Several muscle-oriented bite registration techniques

Dr Derek Mahony presents the second article of this two-part series

The Wax Swallow Bite Registration

A physiologic, muscle-oriented, vertical dimension can be obtained by means of the swallowing reflex technique originally proposed by the late Dr. Willie May. Currently, the wax swallow bite technique, developed by James Carlson, is a simple, direct close approximation of a muscle-related bite registration. Small pillars of soft wax are placed on the first molars, then the patient is instructed to swallow several times. Subsequently, fast-curing impression material is injected around the arch to firmly establish the maxillomandibular relationship. Since humans swallow thousands of times per day, it has been proposed that the swallow position should be compatible with the musculature. This technique is recommended only after verification of good TM joint function with Joint Vibration Analysis or MRI.

The ULF-TENS Bite Registration

Ultra-low Frequency TENS, originally conceived by Bernard Jankelson, is often used to relax the masticatory muscles. It can also be used to determine a bite registration position, sometimes referred to as myo-centric.

After a patient has been “pulsed” for relaxation, usually for about 40 minutes, bite registration material (a quick-cure acrylic) is placed over the mandibular occlusal surfaces and the ULF-TENS is reapplied to “close” the mandible about 1 - 2 mm above the rest position. During this procedure the vertical dimension is usually monitored with a mechanic’s inside calipers between marks on the chin and nose. There is a definite "tech-

Figure 2 The position of the bite registration and the levels of muscle activity, are simultaneously visible in this combined EMG and jaw tracking recording. The vertical dimension is increased 2.5 millimeters, the freeway space is reduced from 4.1 mm to 1.6 mm.
The treatment position chosen can reflect all of the information available regarding the patient's current condition. Finally, the registration material is placed in the mouth and the patient is instructed to close into it while the position of the mandible and the muscle activities are monitored on the computer screen (Fig 2). This allows the clinician to immediately see the three dimensional relationship between the old centric occlusal position and the new bite position. The saved recording can be recalled later and utilized to evaluate the appliance, provisional restorations or the pre-treatment at try-in.

Predicting a patient's response to correcting overclosure
The question is often asked, “How quickly will a patient adapt to a new bite registration?” Even though the object is to “correct” a mal-relationship of the mandible to the maxilla, the patient’s current relationship still has familiarity. The new relationship, no matter how “perfectly” established, will seem strange to the patient at first. There are many factors that influence a patient’s adaptation to a new maxillo-mandibular relation. It is possible to estimate a patient’s response by considering the following factors:

1. The age of the patient [younger = more adaptive, older = less adaptive]
2. The amount of the change [a big change is more difficult to adapt to than a small change]
3. The duration of the overclosed condition [a long-standing condition will be more difficult to “de-program” than one of short duration]
4. The quality of the bilateral TM joint function [good joint function makes adaptation easier]
5. An overclosed bite, due to developmental abnormalities (caught early) can be corrected easily and with rapid adaptation by the patient [children are much more adaptive]
6. Overclosure resulting from parafunction typically coincides with a strong, healthy musculature. Strong, healthy muscles make adaptation easier, but require a treatment plan to protect the restored occlusion from destructive parafunctional forces.
7. An overclosed bite due to carries, loss of teeth, etc. without evidence of parafunction, typically coincides with a weak musculature, making adaptation difficult. This is very often the case with complete removable prosthetics.

Summary
Overclosure is a common condition among patients seeking restorative and/or orthodontic rehabilitation. By evaluating the patient for common signs and symptoms associated with overclosure, one can determine the need for re-establishing a physiologic vertical dimension.

Opening of the bite can be accomplished in a number of ways by following specific guidelines. The use of objective diagnostic aids are extremely helpful by allowing the clinician to optimize TMJ and craniofacial muscle function at the new YDO. The correction of the vertical dimension during a rehabilitative procedure should result in enhanced comfort and improved function in the finished case.

- The TScan range is distributed in the UK by Indent Systems. For further information please contact Indent Systems on 01952 582900, email mike@indentsys.co.uk or visit www.indentsystems.com

* BioSound, Inc. Milwaukwe, WI

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Figures 3a-4f Example of a patient with an overclosed vertical dimension, due to previous loss of teeth, that has been successfully treated using neuromuscular Principles.

After

Fig 4c

Fig 4e

Fig 4d

Fig 4b

Fig 4a

Fig 4f

nique sensitivity* to this proce- dure such that different opera- tors tend to produce slightly to greatly different results. However, once the skill is de- veloped, an operator may pro- duce good consistency. These classic TENS bites ignored the TM joints function in the past, but this should no longer be the case. A final outcome with healthy TMJ’s and muscles is our goal today.

The Phonetic Bite Registration
As with the previously de- scribed muscle-oriented methods, this one begins with muscle relaxation. Then the patient is instructed to speak specific sounds while the an- terior teeth are observed by the clinician. Based on the positions assumed by the teeth with specific phonetics, the cli- nician recognizes the vertical and antero-posterior require- ments and records the posi- tion, typically also with im- pression material. Admittedly, this technique requires subjec- tive clinical judgment and the development of a skill without any objective support.

The EMG Bite Registration
To enhance the precision with which one can determine the optimum muscle-related posi- tion, some practitioners rec- ommend monitoring the activ- ity of the masseter, temporalis and anterior digastric muscles electromyographically. Since the electrical muscle output levels involved are just a few microvolts, this measurement requires a high common mode noise rejection amplifier. After relaxation has been verified electromyographically, the pa- tient is instructed to open very gradually until the digastrics show a slight increase in activ- ity (eg 0.5 microvolts average). This establishes the limit to which opening the bite is per- missible and is typically used as a position for constructing removable orthodontic appli-ances.

Similar tests are done for closing or repositioning the bite antero-posteriorly while monitoring the elevator mus- cles.

The concept is to find the superior, inferior, anterior and posterior limits of muscle rest- ing. Then the new bite position is selected within these limits. The exact relation chosen may be dependent on many factors, such as clinical findings and the clinician's best judgment. With this technique it is also possible to evaluate functional- activity of the musculature with the bite registration in place to further evaluate the appropriateness of the new maxillo-mandibular relation.