



Progressive Bites

*A technique to establish, restore
or maintain desired occlusion*

by Quint Whipple, CDT



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How the teeth's occlusal surfaces come together affects other teeth, gingival tissues, masticatory muscles and joints. Imbalanced or parafunctional forces during occlusion, such as clenching or grinding, can lead to telltale signs of dysfunction including headaches, tooth wear and sensitivity, broken teeth and restorations, and muscle and joint pain.

When patients don't exhibit signs or symptoms of occlusal dysfunction, most clinicians conform to or manage a patient's existing occlusion. However, when problems such as wear, muscle pain, repeatedly broken or chipped restorations, or other symptoms are noted, then establishing a stable occlusion is necessary to ensure long-term restorative functionality and oral health.¹

To do so, clinicians often follow one of five guiding occlusal philosophies:

- musculoskeletal/centric relation (muscle-braced position)
- most posterior retruded position (ligamentous-braced position)
- anterior protrusive position (muscle-braced position)
- neuromuscular position (gravity-assisted position)
- intercuspal position (tooth contact-determined position).²

While these philosophies differ in their approaches to where the jaw joint should be during treatment and how to establish anterior guidance, their similarities support an occlusion where teeth fit evenly—with no one tooth hitting higher than another, and the anterior teeth taking over and posterior teeth discluding during lateral movements to prevent catastrophic and costly consequences that could include porcelain fractures, cement fatigue, recurrent decay and joint- and muscle-related pain.^{1,3}

Regardless of the clinician's preferred occlusal philosophy, it's imperative that occlusion be considered—or corrected, when necessary—during treatment planning for full-arch, full-mouth and multiple-unit rehabilitations.



Fig. 1. Preoperative close-up retracted view of the maxillary anterior teeth of a male patient presenting for a smile makeover.



Fig. 2. Preop retracted full-mouth view of the patient before deprogramming with a Kois appliance.



Fig. 3. Preop retracted view showing the patient's full upper and lower arches.

The basis for the when managing one of the occlusion—is thorough

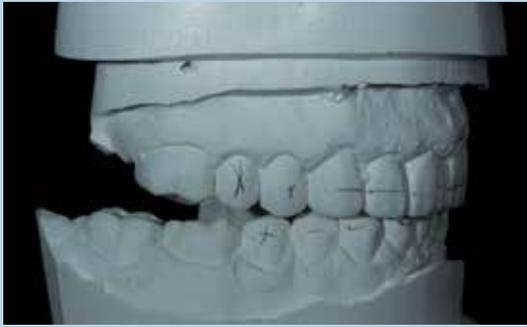


Fig. 4. The preop models were mounted on an articulator in preparation for duplicating the bite in Sil-Tech.

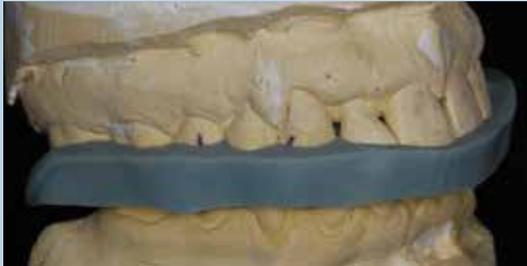


Fig. 5. Sil-Tech putty was used to duplicate the bite represented in the mounted models for use in the progressive bite technique.



Fig. 6. A 1–2mm circumferential lip on the progressive bite matrix helped to easily maintain its proper position.



Fig. 7. Digital calipers necessary for verifying measurement points (Harbor Freight). In this case, the chosen positions were following the cemento-enamel junction of teeth #3 and #30, #9 and #23, and #14 and #19.

Equally essential is that all bite information—independent of the occlusal philosophy followed and how the bite was achieved—be completely and accurately transferred to the laboratory, after which it can be precisely replicated and ultimately translated into accurate restorations.⁴

Communicating the bite

The basis for the clinician and laboratory technician becoming one when managing one of the most difficult aspects of dentistry—a patient's occlusion—is thorough diagnostic records. These should include a full series of photographs (Figs. 1–3, p. 57), models mounted on an articulator (Fig. 4), and a facebow.⁵ These records enable the clinician/dentist team to determine where the teeth need to fit for the patient's occlusion to be ideal and a diagnostic wax-up created.⁶

At the laboratory, upon receiving the models and before creating a diagnostic wax-up,⁶ technicians must first duplicate the models and make a bite matrix that will hold the desired occlusion in place (Fig. 5). This bite matrix, made of impression material such as Sil-Tech by Ivoclar Vivident, should have a lip of between 1 and 2 millimeters circumferentially to help easily maintain the proper position and prevent any bite disclusion (Fig. 6).

Using digital calipers (Fig. 7), three points of continual reference measurements are made to help manage the bite throughout the restorative process: one anterior position and two posterior ones. It's recommended to have three calipers—one for each location and marked with tape indicating which location it represents. This simplifies the work procedures and saves time when managing the bite.

(Using one caliper is fine but requires more time to open and close the calipers at each location; measure between teeth #8 or #9 and teeth #24 or #25. Reference point locations should be selected on the model so that measurements can be taken continually from the same points each time for more accuracy.)

Now the full-arch or full-mouth wax-up can be made to the positions desired and according to the provided bite registration. This wax-up helps plan tooth position, restoration placement, and restoration thickness and tooth reduction requirements.^{5–7} Continually measure the reference points using the calipers, as necessary, until the final wax-up is completed and all points are

clinician and laboratory technician becoming one most difficult aspects of dentistry—a patient's diagnostic records.

fully accurate and equal from start to finish. Verify the opening vertical dimension of occlusion (VDO) with and after the transfer bite matrix (Figs. 8 and 9, p. 60).

Preparation appointment: Implementing the bite intraorally

At this time, the clinician's role is to transfer the established bite from the wax-up to the mouth using the bite matrix. During the preparation appointment, the progressive bite matrix is inserted into the patient's mouth to verify that the bite and VDO have been successfully transferred and that all reference points represent the correct measurements; all three reference points should be verified.

It's important to complete this step before anesthesia or even sedation, because the patient's proprioception is lost as the appointment proceeds.

After anesthesia administration, the circumferential lip of the bite matrix becomes significant because it will aid in continually placing the teeth into the correct position each time and help guide tooth preparations. The patient can be in any position, and the bite matrix will properly position the teeth every time.

One quadrant at a time should be prepared, ideally beginning with Quadrant 1, but leaving the most posterior tooth for last to help maintain the current position, preventing any possible collapse of the bite, and maintaining the VDO. The teeth from #3 to #8 are prepared as necessary, at which point the utility of the progressive

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Fig. 8. Calipers are used to verify the wax-ups' vertical dimension of opening (VDO).



Fig. 9. The VDO of the prep models is also verified using the calipers.



Fig. 10. The bite matrix is relined using a fast-set light-body material, taking care to leave essential space between each layer.



Fig. 11. Provisional restorations were placed during the preparation appointment.

bite matrix and technique becomes obvious.

The bite matrix is inserted into position again to verify all three reference points, then removed and relined *only* where the preparations were completed—and not in the areas of unprepared teeth—using a fast-set light-body impression material (Fig. 10). Upon full set, the bite matrix is removed and then replaced to again verify that the three reference points remain correct.

Preparation can proceed with the next quadrant (e.g., Quadrant 2), from tooth #9 to #14, leaving the most posterior tooth for last. When those preparations are complete, the progressive bite matrix is inserted into the mouth to verify position and reline the bite matrix again.

It is important to note, however, that the two relines should *not* overlap; rather, 2–3mm of space should be maintained between the current and previous reline areas. Maintaining space between each reline and never overlapping them is another significant component of accurately performing the progressive bite matrix technique. This necessary space prevents problems that could otherwise result from opening the bite and, therefore, losing the management of the bite. This space keeps the VDO and bite in the same and correct position (Fig. 10). Additionally, if there's ever a variation in the VDO toward the end of the process, the progress bite matrix is the first component to evaluate.

After the second reline, the three reference points are verified again and, if everything is correct, preparation can continue on the maxillary arch. The bite matrix can then be relined again as previously described, with care taken to maintain 2–3mm of space between the relines. If the case is a full-arch rehabilitation, then provisionalization can begin. If mandibular preparations are required, then the process can continue, with verification measurements taken after each step.

Temporary restorations can be placed using the mold of the provisional wax-up provided by the laboratory (Fig. 11). After



Fig. 12. To verify the VDO of the prepared teeth, the progressive bite and digital calipers are used.

temporization, the three reference locations should again be measured with digital calipers to verify that the bite is at the correct VDO.

Translating the bite: Fabricating definitive restorations

The final impressions are poured at the laboratory and model work completed. The progressive bite, along with a facebow or stick bite, is then used to articulate the models and to verify that the VDO and horizontal and vertical motion are correct according to the three previously determined reference points (Fig. 12).

The wax-up is then duplicated in stone models, and processing is initiated for transforming the wax-up into pressed or milled lithium disilicate restorations, using a product such as IPS e.max by Ivoclar Vivadent. Aesthetic layering is performed to complete the restorations (Fig. 13), after which the VDO is verified one final time.

Conclusion

Using the progressive bite matrix technique can result in a final seating appointment that requires very few adjustments and produces very high success. In fact, using the progressive bite matrix

technique helps to not only verify but also establish a necessary rate of insertion that's reliably predictable. After trying the restorations in the patient's mouth, the case can be cemented according to the appropriate protocol and the measurements verified once again, with the definitive treatment in the correct VDO that was established before the wax-up. ■

Dentistry provided by Dr. Stephen Dankworth, DDS.

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Fig. 13. View of the definitive restorations on the model before cementation.



Fig. 14. Postoperative view of the definitive restorations after the cementation appointment, which went smoothly.

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