complication rates. Intraoperative %TBV transfused was not associated with postoperative transfusion requirements.

CONCLUSION: Postoperative morbidity may be optimized by utilizing transfusion and crystalloid thresholds. As transfusing >85% TBV was associated with increased postoperative complications, we advocate for adopting practices that may either decrease transfusion need to below this threshold (eg, antifibrinolytic therapy, bloodless surgical technique) or provide alternative methods to minimize external transfusion (eg, using cell saver). Additionally, maintaining a crystalloid:EBL ratio of <7:1 may also prevent postoperative complications; colloid replacement may be considered if volume needs exceed this ratio. We aim to conduct further interinstitutional research to identify additional optimal infusion and transfusion practices in this patient population.

Posterior Cranial Vault Distraction Osteogenesis: Routine Low Occipital Craniotomy Is a Safe Approach That Optimizes Outcomes

Presenter: Raquel M. Ulma, DDS, MD

Co-Authors: Gina Sacks, MD; Amy K. Bruzek, MD, MS; Christian J. Vercler, MD; Karin Muraszko, MD; Steven R. Buchman, MD

Affiliation: University of Michigan - C. S. Mott Children’s Hospital, Ann Arbor, MI

OBJECTIVE: Posterior cranial vault distraction osteogenesis (PVD) is a well-established alternative to traditional posterior vault osteotomy for cranial vault expansion in patients with multisuture craniosynostosis with a narrow cranial base. The benefits of PVD over traditional osteotomy include a more gradual and maximal expansion of both the bone and overlying scalp with decreased rates of relapse. Previously described techniques place the inferior osteotomy above the torcula, which limits a more complete normalization of volume and morphology. In this study, we present a safe low occipital craniotomy extending to the foramen magnum, utilized to restore normal anatomy and improve remediation of the narrow cranial base associated with multisuture craniosynostosis.

METHODS: We performed a retrospective chart review of all pediatric patients with multisuture craniosynostosis undergoing PVD surgery at our institution in the years 2012–2019. Extracted data included demographics, perioperative and intraoperative surgical information, and postoperative complications. All included patients underwent preoperative evaluation by neurosurgery, plastic surgery, ophthalmology, and neuropsychiatry. CT and magnetic resonance imaging of the brain and cervical spine with cerebrospinal fluid flow imaging were obtained preoperatively to evaluate bony morphology, venous sinus position, and potential Chiari malformation.

RESULTS: We identified 14 patients undergoing PVD. Thirteen patients had multisuture synostosis. Clinical syndromes included Saethre-Chotzen, Crouzon, and Apert. The average age at time of PVD was 14.2 months (range, 5–93 months). Blood loss averaged 86 ml (range, 20–200 ml); 7 patients required transfusion. No patients had hyponatremia requiring treatment. The average hospital length of stay after surgery was 6.4 days (range, 2–29 days) and all patients completed distraction of 30 mm. Three patients had Chiari malformation before posterior distraction; 2 improved and 1 remained stable postoperatively. Complications included distractor device failure requiring reoperation (1 patient), shunt exposure requiring operation (2 patients), and mild scalp wound infection requiring only local wound care (1 patient). Twelve patients underwent secondary fronto-orbital advancement 8–14 months after the initial posterior vault osteotomy and device placement.

CONCLUSIONS: Low occipital craniotomy is a safe and effective technique for PVD. It allows for maximal expansion of the posterior vault, provides superior morphologic outcomes in patients with turribrachycephaly, and can indirectly improve overall facial growth. Other benefits include decreased tension on the scalp closure and a greater potential of decompressing the foramen magnum and associated Chiari Malformations.

Management of Calcified Cephalohematoma of Infancy: A Single Institution 25-Year Experience

Presenter: Raquel M. Ulma, DDS, MD

Co-Authors: Gina Sacks, MD; Bridger Rodoni, BS; Anthony L. Duncan, MD; Alexandra T. Buchman; Brevin C. Buchman; Christian J. Vercler, MD; Steven J. Kasten, MD; Karin Muraszko, MD; Steven R. Buchman, MD

Affiliation: University of Michigan - C. S. Mott Children’s Hospital, Ann Arbor, MI

PURPOSE: Calcified cephalohematoma of infancy is a result of a subperiosteal blood collection, that usually forms
Palatal Lengthening With Buccal Myomucosal Flaps Improves Hypernasality Without Increasing Obstructive Sleep Symptoms

**Presenter:** Raquel M. Ulma, DDS, MD

**Co-Authors:** Natalie Wombacher, MS, CCC-SLP; Steven J. Kasten, MD

**Affiliation:** University of Michigan - C. S. Mott Children’s Hospital, Ann Arbor, MI

**INTRODUCTION:** Children with cleft palate with or without the cleft lip are predisposed to velopharyngeal dysfunction and the perceptual phenomenon of hypernasality. Researchers estimate that roughly 30% of children with cleft palate will have hypernasality during speech. Research also indicates that children with a history of cleft palate are predisposed to obstructive sleep apnea (OSA).

Typical speech surgeries include dynamic sphincter pharyngoplasty, posterior pharyngeal flap and, for minor velopharyngeal gaps, fat grafting to the posterior pharyngeal wall. Dynamic sphincter pharyngoplasty and posterior pharyngeal flap, while effective at decreasing hypernasality, are known to exacerbate obstructive sleep symptoms. These findings lead to the conundrum of how one successfully manages velopharyngeal dysfunction without causing or worsening obstructive sleep apnea in this population. Therefore, we are in need of an operation that effectively decreases hypernasality and overcomes large velopharyngeal gaps, while mitigating the occurrence of obstructive sleep apnea. We propose that palatal lengthening with buccal myomucosal flaps is the solution to this problem.

**METHODS:** The charts of patients with large velopharyngeal gaps and moderate-to-severe hypernasality that underwent palatal lengthening with bilateral buccal myomucosal flaps between 2016 and 2019 were reviewed in a retrospective fashion. Inclusion criteria include a history of cleft palate or another diagnosis that predisposes to hypernasality, are known to exacerbate obstructive sleep apnea, and at least 1 postoperative speech evaluation with nasometry. All patients were administered the Picture Cued Subtest and received a perceptual rating from the craniofacial speech-language pathologist. Patients were seen preoperatively for a perceptual speech evaluation, standardized articulation testing (as needed), nasometry, and nasopharyngoscopy. Postoperatively, patients were followed at 6-month intervals during which each patient participated in a perceptual speech evaluation, standard articulation testing (as needed), and nasometry in order to better assess resonance changes over time. Ten patients were enrolled in the study, but only 9 met the inclusion criteria, as one patient was excluded for lack of a postoperative speech evaluation.

**RESULTS:** Nasalance is a nasometry score expressing a ratio of nasal-to-total (nasal plus oral) sound energy, and is reported as percentage. Our study findings indicate that most patients had the same abnormal Nasalance score 6 months postoperatively as they did preoperatively. However, at the 12-month postoperative evaluation, 89% of patients (n = 8) had nasometry scores that improved to normal resonance. The one patient with abnormal Nasalance scores