Review Article

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Bioesthetics-Natural Esthetics and Function: A Review

Deepti Pitalia[1*] Ashish Surana[2] Nimisha Kumari[3] Pragya Sharma[4]

[1]Assistant Professor, Department of Conservative Dentistry and Endodontics, College of Dental science and Hospital, Rau, Indore, India.
[2]Associate Professor, Department of Orthodontics and Dentofacial Orthopedics, College of Dental science and Hospital, Rau, Indore, India.
[3]Assistant Professor, Department of Periodontics, Indraprastha Dental College and hospital, Ghaziabad, India.
[4]Private Consultant, Department of Periodontics, Dental Wellness Clinic, Ghaziabad, UP, India.

ABSTRACT

Background: Bioesthetics is a conservative interdisciplinary approach to the restoration of dentition in its natural form and function. Principles of bioesthetics suggest that proper form by following proper graduation effect, smile line, midline, incisal edge position, principle of proportion and good crown morphology of restorations and teeth lead to good occlusion (Harmonized anterior guidance, proper overjet and overbite, stable centric relation contacts) which is necessary for proper functioning and longevity of restoration. The proprioceptors in the periodontal ligaments, mucosa, lips, tongue, cheeks, muscles and TMJ send afferent stimuli to brain and brain in the presence of good occlusion send efferent stimuli to muscles of mastication for proper function.

Keywords: Bioesthetics, Natural, Dentistry.

INTRODUCTION

According to Dr. Robert L. Lee.[1] "Bioesthetics is the discipline in dentistry that studies the beauty of human beings in its natural form and functions." He did Scientific studies on the stomatognathic systems of patients with natural and untouched dentitions, compare them with the stomatognathic systems of patients with poor dentitions. After observing and registering the differences and similarities between the different dentitions, he develop the human biologic model (HBM). Implementing the observations of the HBM allows the clinician to provide restorative care that is comfortable, long-lasting, functional, and esthetic. Dr lee has formulated three principles of bioesthetics.

Principles of bioesthetics:

Principle 1:

Dr. Lee found that all of these patients had in common a stable condylar position (SCP)[2-9] .The condyles of the mandible were located within the glenoid fossa in its most superior and anterior position, held against the articular eminence, centered in the transverse position, and with the disc interposed. This is a reproducible position from a functional point of view and can therefore be registered with the use of models and articulators [10].

Principle 2:

Dr. Lee found that these long-lasting dentitions had in common an overbite of approximately 3 to 4 millimeters and an overjet of 2 to 3 millimeters with the dentition in occlusion.[11-13]

Principle 3:

Dr. Lee found that the patients in his sample had perfect dental morphology [14-19] .He stated on many occasions that in biology, "form is function and function is form," and in his dental samples he observed the following characteristics, which he believed strongly support this statement:

Long upper central incisors

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***Correspondence Dr. Deepti Pitalia.**
Department of Conservative Dentistry and Endodontics, College of Dental science and Hospital, Rau, Indore, India.
Email: endorthoanuli16@gmail.com

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Slightly smaller and more rounded upper lateral incisors.

Long and pointed canines.

Posterior teeth with long and well-developed cusps[10].

Mandibular Relationship: Stable Condylar Position (SCP):

In this position, the condyles are bilaterally seated in the most anterior and superior zone of the fossa, with the disc interposed in its thinnest area which is anatomically and physiologically ideal. It supports mastication, respiration and the swallowing movement of the lips and tongue.

When interferences in the posterior segments get in the way of the arc of closure of the mandible and if the mandible is in centric relation, the patient avoids this prematurity by a forward displacement of the mandible. This massive contraction of the musculature often causes symptoms of muscular pain and stress and thus the system is no longer in equilibrium. This situation in many occasions can lead to dental abrasions, wedge erosions, microfractures of the enamel, pulpitis, recessions, abfractions and dental displacement[10].

Dental Morphology:

The majority of studies done on tooth length and dental morphology are based on teeth with a certain degree of wear [20-21]:

Average measured lengths of these teeth are as follows:
Upper central incisor: 10.5 to 12.5 millimeters
Upper lateral incisor: 9 to 10 millimeters
Upper canine: 10.5 to 12.5 millimeters
Lower incisor: 8.5 to 10 millimeters

The incisal edges are rounded, with a width of 0.5 mm. The premolars and molars have pointed cusps.

Smile line:

An imaginary line along the incisal edges of the maxillary anterior teeth should mimic the curvature of the superior border of the lower lip while smiling (fig 1).

Fig 1: Ideal smile line allows the mandibular canines to pass freely during the incisive movement.

Midline:

The midline of the central incisors should be perpendicular to incisal plane and parallel to the midline of the face (fig 2).

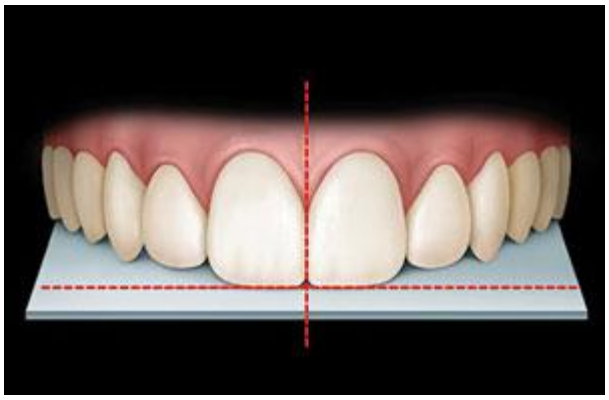

Fig 2[22]: The midline of maxillary CI should be perpendicular to the incisal plane without which an even contact with the lower incisors is not possible in incisive function

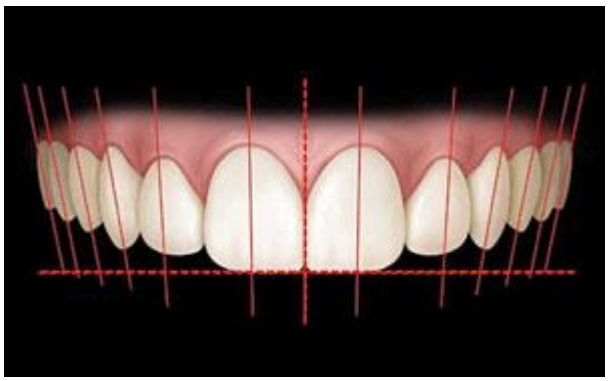

Fig 3[22]: Axial inclination allows compensation for the arch width difference between the maxillary and the mandibular teeth permitting the correct anterior coupling of the incisors.

Axial inclination:

From the central incisor to canine, there should be a natural progressive increase in the mesial inclination of each subsequent anterior tooth (fig 3).[22]

Incisal Embrassures:

At the sharp incisal edges, cusp points and ridges nature has provided convexity at the crests and apexes of these tooth structures inorder to protect the extremely hard prismatic hydroxyapatite enamel from fracturing. The AACD (American academy of cosmetic dentistry) guide states "The incisal embrasure formed by these convexities should display a natural progressive increase in size or depth from central to the mesial of the canine [22].

The incisal embrasure space between the maxillary central incisors is approximately 1 mm, between the central and lateral incisors 2mm and the space between lateral incisors and canine is 3 mm[1].

The distal contact embrasure of the canine provides a high marginal ridge contact for the exceptionally large and sharp buccal cusp of the lower first premolar[22].

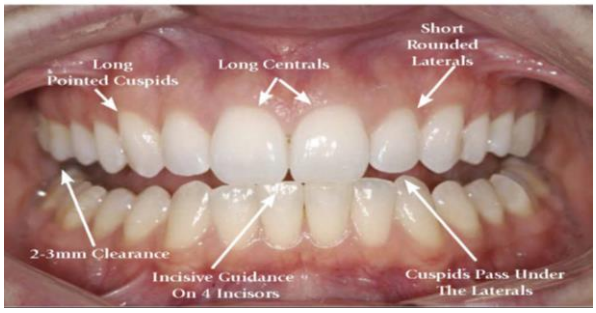

Fig 4[22] : Proper anterior guidance result in proper posterior clearance which allows: Efficient sharp cusp form without interferences in function and physiologic flexure of mandible under masticatory load.

Principles of proportion and central dominance:

Central dominance dictates that the maxillary central incisors must be the dominant teeth since they are the key to smile and should display pleasing proportions. The length of central incisors should be approximately 12mm (11mm to 13 mm) should provide at least 2 mm to 3 mm of clearance of the second molars in incisive guidance (fig 4).Utilizing the mathematic progression of multiple decagon and icasagon matrices, marquardt states that the ideal configuration of the teeth, displayed during the normal attractive smile,also is a geometric construction[22]. He finds the geomatric center is the point from which all the maxillary teeth radiate laterally,it also is the geometric centre of the lip line,laugh lines and dimples(if present)[22].

Labial anatomy and lingual surfaces:

Lobes are formed on the labial surfaces of the anterior dentition. These lobes are important in esthetics because they control the reflection of light and add an illusion of width to the labial surface. Lingual aspect of the maxillary incisors performs like a plate and lower incisors function as a knife. The prominent lingual lobe of the maxillary canine maximizes the canine guidance[22].

Mandibular tooth form:

The average length of the mandibular incisors is approximately 10 mm and of the mandibular canines approximately 12 mm. the incisal edges of the mandibular incisors are generally 0.5 mm wide,creating a sharp and efficient natural cutting tool[1]. The incisal corners of the mandibular incisors are slightly rounded for protection of the enamel rods. The embrasures are minimized creating a wider masticatory blade.

Overbite and Overjet

The overbite and overjet values that Dr. Lee observed in his sample are necessary to ensure occlusal function that produces a mutually protected occlusion. These values are as follows:

Vertical overbite of the upper incisors: 3 to 5millimeters
Vertical overbite of the canines: 4 to 5 millimeters
Horizontal overjet of the incisors: 2 to 3 millimeters (ideally 2.5 millimeters)
Horizontal overjet of the canines: 0.5 to 1 millimeter

The overjet measurement is taken by measuring from the facial aspect of the incisor or the lower canine to the corresponding incisal edge. The vertical dimension of the occlusion is measured from the CEJ of the upper incisors to the CEJ of the

lower incisors and is approximately 16.0 to 20.0 millimeters.

The process of mastication takes place from outside to inside; that is, the sharp portions of the teeth of the mandible (the incisal edges and the cusps) direct the motion of the mandible from the eccentric position to CO. One of the keys to biologic occlusion is the importance of proprioception produced by the contact of the incisors.Anterior guidance is the contact produced at the level of the incisors when the patient goes from edge-to-edge occlusion to maximum intercuspation. This contact is guided by the mesial marginal ridges of teeth no. 8 and 9. These teeth are convex, so that they guide with the least possible contact between the surfaces[10].

In the posterior segments, this anterior guidance position of edge-to-edge incisal occlusion produces a disclusion of approximately 3 millimeters. The lateral mandibular movements are guided by the canines and should produce a disclusion of 1 to 2 millimeters on the working side and 2 to 3 millimeters on the nonworking side.

Fig 5: The proprioceptors in the periodontal ligaments, mucosa, lips, tongue, cheeks, muscles and TMJ send afferent stimuli to brain and brain in the presence of good occlusion send efferent stimuli to muscles of mastication for proper function. This helps to maintain total craniomandibular stability which is important for comfort and function.

CONCLUSION

The human proprioceptive system is very sensitive. Well over 90% of the dental system pathology we treat involves various discrepancies between the cranial base and the mandible. To balance these systems, Bioesthetic Principles must be applied. The proprioceptors in the periodontal ligaments , mucosa , lips , tongue , cheeks , muscles and TMJ send afferent stimuli to brain and brain in the presence of good occlusion send efferent stimuli to muscles of mastication for proper function (Fig 5). The KEY to Bioesthetic dental care is based on a thorough and comprehensive diagnosis is to discover:

What is happening
Why it is happening,instead of jumping to→
What can be done to restore.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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