



Analysis of the dynamic changes in the soft palate and uvula in obstructive sleep apnea-hypopnea using ultrafast magnetic resonance imaging

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ABSTRACT. Apnea and the respiratory cycle are dynamic processes in obstructive sleep apnea-hypopnea (OSAH), which occur only during sleep. Our study aimed to observe the dynamic changes in the soft palate and the uvula during wakefulness and sleep using ultrafast magnetic resonance imaging (UMRI) to provide reference data for the pathogenesis and treatment of OSAH. The dynamic changes in the soft palate and uvular tip of 15 male patients (average age: 50.43 ± 9.82 years) with OSAH were evaluated using UMRI of the upper

airway while asleep and awake after 1 night of sleep deprivation. A series of midline sagittal images of the upper airway were obtained. The distance from the center of the soft palate to the x-axis (an extended line from the anterior nasal spine to the posterior nasal spine), from the uvular tip to the x-axis, from the center of the soft palate to the y-axis (a perpendicular line from the center of the pituitary to the x-axis), and from the uvular tip to the y-axis (designated as PX, UX, PY, and UY, respectively) were measured during sleep and wakefulness. The minimum PX, PY, UX, and UY were shorter during sleep than during wakefulness, whereas the maxima were longer during sleep ($P < 0.01$), the differences between the maximum and minimum PX, PY, UX, and UY were larger during sleep ($P < 0.01$). The upward, downward, forward, and backward ranges of movement of the soft palate and the uvular tip were larger during sleep in OSAH patients. This increased compliance may trigger each airway obstructive event.

Key words: Ultrafast magnetic resonance imaging; sleep apnea; Obstructive sleep apnea-hypopnea