect of oneness or wholeness to the dento-facial composition.

Proportion: To be able to give a certain mathematical representation of beauty for numerically expressing the relationship of the various units that combine to make a composition, the term proportion is used. The relationship of the various units which are different from each other in a composition but are associated with each other through a certain repetitive mathematical factor is the repeated ratio. The proportion between the various elements of a harmonious composition, in which the cohesive and segregate forces are equally balanced and which has its various units in an esthetically appealing respective proportion to each other is the golden proportion.

Dominance: It exists when a strong centralized structure is surrounded by well-demarcated, characterized structures. In a dento-facial composition it creates immaculate unity leading to a harmonious composition. The absence of dominance makes the composition weak. Color, shape and size are the factors which can control dominance).

Balance: It is achieved when there is an exact equilibrium between the forces present on either side of the fulcrum in a composition. In dentistry, this implies the balance of the elements in relation to the midline. If any elements are imbalance on one side then, to create a visual balance either these elements are moved towards the midline or are counter-balanced with opposite elements to regain the balance. In balance the weight of the elements far away from the fulcrum grows in importance.

Visual tension is the tension brought about by the presence of certain elements that cause an imbalance in the given composition. If the presence of these factors is closer to the fulcrum, the effect of the tension into the fulcrum, the effective the tension induced is more magnified as against their presence further from the fulcrum. A distally inclined lateral incisor on one side is compensated by a more mesial inclination of the first premolar on the opposite side to reduce the effective visual tension. These variations are naturally found in dentitions explaining the reason why sometimes irregularities in inclinations still produce pleasant smiles.

The inter-pupillary line helps to evaluate the orientation of the incisal plane, the gingival margins and the maxilla. An imaginary horizontal line through the incisal plane and the gingival margins should be visibly parallel to the inter-

pupillary line. This helps to diagnose any asymmetry in the tooth position or gingival location. When an imaginary line is drawn across the gingival margins, it may not be parallel to the inter-pupillary line indicating a certain degree of canting of the maxilla. [5]

Vertical references: The facial midline serves to evaluate the location and axis of the dental midline and the medio-lateral discrepancies in tooth position. The inter-pupillary line and the facial midline emphasize the 'T' effect in a pleasing face. The dental midline, if perpendicular to the inter-pupillary line and coinciding with the bridge of the nose and the philtrum, produces an attractive orientation of the smile. Axial inclination is the direction of the anterior teeth in relation to the central midline and becomes progressively more pronounced from the central incisor to the canine. There is a definite mesial inclination to all the anterior teeth related to the midline. The axes of the premolars and the first molar on either side also show mesial inclination in relation to the midline.

The perception of tooth inclination can be viewed from the frontal aspect around the central vertical midline, which acts like a fulcrum around which axial inclination of teeth on either side exhibit a phenomenon of balance of lines. Natural smiles show a deviation from this standard axial inclination. Deviations in axial inclination cause a visual tension when beyond the point of equilibrium. [6]

Sagittal references: Soft tissue analysis at a standardized position helps in studying the profile of an individual. The contours of the upper and lower lip support are determined by the position of the anterior teeth and can be used as a guide for the placement of teeth when planning restorations. The lip protrusion, the amount of prominence of chin, recession or prominence of the nose and its degree, all help in profile analysis for diagnosis and treatment planning.

The E-line or esthetic line is an imaginary line connecting the tip of the nose to the most prominent portion of the chin on the profile, ideally the upper lip is 1-2 mm behind and the lower lip 2-3mm behind the E-line. Any change in the position of the E-line indicates the abnormality in the upper or lower lip position. The main support of the upper lip is contributed by the gingival two thirds of the maxillary central incisors rather than the incisal one third. According to study by Fradeani, the lip support is a better guide of tooth position than incisal edge position. [7]

The relationship of the maxillary incisal edges to the lower lip is a guide for the placement of the incisal edge position and length. The pronunciation of the 'F' and 'V' consonants helps determine the position of the incisal edges. On pronouncing 'F' and 'V' the incisal edges should make a definite contact at the inner vermilion

border of the lower lip. Thus the position of the incisal third of the maxillary central incisor can be determined.

Phonetic references: Phonetics plays a part in determining maxillary central incisor design and position. 'F' and 'V' sounds are used to determine the tilt of the incisal third of the maxillary central incisors and their length. The 'M' sound is used to achieve relaxed rest position and repeated at slow intervals can help evaluate the incisal display at rest position. 'S' or 'Z' sounds determine the vertical dimension of speech. Its pronunciation makes the maxillary and the mandibular anterior teeth come in near contact and determine the anterior speaking space. The amount of posterior speaking space varies with the amount of mandibular protrusion necessary to bring the anterior teeth in near contact for the 'S' sound.

Smile elements: The extent of the smile is outlined by the curvature of the upper and lower lip and the position of the angle of the mouth, and it determines the degree of exposure, both in the anterior and posterior teeth, gingiva as well as the width of the buccal corridor. Smiles can be classified as passive, active (moderate) and laugh. In a passive smile the lips are parted slightly away from the rest position expressing content, passion, desire, surprise, etc. In an active smile the lips move to a significant extent away from the rest position displaying more teeth and even gums, expressing joy, welcome, happiness, etc. Laugh is an instant fluctuation from an active smile position where the facial muscles instantly act leading to maximum exposure of the teeth and gums. Humorous and funny situations usually lead to such an expression.

Lip and lip lines: The length, the curvature and the shape of the lips significantly influence the amount of tooth exposure during rest and in function. A prominent tooth display is associated with a youthful smile and most patients would like to seek the benefit of the same. Some researchers demonstrated that the average maxillary incisor display with the lips at rest is 1.91mm in men and 3.40 mm in Women. Patients with short upper lips and younger patients generally display more maxillary tooth structure which may be up to 3.65mm.

Upper lip line helps to evaluate the length of the maxillary incisor exposed at rest and during smile and the vertical position of the gingival margins during smile. The upper lip line can be classified as low, medium or high depending upon the amount of tooth or gingival display that is available at rest or during a moderate smile. The gingival margins may be displayed in high lip line cases. The most apical position of the gingiva over the facial aspect of the maxillary central incisor and canine is slightly distal to the long axis of the tooth while in the maxillary lateral incisor it is at the long axis of the tooth. This is called the gingival zenith. Whenever a patient displays the gingival margins

easily on smiling or speaking, a definite pattern of the gingival display can be recorded. This pattern can be either esthetic or unaesthetic. A smile can be termed “toothy” if more than 6mm of incisal display is seen at rest position or “gummy” if more than 3mm of gingival tissues are displayed in moderate smile). [8]

Lower lip line helps to evaluate the buccolingual position of the incisal edge of the maxillary incisors and the curvature of the incisal plane.

Smile line: It is an imaginary line passing through the incisal edges of the upper anterior teeth. The smile line usually coincides or runs parallel to the inner vermilion border of the lower lip. In a youthful smile the incisal edges of the central incisors and canines are aligned on a convexity and are longer than the lateral incisors, incisal embrasures gradually deepen from central incisor to the canine, giving the appearance of the wings of a gull. Thus the incisal plane is said to have a gull-wing appearance when the incisal edges of the central incisors and canines are aligned on a convexity the incisal plane is convex. Reduced incisal embrasures and leveling of the gull-wing effect as in a straight smile line is associated with aging.

Negative space: Negative space is a dark space appearing between the jaws and the mouth opening either at the corner of the mouth or around the buccal aspect of the posterior teeth during active smile and laugh. The lateral negative space exists between the labial surface of maxillary teeth and the corner of the mouth while the buccal negative spaces appear in the buccal vestibule on either side of the buccal aspect of posterior teeth. Obliteration of these essential spaces by dental elements like bulky canines, wide arches or over-contoured restorations can lead to an unattractive smile. Excessive negative space seen in cases of missing premolars or palatally placed posteriors and a constricted arch also appear unaesthetic. [9]

Progressive abating in a dental composition: When similar structures are aligned in an arch from one after the other, they appear to progressively abate in size from the nearest to the farthest. This gives an illusion of depth. The essential requirement of the front to back progression in dental composition is the alignment of the contour of the labial and surface at the incisal third, middle third and the gingival third of successive teeth in the arch. The incisal mesio-buccal inclines should be well aligned to give a smooth progression from tooth to tooth. The buccal and lateral negative space progressively reduces the illumination on teeth to enhance the front to back abating effect. The presence of poorly shaped teeth, differences in axial inclinations, tooth length discrepancies, discolorations, gingival disharmonies etc. can lead to a

visual tension resulting in a disruption of the front to back progression.

Proportion: When mathematics is applied to the study of ideal tooth form, a numerical relationship is established within a single tooth form (ideal proportion) and also between a series of teeth in the arch (relative proportion). The position of the tooth in the arch, the relationship between the width, the length and the face of the tooth can also be numerically established in relation with certain anatomic landmarks.

Golden Proportion is expressed in numerical form and applied by classical mathematicians such as Euclid and Pythagoras in pursuit of universal divine harmony and balance. It has been applied to a lot of ancient Greek and Egyptian architecture and may be expressed as the ratio 1.618:1. If the ratio is applied to the smile made up of the central, lateral incisor and the mesial half of the canine, it shows that the central incisor is 62% wider than the lateral incisor which in turn is 62% wider than the visible portion of the canine which is the mesial half, when viewed from the front. Application of sizing the central incisors from certain facial measurements is known as the 1 to 16 theory, whereby the height of an ideal maxillary central incisor from the incisal edge to the gingival crest is 1/16th of the distance from the inferior border of the chin to the inter papillary line. The same tooth width can be measured from the mesial to distal contact areas and is 1/16th of the distance measured from either zygomatic prominence through an imaginary facial midline.

Pleasing Smile is a naturally attractive smile that evokes a feeling of beauty or harmony and complements the personality of the bearer is termed as a pleasing smile. The natural pleasing smile may not necessarily comply with all rules of symmetry or golden proportion or may not exhibit perfect balance without irregularity of shape. However, the composition is esthetically appealing with unity within its various elements.

The distinguishing characteristics observed in people with pleasant smile dominance that can be used as a guideline for creating the same are: [10]

- The maxillary central incisors exhibit a strong presence by their size and form reflecting the personality of the individual.
- The maxillary lateral incisors and the canines complement the central incisor in terms of proper shape and form.

Although numerically all proportions of the anterior teeth do not follow the rule of golden proportion, the teeth are so placed that they appear in suitable proportions with each other.

- Smile recurring ratios are observed in the teeth from the central incisor to the premolar.
- Well co-ordinated movements of the lips with the other peri-oral musculature and corresponding harmonious facial expressions, contribute to the pleasant face during smile.
- The complexion and texture on the face contrast with the lip color, gingival and the teeth leading to a distinct demarcation between the oral and the facial frame.

PERCEPTUAL ASPECTS – THE ART OF ILLUSION:

Illusion is an imagination where a perception of an object is created. The art of creating illusions consists of changing perception, to cause an object to appear different from what it actually is. Teeth can be made to appear smaller, larger, wider, narrower, shorter, longer, younger, older, masculine or feminine. One is subjected to light the most fundamental objects exhibits two dimensions, that is, length and width. True natural light is multi-directional and on striking the surface of the object, also reveals texture and shadows, this adds the third life like dimension of depth. Illusion works on two basic principles which are the principle of illumination and the principle of light. The most important of these is the perception that light approaches and dark recedes. This is termed as the ‘Principle of Illumination’. The second artistic predilection of great importance in dentistry is the use of horizontal and vertical lines and ridges. Horizontal lines make the object appear wider and vertical lines make the object appear longer. This is termed as the “Principle of Line”. The artistic predilection exhibited in the principle of illumination can be maintained to change the size, shape and the overall form of the tooth through illusions.

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Cosmetic contouring is the reshaping of natural teeth to make them esthetically pleasing. In natural dentitions, variations seen in tooth shape and size sometimes violate the acceptable width to length ratios as well as the golden proportion. Minor adjustments in contours to change the perception of these proportions increase the esthetic acceptability to a great extent. It is indicated for giving a pleasing appearance to fractured, chipped, extruded, malformed or over lapped teeth. The procedure is contra indicated in hypersensitive teeth, teeth with thin or defective enamel formation or large pulp chambers. [11]

Total Smile Analysis: It is a cumulative inference analysis, drawn by interpreting and integrating various analysis like a visual, space, profile and computer analysis after performing the preliminary analysis. Now-a-days manufacturers promote digital radiography system and video camera in one unit i.e. single hand piece which will be convenient for use.

CAD/CAM: With CAD/CAM (Computer assisted design/ Computer assisted manufacture) technology we can design veneers and crowns to enhance smile while the patient waits. The so called "mock- up" of a planned cosmetic treatment also has been shown to be quite useful. It also allows clinician to visualize the desired results and solve potential problems before providing treatment to the patient.

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