METHODS: A retrospective case-control review of all patients in the senior author’s practice, who underwent either a forehead flap or AFT flap between January 2016 and February 2019, was conducted. There were 18 patients identified. All patients had >1-month follow-up. The 2 groups were compared regarding success, any complications, and cost.

RESULTS: There were 7 traditional forehead flap patients and 11 patients with AFT flaps. Total complication rate was 43% (3/7) for the forehead flap group and 18% (2/11) for the AFT flap group. The complications for the forehead group were a mortality (n = 1), revisional surgery for an area of prominent tip cartilage causing flap atrophy and noticeable tip asymmetry (n = 1), and airflow obstruction (n = 1). The AFT group had 1 partial skin graft loss and 1 incisional dehiscence. Both healed with local wound care without additional surgery. There were no flap failures in either group. Although no official questionnaire was given, the overall patient satisfaction with their reconstructive outcomes was high in both groups, as documented in detailed follow-up clinic visits. The total operating room costs were substantially less in the AFT group. The total operating room costs charged to the forehead flap group averaged around $42,500 per patient for the complete reconstructive process and $17,100 per patient in the AFT group. The average cost savings was over $25,000 in the AFT group.

CONCLUSION: This review demonstrates that the single-stage AFT flap with full-thickness skin graft is a safe, reliable, and less-expensive reconstructive alternative to the forehead flap. The forehead flap will remain a workhorse in nasal reconstruction, especially in patients with very large areas of exposed denuded cartilage where the AFT flap may not provide enough surface area to achieve full coverage. Further review and analysis of the subjective esthetic results between the 2 methods would be helpful to determine if either method offers a significant esthetic advantage. This could be accomplished through both patient interview/questionnaires and professional analysis and comparison of esthetic outcomes completed by blinded independent plastic surgeons. This will be our aim for future studies. In our experience, both reconstructive methods offer good esthetic results, and patients have been satisfied with their outcomes. We can conclude from our study that multiple surgeries increase the total cost of nasal reconstruction and could contribute to higher complication rates. The AFT flap is a straightforward single-stage reconstruction that may reduce the risk of complications while cutting operating costs.

Pressure-related Craniosynostosis: Treatment of Hydrocephalus With Venticuloperitoneal Shunt Associated With Premature Cranial Suture Fusion

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PURPOSE: Hydrocephalus during infancy is a relatively common condition, most frequently treated by cerebrospinal fluid diversion with ventriculoperitoneal (VP) shunting. Secondary craniosynostosis is the premature fusion of ≥1 cranial sutures following VP shunt placement for hydrocephalus and has been reported with varying incidence in the literature. The effect of external forces on the etiology of craniosynostosis has been postulated, and decompressive forces resulting from alterations in cerebrospinal fluid pressure may precipitate premature suture fusion. We examined the incidence of secondary craniosynostosis after VP shunt placement for infantile hydrocephalus to investigate the underlying pathophysiology of shunt-related craniosynostosis (SRC).

METHODS: The authors performed a retrospective chart review and direct examination of serial computerized tomography (CT) images for 127 patients at a single institution who underwent VP shunt for hydrocephalus in infancy. Demographic information, syndromic diagnoses, comorbidities, hydrocephalus etiology, timing of shunt placement, and necessity of shunt revisions were evaluated for each patient. Pre and postoperative CT scans were evaluated for suture fusion, ventricular size, and degree of ventricular decompression. These data were then analyzed to determine any association between these independent variables and the development of craniosynostosis after shunt placement.

RESULTS: Sixty-three patients (49.6%) developed radiographic evidence of SRC within a median of 26 months after VP shunt placement in our study. A total of 5 patients had a syndromic diagnosis, with only one (Pfeiffer syndrome) being associated with primary craniosynostosis. Older age at shunt placement and greater number of shunt revisions were found to be associated with the development of SRC. Gender, gestational age, syndromic diagnosis, degree of ventricle decompression, and etiology of hydrocephalus did not differ between the fused and nonfused groups. Thirty patients had radiographic evidence of single suture fusion, whereas the remaining 33 had multisuture fusion. Among patients with single suture craniosynostosis, the sagittal suture was most commonly involved (86.7%),
whereas in multisuture synostosis, >50% demonstrated fusion of the sagittal and bilateral coronal sutures. Of note, the presence of SRC was not documented in virtually all official CT reports.

CONCLUSION: The results of this study demonstrate that nearly 50% of patients who underwent VP shunt placement for a diagnosis of hydrocephalus in infancy developed SRC. This secondary fusion is often overlooked on routine CT interpretation, and accurate diagnosis requires a high level of suspicion. Our findings support the important role that proper dural stimulation and expansion plays in maintaining cranial sutural patency. Disruption of these normal processes may be a significant factor in the development of nonsyndromic craniosynostosis, with the sagittal suture being most vulnerable to early secondary fusion.

**Perioperative Morbidity of Repeat Posterior Cranial Vault Distraction Osteogenesis: A Single-center Experience**

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INTRODUCTION: Posterior cranial vault distraction osteogenesis (PVDO) has become the preferred modality in many centers for cranial expansion in syndromic and multisuture craniosynostosis patients. The low morbidity profile and large degree of volumetric expansion have propelled its use. The purpose of this study was to evaluate the perioperative morbidity of repeat PVDO in pediatric patients.

METHODS: A retrospective review of all patients who underwent PVDO was performed from 2015 to 2018. Individual demographics, perioperative data, distraction parameters, and complications were reviewed, and repeat PVDO patients were identified.

RESULTS: A total of 16 patients underwent primary PVDO (16.48 ± 15.44 months old at the time of surgery) in the selected time period. Five of these patients had repeat PVDO performed (30.49 ± 15.32 months old at the time of surgery), with 1 patient requiring a third distraction. Indications for repeat distraction were symptomatic intracranial pressure elevation and halted cranial growth. When comparing primary PVDO to repeat PVDO, operative time (168 ± 55 versus 207 ± 47 minutes; \( P = 0.14 \), reported EBL (16.7 ± 9.0 versus 11.3 ± 6.6ml/kg; \( P = 0.20 \)), red blood cell transfusion (25.9 ± 15.1 versus 25.2 ± 10.6ml/kg; \( P = 0.91 \)), length of intensive care unit stay (3.3 ± 4.3 versus 4.0 ± 4.4 days; \( P = 0.72 \)), and length of hospital stay (8.4 ± 9.5 versus 5.8 ± 4.0 days; \( P = 0.53 \)) were not significantly different. Additionally, there was no increased incidence of postoperative complications (37.5% versus 33.3%; \( P = 0.86 \)).

CONCLUSIONS: Repeat PVDO is comparable in perioperative morbidity to primary PVDO in patients with syndromic or multisuture craniosynostosis. Use of PVDO provides excellent cranial expansion and relief of elevated intracranial pressure while delaying the use of frontal advancement or monobloc procedures.

**Cost-Effectiveness of Long-term, Targeted Onabotulinumtoxina Versus Peripheral Nerve Decompression Surgery for the Treatment of Migraine Headaches**

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BACKGROUND: Chronic migraines affect approximately 2% of the US population and cost an estimated $17 billion per year. OnabotulinumtoxinA (botulinum toxin type A [BoNT-A]) is an FDA-approved prophylactic medication for chronic migraine headaches and is best injected in a targeted fashion into specific trigger sites. The purpose of this study is to determine the cost-effectiveness of long-term, targeted BoNTA versus peripheral nerve decompression surgery for the treatment of migraine headaches.

METHODS: A Markov model was constructed to examine long-term, targeted BoNTA versus peripheral nerve decompression surgery. Costs, utilities, and other model inputs were identified from the literature. One-way and probabilistic sensitivity analyses were performed. An incremental cost-effectiveness ratio under $50,000 per quality adjusted life year was considered cost-effective.

RESULTS: The mean cost of peripheral nerve decompression surgery was $10,303 with an effectiveness of 7.06, whereas the mean cost of long-term, targeted BoNTA was $36,071 with an effectiveness of 6.34. Decompression surgery is more effective and less costly over the time horizon of the model. One-way sensitivity analyses were performed. An incremental cost-effectiveness ratio under $50,000 per quality adjusted life year was considered cost-effective.