

Smile Makeover- Current Trends

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ABSTRACT

A systematic approach is required to evaluate, diagnose and solve esthetic problems predictably. Diagnosis and treatment planning should be done thoroughly before proceeding for the treatment. It is of prime importance that the final result is not dependent only on the looks alone. As a clinician our goal is to achieve pleasing composition in the smile by creating an arrangement of various esthetic elements. This article reviews the various principles and methods that govern the art of smile designing. This article will provide a basic knowledge to the reader to bring out a functional stable smile and the basic components of smile and their effect on smile.

Keywords: Elements of smile designing; esthetic smile; smile designing; esthetic proportions.

Introduction:

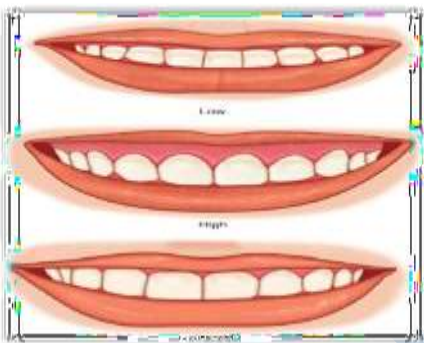
Smile is the ability of person to express a range of emotions with the structure and movement of the teeth and lips It can often determine how well a person can function in society¹.

Esthetic dentistry is characterized primarily by the smile. The goal in the creation of esthetic dental restorations is to stimulate, or improve upon, the appearance of the natural dentition. The successful esthetic restorations must integrate harmoniously with the whole of the face., not just with the surrounding teeth.

Smile designing is not only related to restorative dentistry, in fact it is an interdisciplinary approach involving restorative, orthodontic, prosthodontic and periodontal approaches.

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.

Classification of Smile:
(Solomon)2-



Types of Smile

Depending on the nature of labial mucous membrane
papilla smile
Gingival smile
Mucosa smile

Dependant on the lip component
Straight smile
Convex smile
Concave smile

Esthetic Diagnosis & Treatment Planning:

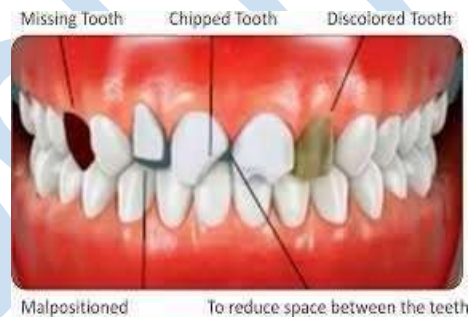
A meticulous esthetic diagnosis followed by a well-defined treatment plan is the foundation of successful esthetic dental treatment.

1. Patient history
2. Clinical examination-

A clinical examination involves a thorough evaluation of-
Facial components
Occlusion relationships
Periodontal attachment
Teeth
TMJ

Total Smile Analysis:

Total smile analysis is a cumulative analysis, drawn by interpreting and integrating various analysis like a visual, space profile and computer analysis after performing the preliminary analysis.



Smile analysis on different aspects

Space Analysis:

It helps to gauge the amount of space available during the treatment planning stage (measure the widths of all teeth and to compare it with the space present in the arch). Disproportionate space may be due to discrepancies in jaw and tooth size, malformed teeth, missing teeth, mal-aligned teeth.



Congenitally present space due to peg laterals

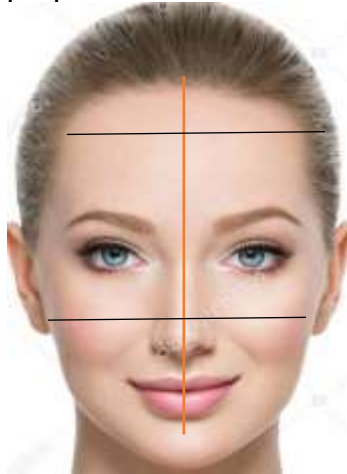
Components of An Esthetic Smile-

- Facial component
- Hard tissues
- Soft tissues
- Dental components
- Teeth
- Gingiva

Facial Composition-

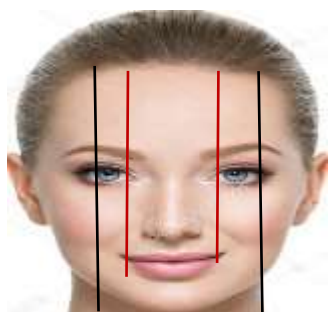
Facial beauty involve proper-
alignment
symmetry
proportion of the face

There are two facial features which do play a major role in the smile design- The interpupillary line and the lips. Lips are important since they create the boundaries of smile design. The interpupillary line should be parallel to the occlusal plane and perpendicular to the midline of the face.



Facial midline, interpupillary line and the lip line

Horizontal Dimensions For An Ideal Face



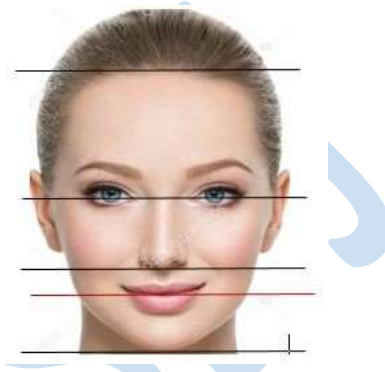
Horizontal dimensions

The width of the face should be the width of five "eyes".

The width of the nose should be equal to the intercanthal distance

The width of the mouth should equal to the distance between two pupils

Vertical Dimensions For An Ideal Face



The full face is divided into three equal parts

Upper part from hair line to the glabella (or eyebrow)

Middle part from glabella to the base of the nose

The lower part from the base of the nose to the chin which is subdivided into two parts, the upper lip forms one-third of it and the lower lip and the chin two-thirds of it.

Vital Elements Of Smile Design- Dental Components1-

Tooth components- Dental midline, Incisal lengths, Tooth dimensions, Zenith point, Axial inclinations, Interdental contact, Embrasures, SPA, Symmetry and balance.

Soft tissue components- Gingival health, Gingival levels and harmony, Interdental embrasure, Smile line.

Midline-

Dental midline should be collinear with facial midline Vertical contact interface between the 2 central incisors. Midline

should be perpendicular to the interpupillary line and parallel to facial midline. As long as the midline is parallel with the long axis of the face midline discrepancies up to 4mm is not considered unaesthetic but canted midlines aren't considered esthetic^{5,6}.

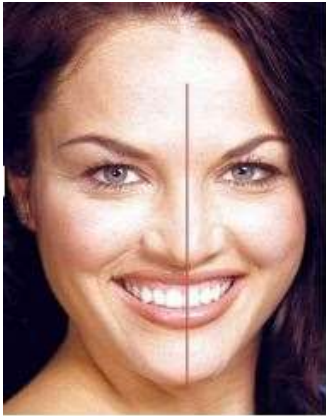


Image of smile where the facial and dental midline do not line up.

Incisal Lengths (Incisal Edge Positions)-

It is the most important determinant in smile creation because it serves as a reference point to decide the proper tooth proportion and gingival levels. Degree of tooth display: 2 mm of incisor edge show at rest



about 2 mm of gingival show When smiling



Phonetic References:

Phonetics play a part in determining maxillary central incisor design and position^{7,8}.

'F' and 'V' sounds are used to determine the tilt of the incisal third of the maxillary central incisors and their length



'F' and 'V' sounds

'E'- incisal edge should be halfway between upper and lower lip.

The 'M' sound is used to achieve relaxed rest position and repeated at slow intervals can help evaluate the incisal display at rest position



E'> incisal edge should be halfway between upper and lower lip.

S' or 'Z' sounds determine the vertical dimension of speech. Its pronunciation makes the maxillary and the mandibular ant. teeth come in near contact and determine the ant. speaking space



'M' sound

Tooth Dimensions-

Correct dental proportion is related to facial morphology and is essential in creating an esthetically pleasing smile.

CENTRAL DOMINANCE- dictates that the centrals must be the dominant teeth in the arch and they must display pleasing proportions. The proportions of width and length of the central incisor must be esthetically and mathematically correct (4:5)



S' or 'Z' sounds

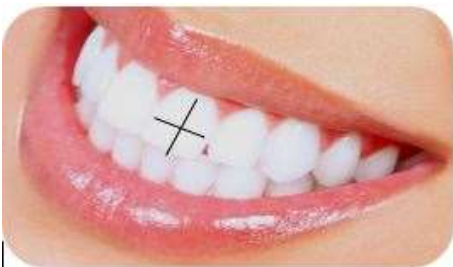
The shape and appearance of the centrals influences the placement of laterals and canines.

Guidelines For Correct Proportions-

Golden proportion
Recurring esthetic dental proportion (ward)
M proportions (methot)
Chu's esthetic gauges

Golden Proportion-

It 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:



width to length ratio –4:5

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.

Chu's Esthetic Gauges-

Dr. Chu's research supports Levin's RED concept and refutes the golden proportion. A series of gauges are available to make intraoral analysis easier. The gauges allow for fast, simple analysis and diagnosis of tooth width problems, tooth length problems and gingival length discrepancies. colour coding predefines desired tooth proportions, quicker and easier to read than any other instrument.

Individual Tooth Dimensions-

Centrals wider than laterals by 2-3mm
canines by 1-1.5MM
Canine wider than lateral by 1- 1.5mm
Canine and central are longer than lateral by 1-1.5Mm

Buccal Corridor-

In an esthetic smile there is a negative space, which is a small space between the maxillary posterior teeth and the inside of the cheek¹². In esthetic smile the percentage visibility decreases as we go more posteriorly.



Measurement of width ratio



Buccal corridor

If there is any malocclusion or discrepancy in arch form leads to loss of esthetics.



Gives depth & mystery to the smile

Interdental Contact Areas & Points-

The contact points of the maxillary teeth are relevant for ensuring optimal 'pink aesthetics' for patients with a high smile line (or visible cervical margins).



- Occlusal disturbance or inadequate restorative dentistry

The '5 mm rule', states that when the distance from the contact point to the interproximal osseous crest is 5 mm or less, there is complete fill of the gingival embrasures with an interdental papilla. For every 1 mm above 5 mm, the chance of complete fill is progressively reduced by 50%.

Gingival Zenith Or Height Of Contour-

The apex of the gingival height of contour on the anterior teeth is called zenith point¹³.



Interdental Contacts

Central: distal third
Lateral: central
Cuspid: distal third
Bicuspid: central

Incisal Embrasures-

In an esthetic smile, the edges of the maxillary anterior teeth follow a convex or gull-wing course matching the curvature of the lower lip^{14,15}.



zenith point

Reduced incisal embrasures and leveling of the gull-wing effect as in a straight smile line is associated with aging.

Sex, Age And Personality¹⁶⁻

Sex-

Maxillary incisors

In females – round, smooth and delicate

In males – cuboidal and vigorous

Age-

Youthful teeth- unworn incisal edge, defined embrasures, high value

Aged teeth- shorter minimal embrasure and low value

Personality

Maxillary canine

If long fang like- Aggressive, hostile

If blunt, rounded short cusp- passive and soft

Soft Tissue Component Of Smile-

The lips frame the teeth and gingiva. The gingiva frames the teeth. The ratio of tooth structure to the amount of gingival and labial tissue should be harmonized to prevent an over-dominance of any one element.

Gingival Line-

GAL- gingival aesthetic line – the ideal gingival line from the cuspid to the central incisors intersects the dental midline at an angle >45° but <90°.

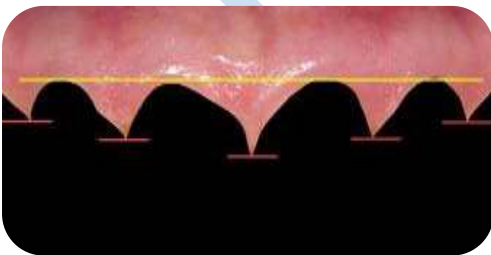


Edges of maxillary anteriors following curvature of lip line

The key esthetic issue is that the gingival line for the anterior teeth should be relatively horizontal to the horizon and relatively symmetric on both sides of the midline. In an esthetic smile, the volume of the gingiva from the apical aspect of the free gingival margin to the tip of the papilla is about 40% to 50% of the length of the maxillary anterior tooth and fully fills the gingival embrasure.



Gingival line



Ideal gingival scallop, with the papilla length relative to tooth length.

Periodontal Biotype And Bioform

The human tissue biotype is classified as thin, normal or thick. The thin periodontal biotypes are friable, escalating the risk of recession following crown preparation and periodontal or implant surgery. This is particularly significant for full coverage crowns

Esthetic Treatment Planning And Sequencing¹⁷-

Integral part of treatment planning

Treatment procedure which will be programmed or charted

Final Case Presentation-

three basic methods

Mock up - with soft tooth coloured wax or composite resin- Direct composite resin placement along with the use of intraoral markers (provide a visual three dimensional means for the patient to see the final result prior to committing to treatment).

Diagnostic wax-up or study casts- This wax up can be evaluated by the patient directly on the diagnostic casts of the articulator and also intraorally with the use of acrylic overlays and acetate matrices.



Gingival line on the same patient on lateral and central apical position

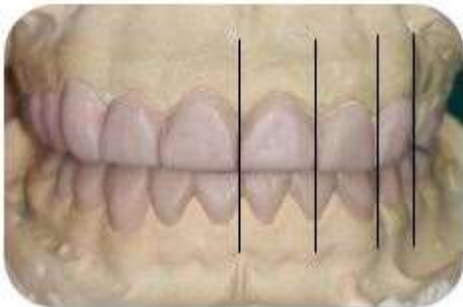


Diagnostic cast

Computer imaging- Digital imaging takes advantage of contemporary technology. In a particular case, esthetic enhancement with a change of arrangement, form, shape and color can be demonstrated quickly.

Smile Line-

It refers to an imaginary line along the incisal edges of the maxillary anterior teeth which should mimic the curvature of the superior border of the lower lip while smiling.



Diagnostic wax up

Another frame of reference for the smile line suggests that the centrals should appear slightly longer or, at least, not any shorter than the canines along the incisal plane¹⁸. The gum line follows the upper most point of the upper anterior teeth. Usually in a perfect smile design the gum line follows the upper lip or is just above it and ensures that just enough gums (2-3mm) are shown to be attractive.



lower lip line during smile

Perceptual Aspects - The Art Of Illusion-

Illusion is a figment of imagination where a perception of an object is created.

Fundamentals And Principles-

The art of creating illusion 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. Illusion works on two basic principles, which are the illusion of principles of illumination and the principle of line.



- upper lip line during smile

The most important of these is the perception that light approaches and dark recedes. This is termed as "Principle of illumination".

The second artistic prediction of great importance in dentistry is the use of horizontal and vertical lines and ridges. Horizontal lines make the objects appear wider and vertical lines make the object appear longer. This is termed as the principle of line.

Law Of Tooth Face-

The face of a tooth is that area on the facial form on both anterior and posterior teeth, that is bound by the transitional line angles as viewed from the facial i.e. labial or buccal aspect. These transitional line angles mark the transition from the facial surface to the mesial, distal, cervical and incisal surfaces. The tooth surface slopes lingually in the mesial and distal region while it slopes cervically from the line angles towards the root surface. Whenever there is no transitional line angle demarcating the incisal portion of the facial surface, the face is bound by the incisal edge as the occlusal tip.

The law of the face implies making dissimilar teeth appear similar by making the apparent faces equal. The apparent face should be manipulated, not the actual face. This is more importantly in the canine and the posterior as the “apparent face”. The transitional line angles are relocated so that the apparent face looks equal. Similar faces produced attract light and appear highlighted while the dissimilar areas that are in a shadow appear to recede.

the lip position in both speaking and smiling. With the use of water, it is often possible to see a slight color shift before the enamel is completely penetrated. The last few layers of enamel are more translucent so that the yellow dentin becomes more visible. Enamel removal should be stopped as soon as color shift is observed and hopefully before it. Anterior teeth in the lower arch should be shortened only to the level where they still occlude in protrusive movements.

Techniques Of Esthetic Recontouring-

Achievement Of Illusions-

The purpose of planning is to determine how to achieve an illusion of straightness. This process must include different views and perspective. An optical illusion must work most effectively in the position from which most people would be viewing the patient

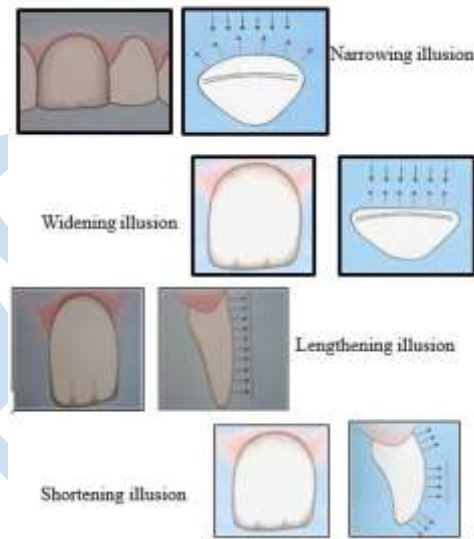
Developmental grooves play important role in creating illusion. If the grooves are placed more apart illusion of more wide teeth can be created & vice versa. If there is dark pigmentation in the periphery and light in central portion of the facial aspect of tooth an illusion of narrow teeth can be created.

Angle Of Correction-

A lower incisor that actually or apparently, extends above the lower incisal plane is quite noticeable. The angle of view is important specially in shaping lower teeth. Because of the angle of view, an anterior tooth which is in linguoversion appears to be much more prominent than the one in labioversion. To contour the tooth in linguoversion, its incisal edge should be beveled lingually.

Reduction-

Reshaping of the natural dentition must always be in relationship to



Illusions for esthetics

Alteration Of Tooth Form-

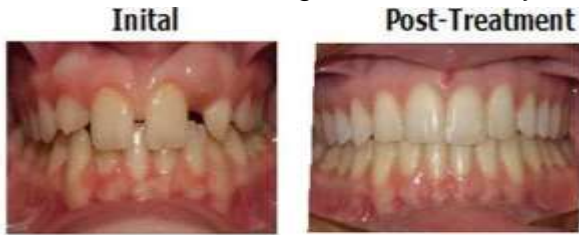
A canine that has drifted or been repositioned into the space of an extracted or a congenitally missing lateral incisors can sometimes congenitally be reshaped to resemble the missing tooth. Another example is to remove the part of the lingual cusp and reshaping of the labial surface of a first bicuspid so that it resembles a cuspid.



Selective reduction of Lower anteriors

Esthetics With Ceramics-

In many dental practices, the ceramic crowns and bridges are one of the most widely used fixed restorations. This has resulted part from technologic improvements in the fabrication of restoration by dental laboratories and in part from growing amount of cosmetic demands that challenge dentists today.



Shape and position of canines changed to lateral incisors

Goals for achieving maximum esthetics with ceramics-

Tooth preparation- Adequate tooth preparation is required to avoid unaesthetic contours. It allows sufficient bulk of the material

Gingival retraction- Harmony with the adjacent periodontium, Emergence profile, high esthetic are achieved by gingival retraction.

Impression- Correct reproducing the finish lines and accuracy is required for better results.



Esthetic with all ceramic crown

Veneers-

It is a layer of tooth coloured material that is applied to a tooth to restore. It is used for localized or generalized defects and intrinsic discoloration.



Tooth preparation and impression

Types ...

Directly fabricated veneers

Indirectly fabricated veneers- This category can be subdivided to the material used-

Composite

Porcelain

Two types of esthetic veneers exist-

Partial veneer

Full veneers



Veneer

Conclusion:

Smile correction is the requirement of modern era due high esthetic demand. With increasing awareness, number of patients for smile designing is increasing. Diagnosis and treatment planning is very much required before proceeding for the treatment. Treatment planning should depend on patient's requirement and condition of dentition and surrounding structures.

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