



# Sleep Apnea, Malocclusion and TMJ Symptoms

THIS ARTICLE HAS BEEN PEER-REVIEWED.

## CASE REPORT

### History

A 65-year-old male patient was referred from a sleep clinic for treatment of moderate obstructive sleep apnea (OSA). His initial complaints included un-refreshed sleep, frequent waking with choking, daytime sleepiness, poor concentration and chronic migraine-type headaches which were worse in the morning. The onset of the sleep disorder was reported as six years prior and 50 years-plus for the headaches. Because of his snoring, he had not slept in the same room as his wife for 11 years.

### Initial Presentation and Clinical Findings

The patient exhibited a Class III Division 2 malocclusion with a 90 percent overbite, constricted maxilla, very long soft palate and macroglossia with scalloping of the lateral borders. (Figure 1)

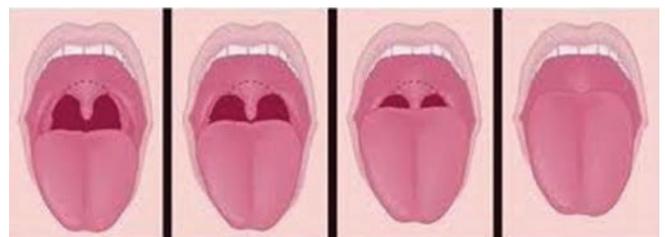
There was complete blockage of his upper airway, large chronically inflamed nasal turbinates and mouth breathing. He demonstrated a reverse swallowing pattern with a tongue thrust.

Functional examination revealed reducing disk dislocations in both temporomandibular joints (TMJ), left side early clicking, right side late clicking with pain. There were myofascial trigger points (with classic pain referral) in the masseters, medial pterygoids, lateral pterygoids, middle and posterior scalenes and upper trapezius muscle groups. Mandibular range of motion was restricted (wide open 37 mm, left lateral 9 mm, right lateral 10 mm and protrusive 10 mm) and accompanied by muscle pain during maximum opening.



**Figure 1**

Macroglossia with scalloped lateral border of the tongue.



**Figure 2**

Mallampati soft palate classification.

Intra-oral examination showed healthy periodontal tissues, all teeth in good condition, restorations in good repair and negative findings for oral cancer and lymphadenopathy. The patient exhibited a Mallampati Class 4 soft palate. This is a visual classification system for the length of the soft palate (Figure 2). A Class 4 indicates a very long soft palate and is a known risk factor for obstructive sleep apnea.

### Physical Examination

Body Mass Index is defined as the ratio of a person's weight to his or her height. The normal values range from 19 to 25, and individuals with numbers greater than 30 are considered obese. This patient's BMI was 37.

The Epworth Sleepiness Scale is used by many sleep clinics to screen for and monitor treatment of OSA. Values from 0 to 9 are normal, 10 to 15 means mild to moderate sleep apnea is likely and 16+ suggests that severe apnea is likely. This patient presented with an Epworth Sleepiness Scale of 17, suggesting severe apnea, despite the sleep specialist's report indicating he was in the moderate range according to results from the sleep study conducted.

### Diagnosis

The diagnosis in this case included all of the following:

- Moderate obstructive sleep apnea.
- Chronic myofascial pain.
- Malocclusion with a constricted maxilla, macroglossia with scalloping of the lateral borders of the tongue, inadequate tongue space.
- Severe sleep-related bruxism, as evidenced by the myofascial trigger points and history of chronic headaches.

### Treatment Plan

- Local anesthetic injections to treat myofascial trigger points.
- Ultrasound and low level laser therapy.
- Placement of a mandibular advancement appliance compatible with chronic myofascial pain, to treat his obstructive sleep apnea.

### Treatment

In order to take a protrusive bite registration, it was necessary to first treat the patient's chronic myofascial pain condition. Ultrasound was used on his masseter muscles bilaterally. This increases the circulation to the trigger point areas and muscle body to reduce the buildup of lactic acid and bradykinins associated with the chronic trigger points. Marcaine 4% 1:100,000 epinephrine (0.5cc per side) was injected into the trigger points of the masseter muscle body (extra-orally) as well as into the lateral pterygoid muscles intra-orally. This was followed by myofascial spray and stretch technique of the masseter muscles. Subsequently,

the patient's maximum opening increased to 44 mm without pain (from the initial 37 mm with pain).

Low level laser therapy was used on the right TMJ to reduce the pain and swelling. This was administered at maximum opening (44 mm) via the external auditory meatus as well as the lateral border of the TMJ while supporting the mandible. The energy level was set at 2 Joules per site.

Many manufacturers of mandibular advancement appliances recommend starting at 70 percent advancement, but if the patient's musculature and TMJ can accommodate 85 percent, it reduces the amount of titration needed on the appliance and also reduces the accommodation needed by the patient that occurs with frequent adjustments (new jaw position, muscle changes, alteration of the biting position on the appliance etc.). This 85 percent position successfully treats a significant number of mild to moderate patients with comfort and little or no further advancement is needed.

A George Gauge was set at 85 percent advancement and placed between the incisors and then bite registration material (super-fast setting polyvinylsiloxane) was injected over the molars and bicuspids to record the position. This position was comfortable for the patient. Upper and lower dental impressions were taken using a silicone-based impression material.

The patient returned two weeks later and we repeated the ultrasound, trigger point injections and spray and stretch. He reported that since the first treatment, he only had one morning headache in two weeks. A mandibular advancement appliance (Luco Hybrid OSA Appliance) was inserted and adjusted, and the patient was instructed regarding placing and removing the appliance as well as home care. At his next one-week re-assessment, the patient reported that his snoring was almost gone. He indicated he had a slightly sore tooth on the lower left side (2nd bicuspid region). He did not have any morning headaches with the appliance wear and the pain in his right TMJ on opening was gone. The occlusion was checked on the appliance and it was found to be slightly heavier on the right side resulting in increased muscle activity on the left side. Spray and stretch was used on the left masseter and his tooth pain disappeared. We repeated the Epworth score and he was now at 8 from a previous score of 17. The appliance was advanced 1.5mm or 6 turns and the occlusion checked again.

After another week, the patient's tooth pain was gone, he had had no morning headaches and the daytime sleepiness he was having had resolved. His jaw felt good and he demonstrated no further trigger points in any of his masticatory or cervical muscle groups. He reported feeling much more energetic while working and the snoring was completely resolved. The appliance was locked in this position

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Figure 3

Sleep study data. All sleep measurements were taken using a 16-channel polysomnogram.

	Before Treatment	After Treatment	Description of Parameter
<b>AHI</b>	39	1	Apnea Hypoxia Index
<b>RDI</b>	42	2	Respiratory Distress Index
<b>AI</b>	19	1	Apnea Index
<b>Mean Apnea Duration</b>	1m19s	0m0s	Recorded in minutes/seconds
<b>Minimum SAO2</b>	78%	94%	Myocardial Infarction Risk if < 80%
<b>Mean SAO2</b>	86%	96%	Averaged for the sleep period
<b>Snore Count Per Sleep Period</b>	659	0	Sleep Duration 5h33m/7h12m
<b>Snore Rate per Hour</b>	126	0	Sleep Duration 5h33m/7h12m
<b>Epworth Sleepiness Scale</b>	17	2	Normal Range 0-9, OSA 10+



Figure 4

The Luco Hybrid OSA appliance.

and the patient was instructed to return in six months to ensure his appliance was working as intended.

He was referred back to the sleep lab for the follow-up study, which showed considerable improvement in all measurements (Figure 3). These findings included masseter hyperactivity which indicated the OSA was adequately treated as was his sleep-related bruxism. The patient was discharged from the sleep clinic.

This treatment was completed seven years ago and the patient has remained stable. The appliance is holding up very well and he required no adjustments over this period. At five years, he requested a second appliance to keep as a spare during travelling.

### Summary and Conclusions

TMD, chronic myofascial pain and similar conditions may be a contra-indication for mandibular advancement appliances. Managing the myofascial condition at the beginning of treatment facilitated the placement of the mandibular advancement appliance and helped in the successful treatment of the patient's OSA condition.

When indicated, a mandibular advancement type of oral appliance should be selected that minimizes the risks associated with the patient's OSA. Patients with chronic mouth breathing are at greater risk of gingival irritation, so

the appliance selected should be open in the anterior segment to allow for mouth breathing. Palatal soreness can be a problem with some designs of these appliances, especially if there is a palatal torus. The same is true with mandibular lingual tori. Patients with periodontal bone loss or short roots are at higher risk of shifting or flaring of the teeth, especially the lower incisor region. Compliance with the treatment requires a comfortable appliance respecting all of the oral tissues. If not, the patient is unlikely to wear the appliance, and treatment may fail. 

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NOTE: The US FDA has granted market clearance (K130797) to the Luco Hybrid OSA Appliance as a Class II medical device in the treatment of mild to moderate OSA and primary snoring in the US as of Dec 18, 2013. Additional information may be obtained at <http://www.lucohybridosa.com>.

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