



The dynamics of pink and white esthetics in complete denture

V. Anand, P. S. Manoharan

Department of Prosthodontics, Crown and Bridge, Indira Gandhi Institute of Dental Sciences, Sri Balaji Vidyapeeth, Pondicherry, India

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Correspondence:

P. S. Manoharan, Department of Prosthodontics, Crown and Bridge, Indira Gandhi Institute of Dental Sciences, Sri Balaji Vidyapeeth, Pondicherry, India.
Tel.: +91-9865019673.
E-mail: manodent_2000@yahoo.com

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Abstract

Esthetics plays an important role in the success of the complete denture prosthesis. Denture esthetics can be enhanced through the application of the concepts and proportions of dental esthetics. These include the selection of teeth form, size, shade and position of the teeth, and the denture base material. To create an individualized esthetic appearance to the patient, a characterized complete denture can be fabricated. Modifications are made in the teeth or the denture bases to make it appear more natural for that particular individual. This paper reviews the concepts and techniques of factors governing the pink and white esthetics of complete denture.

Introduction

“Esthetics” is derived from the Greek word “Aesthesia.” This term was coined in 1750 as the science of sensuous knowledge which gave beauty.^[1] Today, esthetics is as variable as the races, nationalities and different characteristics of gender; it has a transition from youth to maturity and senescence. With respect to dentistry, it is observed as art with rules and principles pertaining to the arrangement of teeth, gingival tissue contours, and restoring the normal dimensions of the face for a particular individual. However, it is observed that what one culture perceives as disfigurement may be beautiful to another.

Dentures can either enhance the patient’s personal image, if they appear natural and attractive. Physical attractiveness is an important social issue in our culture which exerts significant influence not only in the social interactions but also self-concept, psychological well-being, and social behavior of an individual. Studies reveal that our face constitutes an important factor in the general esthetic perception of the people. Within the face, the mouth which includes the dental and smile esthetics appears to be 31% an important factor.^[2] Esthetics in complete dentures is more challenging to achieve, as there are no remaining teeth for reference. A complete denture allows the patient to return to normalcy and social well-being.^[3]

Pink esthetics in complete denture corresponds to the esthetic consideration of the denture base which restores the natural color and contour of the gingiva. This can be incorporated by a selection of the denture base material, creating scalloped margins, stippling, and gingival staining.^[4] White esthetics corresponds to the selection of teeth form, shade, and size of teeth which are arranged according to teeth setting concepts and principles. This plays a significant role in constructing a denture which is functionally and esthetically pleasing.^[5] To create an individualized esthetic appearance to the patient, a characterized complete denture can be fabricated. Modifications are made in the teeth or the denture bases to make it appear more natural for that particular person. Mathematical proportion like the golden proportion and the recurrent esthetic dental proportions along with the previous dentures, radiographs, casts provide valuable information in the construction of the characterized dentures.^[6,7]

History of Anterior Teeth Selection

The importance of dental esthetics and anterior teeth selection was understood from the 19th century. Numerous researches were established to include the aspects of normal patients to edentulous patients for the fabrication of complete denture.

Concepts of tooth selection^[8-12]

Various concepts of tooth selection were proposed and are discussed in Table 1.

Selecting the size of tooth^[13]

The factors influencing the selection of tooth size is given in Table 2.

Selection of Tooth Shade

The shade of denture teeth can be determined by observing the personality, skin complexion, age, existing dentures, pre-extraction records, and patient’s preference. The personality can be identified as strong, average, and soft. A person with a strong personality is full of energy, dynamic, and vivacious. Opposite characteristics can be seen in a weak person.^[14]

Teeth Arrangement

The outline form, color, and size of the teeth may appear to be normal but if the position of the teeth which provides adequate lip and cheek support is not arranged according to the patient the effect of naturalness will not be achieved. Therefore, the position of the anterior teeth must be clinically examined and arranged by the dentist. Restoring the normal lip action and the vermilion

Table 1: Concepts of tooth selection

Concept	Description
White’s concept ^[8]	Temperamental types of a patient named on the physiological function of blood, nerve, bile, lymph For example, Sanguine individual possess thin long and narrow teeth bilious individual have short broad tapering incisors
Pound concept ^[9]	Width of the central incisor – dividing bizygomatic width by 16 Length of the incisors – dividing the length of the face by 16
Frush concept ^[10]	Sex: Feminine characters – softer anatomic tooth form For example, Shallow incisal edge following a curve than straight Masculine characters: Tooth form which expresses vigor, boldness, and hardness Personality: It is reproduced by the manipulation of tooth shapes, tooth shade, positions, and visibility Age: Light shades young people and darker shades for old. Sharp cusp tips for young patients. Erosion can be imparted to artificial teeth by grinding and polishing the artificial teeth, it efficiently conveys the illusion of vigor and advanced age
Winkler’s concept ^[11]	Biological-physiological: Harmony of the facial musculature during the function Biomechanical: Mechanical limitations in the placement of anterior teeth Psychological: Esthetics and facial appearance
William concept ^[12]	A relationship exists between the inverted face form and the form of the maxillary central incisor. Described typical forms of teeth as square, tapering, ovoid

contour of the lip may require both vertical and labiolingual positioning of the teeth.^[15]

Arrangement of Mandibular Anterior Teeth

Mandibular central incisors are placed upright and canines are mesially tilted which are also called as sleeping canines. An overjet of 2–3 mm and overbite of 1–2 mm enhance the esthetics of the denture.^[16]

Characterization of Complete Denture

Characterization can be achieved modifying the arrangement of teeth according to the patient. This can be done using the patient’s pre-existing records and by knowing the expectations and perceptions of the patient. Some of the ways of characterization are:^[7]

- Changing the long axis of the teeth
- Use an eccentric midline

Table 2: Factors influencing the selection of tooth size

Factors influencing the selection of tooth size	Description
Size of face	Width of the anterior teeth=1/16 of bizygomatic width Width of maxillary anteriors=1/3 rd of bizygomatic width
Size of the maxillary arch	Measurements are made from the crest of the incisive papilla to the hamular notches and from one hamular notch to the opposite side. The combined length of the three legs of the triangle in millimeters is used as the selector
Incisive papilla and canine eminence	A line can be placed at the distal termination of the canine eminence. The distance between the canine eminences through the anterior of the incisive papilla gives the width of the anterior teeth
Inner canthal distance	It is the distance between the medial angles of the palpebral fissure. The inner canthal distal was found to be greater than the combined width of maxillary central incisors, the inner canthal distance is multiplied by 0.618, and the resultant product was then divided by two to obtain the width of a single central incisor
Nasal width	Explained that the parallel lines, when extended from the lateral surface of the ala of the nose onto the labial surface of the upper occlusal rim, can be used to give an evaluation of the midline vertical axis of the upper canine teeth
Lip	Labial surface of the maxillary anterior teeth supports the relaxed lip and the incisal edge extends slightly inferior or below the lip margin
Vertical distance between the ridges	The length of the teeth is determined by the vertical distance between the ridges. Use of longer teeth is advisable as the exposure of the denture base can be reduced

- Rotation of teeth
- Long clinical crowns
- Diastema
- A hairline crack can be given in the teeth
- Silver filling can be given on posterior teeth.

Mathematical Concepts of Teeth Arrangement

Golden proportion

The application of golden proportion to dental esthetics was first documented by Levin in 1978. He explained that esthetically pleasing dentition and smile can be obtained with proportions. The golden proportion also gives good guidance in positioning the height of the incisors although it only applies in about 75% of the population.^[7]

Repeated ratio

This is proposed by Lombardi which states the use of a “continuous proportion or repeated ratio” in establishing the width of the central and lateral incisors and continues the placement of the remaining.^[17]

Recurrent esthetics dental (RED) proportion

The RED proportion is a combination of the golden proportion introduced by Levin and repeated ratio that was explained by Lombardi. The RED proportion establishes that, when viewed from the frontal aspect, a constant proportion of the width of the tooth is maintained on moving distally. Instead of accepting a proportion that already exists, the dentist can create his or her RED proportion for a particular patient and situation.^[6]

Pink esthetics

The wooden denture was the first introduced by Japanese, who were masters in woodcarving during the 8th century. George Washington also had a denture carved from a single piece of wood on which natural teeth were screwed. Pierre Fauchard developed a variety of prosthetic techniques during the 17th century. He measured the individual arches and cut bone to fit onto the ridges. Natural teeth or teeth made from hippopotamus or elephant ivory was used. Porcelain dentures were the next to be introduced which had intimate tissue contact. In 1839 Charles Goodyear developed the art of producing a rubber which was further enhanced when his brother Nelson Goodyear who invented a process for making vulcanite which was a form of hard rubber.

Polymethyl methacrylate revolutionized the field of denture base materials in 1937. It fulfilled all the ideal requirements of a denture base material. Due to the significant application of acrylic resin, it was estimated that 95% of all dentures were fabricated by 1946. Nylon was another material introduced in the 1950s as a denture base material but was unpopular due to poor resistance to oral conditions. The Gingiva, which is a part of the soft tissue lining of the mouth surrounds the teeth and provides a seal

around them. It is designed to resist the friction of food when passing over them. A healthy gingiva may be seen as pink or with various pigments. Pink esthetics in complete denture deals with the replication of these gingival contours and the various aspects of gingiva such as stippling, staining, and pigmentation.

Pound in 1951 suggested a method to stimulate gingival color in the denture by tinting acrylic denture bases. He incorporated individual color peculiarities in artificial dentures. Kemnitzner also worked on providing various color tint to the denture base.^[18]

Festooning

Festooning is carving the denture base to create natural tissue contours in the denture. A wax-up procedure is done before carving the denture base.

Objectives and Requirements of Waxing-up

Wax-up must have a natural and pleasing appearance which must also aid in the retention and stability of the denture. Care must be taken not to over contour the labial flange resulting in loss of seal. The buccal and lingual flanges must be compatible with the other oral structures and must be in harmony with them.

Common Errors during Wax-up

Gingival portion

Over contouring of gingiva which may not be esthetically pleasing and is difficult to clean and maintain oral hygiene.

Interdental papilla

Interdental papilla when attempted to replicate must be done with care. A small or non-existent interdental papilla may result as a trap for food. When the papilla is large, they resemble an inflamed tissue.

Errors in waxing-up the palatal region

Palatal wax-up must be done uniformly. Uneven thickness in the palatal region may result in a denture with an uneven palate which may cause discomfort to the patient.

Stippling

Lynn C. Dirksen introduced stippling indentures. Gingival stippling is a characteristic feature of the healthy attached gingiva; hence, when replicated it produces a naturally appearing flanges.^[19]

1. Toothbrush technique
2. Offset bur technique
3. Blow wax technique.

Toothbrush Technique

Before investment, the bristles of the toothbrush are pressed against the surface of the waxed up denture. This results in the production of many tiny indentations in the wax-up. This is

slightly flamed so as to make the indentations less prominent and form minute dimples.

Limitations

In general, investment, there is a high probability for the investment material may get trapped within the pits which makes it difficult to polish and maintain the denture.^[20]

Offset Bur Technique

This technique is one in which a bur with an offset bending on the shank is used. Usually, a round bur of sizes 4–8 is placed in a handpiece and wiped in a circular motion over the denture to create stippling.

Limitations

Polishing of the denture will be a challenge since bur may scratch the surface of the denture. Linear shaped dimples are created rather than round and difficulty in controlling the depth of the bur cut is observed in this technique.^[21]

Blow Wax Technique

The denture base is contoured in the usual manner which will simulate the root eminences. Gingival margin is accurately placed and excess wax is removed from the teeth. The wax is smoothed, and it is polished to avoid defects.^[21]

Use of Tints in the Denture Bases

Several methods have been employed in the construction of dentures which have a tint in the denture base resins to achieve a more natural appearance. Heat cured or auto-polymerizing resins of various shades or colors are usually painted on the denture base. It can also shift on to the mold during denture construction to obtain a tinted denture.

Custom Denture Tinting

Color characterization of the denture base is made by applying gingival stains on to the gingival surfaces after boil out.^[22]

Acrylic Resin Stains

Shade modifiers can be used for denture tinting with colors including red, brown, and black. After the denture is processed with the appropriate shade denture base material, contouring and smoothing are done with an acrylic bur but not polished. Custom tinting is done at this time.

Soft Tissue Shade Guide

A soft tissue shade guide is used to select the color of the denture base material which closely matches with the patient. This must

be done during the selection of artificial teeth. It can also be used to record other characteristics such as the blotches of melanin.^[23]

Light Cured Gum Shading

It is a micro filled composite resin, used in the reproduction of gingival tissues. They are applied in multiple layers and have good mechanical and physical properties.^[24] Internal characterization of denture base can also be using acrylic stains and tissue paper which is reported in literature.^[25]

Conclusion

A natural-looking denture can be achieved by applying artistic principles with respect to the anatomy and physiology of the face. As esthetics is more subjective, no hard and fast rules can be applied and every patient may require a different approach. However, by incorporating, the patient's characteristics in the denture a natural and lifelike prosthesis can be fabricated.

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