

Evolutionary Techniques And Concept of Artificial Teeth: A Review

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Abstract

Esthetics includes the appreciation and response to the beautiful in art and nature. The dentist must visualize esthetics in relation to the patient and then translate that visualization into an acceptable esthetic result. Dental esthetics and the beauty of the smile are of main importance in today's civilization. The edentulous patient is no exception, yet creating a natural-appearing smile for this patient is very hard to achieve. This article discuss

about evolution of techniques and various concept of artificial teeth.

Keywords: Anatomic Teeth, Non-Anatomic Teeth, Modified Anatomic Teeth.

Introduction

Artificial teeth must be placed in a position which will be esthetically acceptable to the patient and the clinician, functionally sound and in harmony with the other structures of the masticatory system[1]. In the mid-1920s, dentists started trial with tooth forms that were designed

for an exact useful purpose rather than just copying natural forms. Thus developed a number of non-anatomical denture teeth. The occlusal surfaces of these teeth are not duplicated from the natural form but are given form from the tooth carver intended to meet exact patient needs, such as denture base stability and improvements in mastication. Some non-anatomical posterior denture teeth were designed completely without cusp, whereas other were mechanical in design, having metal cutters to increase masticatory efficacy[2]. The dentist must visualize esthetics in relation to the patient and then translate that visualization into an acceptable esthetic result[3].

➤ **Evolution of Techniques:**

Anterior Teeth: Young in 1954 described the evolution of various techniques used in the selection of the anterior tooth mold.[4]

Technique 1: During the ivory age and early porcelain period, teeth were selected or created mostly by dimensional measurements of the denture space and arch size with little regard to esthetics.

Technique 2: The “temperamental technique” was the first technique of selecting tooth form from the point of view of influence and universal acceptance. It required several years to associate and establish dental characteristics of the temperaments and to incorporate them in manufactured tooth forms, this occurred by 1885.[5]

Technique 3: The “Typical form” concept projected by W.R. Hall in 1887. This was the initiation of the geometric theory later presented by Williams. The basis of this classification was two-fold, the major basis was the tooth’s labial surface curvatures (transverse and gingivo-incisal), outline form and neck width. Hall gave the classification of overall tapering and square.[6]

Technique 4: Berry’s biometric ratio method – 1906. Berry’s investigated the correlation between face form and tooth form and resulted in the discovery that the maxillary central incisor was 1/16th the width of the face and 1/20th its length. Difficulty in practical applications discouraged the use of this technique.[7]

Mavroskoufis et al in 1981 concluded that the inter-alar nasal width is a reliable guide for selecting the mold of anterior teeth. The authors advocate that the tips of the canine be set on a line which passes through the posterior border of the incisive papilla which proved to be stable anatomic landmark[8-9]. The incisive papilla can also be used as a guide for arranging the labial surface of the central incisors at 10mm anterior to the posterior border of papilla.

Technique 5: “Clapp’s tabular dimension table method” – 1910. Teeth were selected based on the overall dimension of six anterior teeth arranged on the Bonwill circle and the vertical tooth space available in the patient.[10]

Technique 6: Valderrama’s “Molar tooth Basis” was projected in 1913. This method of only historical value used varying measurements between combinations of cusp points to indicate the size of the individual and overall tooth measurements. The basic problem with this technique is that edentulous patients have no molars.

Technique 7: Cigrande 1913 advocated the use of the outline form of the fingernail to select the outline form of the upper central incisor. The size was modified to meet the requirements of tooth space and other relationships.

Technique 8: The Geometric method or Law of Harmony. William’s “Typal form method” projected by J. Leon Williams in 1914 is based on the geometric pattern created by the outline form of the bony face frame – the ovoid, square and tapering forms. William arrived at this classification after extensive anthropological study and was able to interest a manufacturer. This method is

probably still the way in which most dentists select anterior artificial teeth.[11]

Technique 9: “Maxillary Arch outline form” projected by Nelson in 1920. This technique assumed that the arch outline form was a valid method since it was related to an individual’s anatomy. This was invalidated by changes in arch form due to resorption.

Technique 10: “Wright’s Photometric method” proposed in 1936 was based on using a photograph of the patient with natural teeth and establishing a ratio by comparative computation of measurements of like areas of the face and photograph.

Technique 11: “The multiple choice method” introduced by Myerson in 1937 was based on a need for a selective range in labial surface characteristic of transparent labial and mesial surfaces, varying surface colour tone, and characterization of teeth by time and wear.

Technique 12: “Anthropometric – Cephalic index method” projected by Sears in 1941 was best on fact that width of the central incisor could be determined by dividing either the transverse circumference of the head by 13 or the bizygomatic width by 3.3. Tooth length was in proportion to face length.[12]

Technique 13: “Bioform technique” proposed by the Dentist’s Supply company in 1950 is based on the geometric outline forms of face and teeth – the “House” classification for 4 basic and 3 combination typal forms, and 3-dimensional harmony of tooth form and face form. It is associated with the tabular and mold guide systems and is currently in use.

Technique 14: The “Trubyte tooth indicator” or “Selection Indicator Instrument” method advocated by the Dentist’s supply company which is correlated with William’s and House’s Typal form theory and the Tabular technique.[13]

Technique 15: “House instrumental method” of projecting typal outline and profile silhouettes onto the face by means of a telescopic projector instrument and silhouette form plates. This was correlated with designated mold numbers and size variation. This was proposed by House in 1939 and by the Dentist’s Supply Company in 1950.

Technique 16 : “Automatic instant selector guide” of the Austenal company in 1951 correlated form, size and appearance in such a manner that only a single reading was required to select the appropriate tooth mold based on dimensions of denture space and harmony of face and tooth form.

Then in September 1955 Frush and Fisher created a revolution in the field of dental esthetics by the introduction of Dentogenics. In a series of six articles published between 1955 and 1959 they described various means to more natural dentures and many tips on how to avoid the ‘denture look’.[14]

Krajicek in 1956 proposed methods involving the duplication of the patient’s natural teeth either before or after extraction. Klein (1960), Hayward (1968), Kafandaris Theodoros (1974) suggested incorporating the patient’s natural teeth in the denture[15-17]

Posterior Teeth

Anatomic teeth: Gysi in 1914 designed the Trubyte teeth. These were the first anatomic posterior teeth to be developed. They were made of porcelain and resembled natural teeth with transverse ridges intended for tight interdigitation.

Modified anatomic teeth : In 1927 Gysi designed Gysi crossbite teeth.

In 1927 sears designed channel tooth.

In 1930 Avery brothers designed the Scissor bite teeth .

In 1932 Pilkington and Turner designed a tooth which resembled natural occlusal forms but had angle of 30° .

In 1935 French introduced Modified posteriors. In this designed, the upper posterior teeth were similar to „channel teeth“ but with shallow buccolingual inclines. Lower teeth had a sloping buccal surfaces that was placed below the occlusion. Only the lingual cusp contacted the grove in the upper⁵.

In 1937 Max Pleasure designed the Pleasure scheme. In this designed the lower posterior occlusal surfaces were modified to produce a reverse curve by tilting the tooth buccally.

In 1942 John Vincent designed the Metal insert in resin. In this designed, circles of gold solder wire or stainless steel wire were inserted in the maxillary posterior resin occlusal surfaces.

In 1961 Sosin designed Crossblades. In this designed the occlusal surface of the upper second premolar and first and second molars were covered with vitallium[5].

In 1977, Levin modified these teeth by placing the vitallium only on the maxillary palatal cusps for esthetic reasons.

Non – anatomic teeth: In 1929 Hall designed the Inverted cusp tooth. This was the first non - anatomic designs. The occlusal surface of the teeth was flat with sharp concentric ridges around cup – like depression (inverted cusp).

In 1929 Myerson designed True – cusp teeth. This was also a cusp-less posterior that had a series of buccalingual ridges.

In 1934 Nelson designed the Chopping block teeth. This is flat occlusal surface with ridges. Mandibular ridges were placed transversely, while maxillary ridges were placed mesiodistally.

In 1939 Swenson designed the Non-Lock teeth[5].

In 1946 Hardy designed Vitallium occlusal „VO“. These were non-anatomic teeth, which contained metal inserts in occlusal surface.

In 1951 Myerson Tooth Cooperation designed Shear-cusp tooth. These were the first crosslinked acrylic nonanatomic teeth to be developed.

In 1952 Cook designed Coe masticators.

In 1957 Bader designed Cutter-bars.

In 1967 Frush designed Linear occlusal concept. In this concept the single mesiodistal ridge was placed on the lower posterior teeth opposing flat upper teeth[18].

➤ **Concepts of Teeth Selection**

White’s Concept: This method was based on a 5th century BC concept attributed to Hippocrates. Temperamental types were sanguine, nervous, bilious and lymphatic named for the physiologic functions of blood, nerves, bile and lymph of the individual. Artificial teeth were arbitrarily selected to suit the patient’s temperament. A “bilious” individual would be expected to have short, broad, tapering incisor teeth, whereas a “sanguineous” individual would possess long, thin, and narrow teeth [4].

H.Pound’s Concept [19]: Evaluates tooth width by “measuring the distance from zygoma to zygoma, one to one half inches back of the lateral corner of the eyes”
Width of the central incisor $\frac{1}{4}$ bizygomatic width=16
Length is a measure of the distance from the hairline to the lower edge of the bone of the chin with the face at rest.
Length of the central incisor $\frac{1}{4}$ length of the face=16:

Dentogenic Concept [20]: Tooth selection using the concepts of dentogenics is based on the age, sex and personality of the patient putforth by Frush and Fisher 1955. This concept has been explained as the prosthodontic appearance interpretation of three vital factors which every patient possess. The factors are sex, personality and age of the patient.

Winkler’s Concept[21]: This concept emphasises on three points. The biologicalphysiological, biomechanical and the psychological viewpoint. The biological-physiological view point stated the importance of

harmony of the facial musculature and physiological limit with teeth arrangement. Biomechanical shows the mechanical limitations in placement of anterior teeth. Psychological view is based on esthetics and facial appearance.

Leon William's Concept [22]: William formulated a method called the law of harmony. He believed that a relationship exists between the inverted face form and the form of maxillary central incisor in most people. He described three typical forms of teeth as square, tapering, ovoid.

Conclusion

Dental art does not occur automatically. It must be purposely and carefully incorporated into the treatment plan by the dentist. This artistry strives to soften the marks imposed upon the face by time and enables people to face their world with renewed enthusiasm and confidence. Art in collaboration with science of denture construction eases the geriatric patient in maintaining physical and psychological health.

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