

## **Orthopedic Effects With the Occlus-o-Guide® Appliance** **And The Best Way to Obtain Them**

Active clenching exercise with the Occlus-o-Guide® appliance will impact direct forces against the maxilla and thereby to the membranous sutures that make up the maxillary complex. These are those sutures that the maxilla articulates with the sphenoid, temporal, zygomatic, palatine and nasal bones. When a child actively clenches, the forces may vary from 40 to 300 pounds per square inch. (3 to 22 kilograms per square centimeter). The amount of force that a person is able to achieve is somewhat dependent on facial morphology. The shorter the anterior face height (particularly the lower anterior face height ANS-Me), usually the greater the strength of the masseter muscles of closure<sup>1</sup>. Conversely, the longer the anterior face height, the less these same forces are. In fact, it could be argued that these factors of muscle strength could be to a certain extent partly responsible for characteristics of facial morphology such as relative face height and antero-posterior jaw relations and indirectly as well to overbite and overjet.

It is not surprising, therefore, that properly controlled muscle forces, are capable of altering dental and jaw relations. These alterations are caused by several possibilities most of which fall under the category of orthopedic changes which means those caused by growth and structural changes of bone as opposed to tooth movement. Tooth movement obviously is one form of change that can achieve vertical (overbite) and horizontal (overjet) alterations. There are also, however, five other possible causes of change as a result of Occlus-o-Guide® wear, that can cause an improvement in the antero-posterior (as well as vertical) jaw relations, namely:

- a. Stimulation of growth (such as an increase in the intensity of mandibular growth);
- b. Inhibition of growth (such as a diminished or restricted horizontal and/or vertical maxillary growth);
- c. Changes in the efficiency of growth such as an increased advancement of the mandible in a downward and forward direction while the condyle remains in place during its growth. This is in contrast to the condyle being partially displaced in an upward and backward direction resulting in less mandibular anterior positioning in relation to the maxilla during the growth process;
- d. The anterior migration of the articular fossa of the temporal bone which in effect orthopedically advances the mandible; and
- e. Simple anterior (and inferior) displacement of the condyle in relation to the articular fossa.

When the Occlus-o-Guide® is used actively (with biting exercises, keeping the teeth in forceful occlusion for one minute to ten minutes duration; then relaxing the masseter muscles for up to one minute while keeping the teeth in passive occlusion) for two or more hours per day and also wearing the appliance passively while sleeping, significant orthopedic effects are noted. There is about a 90% retardation of downward and forward maxillary

growth while the mandible comes forward 1½ to 3 times its normal rate when compared to a non-treated control sample. When these growth changes are compared to simple tooth movement to correct the same dimension (e.g. overjet), a total correction can be divided into orthopedic changes and tooth changes. When this is done, a percentage of orthopedic versus dental change can be calculated for each patient.

If the patient wears the appliance at least two hours per day with exercise, the orthopedic change, provided the patient has active jaw growth, is usually 70% or higher. On the other hand, if the patient wears the Occlus-o-Guide® actively less than 2 hours per day, the orthopedic effect is less than 70%. In fact, the orthopedic effect can be about 30% when the patient wears the appliance about 1½ hours actively each day. The nighttime passive wear seems to have little effect on the amount of orthopedic change when the patient is over eight years of age (unless they have significant nighttime bruxism).

The effects of the degree of orthopedic change are seen particularly in the inclination of the lower incisors and the degree of relapse or retention following the correction of the malocclusion. Obviously whether lower incisors are tipped during Occlus-o-Guide® treatment is greatly dependent on the amount of initial incisal crowding present and the amount of space generated for the correction of this crowding prior to or during the treatment procedure. When adequate room is provided for the crowding correction, incisor tipping can be held to a minimum by active wear of the appliance for two or more hours each day regardless of the amount of antero-posterior discrepancy to be corrected. Evidently, when the appliance is worn actively, the lower incisors are held tightly within their individual sockets and not allowed the freedom to move in a labial direction. This is true only if the patient has sufficient mandibular growth. If an adult with a significant overjet (over 5mm) obviously without mandibular growth, wears the appliance in excess of two hours actively each day, the lower incisors will display significant labial tipping and the dental changes will approach 90 to 100% of the total horizontal improvement. The way to prevent this adverse change is to restrict adult treatment to about 4mm of horizontal correction (overjet) and only minimum lower crowding corrections, not to exceed 1 or 2mm. Less lower incisal tipping can be accomplished by using a headgear (cervical) or bumper against the maxillary molars if there is upper crowding. If there is no upper crowding, the anterior bow of the headgear can be fitted to touch or rest against the labial plastic of the Occlus-o-Guide®. In this way, the overjet is partially corrected from the distalization of the maxillary area which minimizes the overjet necessary to be corrected by lower incisal tooth tipping.

The mean mandibular incisal labial tipping in a sample of growing children wearing the Occlus-o-Guide® at least two hours actively was 1.3° and showed no difference when compared to a control sample<sup>2</sup>. Therefore, in order to obtain the maximum orthopedic effect (and the least dental effect) using the Occlus-o-Guide® appliance, the recommendation would be to:

- a. Treat any overjet (or overbite) over 4mm during an active growth period prior to the end of the pubertal growth spurt when sufficient horizontal (and vertical) growth remains to properly compensate the required horizontal changes;
- b. Make sure the patient exercises with active clenching for a minimum of two hours per day;
- c. If incisal crowding in the lower arch does exist, it is important that proper space is created either

- d. before or during Occlus-o-Guide® wear to minimize labial tooth tipping (which maximizes the orthopedic effect);
- e. If maxillary incisal crowding exists, that sufficient room is made for these teeth either before or during the appliance use and;
- f. Once the incisal overjet (and overbite) correction is complete, maintain at least one hour per day of active clenching exercise (as well as passive nightwear) until the corrected relationship resists relapse. This ensures sufficient compensating mandibular growth in order to maximize the orthopedic effect, which will in turn increase, the stability of the result.

References:

1. Sassouni, V; A classification of skeletal facial types, *Am. J. Orthod.*, 55: 109-123, 1969.
2. Pourrahimi, P.; Cephalometric evaluation of the correction of overbite and overjet with the Eruption Guidance Appliance, M.S. Thesis, 1982, Northwestern University, Chicago, Illinois, U.S.A.

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