

## 論 文 要 旨

# Evaluation of the effect of oral appliance treatment on upper-airway ventilation conditions in obstructive sleep apnea using computational fluid dynamics

菅 北 斗

**Objective:** To evaluate the effect of oral appliance (OA) treatment on upper-airway ventilation conditions in patients with obstructive sleep apnea (OSA) using computational fluid dynamics (CFD).

**Methods:** Fifteen patients received OA treatment and underwent polysomnography (PSG) and computed tomography (CT). CT data were used to reconstruct three-dimensional models of nasal and pharyngeal airways. Airflow velocity and airway pressure measurements at inspiration were simulated using CFD.

**Results:** The apnea–hypopnea index (AHI) improved from 23.1 to 10.1 events/h after OA treatment. On CFD analysis, airway velocity decreased at the retropalatal and epiglottis-tip levels, while airway pressure decreased at the retropalatal, uvular-tip, and epiglottis-tip levels. The AHI of patients with OSA before OA treatment was correlated with airway pressure at the epiglottis-tip level.

**Discussion:** Treatment with OA improved the ventilation conditions of the pharyngeal airway and AHI. Results of CFD analysis of airway pressure and airflow velocity helped determine the severity and ventilatory impairment site of OSA, respectively.