



Abstract: Treatment of Craniosynostosis: The Impact of Hospital Surgical Volume on Cost, Resource Utilization, and Outcomes

Citation

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CONCLUSION: Open cranial vault remodeling with fronto-orbital advancement is a safe and reproducible procedure with excellent literature to support short-term outcomes. However, little data exist to evaluate this patient population as they mature. Our study critically evaluates physical exam findings, neurocognitive development, and anthropometric assessments in this patient population at or near skeletal maturity.

MAIN OBJECTIVES: Learners will understand the physical exam findings and neurocognitive long-term outcomes following open procedures for metopic craniosynostosis.

Minor Suture Fusion Analysis in Infants with Syndromic and Non-Syndromic Craniosynostosis

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INTRODUCTION: While not definitively proven, cranial base suture fusion is thought to affect both facial and cranial growth patterns. Previous work from our institution and others has demonstrated a high rate of cranial base, so-called "minor", suture fusion in infants with syndromic craniosynostosis. The purpose of this study is to compare rates of minor suture fusion amongst three groups of patients: non-affected controls, patients with non-syndromic craniosynostosis, and patients with syndromic craniosynostosis.

METHODS: We performed a retrospective review of infants diagnosed with syndromic synostosis, non-syndromic synostosis, and/or controls. CT scans were graded on degree of major and minor suture/synchondrosis fusion: 0—open and 1—partially/completely fused by an attending craniofacial surgeon and neuroradiologist. Statistical comparisons were then conducted on location of fusion, rates of fusion, age, and diagnosis.

RESULTS: One-hundred and forty patients met inclusion criteria: 55 syndromic craniosynostosis, 64 non-syndromic craniosynostosis, and 21 control infants. The average age of syndromic subjects (3.6 months) differed from non-syndromic subjects (5.4 months, $p=0.001$) and trended towards younger than controls (5.1 months, $p=0.058$). Overall, syndromic infants had twice the rate (20.5%) of minor suture fusion than non-syndromics (9.1%) and controls (9.2%) ($p<0.001$), whose rates of fusion were statistically equivalent ($p=0.818$). Sites of fusion also differed significantly among groups. Using a multivariate logistic regression that controlled for age, relative to control subjects the fronto-ethmoidal suture was fused less often in non-syndromic (39.06% vs. 76.19%, OR 0.054, $p<0.001$, respectively) and syndromic subjects (22.64% vs. 76.19%, OR 0.055, $p<0.001$, respectively). Syndromic subjects had a significantly greater degree of minor suture fusion in the coronal branches (fronto-sphenoidal, sphenosquamosal and sphenopetrosal), squamosal arch (parieto-squamosal and parieto-mastoid), and posterior intraoccipital minor suture/synchondrosis than both non-syndromics and controls (OR 7.94 and 7.94, 7.74 and 3.52, 3.39 and 3.39, 22.63 and 6.10, 29.82 and 29.82, 12.16 and 6.99; $p<0.05$; respectively).

CONCLUSION: Our data suggests that a small percentage of cranial base sutures begin to fuse in infancy under normal circumstances. Patients with non-syndromic craniosynostosis have similar rates of, and sites of, cranial base suture fusion as controls. In contrast, patients with syndromic craniosynostosis have higher rates of cranial base suture fusion in infancy with a concentration in the region of the coronal branches. Future work will attempt to determine the phenotypic ramifications of these differences.

Treatment of Craniosynostosis: The Impact of Hospital Surgical Volume on Cost, Resource Utilization, and Outcomes

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INTRODUCTION: Craniosynostosis surgery is commonly performed for children at academic centers across the US. Previous literature has found increased hospital and surgical volume to correlate with better post-operative outcomes and decreased costs. However, the association between annual hospital volume of craniosynostosis surgery on inpatient complications and resource utilization is not well studied. In this study, we aim to quantify the impact of annual hospital volume of craniosynostosis surgery on inpatient complications and resource utilization using national data.

METHODS: Children younger than 12 months with nonsyndromic craniosynostosis who underwent surgery in 2012 at academic hospitals were identified from the Kids' Inpatient Database (KID). Hospital craniosynostosis surgery volume was stratified into tertiles based on total annual US hospital cases: low (1–13), intermediate (14–34), and high (≥ 35). Logistic regression models were used to assess the effect of hospital volume on risk of overall complication rate and blood transfusion rate. A gamma log-link generalized linear model was used to assess the differences in total hospital charges and length of stay (LOS) between hospital volume tertiles.

RESULTS: 154 hospitals performed 1,617 total craniosynostosis surgeries in 2012. 580 cases (35.8%) were low volume (LV), 549 cases (33.9%) were intermediate volume (IV) and 488 cases (30.2%) were high volume (HV). Significant differences existed in ethnicity, number of comorbidities, hospital bedside, hospital region, and median household income between hospital volume tertiles. There was no significant difference in major complications between hospital volume tertiles (4.3% LV; 3.8% IV; 3.1% HV; $p = 0.487$). However, there were significant differences between blood transfusion rates with LV hospitals having the highest blood transfusion rates (47.8% LV; 33.9% IV; 26.2%; $p < 0.001$). Mean hospital charges were lowest at high volume hospitals (\$55,839) compared with IV hospitals (\$65,624; $p < 0.001$) and LV hospitals (\$62,325; $p = 0.005$). Mean length of stay was longer at LV hospitals (3.31 days) compared to IV hospitals (3.07 days; $p = 0.013$) and HV hospitals (2.96 days; $p = 0.001$).

CONCLUSION: This analysis of craniosynostosis surgery hospital volume suggests that no significant differences exist in complication rates based on hospital case volume. However, hospital volume is an important predictor of resource utilization, and most notably length of stay and total hospital charge differences were seen. This investigation of craniosynostosis surgery may suggest opportunities for quality improvement.

Nasal Lining Flaps for Closure of the Nasal Floor in Unilateral and Bilateral Cleft Lip and Palate Repairs Reduces the Rate of Alveolar Fistula Formation

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INTRODUCTION: This study was performed to assess the efficacy of the nasal lining flaps for closing the nasal floor in unilateral and bilateral cleft lip and palates. We believe this technique is superior to traditional techniques, resulting in a low rate of fistula formation at the alveolus.

Some surgeons do not close the nasal floor during primary cleft lip repair, leaving a symptomatic alveolar fistula that is present until the alveolar bone grafting. The traditional approach for closure involves the use of anteriorly-based medial (M-flap) and lateral (L-flap) skin flaps. However, these skin flaps are thin and provide notoriously unreliable coverage.

The nasal lining flaps were devised to reconstruct the nasal floor with robust, well-vascularized flaps. These flaps create an anatomic reconstruction of the nasal floor while providing support for the alar base(s). The undersurface of the one-layer repair eventually fills in secondarily.

METHODS: Cleft repairs performed by two craniofacial surgeons at a university children's hospital were identified. One surgeon used the nasal lining flaps while the other used primarily M- and L-flaps to close the nasal vestibule. Patients were included in the study if they had a complete cleft lip and palate and at least 6 months of follow-up.