

# Condylar Seating to its Musculoskeletally Stable Position (CR) with Potential Development of an Anterior Open Bite

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The mandibular condyle's static position within its fossa is a function of the scheme of the occluding teeth and the mandible-to-maxilla relationship during static clenching. If the intensity of the patient's parafunctional activity is not excessive (that is, symptoms are tolerable and wear is adaptive), neither the scheme of the occluding teeth nor the relationship of the jaw is an etiologic factor for a temporomandibular disorder. However, in the presence of intense, uncontrolled parafunction, certain occluding schemes and jaw relationships put the patient at greater risk of developing a more complex temporomandibular disorder.

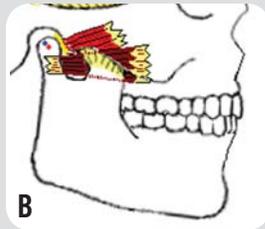
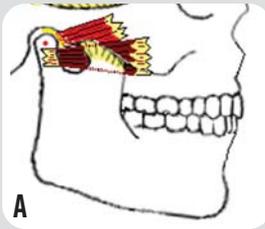
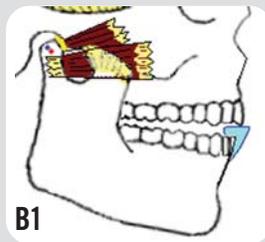
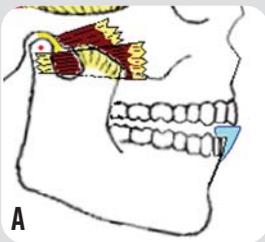
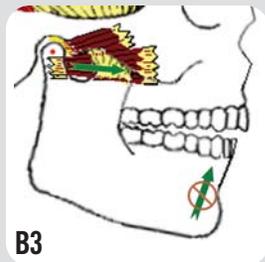
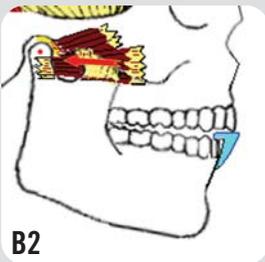


Diagram A demonstrates jaw clenching with the condyle in its optimal musculoskeletally stable position (red dot). Diagram B demonstrates jaw clenching with the center of the condyle (red dot) slightly inferior and anterior to its ideal position (blue dot). In the absence of intense parafunction, this is not a pathologic state. It occurs in a small minority of the population.

The chronically clenched state of the elevator muscles (a potentially pathologic state) shown in diagram B allows the lateral pterygoid to develop in a normal working length in this position. Because the pterygoid is not chronically tensed (as it is when avoiding occlusal interferences during jaw closure), it is not a candidate for "deprogramming."

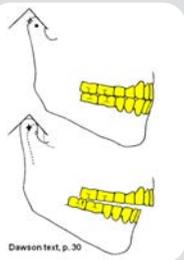


Providing the patient who has pathologic nocturnal clenching with an enhanced deprogrammer (diagram B1) will reduce the intensity of temporalis contraction by 75%, thereby minimizing condylar strain and disc load during parafunctional events. The deprogrammer provides only incisal contact in all excursive parafunctional events, while allowing minimal condylar translation and rotation.



Although it may take weeks (or months), elevating forces will slowly seat the condyle from its former position (diagram B1) to its optimal position (diagram B2), as the lateral pterygoid slightly stretches (in the direction of the red arrow) and remodels accordingly. Once the lateral pterygoid has remodeled and allowed the condyle to seat superiorly/posteriorly, its contraction can still only advance the condyle. There is no muscle to pull the chin up during protrusion (diagram B3), and if an anterior open bite has developed, the simple cessation of enhanced deprogrammer use may not allow the reestablishment of the less-than-optimal condylar position.

To the casual observer the posterior teeth may appear to have supraerupted or the incisors may have intruded. However, no orthodontic studies show that posterior teeth supraerupt due to lack of nocturnal alveolar stimulation. Nor have studies shown that mild to moderate sporadic incisal forces can cause an incisor to intrude.

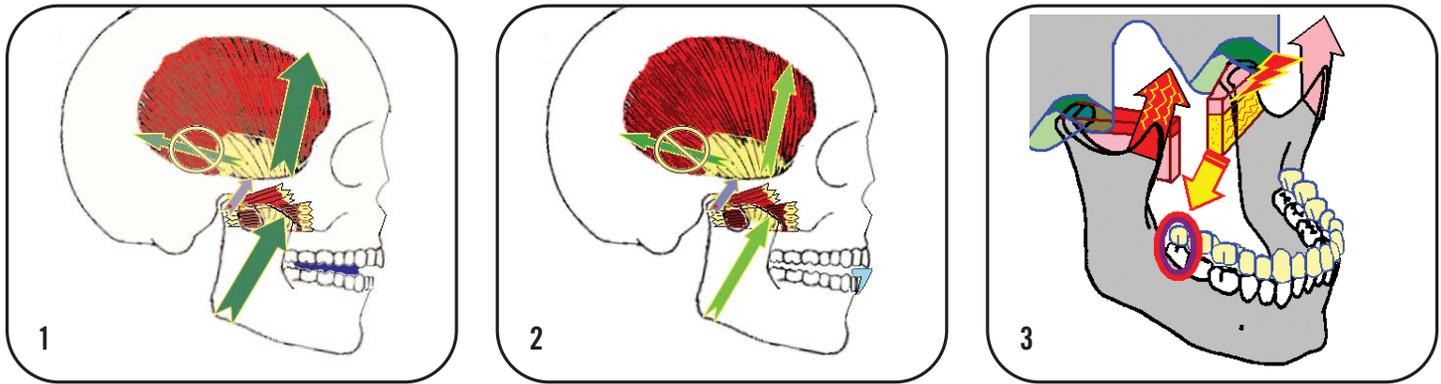


If the condyles do move to a more optimal musculoskeletally stable position (as shown in Dawson's text) the degree, if any, of the potential resulting anterior open bite is the degree of superior and posterior repositioning, and the initial degree of incisal overlap. For example, with a class III, edge-to-edge bite, the slightest condylar seating may prevent the incisor edges from occluding. Conversely, no changes may be apparent in occlusions with more than 50% incisal overlap, regardless of the degree of posterior and superior seating. Once the condyles are in their optimal position (and the patient's symptoms have resolved because the pathologic intensity of nocturnal parafunction has been continually prevented by nightly use of the enhanced deprogrammer), the occluding scheme may be adjusted or modified to the patient's satisfaction.

The paradox of the development of an anterior open bite (as described above) is that it occurs as the patient's symptoms resolve. Instead of being considered a diagnostic event that reveals a prior potential complication to pathologic activity, the anterior open bite is mistakenly identified as an adverse event. Before initiating treatment with an enhanced deprogrammer (especially in those with minimal incisal overlap), inform the patient of the potential diagnostic revelations that may occur as his or her symptoms resolve. The informed patient can then choose whether or not to proceed with treatment.

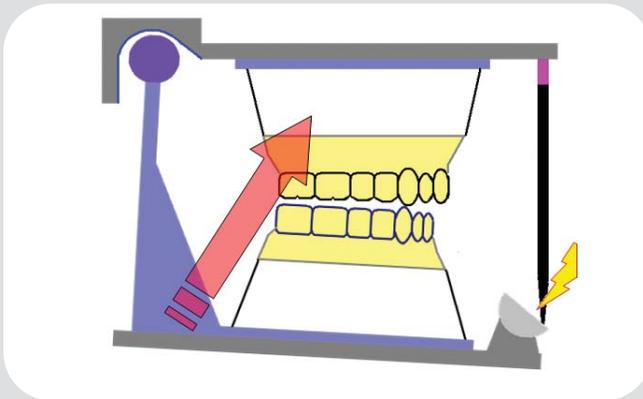
# The Physics of Condylar Compression\*

James P. Boyd, DDS

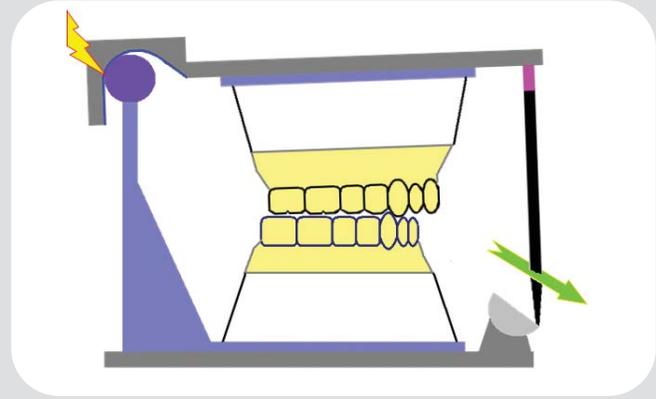


- 1) During the final arc of closure, the elevating musculature achieves its highest intensity of contraction. This is made possible by the resistance provided by bolus contact with the molars. The posterior temporalis is inactive, as its role of retruding the mandible after the translation of the condyles by the lateral pterygoids has been completed. With the condyle now fully seated, the superior head of the lateral pterygoid tenses and braces the disc against the superior and anterior directed load or the condyle, which is created by the force vectors of the elevating musculature.
- 2) The natural act of incising provides for the same direction of force vectors, but with far less intensity.
- 3) Actual pathologic condylar compression occurs not during functional *closure* (as in diagrams 1 and 2), but during the parafunctional act of *resisted attempts at reopening*. In diagram 3, the temporalis on the right side maintains tension following the occluding of the teeth. As the lateral pterygoid on the left side initiates the translation of its condyle (the act of reopening after the occluding of the teeth), it meets with resistance from the still-occluding teeth on the right side. The left lateral pterygoid pulls the condyle in the pathologic (medial) direction, generating considerable strain on the condyle and a shearing compression on the disc.

## How an articulator misrepresents reality



**A)** For an articulator to truly represent functional closure, the maxillary cast must be stable and the mandibular cast must swing freely. Grasp the base and elevate/rotate it in a superior and anterior direction. The extension of the incisal pin should replicate an incisal bite stop. The orientation of the incisal guide plate (not the condyle) is responsible for any strain on the pin (or incisor).



**B)** When the base of the traditional articulator is stable, elevate the maxillary cast and slowly lower it. With the incisal guide pin extended, gravity and your pull on the pin advance the maxillary cast (a completely unnatural act), giving the illusion of posterior joint space compaction.

\*May BM, Garabedian C. Reducing condylar compression in clenching patients. *Crit Rev Biomed Eng.* 2000;28(3-4):389-394.

The two major muscle groups used during clenching activity are the masseter and temporalis muscles. EMG readings of the masseter and temporalis muscles rise significantly during times of macro-clenching. Clenching occurs when the masseter and temporalis muscles contract, pulling the mandible superiorly. The continued contraction of the masseter and temporalis muscles results in compression forces on the teeth and temporomandibular joints. Theoretical joint loading models are utilized to demonstrate the load on the TMJ due to forces generated by the masseter and temporalis muscles. This study measures the EMG readings during bilateral macro-contraction of the masseter and anterior temporalis muscles. An appliance is fabricated to disengage the posterior teeth and a second series of EMG readings is taken to record lowered EMG readings. The vector forces of the reduced EMG recordings demonstrate reduced condylar compression during macro-clenching.