Effect of Zolpidem and Enhanced Expiratory Rebreathing Space on Complex Sleep Apnea

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Treatment-emergent central sleep apnea has been referred to as 'complex sleep apnea', where apparently obstructive respiratory events convert to central apneas with application of positive airway pressure. Potential contributing factors may include increased propensity for arousals and positive airway pressure-induced reductions in CO₂ which amplifies unstable ventilatory control. Here we demonstrate the dramatic beneficial effects of zolpidem and enhanced expiratory rebreathing space on complex sleep apnea, which helps to elude the mechanism of complex sleep apnea.

Key Words  Zolpidem, Dead space, Respiratory, Sleep apnea.
EERS was designed to provide a dead space-like effect using a non-vented mask and 4-6 inches of additional standard tubing. Three weeks after the second titration, the third study was performed with zolpidem 10 mg at bedtime and with EERS. Between the second and third titration, CPAP had not been applied. Sleep was successfully induced and maintained with increased amounts of slow wave sleep in the first half of the night. EERS of 50 mL was added from the beginning of the study and titrated up to 100 cc to minimize hypocapnia. As expected from the second titration, CPAP at 9 cm H2O and zolpidem successfully controlled sleep disordered breathing and sleep fragmentation in the first half night (Fig. 3). With CPAP, EERS, and zolpidem, sleep was more consolidated with decreased arousals and increased amounts of slow wave sleep that was absent at the second titration. Three-and-a-half hours after lights-out, the patient woke up for about 50 minutes, possibly from a zolpidem withdrawal effect (Fig. 3). Once the patient fell asleep again, CPAP at 9 cm H2O was implemented with EERS of 100 mL successfully prevented the emergence of central sleep apneas during the latter part of the titration (Figs. 3 and 4).
Emergence of central apneas with the possible withdrawal of sleep stabilizer due to a pharmacokinetic (half life) effect suggests that increased sleep-wake transitions is one of the contributing mechanisms of complex sleep apnea. We also documented the beneficial effect of EERS to control complex sleep apnea. Though the natural course and underlying mechanisms of complex sleep apneas remain to be fully determined, judicious use of hypnotics and EERS could aid in the management of many patients.

Conflicts of Interest

Dr. Thomas has a patent for a device to regulate CO2 during sleep for treatment of complex sleep apnea. Dr. Yun has no conflict of interest.

REFERENCES