

Altering Vertical Dimension in a Phased Treatment Plan

By John C. Cranham, DDS

It is occasionally necessary to alter a patient's vertical dimension of occlusion (VDO) to solve complex occlusal and/or esthetic challenges.¹ While it has been established that changing the vertical dimension is a viable treatment modality, it involves a great deal of dentistry, and therefore should only be considered when absolutely necessary.²⁻⁴ At least one arch must be completely addressed to have control of the occlusion.⁵ These kinds of problems get ever more complex when dealing with patients who don't have the financial capacity to do the necessary treatment all at once. This article describes a technique that will allow the dental team to create an optimum esthetic and functional result, while phasing the care to stay within the patient's budget.

Case Report

A 54-year-old patient presented to our office interested in making an esthetic change (Figure 1 through Figure 10). She also expressed concern over the wear that she could feel on the back of her upper anterior teeth, as well as the functional changes visible on the lower anterior teeth. Her goal was to create a natural, beautiful smile and simultaneously create a stable long-term result. She wanted to keep her teeth in health and function for the rest of her life. An additional challenge prevailed as financial constraints precluded her from doing all the dentistry at one time—she needed to do her dentistry in phases.

Begin with Proper Records

Dr. Peter Dawson brought to dentistry the concept of searching for “signs of

instability.” While most dentists do an excellent job diagnosing caries and periodontal disease, occlusal disease is also something all dentists should be looking for. Patients who present with wear, mobility, or migration of the teeth are said to have signs of instability. Patients with signs of instability should have a detailed occlusal analysis

to be part of their thorough evaluation. This is because there are patients who present with an occlusion that is simply not distributing force properly, or have parafunctional issues that need to be addressed. Our comprehensive examination/records included:

- Full periodontal probing

- Full restorative charting
- Full series of radiographs
- Full series of photographs (21 photographs that comprise The Dawson Academy Photographic Series®)
- TMJ/occlusal evaluation
- Mounted diagnostic casts (casts mounted on an articulator, with a facebow, and a centric bite record).



(1.) Preoperative full-face image. (2.) Preoperative smile image. (3.) Preoperative smile image focusing on the left lateral. (4.) Preoperative smile image focusing on the right lateral. (5.) Preoperative rest position—illustrating incisally short maxillary teeth. (6.) Preoperative “e” position illustrating incisally short maxillary teeth. (7.) Tipped down smile—incisal edge in correct horizontal position on inner vermillion border of lower lip. (8.) Profile smile. (9.) Maxillary occlusal view. Note extreme wear on the lingual of teeth Nos. 6 through 11. (10.) Mandibular occlusal view.

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In this case, the summary of the problems found at the examination were as follows:

- No active caries
- Mild localized gingivitis, with mild localized periodontitis (one area distal to tooth No. 14 with a 4-mm pocket, all others 2-mm to 3-mm)
- Moderate wear on the lower incisors
- Extreme wear on the maxillary anterior teeth
- Fractured tooth No. 4

Create an Optimum Plan

The goal of every treatment plan is five-fold:

1. Eliminate all caries, creating maintainable, healthy, cleanable tooth contours
2. Eliminate periodontal pockets, creating maintainable healthy, cleanable periodontal sites
3. Create a stable, minimal stress occlusion
4. Create an ideal esthetic result
5. If restorations are necessary, choose the least aggressive, biomechanically sound procedure/restorable material to achieve the desired results

After the biologic issues have been evaluated and addressed, attention should be directed to the esthetic/functional issues. When the size, contour, or position of the teeth are not working esthetically and/or functionally, then it is wise to take a programmed approach for analysis. At the Dawson Academy we use both a two-dimensional and three-dimensional checklist protocol for exactly this purpose. While the detailed use of these checklists goes beyond the scope of this article, we use key photographs along with mounted diagnostic casts to visualize the potential esthetic and functional changes that will be made.

In this case, the proposed changes were waxed on the casts that were mounted on a Denar Mark 320 articulator (Figure 11 through Figure 16). The lower incisal edge position was recontoured and leveled, while approximately 1.5 mm of wax was added to the maxillary incisal edge to create ideal length and proportion. Additionally, the lingual of the maxillary teeth were waxed to replace the tooth structure that was missing from the wear. Note the lingual contour was waxed as a

concavity, to follow normal tooth morphology. Figure 14 illustrates the posterior space that will need to be addressed to create equal-intensity contacts, and Figure 16 illustrates the amount of vertical opening (2 mm) that was required at the pin. It is important to note that the increased vertical not only provided space for restorative material, but it also decreased the overbite while increasing the overjet. This combination creates shallower guidance angles that are very beneficial for the patient who tends to function horizontally.

The patient's treatment plan was as follows:

1. Localized periodontal therapy on tooth No. 14, including scaling and root planing, and Arestin placement
2. Periodontal maintenance
3. Bleaching (trays)
4. Veneers on teeth Nos. 21 through 28

5. All-ceramic crowns on teeth Nos. 6 through 11
6. Bonded onlays on teeth Nos. 2, 3, 14, and 15
7. Onlay veneers on teeth Nos. 4, 5, 12, and 13
8. Nightguard

Look for Ways to Phase Care

While the above treatment plan could have been completed at one time, the patient's financial limitations precluded this option. It has been the author's experience that using composite resin (Herculite Ultra, Kerr Corporation) to restore the lower incisal edges, and to build up the posterior teeth, is an excellent method to create an ideal occlusion and work in phases. In this case, after the patient's periodontal therapy and vital tooth bleaching, teeth Nos. 6 through 11 were prepared for ceramic crowns. The incisal edges of teeth Nos. 22 through 27 were

prepared and restored with Herculite Ultra composite. Once the provisional restorations on teeth Nos. 6 through 11 were fabricated and the centric stops idealized, the vertical opening could be visualized in the posterior region. The space was closed by bonding teeth Nos. 2 through 5 and Nos. 12 through 15 with direct composite restorations (Herculite Ultra). At this point all the requirements of a stable occlusion (ie, centric relation, equal intensity stops, non-interfering posterior teeth, and anterior guidance in harmony with the envelope of function) were created to precision (Figure 17 through Figure 19).

Care needs to be taken in the provisional phase to test the esthetics, phonetics, and function of the new occlusion. Once the doctor and patient are satisfied with the proposed changes, impressions can be made of the approved provisional, to give the laboratory the specific size, shape, and lingual contour



FIG. 11

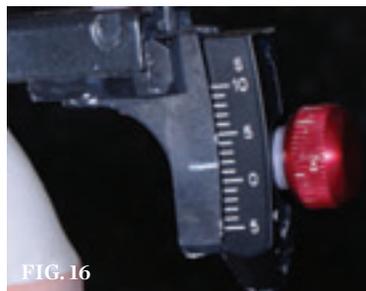


FIG. 16



FIG. 12



FIG. 13



FIG. 14



FIG. 15



FIG. 17



FIG. 18



FIG. 19

(11.) Diagnostic casts were mounted in centric relation on a Whipmix mark 320 articulator. (12.) Lower incisal plane was studied to determine the best plane. Due to financial issues, these edges would be restored with resin. (13.) The maxillary anterior teeth were waxed back to full contour, creating concave lingual contours. (14.) Note the amount the VDO was open after establishing ideal anterior contours were created. (15.) Preliminary diagnostic wax-up. (16.) The vertical was opened 2 mm at the pin. The treatment plan was to add resin to the maxillary posterior teeth to create equal intensity contacts.

(17.) Occlusal view of provisionals on the maxillary anteriors and composite resin on the posterior teeth. (18.) Retracted view of provisionals on teeth Nos. 6 through 11, resin on the incisal edges of teeth Nos. 22 through 27, and resin "tops" on teeth Nos. 2 through 5 and Nos. 12 through 15. (19.) Smile view of provisional restorations.

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of the new anterior crowns. At this point, teeth Nos. 6 through 11 were delivered (Figure 20 through Figure 23).

Upon the completion of the first phase, the patient was placed into recare, and the remaining sextants can be treated optimally over time. We have found many patients very comfortable with doing a segment a year, until the case is completed.

Conclusion

The alteration of the vertical dimension of occlusion is not a decision that should be taken lightly. It leads to a great deal of dentistry, and it is our professional responsibility to do the least amount of dentistry possible to solve the problems of the patient. However, when our occlusal study has indicated a need to alter vertical dimension to obtain the ideal esthetic/functional result, then

we must find the best way to do so. This article has illustrated a technique to use composite resin as a transitional material to phase optimum care.

References

1. Bloom DR, Padayachy JN. Increasing occlusal vertical dimension – Why, when and how. *Br Dent J.* 2006;200:251-256.
2. Kois JC, Philips KM. Occlusal vertical dimension: alteration concerns. *Compend Contin Educ Dent.* 1997;18(12):1169-1180.
3. Rivera-Morales WC. Restoration of the vertical dimension of occlusion in the severely worn dentition. *Dent Clin North Am.* 1992;36(3):651-664.
4. Lee RL, Gregory GG. Gaining vertical dimension for the Deep-Bite Restorative Patient. *Dent Clin North Am.* April 1971;15(3):743-755.
5. Dawson PE. *Functional Occlusion from TMJ to Smile Design.* St. Louis, MO: CV Mosby; 2007:121-123.



(20. THROUGH 23.) The first phase of the treatment plan is complete. Final restorations are in place on teeth Nos. 6 through 11. Maxillary posteriors and lower anterior sextant can be finalized a segment at a time.