

Effect of Genioglossus (GG) Contraction on Oro- (OP) and Naso-Pharyngeal (NP) Cross-Sectional Area (CSA) and Airflow in Patients with Obstructive Sleep Apnea (OSA)

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Introduction: GG contraction is known to improve upper airway flow-mechanics, but its segmental effect on the upper (NP) and lower (OP) parts of the pharynx are unclear. **Methods:** We evaluated the effect of electrically induced GG contraction on NP and OP pressure:CSA relationships during propofol anesthesia in 5 patients with OSA. Fine-wire electrodes positioned in the GG were used for electrical stimulation and CSA was measured endoscopically. Patients were maintained on CPAP, and repetitive decreases in pressure were used to assess both pressure:CSA and pressure:flow relationships, before and during GG contraction. **Results:** Decreases in CPAP resulted in decreases of both NP and OP CSA, with flow limitation occurring only at low CSA ($0.075 \pm 0.039 \text{ cm}^2$). Although pharyngeal occlusion occurred in the OP in 2 patients and in the NP in 3, the mean occlusion pressures (P_{crit}) of both segments were similar (-0.58 ± 1.42 and $0.05 \pm 1.87 \text{ cmH}_2\text{O}$, respectively). GG contraction increased the CSA, predominantly at low pressures, at both segments, shifting the sloping part of the pressure:CSA relationships toward lower pressures in all patients. However, the effect of GG contraction was substantially larger at the OP, decreasing P_{crit} to -6.11 ± 1.18 , as compared to $-2.99 \pm 0.83 \text{ cmH}_2\text{O}$ at the NP. P_{crit} calculated from the pressure:flow relationships decreased from 0.79 ± 1.07 to $-3.06 \pm 0.66 \text{ cmH}_2\text{O}$. **Conclusions:** GG contraction reduces the collapsibility of the OP more than of the NP. The magnitude of improvement in airflow during GG contraction depends, therefore, on the response of the NP-CSA to tongue protrusion. The relatively larger effect of the GG on the NP at low CSAs (at which flow limitation occurs) may explain the beneficial effect of this tongue protruder on the naso-pharyngeal airflow.

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