STRONG CHILDREN'S RESEARCH CENTER

Summer Research Scholar

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ABSTRACT

Title: *Multiview Videofluoroscopically Guided Superiorly Based Posterior Pharyngeal Flap Surgery Improves Speech Outcomes without Creating Obstructive Sleep Apnea.*

Background: Velopharyngeal insufficiency (VPI) results from incomplete closure between the naso- and oropharynx. Excess nasal air emission resulting from VPI impairs production of intelligible speech. Children often develop compensatory misarticulations. These are problematic because they typically persist following surgical correction of VPI and may require extensive speech therapy to eradicate. Posterior pharyngeal flap (PPF) surgery is effective at improving velopharyngeal sufficiency, but historical literature shows a high prevalence rate of obstructive sleep apnea (OSA) following surgery.

Study Objective: To compare pre- and post-operative speech and sleep outcomes for pediatric cleft palate patients undergoing PPF surgery for treatment of VPI.
Hypothesis: We hypothesize that (1) pre-operative removal of significant adenotonsillar tissue along with (2) use of anatomic information from multiview videofluoroscopy to guide surgical approach can result in adequate speech outcome while limiting occurrence of OSA.

Methods: This was a retrospective chart review of 41 pediatric cleft palate patients with VPI (ages 2-20) seen at the University of Rochester from 2015-2022 who underwent PPF surgery to correct hypernasality. Multiview videofluoroscopy was used to identify anatomic causes of VPI and to determine pharyngeal flap width. Patients underwent polysomnography and speech evaluation prior to and following PPF surgery. Sleep studies were scored using the American Academy of Sleep Medicine Manual for Scoring Sleep guidelines. Speech evaluation was performed according to the Great Ormond Street Hospital cleft audit protocol for speech. A modified Pittsburgh weighted values for speech symptoms associated with velopharyngeal incompetence score was recorded. Presence or absence of misarticulations was determined by a single, experienced speech pathologist. Children aged 8.5 ± 4.1 years (range 4 to 18; n=41) were identified who underwent posterior pharyngeal flap surgery for VPI. This included 10 patients with 22q11.2 deletion and 4 patients with Pierre Robin Sequence. All patients underwent multiview videofluoroscopy pre-operatively. 33 patients had both pre- and post-operative speech data and 25 patients underwent both a pre- and post-operative sleep study.

Results: Polysomnography showed no significant difference in obstructive apnea hypopnea index (O-AHI) following PPF surgery (O-AHI pre-op 1.3 ± 1.2; post-op 1.7 ± 2.1 events/hour; $p=0.111$). Significant improvements in speech outcome were seen in patients who underwent PPF (modified Pittsburgh score pre-op 11.52 ± 1.37; post-op 1.09 ± 2.35; $p<0.05$). All but 3 of 38 children had no clinically significant speech symptoms associated with VPI at post-operative assessment. Age at PPF showed no significant correlation with post-op modified Pittsburgh score ($p=n.s.$) or post-op O-AHI ($p=n.s.$). It was expected that older children would demonstrate higher rates of compensatory misarticulation, but our data showed that younger children were more likely to have misarticulations ($p<0.05$).

Conclusions: Pre-operative removal of significant adenotonsillar tissue along with pre-operative visualization data to assess structure and function of the velopharynx to guide surgical approach results in good speech outcome while limiting the occurrence of OSA.