


[View Current Issue](#)

 Inside Dentistry
November 2020
Volume 16, Issue 11

Noteworthy Categories

[CE Articles](#)
[Feature Stories](#)
[Roundtable](#)
[Viewpoint](#)

Editorial Categories

[CAD/CAM](#)
[Diagnosis & Treatment Planning](#)
[Digital Imaging](#)
[Endodontics](#)
[Implantology](#)
[Infection Control](#)
[Magnification](#)
[Materials](#)
[Occlusion](#)
[Oral Medicine](#)
[Orthodontics](#)
[Pain Management](#)
[Pediatric Dentistry](#)
[Periodontics](#)
[Practice Management](#)
[Prevention](#)
[Prosthodontics](#)
[Restorative Direct](#)
[Restorative Indirect](#)

Related Articles

[Becoming a Super GP](#)

Inside Dentistry, September 2015

[Boundary Lines](#)

Inside Dentistry, June 2011

[Management of the Incisal Edge](#)

Inside Dentistry, October 2013

[A Clinical Protocol for the Removal of Balancing Interferences](#)

Inside Dentistry, October 2015

[How Proper Function Dictates Restorative Success](#)

Inside Dentistry, January 2016

Restoring the Worn Dentition

Bioesthetic MAGO treatment offers a minimally invasive approach

Heather Coubrough, DMD

Centric occlusion is certainly the standard of care in dentistry, and it has its place; however, some patients demand more than "repair and replace" dentistry. An ideal dental system exhibits three main attributes: a coincident relationship between maximum intercuspation and seated condylar position (SCP), incisor and canine guidance that prevents posterior tooth contact until final closure, and minimally worn teeth with proper form.¹

The gap between centric occlusion and centric relation can be bridged through the concept of "bioesthetics," which Robert L. Lee, DDS, MS, defined as, "the study or theory of the beauty of living things in their natural forms and function."² Only when a restorative dentist is able to establish the aforementioned three attributes can a highly functional, highly esthetic, and highly durable dental system be achieved.

For patients who exhibit wear related to improper occlusion, the first step is to use a device, such as a bioesthetic maxillary anterior guided orthotic (MAGO), that will serve to create a "surrogate occlusion" (Figure 1 and Figure 2). The three most important functions of this interocclusal device are to facilitate the alignment of orthognathic and adjacent tissues, aid in the evaluation of neuromuscular avoidance patterns, and simplify the measurement of occlusal contact sensitivity tolerances.³ The design of the orthotic is determined by manually manipulating the mandible to more closely reflect the condyles in the seated position within the glenoid fossae, which is sometimes referred to as "centric relation du jour."⁴ For the first 24 hours or until the first adjustment, the orthotic is functioning as an anterior deprogrammer. After 24 hours, the anterior region is shim tested again and, if necessary, calibrated before the posterior contacts are introduced. After a series of adjustments, a patient will attain SCP and tactile contacts on the device.

Spear and, subsequently, Okeson reported that a posterior interference may cause the condyle to displace the disc while the mandible works as a fulcrum to avoid the contact and reach maximum intercuspation.^{5,6} Oftentimes, a posterior interference will cause the patient to create an avoidance pattern, which can drive the jaw forward and away from the interference in a diagonal trajectory. The resultant lateral force distributed to the affected side can cause marginal collaring, abfraction, and wear facets (Figure 3). The maxillary canines are an average of 0.5-mm longer than the plane of the posterior teeth and will reflect wear first.⁷ Over time, a subsequent loss in canine guidance will lead to a long-term cascade of wear patterns and recession.

By removing the interference and obtaining a new posture through use of the MAGO, a more physiologic diagnostic start point (ie, centric relation) may be considered for treatment decisions. The byproducts of a stable joint position include a decrease in capsular inflammation, removal of the engram of the interference, boney remodeling, and a reduction of degenerative joint disease. At this stage, the MAGO has helped to achieve two of the three biologic attributes of the ideal dental system, and it is time to introduce the ideal biologic tooth form.

Case Report

A 34-year-old female patient presented with recurring chipping to the incisal edge of tooth No. 8 (Figure 4). Her dental history included wisdom tooth extractions but was otherwise unremarkable. The patient exhibited evidence of anterior wear patterns, which had resulted in a loss of anterior and canine guidance. The posterior interferences that developed with the loss of anterior guidance had subsequently resulted in localized areas of posterior recession and rolled marginal tissue as well as the recurrent chipping on tooth No. 8.

As a young professional who owned a real estate firm, the patient did not feel confident presenting to clients with her compromised esthetics. One conventional treatment option would have been to veneer her maxillary anterior teeth, which would have required the unnecessary reduction of her otherwise healthy dentition and likely resulted in continued failure of the porcelain due to the untreated parafunctional habits. Alternatively, the patient was presented with a more conservative and predictable treatment involving bioesthetic rehabilitation.

The first step in her bioesthetic treatment was to stabilize the temporomandibular joints. The patient was prescribed a MAGO with instructions to wear it 24 hours a day. After several adjustments, the patient became asymptomatic (ie, demonstrating neuromuscular release and no longer needing adjustments), and a centric bite at the same vertical dimension was recorded (Bite-Tray, Panadent) at three consecutive appointments, using a rigid impression material (MEMOREG[®] 2, Kulzer) to register the maxillary and mandibular cusps and impression compound (Green Impression Compound Stick, Kerr Dental) to record the interarch relationship in the SCP. In addition, a condylar position indicator was then used to record the three condylar positions. When the three recordings are either coincident or within 1 mm of one another, as demonstrated in a study by Crawford, the joint has been objectively proven to be stable.⁸

Although the SCP was demonstrated to be stable, the diagnosis was still operating on an arbitrary hinge and was only accurate at that vertical dimension; therefore, a jaw movement record (Axi-Path Recorder[®], Panadent) was completed to determine the true hinge axis, which afforded the flexibility to change the vertical dimension of occlusion of the case (Figure 5). When the true hinge was determined and confirmed intraorally with a horseshoe jig, a lab technician fulfilled the third attribute of a bioesthetic dental system by fabricating a wax-up that adhered to the principles of tooth form and function at the vertical dimension determined by the dentist (Figure 6).

The creation of the occlusal anatomy is accomplished through the proper axial inclination of the anterior teeth with a correct horizontal overjet of 2 mm to 3 mm and a vertical overlap of 3 mm to 4 mm.^{9,10} An appropriate incisal design facilitates the guidance of the posterior teeth with the condyles in a centric relationship. The functional goal of bioesthetics is fulfilled by maximizing the anterior guidance and "verticalizing" the posterior dentition with the condyles in their most posterior and superior stable position against the articulator disc in the glenoid fossae.¹¹ This anterior guidance affords a more ideal posterior crown form that is without eccentric occlusal interferences, minimizing the influence of condylar guidance on the form of the posterior teeth.

The wax-up was used to transfer the ideal tooth form to the existing occlusal scheme of worn teeth. First, the form of the wax-up was delivered to the patient as an "esthetic try-in" for confirmation. A perforated shim was used as a template, and a flowable material (Filtek[™] Supreme Ultra, 3M) was injected through the perforations to create the intended tooth form. The patient wore the provisional restorations overnight to challenge the form of the teeth as it related to lip competence, phonetics, and esthetics.

After the function and esthetics of the provisional restorations were confirmed, the next phase of treatment involved the definitive transfer of the form from the wax-up to the six maxillary anterior teeth as well as to the lower incisors and a first molar. With no reduction performed, the teeth to be treated were first microabraded, and then a fourth-generation universal adhesive bonding protocol (All-Bond 2[®], BISCO Inc.) was employed to ensure a high bond strength of the resin materials. Clear, rigid guides that were cut back on the facial aspect would be used to establish the incisal edges. After the teeth were treated, a packable nanohybrid composite (3M Filtek[™] Supreme, 3M) was placed into the guides along the incisal edge (Figure 7). Packable composites deliver a predictable esthetic with minimal shrinkage. After each incisal edge was established, a verification jig was used to confirm that the case maintained the accuracy that it was designed to achieve (Figure 8). After each incisal edge was defined, the facial form was added. In this case, a free-hand technique (OpraSculpt, Ivoclar Vivadent) was used to establish the facial contours (Figure 9). The final polish was accomplished with a series of discs (Super-Snap, Shofu), and a polishing paste (Enamelize[™], Cosmedent) was used with a felt disc to provide a smooth and natural esthetic.

After the first day of the restorative treatment was completed, the occlusion was confirmed, and the patient left the office wearing a "mini-MAGO" orthotic to permit the joint to return to SCP. At the beginning of the next appointment, the occlusion of the "mini" was verified and the bite was calibrated, as needed. Next, the remaining posterior teeth and lower canines were restored. Static contacts were registered, which should hold 8- μ m shim stock, except for the canines, which should allow the 8- μ m shim to slide out. While the static contacts were holding the shim, the three test positions were recorded to ensure that there was adequate anterior guidance (Figure 10 and 11). With the posterior interferences eliminated, adequate clearance provided to establish anterior guidance, and the teeth restored to proper form in centric relation, the patient expressed her approval of the definitive function and esthetics (Figure 12 and Figure 13).

Conclusion

The restoration of biologic form and function in centric relation without gross (or in this case any) reduction of the natural dentition is the most minimally invasive treatment that can be presented to a patient. When the teeth have been restored to ideal form, the joint remains in a stable SCP and the entire dental system exists in vertical harmony. The muscles of the mouth and face relax and appear fuller (Figure 14 and Figure 15). This conservative approach affords the patient with many potential benefits, including being able to avoid the unnecessary reduction of healthy tooth structure, the eventual need to replace veneers, and the continuation of attrition and periodontal damage.

Acknowledgement

The author would like to thank lab technician Dan Klimesh, BDT, Cedar Rapids, Iowa, for his work on the case.

Disclosure

The author does not have any personal or financial relationships with any of the companies that produce the materials used in this article.

About the Author

Heather Coubrough, DMD
Fellow
Academy of General Dentistry
Private Practice
Boston, Massachusetts

References

- Hunt KH. Bioesthetics: the study of beauty in life. *Dent Today*. 1996;15(1):48, 50-55.
- Stewart H. Conservative dentistry and bioesthetic principles. *Contemporary Esthetics*. 2007;11:34-42.
- Sletten WO, Taylor LP, Goodacre C, Dumont T. The effect of specially designed and managed occlusal devices on patient symptoms and pain: a cohort study. *Gen Dent*. 2015;63(2):46-52.
- Cordray FE. Three-dimensional analysis of models articulated in the seated condylar position from a deprogrammed asymptomatic population: a prospective study. Part 1. *Am J Orthod Dentofacial Orthop*. 2006;129(5):619-630.
- Spear FM. Fundamental occlusal therapy considerations. In: McNeill C, ed. *Science and practice of occlusion*. Hanover Park, IL: Quintessence Publishing Co;1997:421-436.
- Okeson JP. Biteguard therapy and fabrication. In: Lundeen H, ed. *Advances in Occlusion*. Boston, MA: John Wright PSG Inc; 1982:220-226.
- Egger, Bernhard. Dental morphology. Presented at: OBI Level IV Lecture; January 10, 2020; Denver, CO.
- Crawford SD. Condylar axis position, as determined by the occlusion and measured by the CPI instrument, and signs and symptoms of temporomandibular dysfunction. *Angle Orthod*. 1999;69(2):103-116.
- Lee RL. Anterior guidance. In: Lundeen HC, Gibbs CH, eds. *Advances in Occlusion*. Boston, MA: John Wright PSG Inc; 1982:51-79.
- Lee RL. Esthetics and its relationship to function. In: Rufenacht CR, ed. *Fundamentals of Esthetics*. Chapter 5. Carol Stream, IL: Quintessence; 1990.
- Hunt HK. Abfraction lesions: a bioesthetic approach to improve function and appearance. *Inside Dentistry*. 2006;2(1):23-28.

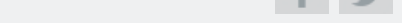


Fig. 1



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12



Fig. 13



Fig. 14



Fig. 15