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Title: Discoordination of tongue muscles in obstructive sleep apnoea

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Body: Rationale: OSA is characterized by pharyngeal obstructions during sleep. We have recently demonstrated that during mild anaesthesia, dilator muscles EMG increases during apnoeas and hypopnoeas, but fails to improve airflow. The present study evaluates the hypothesis that failure of intense activation of tongue protrusors may be associated with sleep-induced changes in tongue muscle coordination. Methods: Esophageal pressure (Pes), airflow, and intramuscular EMG of the genioglossus (GG) and tongue retractors (TR) were recorded in 10 OSA patients. While awake, EMG/Pes was assessed while patients breathed through a variable resistor, to estimate the EMG required to prevent pharyngeal collapse. During sleep, EMG/Pes was evaluated during flow limitation. Pre-arousal peak inspiratory EMG was compared to peak EMG at the same Pes during wakefulness. Results: Patients were 46.1 ± 11.1 years old, with AHI of 59.5 ± 17.3 /hr. During wakefulness, both GG and TR were activated similarly. During sleep, the maximal levels of GG-EMG before arousal were significantly larger than those observed during wakefulness at equal Pes ($262.5 \pm 180.7\%$, $p=0.019$). Maximal TR-EMG, however, were significantly lower than those recorded during wakefulness (68.7 ± 37.7 , $p=0.027$). Conclusions: Augmentation of GG-EMG during obstructed breathing fails to improve airflow. GG-EMG increase to levels higher than those required to prevent pharyngeal collapse during wakefulness. Differently from the similar pattern of activation of GG and TR during wakefulness, co-activation of TRs is deficient during sleep. This alteration in the pattern of tongue muscle activation may be involved in the pathogenesis of pharyngeal obstruction during sleep.