JCSM
Journal of Clinical Sleep Medicine

Podcast of the Journal of Clinical Sleep Medicine

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Welcome to the regular podcast of the *Journal of Clinical Sleep Medicine*. I am Dr. Stuart Quan, editor of the *Journal*. These podcasts are a regular feature of each issue of the *Journal* and can be downloaded at the *Journal's* website. Each podcast features summaries of important articles published in the current issue of the *Journal*, as well as occasional interviews with authors of these papers.

The lead article in this issue is entitled, "Treatment of Positive Airway Pressure Treatment – Associated Respiratory Instability with Enhanced Expiratory Rebreathing Space," by Geoffrey Gilmartin, Brennden McGeehan, Kevin Vigneault, Robert Daly, Megan Manento, Woodrow Weiss, and Robert Thomas from the Beth-Israel Deaconess Medical Center in Boston, Massachusetts. Complex sleep apnea is characterized by both obstructive and central apneic episodes on a diagnostic polysomnogram. Although standard, continuous positive airway pressure effectively treats the obstructive component of this condition, there have been many different proposals on how to treat the central component. There is increasing data that ventilatory instability during sleep is responsible for sleep-disordered breathing, including Cheyne-Stokes breathing, central sleep apnea and central events occurring after positive pressure titration. Ventilatory instability can be worsened by hypocapnea. In this paper, a novel approach using low-volumes of dead space is described in a large series of patients with CPAP refractory obstructive sleep apnea. The authors hypothesized that addition of dead space to minimize hypocapnea would improve the sleep-disordered breathing.

The paper is a retrospective review of 204 patients who were diagnosed with obstructive sleep apnea and emergence of central sleep apnea or persistent periodic breathing after CPAP application. These individuals were fitted with an apparatus that allowed re-breathing of a low amount of dead space. The authors call this "enhanced expiratory re-breathing space." This was provided by using a non-vented nasal or oral-nasal mask. The listener is advised to review Figures 1 & 2 from the paper. CO2 levels in the mask were monitored with a mainstream, end-tidal CO2 sensor. CO2 was increased by adding 50, 100 and 150 ml of dead space using conventional, blue, corrugated 22 mm tubing. Such tubing is commonly used with mechanical ventilators in an intensive care unit. The protocol for initial titration of the dead space is described in Tables 1 & 2 in the paper. Patients were sent home with the apparatus used in the laboratory after the initial titration and followed for a mean of 569 days. Of the 204 participants, 115 were observed in follow up to use the novel device on most nights with some subjective clinical benefit. The authors suggest that use of enhanced expiratory re-breathing space may be a practical option for treatment of patients with respiratory instability (persistent sleep-disordered breathing) associated with, or induced by, positive airway pressure.

The article by Gilmartin and colleagues in the *Journal* is followed by an editorial by Dr. David Rapoport from the Division of Pulmonary, Critical Care and Sleep Medicine at New York University School of Medicine in New York City. In this editorial, Dr. Rapoport points out that the addition of dead space did not produce a significant increase in end tidal arterial oxygen tension, indicating that reduction or dampening of hypocapnea was more important in improvement in the periodic breathing than inducing hypercapnea. He also cautions that this was a retrospective study and, in addition, some patients with CPAP-emergent central sleep apnea may improve if they just use CPAP for longer. Thus, it is unclear how much long-term benefit may be attributable to the addition of the novel treatment. Furthermore, some patients received both oxygen as well as bi-level treatment in addition to the novel therapy. He notes that a prospective trial is needed to determine the role of enhanced expiratory re-breathing space.

The next paper to be reviewed in this podcast is entitled, "Mallampati Class Is Not Useful in the Clinical Assessment of Sleep Clinic Patients," by Craig Hukins from the Sleep Disorders Center at Princess Alexandra Hospital in Woolloongabba, Australia. Classifying the upper-airway cross-sectional diameter on the basis of Mallampati class is frequently done in preoperative assessments. This classification system also is used commonly by sleep clinicians when evaluating patients for their risk of having obstructive sleep apnea. There have been several studies that have shown a significant correlation between Mallampati class and severity of the apnea-hypopnea index. In this study, the author evaluated the usefulness of Mallampati class in predicting whether patients would have severe obstructive sleep apnea and in identifying individuals who did not have obstructive sleep apnea in a sleep clinic population. 953 subjects were included in the study, of whom 619 were male. Their average age was 50 years and their average body-mass index was 33.8. The average apnea-hypopnea index was 26.1, with the 95% confidence interval between 1.4 and 78.7 events per hour. The author found that there was a weak statistical association between Mallampati class and apnea-hypopnea index with the correlation coefficient equal to 0.13 but that Mallampati class explained only 1.7% of the variability in apnea-hypopnea index. With respect to the usefulness of using a Mallanpati class of four to predict an apnea-hypopnea index greater than 30, the

positive predictive value was only 35% and the negative predictive value was 71%. Furthermore, the positive likelihood ratio was only 1.21. As for the reverse, using a Mallampati class of one to exclude obstructive sleep apnea, the positive predictive value was 27% and the negative predictive value was 82%. Positive likelihood ratio was 1.63. These likelihood ratios are small and have limited use in identifying or excluding those with severe obstructive sleep apnea. Thus, it would seem that the Mallampati classification has relatively limited use in the clinical evaluation of individuals with obstructive sleep apnea.

The final paper to be included in this podcast is entitled, "Nightly Use of Sodium Oxybate Is Associated with a Reduction in Nocturnal Sleep Disruption: A Double-Blind, Placebo-Controlled Study in Patients With Narcolepsy," by Dr. Jed Black from Stanford Sleep Disorders Clinic, Stanford, CA and Dr. Carl Hornfeldt, Dr. Neil Inhaber and Mr. Daniel Pardi from Jazz Pharmaceuticals in Palo Alto, CA. Sodium oxybate has been demonstrated to be an effective form of treatment for the cataplexy and excessive daytime sleepiness of patients with narcolepsy. However, the mechanism by which sodium oxybate improves daytime sleepiness in narcolepsy is unclear. This study is an analysis of data from a double-blind, placebo-controlled parallel trial designed, initially, to assess the efficacy of sodium oxybate for the treatment of excessive daytime sleepiness in narcolepsy. The current report is the results of the trial with respect to the effects of sodium oxybate on sleep architecture. In the trial 353 participants were enrolled, of whom 285 were randomized to sodium oxybate treatment. Doses of sodium oxybate ranged from 4.5 to 9 grams per night. Average age of the participants was 40.5 years. Polysomnograms were administered at several points during the eight-week period of drug or placebo administration. Sleep architecture variables were calculated during each half of the night of polysomnography, which corresponded to the first and second doses of sodium oxybate and then were summed to give values for the entire night. The results showed that participants who received sodium oxybate had dose-related increases in the duration of Stages III and IV sleep, with a median increase of 52.5 minutes at the highest dose of nine grams of sodium oxybate with a corresponding increase in Delta power as well. Additional findings were a decrease in nocturnal awakenings, as well as Stage I sleep, and corresponding increases in total sleep time and Stage II sleep. These findings suggest that the improvement in daytime symptoms in narcoleptics with the use of sodium oxybate may be related to changes in their sleep architecture.

This concludes the regular podcast of the *Journal of Clinical Sleep Medicine*. The listener is encouraged to read the contents of the *Journal* for additional information regarding each of the articles summarized in this podcast, as well as other papers published in this issue of the *Journal*.