

## Esthetic consideration in complete denture

The term "**esthetics**" is borrowed from the Greek word "aesthesia", which means sensation or sensibility. It can be defined as "belonging to the appreciation of the beautiful"

**Esthetics:** branch of philosophy dealing with beauty; in dentistry, the theory and philosophy that deal with beauty and the beautiful, especially with respect to the appearance of a dental restoration, as achieved through its form and/or color; those subjective and objective elements and principles underlying the beauty and attractiveness of an object, design, or principle.

### Cosmetics and Esthetics and beauty

The term cosmetic refers to substances and procedures that are used to enhance features or correct defects in appearance.

The term esthetics is different from cosmetic in that it signifies "natural beauty"—a quality that comes from within.

Beauty is generally described as "a pleasurable psychological reaction to a visual stimulus.

**Esthetic dentistry:** is a combination between the 'art and science of dentistry'. The simultaneous application of technical and artistic skills enables a practitioner to achieve outstanding esthetic and functional results.

**Denture esthetic:** the effect produced by a dental prosthesis that affect the beauty and attractiveness of the person.

**Esthetic Divergence:** There is often a difference of opinion concerning aesthetics among dentists and technicians on one hand, and patients on the other. For example, patients very often desire whiter teeth than those proposed.

### Factors Influencing the Appearance of Dentures:

- ✓ Patient factors: 1. Gender. 2. Age. 3. Personality.
- ✓ Tooth factors: 1. Personality. 2. Horizontally. 3. Individual.
- ✓ Denture base factors
- ✓ Tooth/Denture base factors

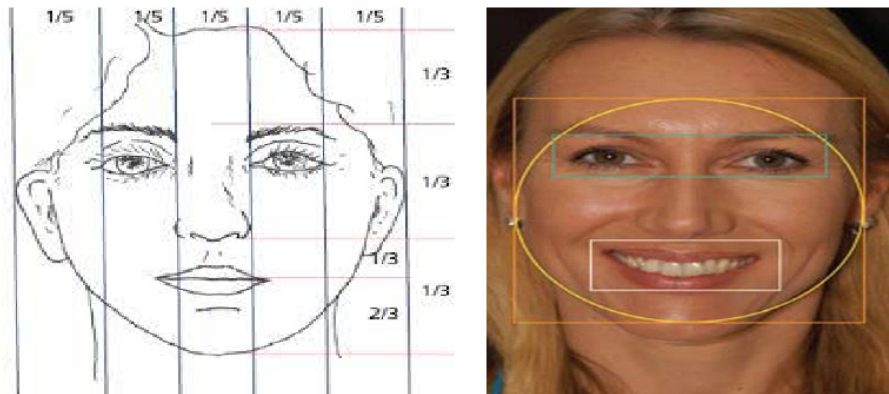
**Esthetic analysis should involve the evaluation of certain elements in a specific sequence:**

1. Facial analysis (general facial balance)
2. Dento-facial analysis (maxillo-mandibular relationships to the face, and the dental midline relationship to the face)
3. Dento-labial analysis (the relationship of the teeth to the lips)
4. Dento-gingival analysis (the relationship of the teeth to the gingiva).
5. Dental analysis (inter-tooth and intra-tooth relation, form and position along with color)

### Facial and dento-facial analysis

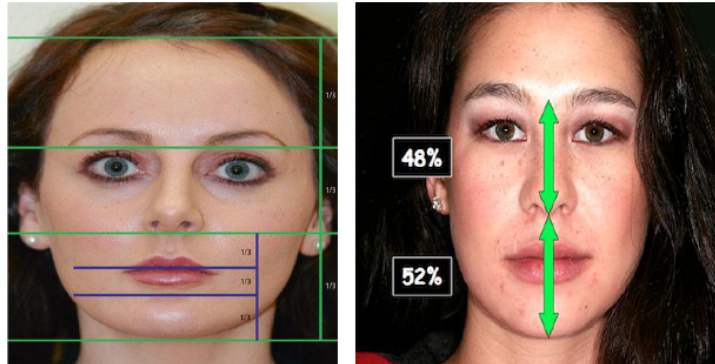
#### Transverse facial proportions

The assessment of the transverse components of facial width is best described by the rule of fifths. This method describes the ideal transverse relationships of the face. The face is divided sagittally into five equal parts from helix to helix of the outer ears. Each of the segments should be one eye distance in width. Each transverse fifth should be individually examined and then assessed as a complete group.



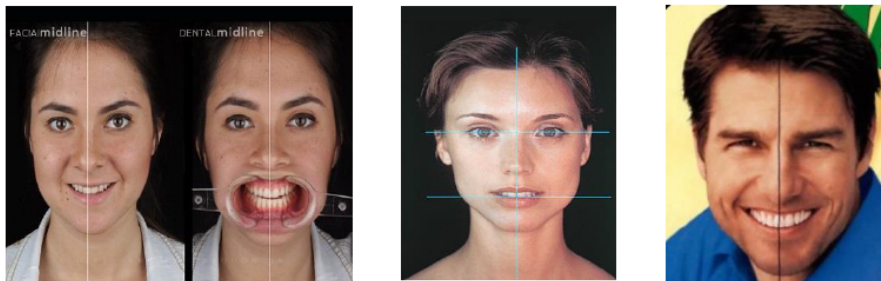
#### Vertical facial proportion

The face is divided into horizontal thirds. The upper third extends from the hairline to the glabella, the middle third from the glabella to the subnasale, and the lower third from the subnasale to the menton. These facial thirds are rarely equal. The lower third is further divided into its own thirds, defining the upper lip, lower lip, and chin.

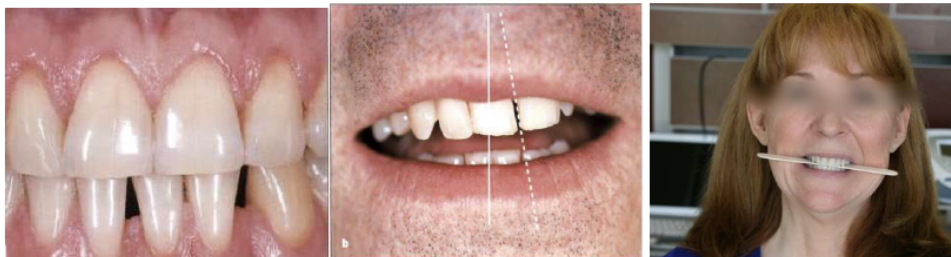


### The facial and Dental Midline

The facial midline is located in the center of the face, perpendicular to the interpupillary line.



- Maxillary and mandibular midlines do not coincide in 75% of cases
- The mandibular teeth are not usually exposed while smiling, the mismatch of mid-lines does not affect the natural esthetic dentition. In esthetics, the mandibular mid-line is not of great importance.
- Midline discrepancies of up to 4 mm will generally not be perceived as unesthetic .as long as the midline is parallel with long axis of the face.
- A canted midline would be more obvious, and therefore, less acceptable



### Dento-labial Analysis

- Incisal display & incisal edge position
- Gingival display
- Lip length and mobility
- Smile line and smile pattern
- Buccalcorridor

### Incisal display at rest position

- 3-4 mm of the incisal third of the maxillary central incisor should be visible in a young individual at rest position
- As age increases, the decline in the muscle tone and teeth attrition results in less tooth display.
- A general rule suggested by spear (1999) is the more mobile the lip ,the less incisal edge can be seen.

### Incisal display during smiling

In an esthetic smile, the edges of the maxillary gull-wing curve matching the curvature of the lower lip (inner contour of the lower lip). A straight flat smile line is less pleasing.

A reverse curve where the front teeth appear to be shorter than the canines gives a look of aging and wear and can be quite unattractive.



### Factors Affecting Incisal Display

The lip incisor relationship depends on a number of factors including:

1. Upper lip length.
2. The 'smile curtain', defined as the muscular capacity to raise the upper lip.
3. The vertical position of the anterior maxilla and incisor teeth.
4. The anteroposterior position of the anterior maxilla and incisor teeth.
5. The inclination of the maxillary incisor teeth.
6. Maxillary incisor crown length, including the presence of incisal wear.

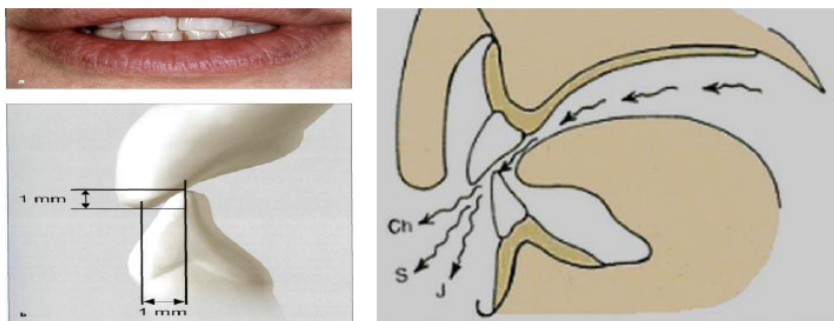
### Phonetic and incisal position

**E sound:** the maxillary incisal edge halfway between the upper and lower lip, a pleasing incisal edge position is centered between the upper and lower lips when the patient is asked to say "Eeeeeee"

**F and V sounds:** fricative sounds are produced by the interaction of the maxillary incisal edge with the inner edge of the lower lip vermilion border.



**S sound:** the mandibular central incisor are positioned 1 mm behind and 1 mm below the maxillary incisal edge . s sound used to determine the vertical height of dimension. (This is used for fabrication of complete dentures while checking the vertical height.)



**M sound** : the patient is asked to repeat the "M" sound several times. In so doing, the lips relax, and dentist can readily observe the incisal edge position of lips at rest. When the "M" sound is pronounced, lips come together, After the "M" sound, lips part in the rest position.



### Gingival display

- In a study by Kokichin 1999, it was demonstrated that dental evaluators and lay people still considered it esthetic if 2 mm of gingiva showed in a full smile.
- Smile classified according to gingival display into:
  1. No gingival display.
  2. 2-3 mm gingival display.
  3. More than 3mm gingival display (gummy smile).



### Dento-gingival Analysis:

- The gingival scalloped shaped the teeth and should be between 4 to 5 mm.
- The gingival height of the maxillary laterals should fall approximately 0.5 –1 mm incisal to the similar central and canine heights.

**Zenith points:** are the most apical point of the clinical crown, which are the height of contour, their position are dictated by the root form anatomy, cemento-enamel junction (CEJ), and the osseous crest, where the gingiva is scalloped.

The most zenith point are generally located just distal to a line drawn vertically through the middle of each tooth. The lateral incisor are one exception to that rule as their zenith point are placed more centrally or on the midline of the tooth margin, the position of zenith points gain importance when closing diastemas or changing the distal or mesial tilted position of the teeth.



### Lip length and mobility

The average lip length at rest as measure from subnasale to the most inferior portion of the upper lip at the midline; 23mm in male, 20 in female.

Lip mobility is simply the amount the lip moves from where it sits at rest, to the highest position it moves to during a spontaneous smile.

**Hypermobile upper lip:** more elevation of lip and more gingival display during smile, and less amount of incisal display at rest (older look).

**Hypomobile upper lip:** low lip line on smile and excessive incisor display at rest.

### Smile Line And Smile Pattern

The lips must be viewed as the picture frame of all esthetic dentistry.

1. Smile style,
2. Smile stage, and
3. Smile type

### Smile style

**I. Commissure Smiles (Monlisa):** the most common pattern, seen in approximately 67% of the population. In this smile, typically thought of as a Cupid's bow, the corners of the mouth are first pulled up and outward, followed by the levators (muscles) of the upper lip contracting to show the upper teeth. The lowest incisal edges of the maxillary (upper) teeth are the central incisors.



**II. Cuspid smile (canine smile):** Thirty -one percent of the sample was found to have a “canine” or “cuspid” smile, where levator labii Superioris dominant, exposing the canines first, followed by the corners of the mouth



**III. The complex smile:** The shape of the lips are typically illustrated as two parallel chevrons, characterizes 2% of the population. 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. The key characteristic of this smile is the strong muscular pull and retraction of the lower lip downward and back.

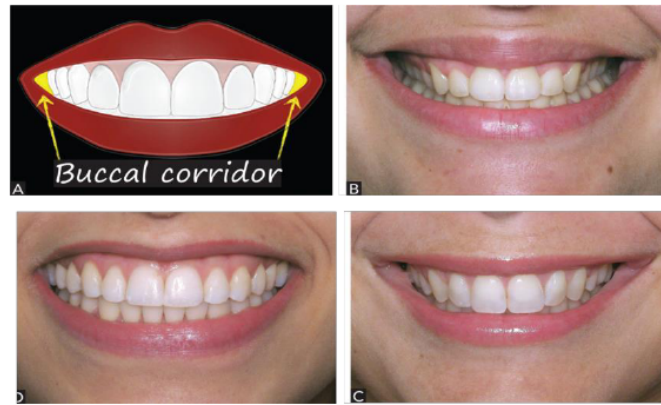




### Buccal corridor (negative space)

According to the definition of Frush and Fixher, buccal corridor is the space between the labial surface of the most posterior tooth and the labial commissure during smile. However, some authors used the distal surface of the canine instead of the labial surface of the posterior tooth as reference

- Excessive buccal corridor result when posterior teeth set to far lingually result in dark space appear unaesthetic .



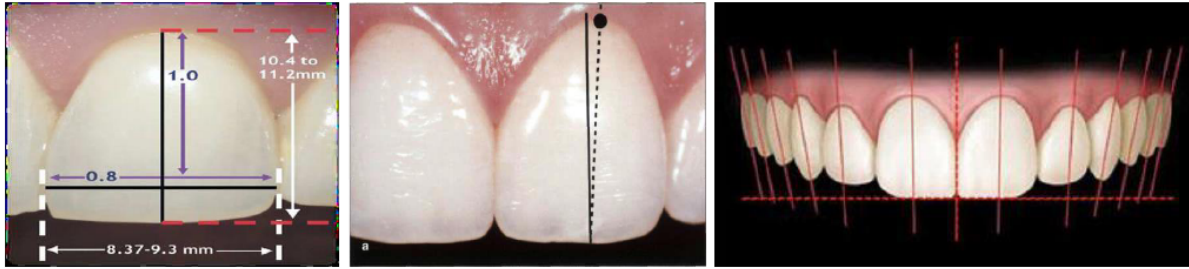
### Dental analysis:

- The average length for maxillary central incisors has been measured between 10 mm to 11 mm
- The width to-length esthetic relationship has been discussed in the literature to be between 70% to 80%

### Tooth axis:

The axis of the central incisors is usually slightly tilted distally towards the apex of the tooth when compared to the mid-line, perpendicular to the interpupillary line.

The most pleasing position of the central incisors labiolingually exists when the labial surface of the incisors is positioned vertically or with a slight labial axial inclination. Variations of this position will occur in individuals with different skeletal types and facial profiles.

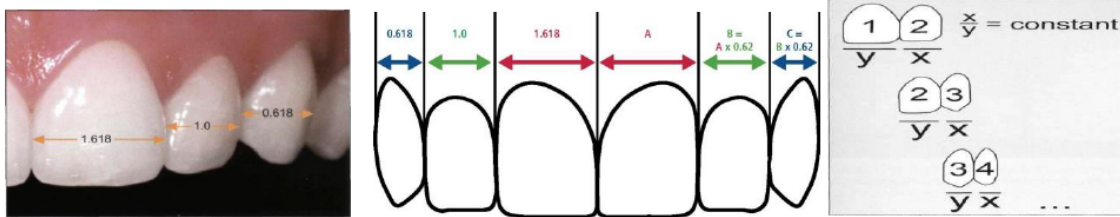


**Inter-tooth Relationships**

**Golden proportion (Lombardi)**

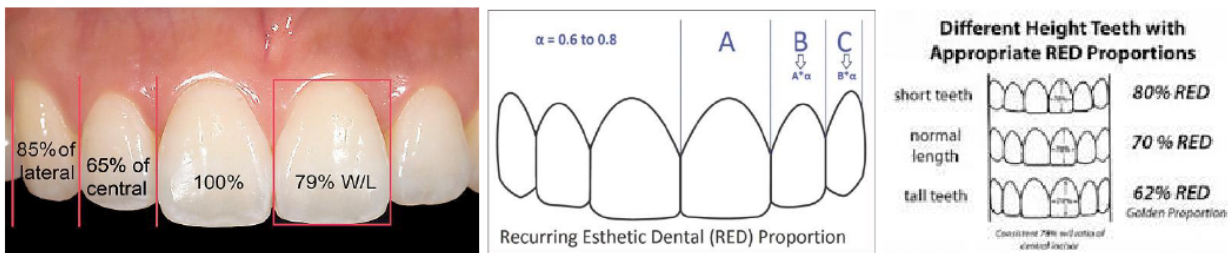
In dentistry the terms "golden proportion" is a mathematical theorem concerning the proportions of the dentition. Or its mathematically constant ratio between the smaller and larger , the ratio is approximately 1.618.

According to this rule, if the width of each anterior tooth is approximately 60% of size of its adjacent anterior tooth then it is considered esthetically pleasing. It follows logically if width of lateral incisor is 1, central should be 1.618 times wider and the canine 0.618 times narrow.



**Recurring esthetic dental proportion (RED proportions) (Ward):**

The width proportion between 2 adjacent teeth as viewed from the frontal should remain constant, progressing successively distally. The RED proportion is not limited to one particular proportion but allows the desired RED proportion, as the 62%, to be selected and consistently applied throughout each individual case. Generally the values of the RED proportions used are between 60% and 80%.



**Steps in achieving esthetic complete denture:**

- 1- An accurate impression
- 2- Jaw relation
- 3- Selection of teeth
- 4- Arrangement of teeth
- 5- Characterization

**1. Accurate impressions:** Thickness of labial flange of both dentures, this is accomplished at the impression phase of treatment, so that the esthetics as well as retention and stability are important goals. Border thickness should vary with the needs of the patient, depending on the extent of residual ridge loss. The vestibular fornix should be filled, but not overfilled, to restore facial contour. Overextension of these borders gives the patient the appearance of having a cotton roll under the lip. A longstanding edentulous patient requires thicker borders.



**2. Jaw relation:** Correct vertical dimension is essential for proper positioning of Orbicularis oris and associated muscles. Establish or re-establish the correct vertical dimension of occlusion to reestablish physiologic muscle length and eliminate a prognathic looks. Insufficient vertical dimension at occlusion or excessive vertical dimension of occlusion will have a negative effect on patient's esthetics.

(A) Shows patient with decrease vertical dimension.

(B) The lady has increase vertical dimension



### 3. Selection of anterior teeth

The selection of teeth and their arrangement to meet esthetic requirements demands artistic skill in addition to scientific knowledge. But there are anatomic landmarks manufactured aids that can be used as guides. Best method to develop the skill is to observe natural teeth.

#### Objective of tooth selection:

1. Function efficiently
2. Normal speech
3. Aesthetically pleasing
4. No tissue abuse
5. Should maintain the vertical dimension.



**Anterior teeth selection:** Anterior teeth selected primarily to satisfy esthetic while posterior selected for function.

#### Guides for anterior teeth size:

**Pre-extraction records:** Diagnostic cast, photograph, radiograph, extracted teeth and previous denture.

#### Post extraction record:

1. Central incisors restore philtrum if possible.
2. Central incisors restore vermillion border.
3. Incisal points and smile line determine height of tooth (age-related).
4. Position of canine points:
  - A. Relate to inter-alar width (smiling).
  - B. Relate to pupils (require pre-extraction photograph).
5. If patient is already a denture wearer, the mouth should be examined with the dentures in the mouth giving importance to physiological and esthetic aspects.

**Factors of selection of anterior teeth:**

**1. Color:** Show your patients a complete shade guide and select the two lightest and darkest tabs. Point out how different these two are and find out which one they prefer. Delete the rejected color, and select another shade from the preferred half of the shade guide. Repeat this pair comparison, and after two or three selections by your patients, you will have the shades that they want. Note the selections used in your file.

**2. Size:** Depend on:

- a) Existing dentures.
- b) Models of previous teeth.
- c) Photograph



All of above give valuable input for selection of the size and shape of teeth. Teeth can be measured in millimeters and teeth of similar size selected coupled with actual measurement, again use a method of pair comparison to assist patients to decide what size of tooth they prefer.

**Factors that influence the size of anterior teeth are:**

1. Size of the face.
2. Amount of available interarch space.
3. Measured distance between distal of right and left maxillary cuspids.
4. Length of the lip.
5. Size and relation of arches.

**3. Mold:** select and agree on the mold of the teeth. Teeth of a similar size can appear entirely different because of their taper, contacts, and labial curvature. Allow your patient to select between molds of the same size but different shapes. Set two different molds on the right and left sides of a piece of wax rope and ask patients which they prefer. There is a choice of mold: square, tapering or ovoid. In general terms, square molds suit patients with large, rugged features. Long and narrow faces may be best suited to tapering molds, whereas ovoid molds tend to suit patients with small, round faces.

**Suggestions for Selection of Teeth**

1. Always moisten the shade guide because when in mouth, the teeth are always moist and this has an affect on the reflection and refraction of light and hence the colour.
2. Always place the teeth in the shade of the upper lip in the position they are to occupy. They will appear darker in this position than in hand.
3. Select teeth under natural light.
4. Attempt to look at the face as a whole rather than focus on the teeth.

**Form of the Anterior Teeth**

The form or outline of the anterior teeth can be determined using the following factors:

1. Shape of the patient's face or facial form (previously mentioned)
2. SPA factors (sex, personality, age.)

**Sex:**

The form or shape of the teeth differs in males and females.

In females, the incisal angles are more rounded and the teeth have a lesser angulation. In males, the incisal angles are rounded to a lesser degree and the teeth are more angular.

**Age:**

The age of the patient is important in teeth selection because of the physiological and functional changes that occur in the oral tissues. The patient can be young, middle-aged or old-aged. The following changes are observed with an advance in age of the patient:

- Old people usually have abraded teeth with worn out contacts. Hence, placement of contoured teeth may look artificial.
- Old patients have gingival recession. It can be reproduced in the dentures to provide a natural appearance, by selecting a long tooth, contouring the wax.
- Old people show a blunt smile line and pathologic migration of teeth.
- The color of the teeth also changes with age. In old people, the enamel is abraded and the dentine which carries a yellow tinge is more visible.

#### 4. Arrangement of teeth

The clinician should attempt to create the illusion of natural teeth when finalizing the appearance. It should be remembered that the prevalence of irregularity or crowding of natural teeth is high. Therefore, if dentures are constructed with a 'perfect' arrangement, the risk of the resulting appearance seeming artificial is considerable. As a general rule, imperfection in the anterior tooth arrangement is a basic requirement in creating the illusion of natural teeth. Complete symmetry should be avoided: for example, the anterior teeth should not be placed so that the incisal edges are all at the same level.

##### **The goals of tooth arrangement:**

1. To have the front teeth look well.
2. Allow the patient to speak clearly.
3. Teeth positioned for the best comfort, stability and retention of the dentures.

##### **Position of the Teeth**

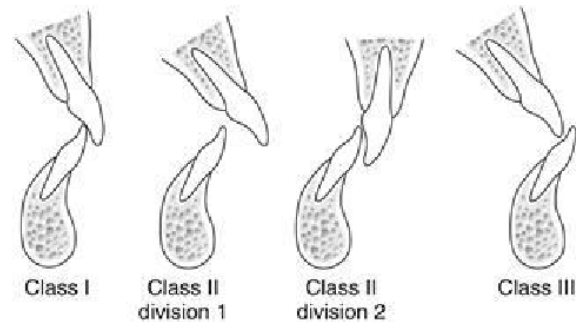
The amounts of tooth showing, orientation of the occlusal plane, and labiolingual inclination all have an influence on aesthetics. If the level of the occlusal plane is set too low, or if the anterior teeth are set on a flat plane, then the teeth will be too visible. This will be emphasized when the patient smiles, as the teeth will not follow the smile line of the lip. The orientation will also have an influence, and if is not approximately parallel to the interpupillary line, then the smile will look crooked. The center line of the teeth is also critical, as this will have a negative effect on appearance if it is not coincident with the center line of the face. The labial frenum should not be used to guide positioning of the center line, as this is often not in the center of the face. The labiolingual position of the anterior teeth, in particular of the necks of the teeth, is critical in terms of lip support. A common misconception is that lip support is reliant on the shape of the labial flange of the denture. However, if the flange is thickened, then this will cause bulking out beneath the nose similar to a gum shield. If teeth are moved away from the crest of the ridge, then this will cause instability of the denture. Setting teeth directly over the crest of the ridge with an upright inclination will not provide adequate lip support. A further possibility is to place the necks of the teeth close to the alveolar ridge and tilt the incisal edges of the teeth labially. This will improve the lip support and is less likely to be unstable than when using biometric guides.

### Arrangement of the lower anterior teeth

In many patients, they will be displayed more during function than the upper teeth and therefore may be a dominant factor in determining the patient's dental appearance. Again, the same general rules regarding perfection and evenness of tooth arrangement which have been discussed previously should be applied.

#### The following should be considered when arranging lower anterior teeth:

1. Vertical overlap.
2. Horizontal overlap.
3. Antero-posterior inclination in proximal view.
4. Inclination of long axes.



### Incisal relationship

The method of determining an incisal relationship which is appropriate for an edentulous patient's skeletal relationship is important. If a patient is provided with dentures which have an inappropriate incisal relationship, for example, a Class I incisal relationship on a marked skeletal Class II base, there is a risk that, in addition to problems with stability, the dentures will lack in harmony and the aesthetic result will be poor.

#### The arrangement is influenced by:

##### (1) Age:

- Due to decrease in muscle tone, sagging of the cheeks and lower lips occur. To prevent cheek biting (due to sagging), horizontal overlap of posterior teeth can be increased.
- Inter-occlusal distance reduces with age. Hence, mandibular teeth are more visible than the maxillary teeth.

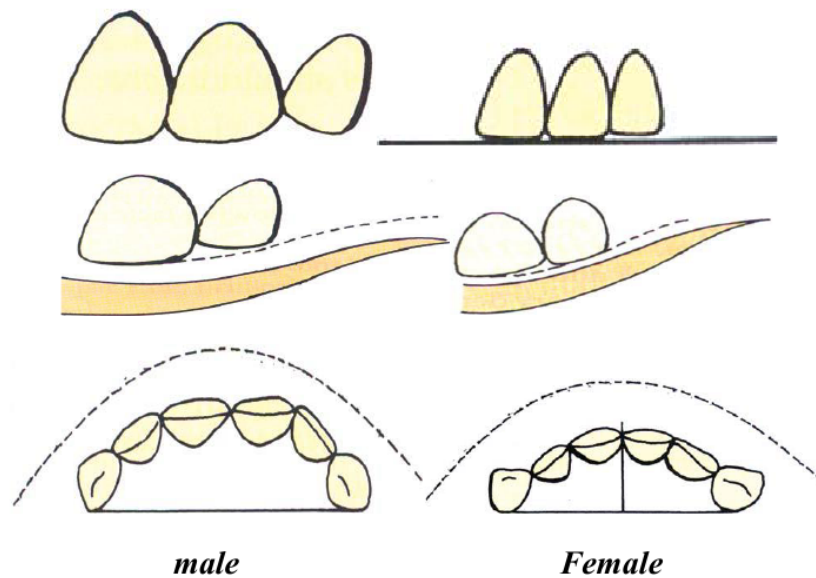
##### (2) Gender:

Roundness arch form denotes femininity, and squareness denotes masculinity.

- The incisal edge of the central incisors is parallel to the lips and the laterals are above the occlusal plane in males. But the incisal edges of the central and lateral incisors follow the curve of the lower lip in females.



- The distal surface of the centrals is rotated posteriorly for females.
- The mesial surface of the lateral incisors is rotated anteriorly in relation to the centrals in females
- In males the mesial end of the laterals is hidden by the centrals. This makes the canine very prominent in males
- Only the mesial thirds of the canines are visible in females because they are rotated anteriorly whereas even the middle two-thirds of the canines are visible in males.
- The cervical regions are prominent in males than in females.
- Females on smiling expose more anterior teeth hence, the premolars should be arranged based on aesthetics for females.



**(3) Personality:** The people's personality can be influenced by the appearance of their teeth. It is the obligation of the dentist to arrange the artificial teeth in a manner to encourage the development of an attractive personality.

**(4) Artistic Reflection:** Artistic reflection is the arrangement of the teeth to reflect the dentist's concept of what appears natural for the patient. The artistic ability of the dentist is often taxed to achieve a composition of teeth that harmonizes with the surrounding features and is acceptable to the patient.

**5. Characterization of teeth:**

To alter by application of unique markings, indentations, coloration and similar custom means of delineation on a tooth or dental prosthesis thus enhancing the natural appearance. Characterizing the dentures should without deviating grossly from the principles of teeth setting to suit the individual's appearance. The possible effect is that all dentists may give almost identical complete dentures to their patients. All complete denture wearers were looking similar possessing a monotony of sameness. They understandably do not ask for what they don't know. It is the duty of the dentist to inform the patient that his or her complete denture can be characterized to suit his/her wish and appearance. Characterization helps the dentist to incorporate his artistic skills along with theoretical knowledge in the fabrication of denture. Size and shade of the teeth can be selected to match the patients' natural teeth. The aim is that the teeth should harmonize with the facial features, and it should be functionally acceptable. Characterization should have some amount of realistic perception rather than incorporating unrealistic features.

According to Frush and Fisher dentogenic concept includes effects of three main factors such as age, sex and personality in sequence of esthetic planning. Various means like minor irregularities in tooth arrangement, overlapping, tilting, depth grinding, modification of incisal edges, rotations of teeth, stippling, staining, tinting of the denture base, crowding and fixing dental jewelry etc., can be incorporated depending on patient's desire towards achieving natural illusion.

**Clinical application:**

1. Creating asymmetry in the divergences of the proximal surfaces of the teeth from the contact points.
2. Varying the direction of the long axis.
3. Use an eccentric midline.
4. Diastema
5. Grinding the incisal edges of lower anterior teeth.
6. Create a good smile line by the proper placing of the maxillary posterior teeth mediolaterally in relation to the cheek. When the teeth are placed too far laterally, the buccal corridor is eliminated, resulting in a harsh, ugly, and toothy appearance.



Denture flanges mimicking gingival color



Malaligned anterior teeth with spacing



Crowding and overlapping of the teeth



Tobacco staining on complete denture



Dental jewelry on maxillary lateral incisor



Complete denture with peg lateral incisor

### The Gingival Contour

There are three aspects to consider:

1. The contour of the gingival margins at the necks of the teeth.
2. The contour of the flange.
3. The color of the flange.

In a natural dentition, the contour of the gingival margin varies from central incisor to lateral incisor to canine. This should be reproduced in a complete replacement denture. In terms of the shape of the flange, the clinician must decide whether to provide a flange with a smooth or anatomical finish. In the case of the anatomical finishing, the dental technician is instructed to

1. Reproduce the shapes of the roots of teeth when contouring the flange.
2. The flange can also be stippled to reproduce stippling of the keratinized gingiva. These features are most useful when the patient has a high smile line and is likely to have a visible flange. A potential problem with anatomical contouring is the difficulty in keeping the flanges clean, particularly when extensively stippled.
3. Finally, the appearance of the oral mucosa can be reproduced using color tints in the acrylic resin. This is time consuming for a dental technician and will be facilitated by the technician seeing the patient or a photograph of the oral mucosa. Nonetheless, the appearance of the denture will be enhanced if the flange is visible due to a high smile line.

#### Denture base factors:

1. Contour
2. Colour

Benefits of properly contoured dentures:

- ✓ Improved tolerance and comfort
- ✓ Facilitates stability and control.
- ✓ Prevents chronic biting of the lip or cheek.

#### Final Decision for Esthetics depends upon:

- Maxillomandibular relationships
- Patient's appearance
- Patient's mental attitude
- Functional requirements

