

Case Presentation: Effect of combined full mouth rehabilitation and oral appliance therapy on obstructive sleep apnea

By G. Dave Singh, DDSc, PhD, BDS and Samuel E. Cress, DDS

Abstract

The effect of full mouth rehabilitation (FMR) on obstructive sleep apnea (OSA) is unknown. While there is increasing evidence of the efficacy of oral appliances in treating OSA, there are no reports in the literature that document the combined effects of FMR and oral appliance therapy (OAT) on OSA. This case report is a continuation of a previous case study that described the beneficial effects of surgical torus mandibularis removal on OSA. In this same case, we found an additional 28 percent decrease in the apnea-hypopnea index (AHI) compared with the baseline after FMR. Indeed, a further 61 percent decrease in the AHI and an 86.5 percent improvement in the oxygen desaturation index (ODI) were found with OAT. Therefore, we conclude that further studies on the relationship between FMR combined with OAT and OSA are needed.

Introduction and History

In our previous study,¹ we reported a 15 percent reduction in the overall apnea-hypopnea index (AHI) following surgical reduction of bilateral mandibular tori. Here we report the continued care for this particular patient.

Briefly, this 47-year-old male initially presented in the dental office with a chief complaint of excessive daytime sleepiness. His medical history was unremarkable but intra-oral examination revealed severe anterior and posterior wear facets, buccal exostoses and large, bilateral torus mandibularis (Fig. 1). Previously, he had a sleep study investigation, and had been diagnosed with moderate OSA. He had tried continuous positive airway pressure (CPAP) and two different oral appliances but neither the CPAP nor the oral appliances were tolerable. He was referred to a periodontist for evaluation, and the buccal exostoses and mandibular tori were successfully removed. While this procedure was reported¹ with a 15 percent decrease in the AHI to 18.2/hr, moderate OSA was still present. Therefore, we decided to proceed with a more definitive treatment plan to control the residual OSA. However, in view of the patient's extensively worn dentition (Fig. 1) and the concomitant poor esthetics, it was decided to undertake FMR, not only as a finishing procedure, but also as an exploratory investigation of the effect of FMR on OSA.

When the patient returned for his second consultation, he was presented with a treatment plan for comprehensive FMR. After obtaining appropriate consent, upper and lower full arch impressions using Sil-Tech (Ivoclar Vivadent, Amherst, N.Y.) and Imprint II Garant (3M ESPE Dental Products St. Paul, Minn.) and a bite registration for diagnostic wax-ups and tooth reduction guides were taken and temporary molds were constructed. The FMR was delivered uneventfully, and the patient was requested to take another home sleep study, using the same device previously used (WatchPAT, Itamar Medical Inc., Franklin, Mass.)



Figure 1a

Pre-operative intra-oral presentation, showing a worn anterior dentition with extensive wear facets on the cuspids.



Figure 1b

Pre-operative upper arch, showing a worn maxillary dentition with extensive wear facets on the anterior and posterior teeth.



Figure 1c

Pre-operative lower arch, showing a worn mandibular dentition with extensive wear facets with bilateral mandibular tori evident.

Findings

Figure 2 shows the results of the FMR. The patient was very satisfied with the esthetic outcome. Furthermore the post-FMR sleep study indicated that the AHI fell by 28 percent compared with the initial baseline to 15.4/hr and the oxygen desaturation index (ODI) improved by 42 percent. Table 1 summarizes these findings.



Figure 2a

Post-operative results of the full mouth reconstruction, showing restored anterior dentition with improved dentofacial esthetics. The patient was satisfied with the esthetic outcome.



Figure 2b

Post-operative results of the full mouth reconstruction, showing restored cuspids and posterior occlusion on the right side.



Figure 2c

Post-operative results of the full mouth reconstruction, showing restored cuspids and posterior occlusion on the left side.

Table 1

	Baseline	Post-surgery	Post-FMR	Post-OAT	Change
AHI	21.4	18.2	15.4	8.3	61.2%
ODI	12.6	8.7	7.3	1.7	86.5%

Further Treatment

Although the AHI had fallen significantly compared to the baseline reading, it was decided that further treatment options should be explored. The patient was informed and educated about an alternative oral appliance. After obtaining consent, an upper DNA appliance with a 10mm OSA extension (Fig. 3) was delivered. The OSA extension was adjusted and the occlusion was checked, but no adjustments were found to be necessary. The patient was given the home sleep study unit for another overnight sleep study. When the study was read, it was found that the AHI had decreased further by 61.2 percent to 8.3/hr and the ODI improved by 86.5 percent. These results are summarized in Table 1. The patient was kept under review and further adjustments were made as needed to the oral appliance.



Figure 3

The oral appliance used in this case was a maxillary DNA appliance with a beaded 10mm extension. The extension was adjusted and the occlusion was checked periodically as necessary.

Discussion

In this present case study, the pre-operative AHI of 21.4/hr was reduced by 15 percent to 18.2/hr via surgical reduction of mandibular tori, and this improvement was associated with a 31 percent improvement in the ODI. However, despite this progress, other methods of decreasing the AHI further were considered. Bearing in mind the poor dental esthetics associated with a worn dentition that has been subjected to chronic sleep bruxism, FMR was undertaken as the second phase of treatment in this case. One could argue that OAT should have been implemented prior to FMR but, in view of unacceptable cosmetics, it was agreed that FMR would be undertaken. The results of this protocol were not without additional benefit. By restoring the vertical dimension of the occlusion, the AHI of 18.2/hr was reduced by 28 percent to 15.4/hr, and this improvement was associated with a 42 percent improvement in the ODI. Despite these enhancements, it was felt

that the residual AHI should be addressed. Therefore, OAT was implemented.

In this case, the OAT selected was an extended DNA appliance (Fig. 3). The DNA appliance system is designed to correct maxillomandibular underdevelopment in both children² and adults.³⁻⁴ The acrylic-based DNA appliance used in this case had: Six (patented) anterior 3-D axial springsTM, a midline screw, posterior occlusal coverage, retentive clasps, a labial bow and a 10mm beaded extension for OSA (Fig. 3). The DNA appliance was worn at nighttime while sleeping, but not during the daytime and not while eating. The DNA appliance was adjusted by turning the midline screw 0.25mm once per week. The post-treatment home sleep study was repeated after one month. The final post-operative home sleep study revealed that the AHI fell by 61.2 percent and the ODI improved by 86.5 percent. Therefore, this case report supports the concept of OAT following FMR in adults for the management of OSA. This case will be kept under review to assess the long term effects of the protocol adopted in this particular case.

Acknowledgements

We would like to thank Kimberly Cress, MD for her help with this project, and Arrowhead Dental Laboratory for the restorative work.

References

1. Singh GD, Cress SE, Michael K. McGuire MK, Chandrashekhar R. Case report: Effect of mandibular tori removal on obstructive sleep apnea parameters. *Dialogue* 2012;1:22-24.
2. Singh GD, Lipka G. Case Report: Introducing the Wireframe DNA applianceTM. *J Am Acad Gnathol Orthop* 2009;26:8-11.
3. Singh GD, Wendling S, Chandrashekhar R. Midfacial development in adult obstructive sleep apnea. *Dent. Today* 2011;30:124-127.
4. Singh GD, Utama J. Effect of the DNA applianceTM on migraine headache: Case report. *Int J. Orthod* 2013;24:45-49. 

AUTHORS BIO

G. Dave Singh, DSc, PhD, BDS, is president of BioModeling Solutions LLC in Beaverton, Oregon.

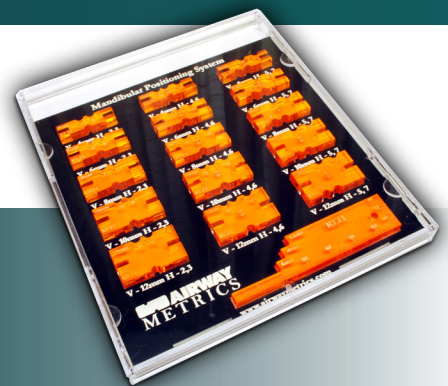
Samuel E. Cress, DDS, is owner of Colony Dental in Sugarland, Texas.

AIRWAY METRICS

AIRWAY METRICS LLC • Phone: 206-949-8839
www.airwaymetrics.com

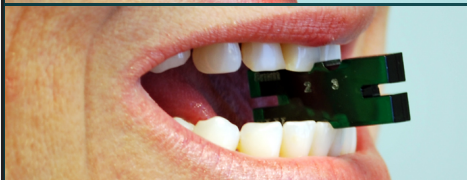
ARE YOU TREATING SLEEP APNEA PATIENTS?

- A 1-2-3 SYSTEM FOR SLEEP APNEA APPLIANCES
- DON'T GUESS WITH PERCENTAGES -
MEASURE ANTERIOR/VERTICAL
FOR A STARTING AND FINAL TARGET POSITION



Snore Screener

- Quickly locates preferred airway zone



Mandibular Positioning Simulator

- Interfaces with Pharyngometry
- Available in blue or amber



Bite Fork and Handle Attachment

- For bite registration
- ALL NEW - TWICE AS MANY FOR 30% LESS

Visit
airwaymetrics.com
For Complete
Details!