

# **Title: Sleep and Speech Outcomes of Secondary Speech Surgery for Children with Velopharyngeal Insufficiency**

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## **Abstract**

**Background:** Velopharyngeal insufficiency (VPI) results in hypernasality because air escapes through the nose during speech. VPI is common in children with craniofacial clefting. Surgical interventions designed to limit airflow through the nose during speech include: Furlow palatoplasty, pharyngeal flap, or sphincter pharyngoplasty. However, narrowing the nasopharyngeal airway can cause sleep apnea.

**Hypothesis:** Careful attention to pre-operative speech evaluation data and sleep disorders can maximize speech outcomes while minimizing sleep disordered breathing.

**Objectives:** The purpose of this study is to describe the speech and sleep outcomes of patients with craniofacial clefting who have undergone secondary speech surgery.

**Methods:** This was a retrospective chart review including 484 unique patients who attended craniofacial clinic between January 1, 2016 and May 31, 2018. Of these, 179 underwent polysomnography, and secondary speech surgery occurred in 20. A detailed speech evaluation was performed before and after surgery. Resonance was assessed using the parameters defined by Henningson et al. (2008), and placed on a non-parametric scale ranging from -1 (hyponasal) to 3 (severely hypernasal). Polysomnography results were used to quantify sleep disordered breathing. A statistical program (SPSS) was used to statistically analyze results, with a paired sample t-test used to compare pre- and post- operative values.

**Results:** Post-operative hypernasality ( $-.25 \pm .43$ ) was significantly improved from pre-operative ( $1.90 \pm .7$ ,  $p < .05$ ). Other speech variables (visible nasal air emission, audible nasal air emission, compensatory articulation error, speech understandability, and speech acceptability) were not significantly impacted by the surgery. Polysomnographic measurements of obstructive apnea-hypopnea index, oxygen saturation nadir, wake time after sleep onset, and sleep efficiency were not significantly impacted by surgery.

**Conclusion:** Secondary speech surgery can significantly improve the hypernasality of patients with VPI. There is no evidence that sleep quality is impacted by the surgery.