

# Bioesthetics:

## Working with Nature to Improve Function and Appearance

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**"Bioesthetics is the study or theory of the beauty of living things in their natural forms and functions".**  
- R.L. Lee<sup>1</sup>

In dentistry, the definition may be expanded to include dental (teeth), dentofacial (smile), and facial (face) complexes in order to transform oral functional and esthetic problems into beautiful, natural-looking smiles.<sup>2,3,4</sup>

*Applying the principles of bioesthetics, an interdisciplinary approach was undertaken.*

This article presents one patient from diagnosis to treatment. Applying the principles of bioesthetics, an interdisciplinary approach was undertaken which resulted in a successful treatment that is functionally correct and esthetically pleasing.<sup>5,6</sup>

### Case Presentation

The patient was a 27 year-old woman whose primary complaint was musculature facial tension with excess pressure on the posterior dentition. She was also unhappy with the appearance of her front teeth. Radiographically, the tomograms, cephalometric, panorex, and full-mouth periodontal series, as well as periodontal probing, revealed



Figure 1: Note the "Hollywood" look - straight, white and flat.



Figure 2: Centric relation tray and anterior retruded compound index.

no pathology. However, the incisal enamel and dentin on all of the maxillary and mandibular anterior teeth were severely worn which is pathological in nature (Fig.1).

### Preliminary Diagnosis

A preliminary, centric-relation record was made using a retruded anterior compound index and an anatomical face-bow registration (Fig.2). The casts were mounted in pretreatment, centric-relation position on a Panadent articulator (Fig.3). The patient was fitted with a M.A.G.O. (maxillary anterior guided orthotic) splint, which was worn for two weeks with no reported discomfort (Fig. 4).

This TMJ stabilization / splint was worn 24 hours a day, except for brushing, until condyle position stability (centric relation) was achieved with no clinical signs or symptoms of TMJ dysfunction. This procedure is necessary because it allows time for the condyles to assume their most superior anterior and medial position while in intimate contact with the thinnest part of the biconcavity of the disk. It allows time for the entire TMJ complex to attain better functional health and permits posterior avoidance patterns of the occlusion to wane. The procedure also insures that the diagnostic measurements of condylar movements



Figure 3: Casts mounted in centric relation show an anterior open bite.



Figure 4: M.A.G.O. splint in the mouth shows posterior separation.

*One of the goals of bioesthetics is to achieve proper anterior guidance using natural, unworn, anterior crown forms.*

and centric relation will be accurately recorded and provides training in anterior-guided chewing cycles.<sup>7</sup>

### Final Diagnosis

After a stable centric relation position was established with the M.A.G.O., a new

centric relation record was made and the final diagnostic casts were mounted. Bennett analogs of 1.5 mm were used on the articulator. A protrusive interocclusal record was made to set the proper angulation of the condylar motion analogs.

One of the goals of bioesthetics is to achieve proper anterior guidance using natural, unworn, anterior crown forms. This anterior guidance will allow for more natural (sharp), posterior crown forms without eccentric occlusal interferences. Successful treatment for this patient would also result in a

reduction of wear on the posterior teeth.

The first step in diagnosis was to determine if the occlusion could be treated with coronaplasty. By verifying maximum intercuspal position with the centric relation position, we could insure (TMJ) harmony with intercuspal position.

There were three goals to be accomplished by coronaplasty. The first goal was to get all teeth in the mouth to contact with even pressure and maximum intercuspation in stable centric relation. The second goal was to

relegate all eccentric tooth contacts to the anterior teeth with the most vertical occlusion possible within the limits of anterior, genetic-like (in this case artificial) tooth forms. The third goal was a successful coronaplasty that would preserve or recreate the best possible natural-like tooth forms for the posterior teeth (Fig.5).<sup>7</sup> A determination was required as to whether or not the anterior teeth could be brought into contact in centric relation without radical posterior tooth reduction.<sup>7</sup> This procedure (performed on the mounted casts) closed the anterior open bite but did not restore the patient to the best biological occlusion and esthetic harmony.



Figure 5: Note the individuality, sculpturing and youthful appearance of each central, lateral, cuspid, and first.

The next step was to evaluate the protrusive edge-to-edge position for the clearance of the posterior teeth. Finally, the lateral jaw position was then evaluated for clearance of posterior teeth on the working and non-working sides, and note the amount of posterior clearance (Fig.6).

On the cast, anterior maxillary and mandibular teeth were restored to average, unworn lengths with normal overlap (anterior guidance) in wax (Fig.7). Because the incisive position was not attainable utilizing the worn dentition, the chosen treatment was to restore the anterior teeth in conjunction

with coronaplasty.<sup>8,9</sup> Based on the favorable results of the coronaplasty on the models, the decision was made to

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proceed with patient treatment. The diagnostic casts wax up was later used to design laminates for the maxillary and mandibular anterior teeth necessary to achieve bioesthetic appearance and function.

Utilizing the bimanual manipulation technique (Dawson)<sup>10</sup>, coronaplasty was performed to establish centric relation occlusion. Protrusive and lateral excursions were not adjusted at this time because the anterior guidance had not yet been established. If eccentric adjustment had been done at this point, using the severely worn anterior teeth would have resulted in substantial loss of good posterior tooth form (flattened) which would overload the dentognathic system in time.

Following coronaplasty, the anterior teeth were prepared for porcelain veneers. A face-bow and centric relation interocclusal record was made and working casts mounted. The laminates were fabricated utilizing the foil technique on a Panadent articulator in centric relation. Some further occlusal coronaplasty was needed on the working casts to develop the final bioesthetic occlusion. (Fig.8) Final coronaplasty was done in the mouth at the time of restoration placement and was essentially identical to the laboratory casts.



Figure 6: The posterior dentition is protected from eccentric interferences by the incisor and canine overlap.

### Dental Complex

The occlusal scheme was accomplished by: 1) proper axial inclination of the anterior teeth, 2) ideal incisor vertical overlap of 3 mm to 4 mm., and horizontal overlap of 2 mm to 3 mm, and, 3) canine

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overlap of 4 mm vertical and 1 mm horizontal. This bioesthetic anterior guidance in conjunction with the recorded condyle movements guide the mandibular teeth to centric relation without posterior interferences.<sup>6,9</sup>

The porcelain laminates were constructed to biological esthetics. As a general guide, the maxillary central incisors, cuspids, and mandibular cuspids are approximately 12 mm and the mandibular central and lateral incisors 10 mm. In this case, they were 11 mm and 9 mm respectively.

The length of the maxillary laterals were shortened in conjunction with the mandibular cuspids to guide in protrusive movement and esthetics.<sup>1,11</sup>

### Dental Facial Complex

The width of the face was determined as stated above using the Golden Rule, negative lateral space and the size of the mouth.<sup>4,12</sup> The posterior plane of occlusion rises toward the Frankfort Plane with the maxillary buccal cusp tips rising as we move posteriorly. By reestablishing the original length of the anterior teeth, the esthetic appearance was facilitated (Figs.9 and 10).

The maxillary cuspid incisal line was made to parallel the horizon when the patient's head was perfectly erect.<sup>1</sup> The



Figure 7: The incisal edges were lengthened 2.5 mm. to provide proper incisive function, lip support, and youthful smile.



Figure 8: The centric relation contacts are almost identical in the mouth as on the mounted casts. As a result, anticipating the addition of resin to the lingual of #7.

anterior esthetic line was achieved with the Panadent Bio-Esthetic Plane Level (Panadent Corporation, Grand Terrace, CA 92313) mounted on the anatomical face-bow.

### Facial Complex

Dentists are hard-tissue plastic surgeons.<sup>5</sup> Williamson stated, "Only when posterior disclusion is obtained by an appropriate anterior guidance can elevating activity of the temporal and masseter muscles be reduced. It is not the contact of the canines that decreases the activity of the elevator

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muscles, but elimination of posterior eccentric contacts" (Fig.11).<sup>13</sup>

Applying the above criteria with both the laboratory technician and restorative dentist, allows the team to reach the bioesthetic goals of natural form and function.



Figure 9: Note the pathology of the lower lip.



Figure 10: By designing the anterior restoration, we achieved a remodeling of the lower lip to a more esthetic form.



Figure 11: With bioesthetics, a more dynamic radiance of the facial complex occurred.

## Conclusion

Today, successful functional and esthetic dentistry consists of mastering a thorough understanding of natural, unworn tooth morphology, tooth positions, and gingival contours. This will permit the dentist to correctly interpret the relationship between the dentofacial and facial complex.<sup>1-3</sup> The use of comprehensive diagnostic and treatment planning has produced a healthy, esthetic and biologically-compatible result that will be easily maintained for many years. By incorporating bioesthetic principles into the teeth, smile and face, there was a tremendous impact on the physical appearance and psychological well being of the patient. ☯

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