

Assessing Change in OSA Severity During a Non-treatment Wash-Out Period – is there a Halo Effect?

Daniel Levendowski¹, Todd Morgan², Djordje Popovic¹, Victoria Melzer³,
Daniela Scarfeo¹, Philip Westbrook¹

Advanced Brain Monitoring¹, Scripps Memorial Hospital², La Costa Dental³

Introduction: Dentists who treat obstructive sleep apnea with mandibular repositioning devices (MRD) do not routinely obtain pre-treatment apnea/hypopnea index (AHI) values with the same equipment used to assess treatment outcomes. Once treatment has been initiated, health/safety concerns impact the recommendation to temporarily suspend therapy to obtain reference values. There is limited data to support the assumption that the AHI values return to an untreated baseline levels in the first night after treatment has been suspended. This pilot study attempts to address this question.

Methods: Eight males and two females participated in this IRB-approved study after undergoing pre-treatment in-home sleep studies and >3-months of mandibular repositioning device (MRD) therapy. Subjects wore the ARES Unicorder (Advanced Brain Monitoring, Carlsbad, CA) on four-consecutive nights; with MRD therapy and three nights without MRD therapy. Subjects were asked to refrain from driving and to consume similar amounts of alcohol before bed during the study. Four-sets of visual-analog-scale responses were obtained beginning the day prior to Night-1, and in the morning after Nights-1, -2 and -3 (i.e., first two sets were obtained after MRD therapy and second two sets measured changes resulting from suspension of therapy). VAS measures included daytime changes in alertness, stress, happiness, physical and mental exhaustion and night-time changes in sleep quality, ease of falling asleep, tiredness after waking up, and dry-mouth after waking up. Additional measures included increase use of the restroom, acid reflux during the night, or morning headaches. The AHI and RDI, and percent time snoring were obtained from previously reported auto-scoring algorithms. Repeated analysis of variance and t-tests were used to assess difference across nights.

Results: Subjects had primarily mild-OSA based on the overall AHI and moderate-OSA based on RDI (Figure 1). Pair-wise analysis showed no statistically significant differences in AHI, snoring, valid recording time or percent-time supine across the three no-therapy nights. For the five subjects with an AHI < 10, a significant decrease in the AHI during N1 and N2 without MRD therapy compared to the pre-treatment baseline was noted (Figure 2.a.), and not apparent when RDI values were compared (Figure 3.a.). For this group, a reduction in the percent time snoring > 30 dB the first night without therapy was close to significant (Figure 4.a.). There were no differences across nights for the five subjects with a pre-treatment AHI > 10. There were no statistically significant differences in the VAS response across the four time-points, suggesting patients were not immediately impacted by the return of sleep-disordered-breathing as a result of temporary suspension of therapy.

Conclusions: Patients did not report significant differences in daytime alertness or exhaustion after two nights without therapy. For patients with very mild OSA (AHI < 10) there may be a slight halo effect in the depth of desaturation and snoring during the first two nights. It appears that the greater the AHI/RDI, the less likely there is for a wash-out/halo effect. Although this data set is quite small, the results suggest that a measure of pre-treatment OSA severity can be approximated with the temporary suspension of MRD therapy.

Support: Funding NIH SBIR 2R44-DE016772-0

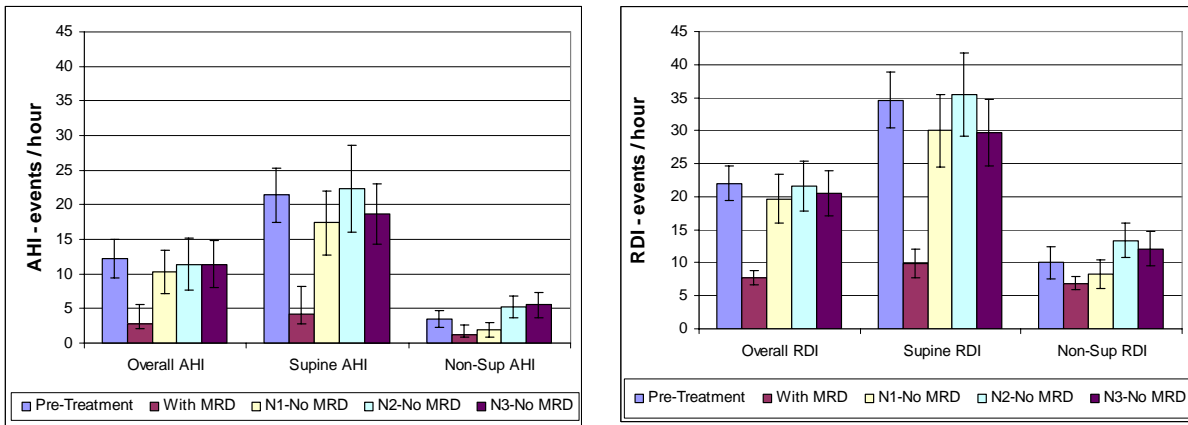


Figure 1. Changes in a) AHI and b) RDI by position at baseline, with treatment and three consecutive nights without treatment.

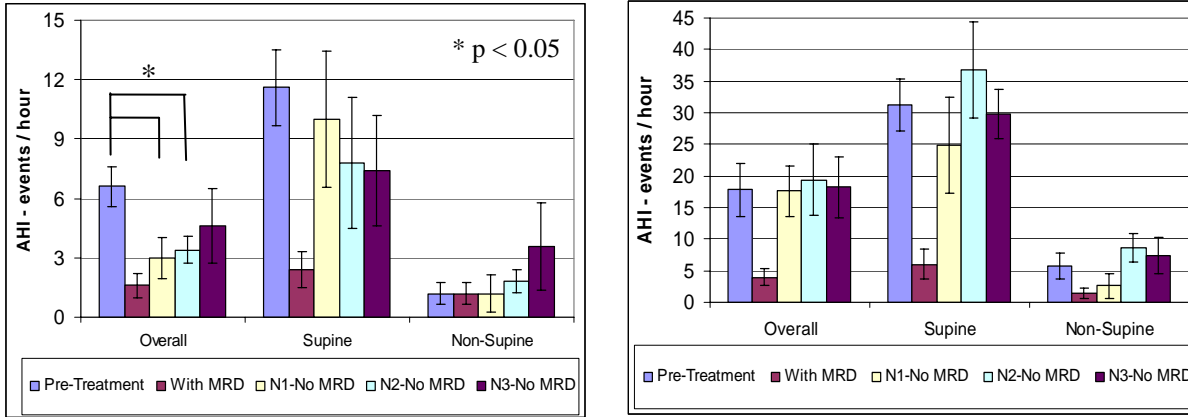


Figure 2. Changes in AHI for five subjects with overall AHI < 10 and five subjects with AHI > 10 by position and across conditions.

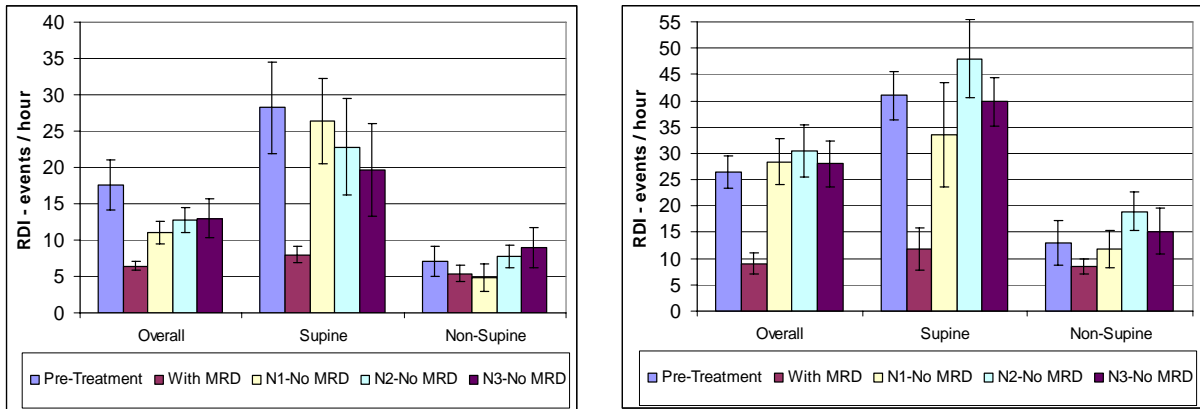


Figure 3. Changes in RDI for five subjects with overall AHI < 10 and five subjects with AHI > 10 by position and across conditions.

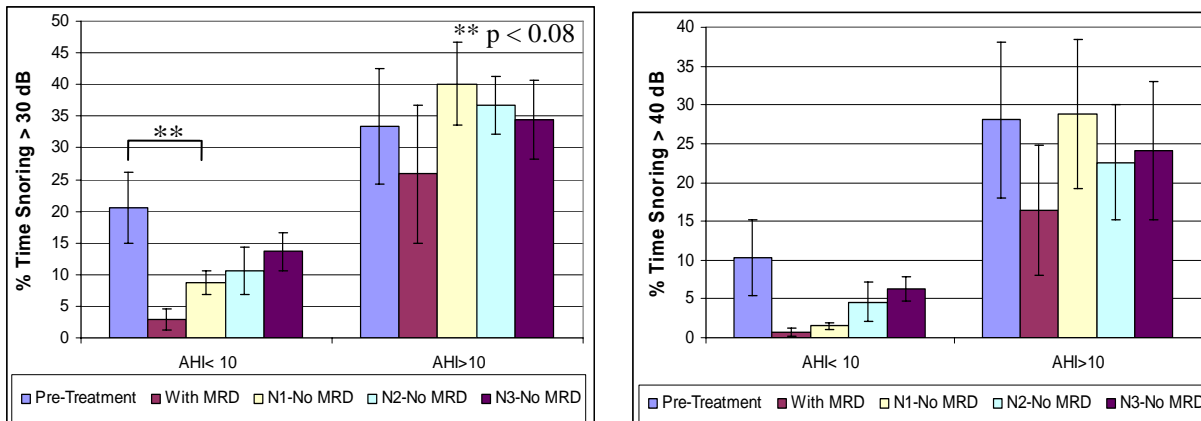


Figure 4. Changes in percent time snoring a) > 30 dB and b) > 40 dB for five subjects with AHI < 10, and five with AHI > 10 across conditions.