Original Research Paper Prosthodontics

# ESTHETIC SMILE DESIGNING:A PROSTHODONTIST REVIEW


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| **Dr. AV Sreekumar** | Professor and HOD Department of Prosthodontics and Crown&Bridge Kannur Dental College, Anjarakandy, Kannur. |
| **Dr.Abdul Sameeh*** | P.G.Student, Department of Prosthodontics and Crown&Bridge, Kannur Dental College, Anjarakandy, Kannur. *Corresponding Author |
| **Dr Mohammed Shabas** | Assistant professor, Department of Prosthodontics and Crown&Bridge, Kannur Dental College, Anjarakandy, Kannur. |


**ABSTRACT** The crafting of an ideal smile requires analyses and evaluations of the face, lips, gingival tissues, and teeth and an appreciation of how they appear collectively .Such an ideal smile depends on the symmetry and balance of facial and dental features. The color, shape, and position of the teeth are all part of the equation. The role of prosthodontist in carving an aesthetically pleasing smile is exceptionally important owing to the rehabilitative treatment procedures he is expertise in. This article reviews the various elements that govern the art of smile designing.

**KEYWORDS** : smile design,esthetic smile,smile elements,smile proportion

## Introduction

"Esthetics is a branch of philosophy dealing with beauty and beautiful, especially with judgment of taste concerning them". Esthetics has become increasingly important in the practice of modern dentistry and is synonymous with a natural, harmonious appearance.

Even though most people don't know exactly what constitutes a good smile, they can well appreciate one. Using the "Principles of Smile Design", a prosthodontist can artificially carve out an aesthetically pleasing smile for the person who desires it.

## Goals of smile design

Today smile design not only means designing teeth, but also creating a smile that truly complements the patient's face and personality. Following this philosophy, smile design starts with an analysis of the face.

The number of teeth involved in the esthetic treatment plan will depend upon the patient's facial and dental esthetic analysis. It is therefore imperative to integrate the esthetic parameters with the functional parameters of the occlusion[1].

Harmonizing an esthetics smile requires a perfect integration of facial composition and dental composition. The facial composition includes the hard and soft tissues of the face. The dental composition relates more specifically to teeth and their relationship to gingival tissues.

## Facial Analysis

The facial analysis involves an assessment of the face as a whole. This analysis is done in two dimensions: the *horizontal and vertical*.

### *Horizontal dimensions for an ideal face*

- The width of the face should be the width of five "eyes".
- The width of the nose should be equal to the distance between two eyes.
- 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.
- 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.

This analysis is done in two planes: the *frontal and the sagittal.*

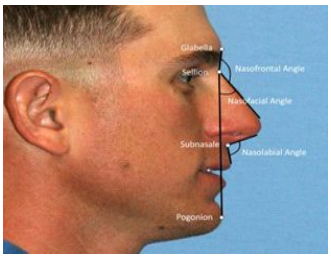
**Frontal view**:

The basic *shape* of the face when viewed from the frontal aspect can be one of the following.

- Square
- Tapering
- Long
- Ovoid

The facial midline is marked from the glabella to the middle of the philtrum. This is connected to the midline of the smile, creating a relationship between the face and the smile.

**Sagittal plane**




The lateral profile of an individual can be any one of the following:
- Straight
- Convex
- Concave

We look at the Ricketts esthetic plane, formed between the tip of the nose and the tip of the chin. Another parameter is the nasio-labial angle, formed by the base of the nose and the upper lip. These parameters provide information regarding the prominence of the anterior segment and the premaxilla and are instrumental in determining the position of the incisors in the labio-lingual plane while designing the smile. Thus we evaluate the relationship of the features to each other and to the smile.

There are two facial features which do play a major role in the smile design:

1. the interpupillary line and
2. Lips.

**Interpupillary line**

The interpupillary line should be parallel to the occlusal plane and perpendicular to the midline of the face

**Lips**.

Lips are important since they create the boundaries of smile design.

*If we come across major discrepancies in the above-mentioned two factors, then we have to seriously consider the correction of the facial composition, before we venture into the correction of the dental composition.*

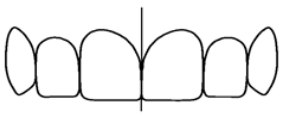
**Dental Analysis:**

The dental analysis provides insight into characterization and individuality of the teeth.

By following the systematic approach using the parameters observed during the various analyses, dentist will have a technique to execute a successful smile design[2].

**Dental compositions**
- Dental midline
- Incisal edges
- Tooth dimensions
- Zenith points
- Axial inclinations
- Interdental contact area (ICA) and point (ICP)
- Incisal embrasure
- Symmetry and balance
- Interdental embrasure
- Smile line

***Dental midline***



- The midline refers to the vertical contact interface between two maxillary central incisors.
- It should be parallel to the midline of the face.
- The philtrum of the lip is the most accurate anatomical guide posts.
- Various anatomical landmarks such as midline of the nose, forehead, chin, philtrum, interpupillary plane can be used as guides to the midline assessment.
- The maximum allowed discrepancy can be 2 mm and sometimes greater than 2 mm discrepancy is esthetically acceptable so long as the dental midline is perpendicular to the interpupillary line.
- Maxillary and mandibular midlines do not coincide in 75% of cases.
- It is not advisable to use the mandibular midline as a reference point.
- Mismatch between maxillary and mandibular midline does not affect the esthetics because mandibular teeth are not usually visible while smiling.

***Incisal lengths***

The most important determinant in smile creation because it serves as a reference point to decide the proper tooth proportion and gingival levels[2].

Degree of tooth display:
a. 2 mm of incisor edge show at rest
b. about 2 mm of gingival show When smiling

*The parameters used to help establish the maxillary incisal edge position are:*

1. Degree of tooth display,
2. Phonetics
3. Patient input.

Degree of tooth display:

When the mouth is relaxed and slightly open, 3.5 mm of the incisal third of the maxillary central incisor should be visible in a young individual. As age increases, the decline in the muscle tonus results in less tooth display.

Phonetics:

Phonetics is a major determinant of the tooth length. The patient has to sit erect or stand during the phonetic exercises[2].

- M sound: After pronunciation, the lips return to their normal rest position, allowing evaluation of the amount of the tooth display in rest position.
- E sound: The maxillary incisal edge position should be positioned halfway between the upper and lower lip during the "E" sound.
- F and V sounds: Fricative sounds are produced by the interaction of the maxillary incisal edge with the inner edge of the lower lips' vermilion border. Thus, fricative sounds help to determine the labiolingual position and length of the maxillary teeth.
- S sound: During pronunciation, the mandibular central incisors are positioned 1 mm behind and 1 mm below the maxillary incisal edge.

Tooth dimensions:


- The width to length ratio of the central incisors should be approximately 4:5; a range for their width of 78% of their length[5].
- Shape and location of the centrals determines the appearance and placement of the laterals and canines.
  Various guidelines for establishing correct proportions in an esthetically pleasing smile are
- Golden proportion (Lombardi),
- Recurring esthetic dental proportions (LEVIN),
- M proportions (Methot)
- Chu's esthetic gauges.

1. Golden proportion (Lombardi)


When viewed from the facial, the width of each anterior tooth is 60% of the width of the adjacent tooth (mathematical ratio being 1.6:1:0.6).[9]

The lateral incisors should be 60% the width of the central incisors and the canines 60% that of the lateral incisors.[10]

2. Recurring esthetic dental proportions (Ward)
Each tooth becomes smaller by a fixed percentage as you move back in the mouth.


3.M proportions (Methot**):**
This method compares the tooth width with the facial width using software.

4.Chu's esthetic gauges:

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;
- color coding predefines desired tooth proportions, quicker and easier to read than any other instrument;
- Used as a reference guide between clinician and lab technician, hence reduces the incidences of miscommunications errors.

***Buccal corridor***


Buccal corridor refers to dark space (negative space) visible during smile formation between the corners of the mouth and the buccal surfaces of the maxillary teeth.

Its appearance is influenced by
- The width of the smile and the maxillary arch
- The tone of the facial muscles
- The positioning of the labial surface of the upper premolars
- The prominence of the canines particularly at the distal facial line angle
- Any discrepancy between the value of the premolars and the six anterior teeth.

**ZENITH POINTS**

Zenith points are the most apical position of the cervical tooth margin where the gingiva is most scalloped.

- Usually lies distal to the center of the tooth, with the exception of lateral incisors which is more centerally or in the midline.
- Zenith points is a critical step in alteration of mesial and distal dimensions, and in the closure of diastema
- Incorrect adjustment of the zenith point gives the appearance of tiltingteeth.

**Tooth inclination:**

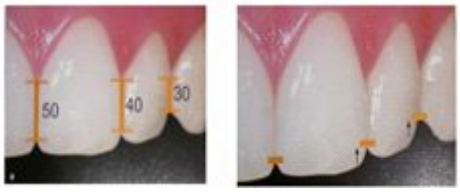
From the central to the canine, there should be increase in the mesial inclination.

It should be least noticeable with the centrals and more pronounced with the laterals and slightly more so with the canines.

There is also labiolingual inclination which is guided as follows:

Maxillary central incisor – positioned vertically or slightly labial
Maxillary lateral incisor –incisal edge inclined slightly labially
Maxillary canine – cervical area positioned labially, cusp tip lingually angulated

**.Interdental contact area**




- Interdental contact area: It is the broad zone in which two adjacent teeth touch.
- It moves apically as we move from central to canine. It follows the 50:40:30 rule in reference to the maxillary central incisor.[7]
- Interproximal contact point: It is the most incisal aspect of the interdental contact area.
- As a general rule, the ICP moves apically, the further posterior one moves from the midline.

**Incisal embrasures**


- Embrasures are the small triangular gaps between the teeth at the biting edge [5]
- Failure to provide adequate depth and variation to the incisal embrasure will make the teeth appear too uniform and give the dentition a box like appearance.
- The individuality of the incisors will be lost if their incisal embrasures are not properly developed.
- Also, if the incisal embrasures are too deep, it will tend to make the teeth look unnaturally pointed.
- As a rule, a tooth distal to incisal corner is more rounded than its mesio incisal corner.

**Cervical embrasure**

The darkness in the interproximal triangle between the gingiva and the contact area.

- At times, this will require long contact area that will be extended toward the cervical.
- This will encourage the formation of a healthy, pointed papilla instead of the blunted tissue form that often accomplishes a black triangle.

**Symmetry&balance:**

Symmetry is the harmonious arrangement of several elements with respect to each other.

- Symmetrical length and width is most important for the centrals. It becomes less absolute as we move further away from the midline.
- Static symmetry: mirror image, maxillary central incisors.
- Dynamic symmetry: two objects very similar but not identical. Playing with perfect imperfection in the laterals and canines allows for a more vital, dynamic, unique and natural smile.
- Balance is observed as the eyes move distally from the midline, so that both the right and left sides of the smile are well balanced.

**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.

- 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 plane.
- Reverse smile line or inverse smile line occurs when the centrals appear shorter than the canines along the incisal plane.

**LIP LINE**

- It refers to the position of the inferior border of the upper lip during smile formation and thereby determines the display of tooth or gingiva at this hard and soft tissue interface[3].
- A high lip line exposes all of the clinical crowns plus a contiguous band of gingival tissue
- A low lip line displays <75% of the maxillary anterior teeth.
- Under ideal conditions, there can be a 1–2 mm display of the gingival tissue.
- Showing 3–4 mm or more of the gingiva (gummy smile) often requires cosmetic periodontal recontouring to achieve an ideal result.

**Gum line:**

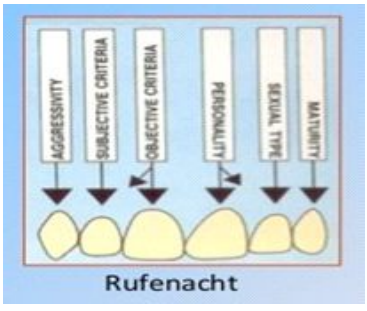
- The gum line follows the upper most point of the upper anterior teeth.
- Usually in a perfect smile design the gum line follows the upper lip or is just above it and ensures that just enough gums(2-3mm) are shown to be attractive.

**Soft tissue component of smile design:**

- **Gingiva**

- The gingiva acts as the frame for the teeth; thus, the final esthetic success of the case is greatly affected by the gingival health.
- Healthy gingiva is usually pale pink in color, stippled, firm and it should exhibit a matte surface;
- Located facially – 3 mm above the alveolar crestal bone and
- Located interdentally – 5 mm above the intercrestal bone papilla should be pointed and should fill the gingival embrasure right up to the contact area.
- The gingival margin of the lateral incisor is 0.5–2.0 mm below that of the central incisors.
- The least desirable gingival placement over the laterals is for it to be apical to that of the centrals and or the canines.

**Characterization**




***Age*** – Maxillary central incisor

- Youth: unworn incisal edge, defined incisal embrasure, low chroma and high value
- Aged: shorter, less smile display, minimal incisal embrasure, and high chroma and low value.

***Sex*** – Maxillary incisors

- Female : round smooth, soft delicate
- Male : cubical, hard vigorous

***Personality*** – Maxillary canine

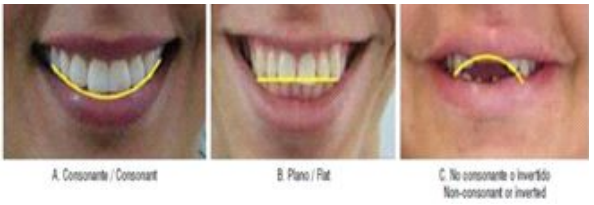
- Aggressive: pointed long cusp form
- Soft: blunt, rounded, short cusp form.

**Shade selection**

- Shade selection must be customized for each individual.
- It should be natural and polychromatic.
- The body of the tooth can be fairly uniform in color but the gingival third should be noticeably richer in chroma.

The chroma should also increase from central to the canine, canine having a higher chroma.

**SMILE ARC**




The relationship of the contour of the incisal edges of the maxillary anterior teeth relative to the curvature of lower lip during a social smile.

Smile arcs are of three types

- Straight
- Consonant
- Non consonant

Consonant smile arc has the curvature of incisal edges of the maxillary anterior teeth parallel to the upper border of the lower lip.

For consonant smile arc, the centrals should appear slightly longer or, at least, not any shorter than the canines along the incisal plane

Straight smile arc is that in which the incisal edges of the maxillary anterior teeth are in a straight line to the upper border of the lower lip.

Reverse smile arc is the one in which the incisal edges of the maxillary anterior teeth are curve reverse to the upper border of the lower lip.

**Conclusion**

The crafting of an ideal smile requires analyses and evaluations of the face, lips, gingival tissues, and teeth and an appreciation of how they appear collectively .Such an ideal smile depends on the symmetry and balance of facial and dental features. The color, shape, and position of the teeth are all part of the equation. Recognizing that form allows function and that the anterior teeth serve a vital role in the overall health and well being of the patient is paramount. Using a comprehensive approach to diagnosing and treatment planning of esthetics can help achieve the smile that best enhances the overall facial appearance of the patient and provides the additional benefit of enhanced oral health. All these equations and proportions do not still adequately hold good toward restoring an ideal smile.

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