

Principles Of Esthetic Evaluation For Anterior Teeth

Dr. Abhilasha Bal¹, Dr. Ramandeep Dugal¹, Dr. Karishma Shah², Dr. Uma Mudaliar³

¹Department of Prosthodontics, M.A. Rangoonwala Dental College, India

²Restorative Dentistry, University of Leeds, United Kingdom

³D.Y. Patil Dental College & Hospital, India

Abstract: By Definition Esthetic Dentistry Is “The Art And Science Of Dentistry Applied To Create Or Enhance The Beauty Of An Individual Within Functional And Physiological Limits.” The Concept Of Esthetics Cannot Be Considered Relative. There Are Many Straightforward And Universally Accepted Principles That Decide The Esthetic Value Pertaining To Dentistry. This Article Discusses Facial, Dentolabial, Dental, Phonetics, And Gingival Considerations For Evaluating Any Case That Requires Esthetic Treatment. It Is Imperative That A Dentist Has Thorough Knowledge About These Basic Principles To Obtain The Optimum Esthetic Results While Restoring Function And Health Of The Patient.

Keywords Esthetics, Facial, Dentolabial, Dental, Phonetics, Gingival

I. Introduction

Dentistry has seen a significant increase in the emphasis on elective treatment for better esthetics. Webster’s Dictionary defines esthetics as “the branch of philosophy dealing with beauty and taste (emphasizing the evaluative criteria that are applied to art).” The success of a restoration depends on sound mechanical, biological and esthetic principles. An ideal restoration must satisfy these requirements. Irfan Ahmad has suggested the HFA triad (Fig. 1). According to this, careful dental treatment must be directed to fulfil the Health, Function and Aesthetics for the patient [1]. It is important to undertake the treatment in the sequence where health is first, followed by function and last esthetics. Health can be achieved without function and esthetics. However, to achieve optimal esthetics the restoration must be in function and healthy. Hence esthetic treatment is a combination of both systematic principles and artistic skills.



Figure 1: Irfan Ahmad's HFA Triad

Adapted from Protocols for predictable aesthetic dental restorations by Ahmad, 2006

The first step in esthetic treatment is communication with the patient. Each patient electing for esthetic treatment has certain expectations. The treatment objectives need to be discussed in detail and a thorough consultation must be done. Various techniques described to do a consultation for an esthetic rehabilitation treatment include before-and-after photographs of patients, diagnostic models with wax ups, composite resin mock-ups on the patient and computer-imaging simulations. Of the mentioned options the computer-imaging simulations offer the best idea to the patient regarding the treatment outcomes [2]. The idea of the treatment must be to meet these expectations keeping in mind the HFA triad. Communication with the dental technician also proves vital in fabrication of the restorations. This would result in a balance between the esthetic needs and the functional requirements of the patient. Each patient presents unique characteristics with respect to the patient’s facial and dental esthetics. Effective communication helps the dentist and the technician achieve these characterizations for individual patients.

The concept of esthetics cannot be considered relative. There are many straightforward and universally accepted principles that decide the esthetic value pertaining to dentistry. For the ease of understanding, these principles will be divided as follows:

- a) Facial considerations

- b) Dentolabial considerations
- c) Dental considerations
- d) Phonetics
- e) Gingival considerations

II. Facial Considerations

Lee Milton rightly quoted “People seldom notice old clothes if you wear a big smile.” A pleasing face is always accompanied with an esthetic smile. However, generally one never notices a smile at a close distance as routinely done in dentistry. Hence it is important that the smile is always analyzed in relation to the face of the patient. The facial features have an important influence on the perception of an individual’s personality. A thorough facial analysis is mandatory for any patient undergoing an esthetic treatment. The extra-oral examination is made using horizontal and vertical reference lines which correlate to the patient’s face and dentition in space.

2.1 Frontal View

The frontal view of the patient allows adequate identification of the reference guides that are vital in the esthetic treatment planning. The ideal head position for the evaluation is when the observer is in front of the patient, and when the patient holds the head in a natural posture. As mentioned before, various reference lines must be identified during the examination (Fig. 2).



Figure 2: Reference lines used for esthetic treatment planning Adapted from Esthetic rehabilitation in fixed prosthodontics, volume 1: esthetic analysis: a systematic approach to prosthetic treatment by Mauro Fradeani.

The *interpupillary line* passes through the centre of the eyes. If parallel to the horizontal plane, it is the most suitable reference for carrying out correct analysis [2]. The interpupillary line is often used as a reference to orient the incisal plane, occlusal plane and the gingival contours. Amra Vukovic reported a parallelism of interpupillary line to the interincisal line in 90% of the subjects [3]. Facial harmony is seen when the interpupillary line is seen to be parallel to the ophriac line (eyebrows), interalar line and the commissural line of the lips. However, the eyes or even the corners of the mouth are not always positioned at the same height. In such cases, the horizon is taken as the plane of reference.

Using the aforementioned horizontal reference planes, a face can be divided into three portions. The upper third of the face is between the hairline and the ophriac line, the middle third of the face is between ophriac line and the interalar line and the lower third extends from the interalar line to the tip of the chin. These thirds vary in sizes from individual to individual. The lower third is crucial from a dental point of view. The lower third could be further divided into thirds; the base of the nose till the lower edge of the upper lip occupying the upper third and the bottom lip and the chin occupying the lower two thirds.

For patients with decreased vertical dimensions, the diminished height of the lower third of the face is apparent. These patients present with reduced labial visibility, edges of the lips folding inward, and deepening of the concavity below the lower lip.

When a patient’s mouth is in broad smile position, an imaginary line can be marked through the corners of the mouth. This line is known as the *intercommissural line*, or ICL. The amount of maxillary tooth revealed below the ICL interacts with the viewer’s perception of the patient’s age. In a youthful smile, approximately 75% to 100% of the maxillary teeth would show below this line.

The *midline* line is a crucial vertical reference line. It not only locates the position of the facial midline but also determines the direction of the midline. It is traced by joining the glabella, the tip of the nose, the philtrum and the tip of the chin. Some also refer it to as the imaginary line that runs vertically from the nasion, subnasal point, interincisal point and the pogonion. As a rule, the midline is perpendicular to the interpupillary line. However, the dental midline need not always coincide with the facial midline. Amra Vukovic reported an 81% coincidence in the dental and facial midlines [3]. Miller and coworkers stated that the dental midline coincides with the philtrum midline in only 70% of the cases [4]. However, they also stated that slight deviations in the midline does not compromise overall esthetics. This was not in agreement with Soares as he stated that half of his study subjects had deviations of the midline [5]. Miller had also documented the relation

of the maxillary midline with the mandibular midline. The maxillary and mandibular midlines didn't coincide in 72% of the documented cases. Hence, in the absence of the maxillary central incisors, dentists should avoid using the mandibular midline to establish the maxillary midline.

Stephen Rosenstiel conducted a web-based study to find out the preferences of the general public on esthetic parameters. According to his results almost 80% of the patients preferred no midline discrepancy [6]. Thus, an attempt must always be made to keep the dental midline as close to the facial midline as possible.

Some patients have their nose or chin deviated from the center resulting in asymmetric faces. The visual junction of maxillary central incisors could be at an angle to the facial midline, which is referred to as a canted midline. In such cases the maxillary midline does not coincide with the dental midline resulting in a slant. This could have a negative effect to the overall esthetics of the smile. For this reason, the center of the upper lip or the labial philtrum can be used as the ideal reference for determining the patient's facial midline.

2.2 Lateral View

2.2.1 Profile

An evaluation of the lateral view is a determining factor of an esthetic evaluation. In the lateral view, the patient's head is held erect with the eyes gazing towards the horizon. This position gets the Frankfort plane to an angle of 8 degrees with the horizontal plane, which is termed the *esthetic plane*. The lateral examination is presented as normal, convex and concave profiles. It is evaluated by measuring the angle formed by the glabella, subnasion and the tip of the chin (soft tissue pogonion).

In a normal profile, the lines joining the mentioned points generally form an angle of roughly 170 degrees whereas in a convex profile, the angle formed is substantially reduced creating a posterior divergence. This is generally because of the relative posterior placement of the tip of the chin. In a concave profile, the angle formed is greater than 180 degrees creating an anterior divergence. This is generally because of the anterior positioning of the tip of the chin.

Excessive concave and convex profiles are generally associated with skeletal Class II or Class III conditions. However, these profiles don't indicate which jaw is retruded or protruded: the maxilla or mandible. At times the patient profiles are associated with psychological characteristics. Rufenacht reported that a convex profile is associated with a dominant and ambitious personality and a concave profile may show opposite attributes [7].

The E-line is the line that joins the tip of the nose to the tip of the chin and is useful in evaluating the profile. In a normal profile the upper lip is 4 mm posterior to the E-line and the lower lip is 2mm posterior to the E-line. However significant variations have been seen between different sexes and races.

The nasolabial angle is at the subnasale region and is formed by the tangent to the base of the nose to the tangent to the outer edge of the upper lip. The angle varied with the position of the upper lip. In patients with normal profiles, males have an average angle of 90-95 degrees while females have an average of 100-105 degrees.

The nasolabial angle and the E-line can change significantly following prosthetic treatment. Care must be taken not to make changes to the dental positions that would interfere with the nasolabial angle and the E-line.

III. Dentolabial Considerations

3.1 Incisal Edge

3.1.2 Incisal Curve

The ideal incisal curve when observed in the frontal view is a convex curve that follows the natural concavity of the lower lip during smiling. David Sarver referred to this as the incisal arc. He defined it as the relationship of the curvature of the incisal edges of the maxillary incisors and canines to the curvature of the lower lip in the posed smile. The ideal smile arc has the maxillary incisal edge curvature parallel to the curvature of the lower lip upon smile; the term consonant is used to describe this parallel relationship. A nonconsonant or flat, smile arc is characterized by the maxillary incisal curvature being flatter than the curvature of the lower lip on smile [8].

A high percentage of individuals show parallelism between a convex incisal curve and the lower lip. Studies have reported about 85% of the cases showing this parallelism [9]. Soares documented that the straight and the convex incisal curves were more prevalent than the reverse incisal curves [5]. This was in accordance with the results obtained by Dong: a parallel smile was seen in 60% subjects, 34% had a straight smile, and only a 5% were observed with a reverse smile. When Al-Johany studied 50 celebrity smiles that were considered to be esthetic he found 78% had an anterior incisal curve that was parallel with the lower lip and 22% showed a straight rather than curved line. None of the subjects showed a reverse curvature in relation to the lower lip [10].

The curvature is slightly evident in dental Class I patients. It tends to flatten out considerably in Class III patients and is noticeably convex in Class II patients.

Depending on the relationship between the upper incisal margins and the lower lip, the relationship could be termed as contacting, covering, and not contacting. A study carried out by Dong suggested that the majority of patients are included in the not contacting category (54%). Tjan found that 47% subjects showed the maxillary anterior teeth touching the lower lip, 35% were not touching the lower lip, and 16% had the incisal portions of the anterior teeth covered by the lower lip.

However, abrasion of the incisal edges could lead to a flat or reverse incisal curvature where the convex curve is lost. This is unpleasant from the esthetic point of view. A flat incisal plane produces a sense of an “aged” smile.

Whenever possible the clinician must try creating a convex incisal curve. This not only improves the esthetics of the smile but also helps in establishing the incisal guidance. However, the lower lip is not always similar in its curvature on each side so it is important that dentist decides to what plane the maxillary incisal edges are made parallel. It is better to use the horizontal plane as the stable reference in such cases rather than the curvature of the lower lip.

3.1.3 Incisal Profile

The incisal profile is the position of the incisal edges in the anteroposterior direction. As a rule, it must be placed within the confines of the inner border of the lower lip. This allows proper closure of the lips without any interference keeping them competent. It is recommended to have the incisal edges remain inside the vermilion border of the lower lip.

3.2 Smile Line

The amount of tooth display is very critical. The smile line is the position of the inferior border of the upper lip at maximum smile. On the basis of the amount of show of the teeth and the gingiva, Tjan and Dong divided smile lines into low, average and high smile lines (Fig. 3) [9, 11].



Figure 3: Average, low, and high smile lines. Adapted from *Esthetic rehabilitation in fixed prosthodontics, volume 1: esthetic analysis: a systematic approach to prosthetic treatment* by Mauro Fradeani.

In the low smile line the anterior teeth are exposed by not more than 75%, which is found in about 20.5% of patients according to a study by Tjan and 15% according to Dong. Here the clinician can avoid any treatments that are indicated for idealizing the gingival contours. Also priority must be given to have supragingival margins.

In the average smile line, 75% to 100% of the anterior teeth as well as the interproximal gingival papillae are visible. This was found in 69% percent of the subjects according to Tjan and in about 56% according to Dong [11].

A band of gingiva of differing height is seen with the entire anterior tooth in a high smile line. Goldstein examined 5 female subjects and found out that 32% of the subjects had a high smile line [12]. However, this was visible in only 10.5% of the patients [9] and in 29% according to Dong. The high smile line is nearly twice as prevalent in the female population. This may be due to the difference in height of the upper lip (20 to 22 mm in women and 22 to 24 mm in male). These cases may require corrective treatment in case the curvature of the gingival margins is not ideal. One must ensure that if intrasulcular margins are given, the biological integrity of the restoration is maintained.

With age, there is a loss of lip volume and architecture leading to a reduced tooth display. Some display of gingiva is thus often considered to be pleasing since it is consistent with a youthful appearance.

Kourkouta evaluated 15 subjects that had undergone implant treatment in the upper anterior region of the mouth and concluded that 46.6% of the subjects had an average smile line while 26.7% had a high and 26.7% had a low lip line [13]. This study also had results in accordance to the previous work by Tjan and Dong in terms of number of subjects compared to the total sample size.

A *pleasing smile* can be defined as one that exposes the maxillary teeth completely, along with approximately 1 mm of gingival tissue. Gingival exposure that does not exceed 2 to 3 mm is nevertheless considered esthetically pleasing, while an excessive display (more than 3 mm) is generally considered unattractive by most patients [14, 15]. Tjan and coworkers found that 20.5% of subjects tested showed a low

smile line, while 69% had an average smile line and only 10.5% displayed a high one [9]. The same authors stated that the high smile line was found in twice as many female subjects as male subjects. This fact was confirmed by Owens and associates [16] who found it repeatedly in each of the six races they examined. A high smile line is often correlated with particularly efficient labial muscles and a short upper lip. Measuring the distance between the base of the nose and the lower border of the upper lip (labial philtrum), Peck and Peck [15] verified that the average length is roughly 20 to 22 mm in women and 22 to 24 mm in men. The reduced height of the upper lip in female subjects results in a smile line that is on average 1.5 mm higher than in male subjects.

Regardless of the type of smile line the patient may possess, when moving upward, the lower edge of the upper lip may take on a convex, flat, or concave shape at its center. Depending on the length of the upper lip, this gives a different amount of tooth exposure in the area of the maxillary central incisors [11]. The upper lip can sometimes show different levels of exposure between the right and left sides, resulting in an irregular smile line.

Just like the lower lip, the upper lip is also a structure that changes with time and so is unreliable as a reference parameter. Clinicians should therefore use the same criteria adopted for the lower lip: parallelism of the incisal plane with the horizontal reference line (the interpupillary line), regardless of the curvature of the upper lip [9].

The high smile line showing a band of gingiva of more than 3 to 4 mm is termed as a *gummy smile* and is judged to be esthetically unattractive by many. The reasons for a gummy smile could be:

1. Short upper lip
2. Labial hypermobility
3. Anterior dentoalveolar extrusion
4. Excessive vertical development of the upper maxilla
5. Altered passive tooth eruption.

Correction of a gummy smile could involve orthodontic treatment or crown lengthening procedures. The idea of the treatment is to establish the ideal tooth length and also reduce the amount of visible gingiva.

3.3 Smile Width

While smiling, the anterior teeth are generally exposed with the premolars. In a few cases the first molars are exposed as well. The width of the smile varies from individual to individual. According to Dong a majority of subjects (57%) had a smile width up to the second premolars while around 20% had smile widths up to the first molar [10, 17].

Prior analysis of the smile width will help the clinician decide the type of preparation to be performed. In the posterior areas, keeping the principles of tooth preparations in mind, a conservative chamfer margin is generally considered to maintain the tooth structure. However, this could mean that the metal margin will be seen in cases with wider smile widths. Thorough analysis and treatment planning must be done in such cases.

The labial corridor is the space seen on either sides of the mouth during smiling between the buccal walls of the maxillary teeth and the corners of the mouth. This slight gap is always seen in a harmonious smile. However, if the prosthetic restorations are placed too far buccal the entire labial corridor could be obliterated altering the harmony of the smile. If the labial corridor is absent it gives an artificial appearance. The smile progression can be altered in a way to maintain the harmony of the labial corridor. This can be achieved by providing the correct inclination to the posterior teeth.

The buccal corridor is the space seen on either side of the mouth during smiling, between the buccal walls of the maxillary teeth and the corners of the mouth. This slight gap, which is also always seen in a harmonious smile, allows the natural progression of the smile to be expressed [18, 19].

The perspective created by the progressive distance of the teeth with respect to the eye of the observer is further accentuated by both a gradual reduction in light reflection in the posterior teeth and by the simultaneous reduction in tooth height that is normally found starting from the anterior areas and proceeding toward the posterior ones [17]. The combined effect of these two factors helps to substantially increase the illusion of distance and depth.

Patients who have a narrow arch form a wide lip extension; tooth reveal behind the canines can be in shadow or disappear completely. This condition has been called deficient vestibular reveal, or DVR [20]. This may have negative esthetic consequences in certain patients.

3.4 Interincisal Line vs. Midline

One of the most reliable references to identify the facial midline is the midline of the philtrum of the upper lip. Similarly, the most reliable reference to identify the dental midline is the maxillary interincisal line. However, any inclination of the incisors in the mesiodistal direction could prove a problem in determining the dental midline. In such cases, stable landmarks like the papilla distal to the central incisors is taken. If there is a discrepancy between the interincisal line and the midline and it is limited, no treatment must be carried out to

correct it unless the patient requests it. In such cases orthodontic correction must be considered. It must be noted that the axial inclination can be altered using prosthetic treatment. One must establish the interincisal line to be as vertical as possible not considering any discrepancy with the facial midline into account (Fig. 4).



Figure 4: Coinciding interincisal line and midline (left) and deviating interincisal line from midline (right). Adapted from *Esthetic rehabilitation in fixed prosthodontics, volume 1: esthetic analysis: a systematic approach to prosthetic treatment* by Mauro Fradeani.

3.5 Occlusal Plane vs. Commissural Line

The occlusal plane is formed by joining the incisal surfaces of the anterior teeth with the occlusal surfaces of the posterior teeth. When viewing from the lateral aspect, this is parallel to the ala-tragus line (Camper's line).

3.6 Upper Lip Curvature

Upper lip curvature is divided into three categories. Upward curvature means that the corner of the mouth is higher than the center of the lower border of the upper lip. Straight means that the corner of the mouth and the center of the lower border of the upper lip are on a straight line. Downward curvature means that the corner of the mouth is lower than the center of the lower border of the upper lip.

According to Dong, an upward smile was rare (12%) while straight (45%) and downward (43%) smiles were relatively numerous. He also stated that an upward or straight smile is more esthetic compared to a downward smile. This was confirmed by Al-Johany. He compared 50 smiles that were considered to be esthetic and found the upward curvature in 62% of those subjects [10].

IV. Dental Considerations

4.1 Color

4.1.1 Hue (Fig. 5)

Hue is the name of the color (Red, Orange, Yellow, Green, Blue, Indigo, and Violet). In the younger permanent dentition, hue tends to be similar throughout the mouth. With aging, variations in hue often occur because of intrinsic and extrinsic staining from restorative materials, foods, beverages, smoking, and other influences [21].



Figure 5: Hue

4.1.2 Chroma (Fig. 6)

Chroma is the saturation or intensity of hue; therefore, it can only be present with hue. For example, to increase the chroma of a porcelain restoration more of that hue is added. Chroma is the quality of hue that is most amenable to decrease by bleaching. Almost all hues are amenable to chroma reduction in vital and non-vital bleaching. In general, the chroma of teeth increases with age.

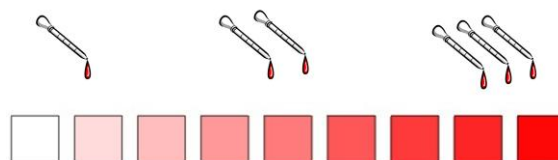


Figure 6: Chroma

4.1.3 Value (Fig. 7)

Value is the relative lightness or darkness of color. A light tooth has a high value; a dark tooth has a low value. It is not the quantity of the 'color' gray but rather the quality of brightness on a gray scale [21]. That is, the shade of color (hue plus chroma) either seems light and bright or dark and dim. It is helpful to regard value in this way because the use of value in restorative dentistry does not involve adding gray but rather manipulating colors to increase or decrease amounts of grayness.



Figure 7: Value

So the value is the most important factor in shade matching. If the value blends, small variation in hue and chroma will not be noticeable [22].

4.2 Texture

In natural teeth there are surface morphologic characterizations known as micro and macro-texture. *Micro texture* refers to tiny grooves, mostly horizontal, that are normally found in young teeth. These generally decrease or disappear in patients older than 40 to 50 years.

Macro texture consists of lobes that, as a rule, divide the buccal face of the tooth into rather distinct concavities and convexities. These are normally well defined in young teeth but may disappear or be reduced considerably with age as a result of the action of the perioral muscles (cheeks and lips), which produce surface erosion with an inevitable consequent loss of dental volume [23].

4.3 Form and Contour Form (Fig. 8)

Triangular form: Outer limits of the contour of the buccal face are divergent incisally and show a marked cervical convergence. This creates a rather narrow cervical area.



Figure 8: Triangular, ovoid and square forms.

Adapted from *Esthetic rehabilitation in fixed prosthodontics, volume 1: esthetic analysis: a systematic approach to prosthetic treatment* by Mauro Fradeani.

Ovoid form: Outer limits tend to be curved and rounded, both incisally and cervically, along with a gradual reduction of both the cervical area and the incisal edge.

Square form: Outer limits are more or less straight and parallel, creating a wide cervical area and a similarly large incisal edge.

4.4 Size and Proportion

The size of the maxillary central incisors was found to have an average width of 8.3 to 9.3 mm and an average length of 10.4 to 11.2 mm [24]. While tooth width generally remains constant, the length, in contrast, can change considerably with age.

In young patients, the incisal edge often has clearly distinguishable mamelons and is not abraded. The tooth may appear shorter as a whole because the gingival margin is in a more coronal position in relation to the enamel-cement line (altered passive tooth eruption). This partial covering of the tooth by the gingival tissue in the cervical area may sometimes lead to a marked reduction in tooth length. In older subjects, however, it is quite common to find abrasion of the incisal margins, which then generates a change in the incisal curvature and a tendency toward its gradual flattening. In some cases, this reduction in tooth length is partially compensated by recession of the gingival levels, which is caused by a gradual reduction in periodontal support. The substantial maintenance of tooth length that occurs in this way is accompanied by a gradual apicalization of the incisal edge position and by an inevitable reduction in tooth exposure, both with the lips in the rest position and during smiling [25].

Almost all studies of tooth proportion have concluded that the width of a central incisor is roughly 80% of the length within a certain variable range. This is the width-length ratio considered ideal by many patients, according to Brisman, although many clinicians, probably influenced by the prefabricated teeth of removable dentures, seem to prefer longer, narrower teeth [26]. Chiche and Pinault consider a proportion between 75% and 80% to be ideal. It has been found that men have larger incisors compared to women, in the same way that individuals of black ethnic origin have larger incisors compared to Caucasian individuals. Peck and Peck confirmed this data and also found that female subjects have a shorter clinical crown length in the central incisors, which is often associated with a high smile line [15].

Western civilization has drawn the conclusion that for objects to be proportional to one another the ratio of 1:1.618 is esthetically pleasing, known as the *golden proportion* (Fig. 9). Much has been hypothesized from this ratio, from the mathematical relationship of the chambers of the nautilus shell to facial proportions. As a general rule, if the apparent size of each tooth, as observed from the frontal view, is 60% of the size of the tooth anterior to it, the relationship is considered to be esthetically pleasing. That is, if the apparent width of the central incisor is 1.618, the lateral incisor and canine should be 1.0 and .618 respectively [27].



Figure 9: Golden proportion.

4.5 Incisal Margin

In adolescents, the incisal edge, viewed from the front, shows mamelons, which tend to disappear at a young age. The particular morphology of the incisal margin, which is tilted in the buccolingual direction, coupled with the phenomenon of total light reflection, is responsible for the formation of the thin opalescent band that is typical of the maxillary incisors [28]. The most apical location of the inner border in relation to the buccal border must therefore be reproduced in the prosthetic restorations as well to avoid creating an unnatural appearance [29].

V. Phonetics

Phonesis is a function that is closely affected by the relationship between the teeth, lips and the tongue, and it can be significantly compromised by inadequate restorations. Pronunciation of the sound of m, e, f/v, and s can be a valuable aid in identifying some of the functional and esthetic parameters to be followed when creating the prosthetic treatment plan.

Phonetic tests are reliable and useful in making a correct esthetic and functional diagnosis [30]. They can give useful indications for establishing both appropriate tooth position and length, as well as for determining a suitable vertical dimension of occlusion.

5.1 “M” Sound

By having the patient repeat words containing this consonant at regular intervals, by repeating the word “mom” for example, the position of the mandible at rest can be ascertained. In the interval between one pronunciation and the next, the clinician can then evaluate the portion of the central incisors that is visible in the rest position.

In this phase, the portion of the central incisors, normally visible in young patients, is approximately 3.5 mm in female subjects and approximately 2mm in male subjects.

5.2 “E” Sound

Another aid in phonetic evaluation of the incisal length of maxillary teeth is, according to Spear, prolonged pronunciation of the vowel sound ‘e’ (as in “me”).

For young patients, the incisal edge is brought very close to the lower lip. If the maxillary teeth occupy less than 50% of this space, they can normally be lengthened prosthetically to occupy as much as 80% of the space between the lips [31].

Because of the reduced tonicity of the perioral tissues in elderly patients, the space between upper and lower lips is only partially occupied by the maxillary incisors. In any case, it should not take up more than 50% of the space in question, so that it does not seem excessively long in patients who are no longer young.

5.3 “F/V” Sound

Correct pronunciation of the sounds ‘f’ and ‘v’ is produced by light contact between the maxillary central incisors and the vermilion border of lower lip.

It is essential to perform adequate tooth preparation, which involves lingual tilt of the incisal third of the prosthetic abutment. In fact, insufficient reduction in this area is often the cause of excessive buccal positioning of the incisal profile that results from the inevitable thickness of ceramic that the technician must build up to achieve an esthetic result. This will lead to incorrect pronunciation of the sound ‘f’ and ‘v’, giving

the patient a sensation of excessive dental bulk and causing difficulty in closing the lips because the incisal edge is positioned beyond the vermilion border [32].

5.4 “S” Sound

While pronouncing the letter ‘s’, the maxillary and mandibular teeth reach their maximum level of contiguity, drawing close to each other but never coming into contact. The use of this sound is the most practiced method for determining clinical acceptability of the vertical dimension [33, 34].

In patient rehabilitation, if a large space is found between the two arches, an increase in the vertical dimension should be considered.

Excessive elevation is demonstrated by a marked difficulty in pronouncing the ‘s’ sound because the teeth completely invade the free space when the two arches come into contact.

VI. Gingival Considerations

6.1 Color

Healthy gingival tissue is usually pink, although there is considerable variation among individuals. When inflamed, however, the tissue turns a red color, which can at times be very intense. If the tooth has been treated endodontically, the gingival color can also be affected negatively by root discoloration. The characteristic bluish-gray area that shows this can be quite noticeable if the gingival tissue is thin.

6.2 Stippling

In approximately 40% of individuals, especially in thick periodontal biotypes, the surface of the soft tissues has an "orange peel" appearance, which is known as ‘stippling’. This is caused by the attachment of the supracrestal fibers to the epithelium above.

6.3 Form

Healthy gingival tissue is firmly attached to underlying layers. Its shape is determined by the gradual reduction in gingival thickness from the attached gingiva to the free gingival margin.

6.4 Architecture

In healthy tissue, the gingival margin and the alveolar crest beneath it follows the scalloped outline of the cemento-enamel junction. In the buccal regions, the gingiva is therefore positioned more apically compared to the inter-dental areas. The gingival outline, which overlaps that of the osseous ridge underneath, delineates the typical scalloped design of the margins, thereby determining the positive architecture of the gingival outline [35]. This is much more accentuated around the anterior teeth and becomes virtually flat around the molars. The scalloped outline is determined by the alignment and the position of the teeth in the arch as well as by their shape and by the level of contiguity with the adjacent teeth [36].

6.5 Periodontal Biotype

In the thick biotype, articularly thick tissues are usually associated with normal or reduced exposure of the clinical crowns, with only a slightly scalloped architecture and the presence of a basically square tooth shape [35, 37, 38].

Thin periodontal tissues are, in contrast, associated mainly with increased exposure of the clinical crowns. The gingival outline is particularly scalloped and is accompanied by a basically triangular tooth shape [35, 37, 38].

6.6 Gingival Margin Outline

Varying amounts of the gingival tissues are exposed to a greater or lesser extent, depending on the patient's smile line. In subjects with a low smile line, any disharmony in the gingival margins does not generally represent an esthetic problem. Conversely, any irregularities in the alignment of the gingival margins or the lack of interdental papillae can constitute a marked esthetic deficit in individuals with an average or high smile line [39].

6.7 Parallelism

Ideally, the outline of the gingival margins, as delineated by the cervical levels of the maxillary canines and central incisors, should be parallel to both the incisal edge and the curvature of the lower lip. Moreover, the gingival levels should maintain adequate parallelism with the occlusal plane and the horizontal reference lines, namely the commissural and the interpupillary lines [17]. The absence of parallelism will upset the sense of balance in the dentogingival composition, with negative repercussions for the overall esthetic appearance.

6.8 Symmetry

The gingival margins of the maxillary central incisors and the canines should be symmetric and in a more apical position compared to those of the lateral incisors. The lateral incisors should be coronal to a line traced across the cervical margins of the canines and central incisors. Symmetry of the gingival margins at the midline (maxillary central incisors) to be essential, while more laterally, a certain amount of asymmetry is permissible. Depending on their position, the lateral incisor can sometimes show a more apical gingival outline, while others are more coronal compared to the adjacent teeth without compromise to the esthetic result.

VII. Conclusion

Esthetics is the philosophy, psychology and sociology of the "beautiful" in art and nature. In dentistry, the prosthetic restoration of form and function to the masticatory system contributes to the beauty and harmony of face; whether young or old.

Esthetic dentistry continues to grow as a major part of overall dentistry though the initial emphasis must always concentrate on basic oral health principles. A patient's treatment plan should consist of evaluating the entire face rather than an individual tooth. Treatment must then be performed in an orderly fashion with an understanding of proper analysis of the facial features and lip movement in relation to the teeth, achieved by evaluating the facial, dentolabial, phonetic, dental, and gingival parameters.

References

- [1] I. Ahmad, *Protocols For Predictable Aesthetic Dental Restorations* (United Kingdom: Blackwell Munsgaard, 2006).
- [2] D. Almog, The Effect Of Esthetic Consultation Methods On Acceptance Of Diastema-Closure Treatment Plan, *Journal Of The American Dental Association*, 135(7), 2004, 875-881.
- [3] J. Vukovic, B.C. Jones, L.M. Debruine, A.C. Little, D.R. Feinberg, And L.L. Welling, Circum-Menopausal Effects On Women's Judgments Of Facial Attractiveness, *Biology Letters*, 5(1), 2009, 62-64.
- [4] E.L. Miller, W.R. Bolden, And H.C. Jamison, A Study Of The Relationship Of The Dental Midline To The Facial Median Line, *Journal Of Prosthetic Dentistry*, 41(6), 1979, 657-660.
- [5] C.J. Soares, R.B. Fonseca, L.R.M. Martins, And M. Giannini, Esthetic Rehabilitation Of Anterior Teeth Affected By Enamel Hypoplasia: A Case Report, *Journal Of Esthetic And Restorative Dentistry*, 14(6), 2002, 340-348.
- [6] S.F. Rosenstiel, D.H. Ward, And R.G. Rashid, Dentists' Preferences Of Anterior Tooth Proportion--A Web-Based Study, *Journal Of Prosthodontics*, 9(3), 2000, 123-136.
- [7] M. Fradeani, *Esthetic Rehabilitation In Fixed Prosthodontics, Volume 1: Esthetic Analysis: A Systematic Approach To Prosthetic Treatment* (Chicago, IL: Quintessence Publishing Co., 2004).
- [8] D. Sarver, *Esthetic Orthodontics And Orthognathic Surgery* (Maryland Heights, Mi: Mosby, 1998).
- [9] A.H. Tjan And G.D. Miller, Some Esthetic Factors In A Smile, *Journal Of Prosthetic Dentistry*, 51(1), 1984, 24-28.
- [10] S. Al-Johany, A.S. Alqahtani, F.Y. Alqahtani, And A.H. Alzahrani, Evaluation Of Different Esthetic Smile Criteria, *International Journal Of Prosthodontics*, 24(1), 2011, 64-70.
- [11] J.K. Dong, T.H. Jin, And H.W. Cho, The Esthetics Of The Smile: A Review Of Some Recent Studies, *International Journal Of Prosthodontics*, 12(1), 1999, 9-19.
- [12] R.E. Goldstein, *Esthetics In Dentistry* (Canada: B.C. Decker, 1998).
- [13] S. Kourkota, Implant Therapy In The Esthetic Zone: Smile Line Assessment, *International Journal Of Periodontics And Restorative Dentistry*, 31(2), 2011, 195-201.
- [14] E.P. Allen, Use Of Mucogingival Surgical Procedures To Enhance Esthetics, *Dental Clinics Of North America*, 32(2), 1988, 307-330.
- [15] S. Peck, L. Peck, And M. Kataja, The Gingival Smile Line, *The Angle Orthodontist*, 62(2), 1992, 101-102.
- [16] P. Fudalej, Long-Term Changes Of The Upper Lip Position Relative To The Incisal Edge, *American Journal Of Orthodontics And Dentofacial Orthopedics*, 133(2), 2008, 204-209.
- [17] C.R. Rufanecht, *Fundamentals Of Esthetics* (Chicago, IL: Quintessence Publishing Co., 1990).
- [18] R.D. Johnson And R. Gallerano, The Effects Of Buccal Corridor Spaces And Arch Form On Smile Esthetics, *American Journal Of Orthodontics And Dentofacial Orthopedics*, 128(5), 2005, 557.
- [19] D.E. Ritter, L.G. Gandini, S. Pinto Ados, And A. Locks, Esthetic Influence Of Negative Space In The Buccal Corridor During Smiling, *The Angle Orthodontist*, 76(2), 2006, 198-203.
- [20] B. Ingervall And B. Hedegard, An Electromyographic Study Of Masticatory And Lip Muscle Function In Patients With Complete Dentures, *Journal Of Prosthetic Dentistry*, 43(3), 1980, 266-271.
- [21] L. Miller, Organizing Color In Dentistry, *Journal Of The American Dental Association*, 115(1), 1987, 26-40.
- [22] K.L. O'keefe, E.R. Strickler, And H.K. Kerrin, Color And Shade Matching: The Weak Link In Esthetic Dentistry, *Compendium*, 11(2), 1990, 118-120.
- [23] F.J. Gascon Mayordomo, A Fons Font, J.C. Malabia Lieb, F. Torrella Francés, And E. Aliaga Boniche, Current Esthetic Parameters In Fixed Prosthodontics, *Journal Of The American Dental Association*, 4(8), 1988, 377-384.
- [24] E.G. Owens, C.J. Goodacre, P.L. Loh, G. Hanke, M. Okamura, K.H. Jo, C.A. Muñoz, And W.P. Naylor, A Multicenter Interracial Study Of Facial Appearance: Part 2: A Comparison Of Intraoral Parameters, *International Journal Of Prosthodontics*, 15(3), 2002, 283-288.
- [25] K.A. Al Wazzan, The Visible Portion Of Anterior Teeth At Rest, *Journal Of Contemporary Dental Practice*, 5(1), 2004, 53-62.
- [26] A.M. Laverre, K.R. Marcroft, R.C. Smith, And R.J. Sarka, Denture Tooth Selection: Size Matching Of Natural Anterior Tooth Width With Artificial Denture Teeth, *Journal Of Prosthetic Dentistry*, 72(4), 1994, 381-384.
- [27] M. Mahshid, A. Khoshvaghti, M. Varshosaz, And N. Vallaei, Evaluation Of "Golden Proportion" In Individuals With An Esthetic Smile, *Journal Of Esthetic And Restorative Dentistry*, 16(3), 2004, 185-192.
- [28] M.R. Mack, Perspective Of Facial Esthetics In Dental Treatment Planning, *Journal Of Prosthetic Dentistry*, 75(2), 1996, 169-176.
- [29] H. Ohyama, S. Nagai, H. Tokutomi, And M. Ferguson, Recreating An Esthetic Smile, *Dental Clinics Of North America*, 45(1), 1996, 107-230.

- [30] G.A. Murrell, Phonetics, Function, And Anterior Occlusion, *Journal Of Prosthetic Dentistry*, 32(1), 1974, 23-31.
- [31] E. Pound, Esthetic Dentures And Their Phonetic Values, *Journal Of Prosthetic Dentistry*, 1(1-2), 1951, 98-111.
- [32] W.C. Rivera-Morales, And N.D. Mohl, Variability Of Closest Speaking Space Compared With Interocclusal Distance In Dentulous Subjects, *Journal Of Prosthetic Dentistry*, 65(2), 1991, 228-232.
- [33] C. Runte, D. Tawana, D. Dirksen, B. Runte, A. Lamprecht-Dinnesen, F. Bollmann, E. Seifert, And G. Danesh, Spectral Analysis Of /S/ Sound With Changing Angulation Of The Maxillary Central Incisors, *International Journal Of Prosthodontics*, 15(3), 2002, 254-258.
- [34] P. Lamontagne, The Evolution Of Dental Esthetics, *Journal Dentair Du Québec*, 27, 1990, 365-371.
- [35] S.S. Wagman, The Role Of Coronal Contour In Gingival Health, *Journal Of Prosthetic Dentistry*, 37(3), 1977, 280-287.
- [36] C.J. Goodacre, Gingival Esthetics, *Journal Of Prosthetic Dentistry*, 64(1), 1990, 1-12.
- [37] H. Baharav, B.Z. Laufer, Y. Langer, And H.S. Cardash, The Effect Of Displacement Time On Gingival Crevice Width, *International Journal Of Prosthodontics*, 10(3), 1997, 248-253.
- [38] M.R. Dragoos And G.B. Williams, Periodontal Tissue Reactions To Restorative Procedures, *International Journal Of Periodontics And Restorative Dentistry*, 1(1), 1981, 8-23.
- [39] S. Charruel, C. Perez, B. Foti, J. Camps, And V. Monnet-Corti, Gingival Contour Assessment: Clinical Parameters Useful For Esthetic Diagnosis And Treatment, *Journal Of Periodontology*, 79(5), 2008, 795-801.