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

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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, 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 reported 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.)
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.

Table 1

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>Post-surgery</th>
<th>Post-FMR</th>
<th>Post-OAT</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHI</td>
<td>21.4</td>
<td>18.2</td>
<td>15.4</td>
<td>8.3</td>
<td>61.2%</td>
</tr>
<tr>
<td>ODI</td>
<td>12.6</td>
<td>8.7</td>
<td>7.3</td>
<td>1.7</td>
<td>86.5%</td>
</tr>
</tbody>
</table>

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 children and adults. The acrylic-based DNA appliance used in this case had: Six (patented) anterior 3-D axial springs, 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.

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References

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