PURPOSE: Velopharyngeal insufficiency (VPI) occurs in approximately 11%–50% of patients born with cleft palate (CP). Correction of VPI with pharyngoplasty reduces the size of the nasopharyngeal airway, increasing the risk of obstructive sleep apnea (OSA) symptoms, which results in port-revision in 2%–3% of cases. While existing studies have examined the short-term effect of pharyngoplasty on OSA symptoms within a 5-year postoperative period, the long-term impact of pharyngoplasty is unknown. Polysomnograms are the gold standard for diagnosis of OSA, but they are not cost-effective and are resource-limited for screening. Thus, we aimed to utilize validated patient-reported outcomes measures to examine the effect of pharyngoplasty on long-term OSA symptoms among patients with CP who are over the age of 14 years.

METHODS: Patients over the age of 14 years with cleft palate were enrolled from the craniofacial clinics at the University of California, Los Angeles and the Cleft Palate Program at the Orthopaedic Institute for Children. Sixty-one patients were prospectively administered the Patient Reported Outcomes Measurement Information Systems pediatric version 1.0, sleep-related impairment short form 4a. Retrospective chart review was conducted to collect patient demographic, surgical, and past medical data. Sleep-related impairment scores were compared between patients with and without sphincter pharyngoplasty and other potential medical or surgical risk factors of sleep-related impairment, using analyses of variances and independent samples t tests. Associations between sleep-related impairment scores and patient demographics were assessed using Pearson's correlation coefficients.

RESULTS: Overall, 61 CP patients (30 men) over the age of 14 (mean age: 20.4 ± 4.6 years) were administered the Patient Reported Outcomes Measurement Information Systems sleep-related impairment short form. 35 patients (57.4%) were diagnosed with VPI and 25 patients (41.0%) underwent pharyngoplasty. CP patients with a history of pharyngoplasty showed significantly increased levels of sleep-related impairment compared with patients who had not undergone pharyngoplasty (P = 0.029). Sleep-related impairment scores between patients with and without Furlow palatoplasty or pharyngeal flap for VPI were not significantly different. No significant differences were found between patients with and without other potential surgical risk factors, including distraction, hyoid advancement, Le Fort advancement, or septorhinoplasty. Similarly, sleep-related impairment scores did not significantly differ among patients with or without other potential contributing medical risk factors, including preterm birth, congenital cardiac condition, reactive airway disease, or depression. In addition, sleep-related impairment scores did not significantly correlate with BMI values.

CONCLUSIONS: Pharyngoplasty among patients with CP is associated with increased sleep-related impairment, even after the age of 14 years. While pharyngoplasty cannot be considered to be the cause of long-term OSA, our current study suggests that increased vigilance in long-term validated, quantitative sleep screening may be necessary for patients who have undergone pharyngoplasty with potential considerations for intervention.

Assessment of Intraoperative Transfusion and Blood Loss in Craniosynostosis Repair

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BACKGROUND: In cranial vault remodeling for correction of craniosynostosis, the major intraoperative risk is blood loss. While institutional, anesthesiologist-related and surgeon-related differences in practices for blood loss assessment and transfusions may exist, calculated blood loss has been reported in the literature to standardize and more accurately assess blood loss and transfusion requirements.1-2 There is currently little consensus over the contributing factors and degree of blood loss in craniosynostosis repair, with a high variability in calculation methods. The objective of this study was to accurately characterize blood loss in open craniosynostosis repair, and to assess the adequacy of intraoperative blood transfusion.
METHODS: We performed a retrospective single-institution study of all patients undergoing open cranial vault remodeling for craniosynostosis from April 2013 to July 2020. Medical records were reviewed for patient demographics and operative details. The literature was reviewed for various methods of calculating blood loss (CBL), and new optimized equations were developed: first by modifying for blood volume variations using meta-analyses of blood volume ratios by age, and second by accounting for hemodilution through a concept applied in prior published equations. All equations were applied to our cohort for comparison with transfusion requirements. In addition, comparisons were made between those who were over- and under-transfused intraoperatively. Independent samples \( t \) tests were used for all comparisons.

RESULTS: In total, 55 patients underwent open cranial vault remodeling in our cohort. The mean CBL from published equations ranged from 419.1 mL to 695.7 mL, while our optimization came to 670.1 ± 445.0 mL. On average, 302.7 ± 182.1 mL was transfused, with a net transfusion deficit of 63.8 mL. An estimated 21 (38%) patients were under-transfused, while only 4 (7%) patients were over-transfused intraoperatively. Under-transfused patients were, on average, older (2.36 versus 0.52 years, \( P = 0.025 \)) with higher preoperative hemoglobin (12.3 versus 10.8, \( P = 0.028 \)), and CBL (116.9% versus 64.2% EBV, \( P = 0.030 \)). There were no complications. Overall, the majority of patients in our cohort were adequately transfused, with no complications and successful reconstruction on follow-up (mean time: 27 months) in all patients.

CONCLUSIONS: Our data suggest that CBL and transfusion requirements vary significantly based on the equations used and we propose an optimized equation accounting for hemodilution and blood volume variations. Specific patient factors should be taken into account for individualized management of intraoperative transfusion.

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Does Different Cranial Suture Synostosis Influence Orbit Volume and Morphology in Apert Syndrome?

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BACKGROUND: This study compared the orbital and periorbital morphological variations in Apert syndrome patients who have different cranial vault suture synostosis, so as to provide an anatomic basis for individualized surgical planning.

METHODS: CT scans of 57 unoperated Apert syndrome and 59 controls were subgrouped as: type I. Bilateral coronal synostosis; type II. Pansynostosis; type III. Perpendicular combinations of cranial vault suture synostoses.

RESULTS: Orbit bony cavity volume was significantly reduced in type I and type II by 19% (\( P < 0.001 \)) and 24% (\( P < 0.001 \)). However, the reduction of orbital cavity volume in type III did not reach statistical significance. Globe volume projection beyond the orbital rim, however, increased by 76% (\( P < 0.001 \)) in type III, versus an increase of 54% (\( P < 0.001 \)) in type I and 53% (\( P < 0.001 \)) in type II, due to different ethmoid and sphenoid bone malformations. Maxillary bone volume is only significantly reduced in type I bicoronal synostosis (24%, \( P = 0.048 \)). Both type I and type II developed relatively less zygoma and sphenoid bone volume.

CONCLUSIONS: Different cranial vault suture synostoses generate a varied influence on periorbital development in Apert syndrome. Instead of mitigating the abnormalities resulting from bicoronal synostosis in type I, additional midline suture synostosis worsens the exorbitism due to a more misshaped ethmoid.