**Affiliation: Beth Israel Deaconess Medical Center / Harvard Medical School, Boston, MA**

**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**

**Presenter: Paul A. Mittermiller, MD**

**Co-Authors: H. Peter Lorenz, MD; Rohit K. Khosla, MD; Harleen Sethi, BS**

**Affiliation: Stanford University, Stanford, CA**

**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.
RESULTS: There were 64 patients in the study. Thirty-seven (37) underwent closure with nasal lining flaps while 27 underwent closure using traditional techniques. The rates of alveolar fistula formation were 3% (1/37) and 30% (8/27), while the rates of non-alveolar fistula formation were 16% (6/37) and 15% (4/27), respectively. The lower rate of alveolar fistula formation in the group that underwent closure with the nasal lining flaps was statistically significant (p=0.003, Fisher’s exact test). There was no statistically significant difference in rates of non-alveolar fistula formation (p=1, Fisher’s exact test).

CONCLUSION: The nasal lining flaps have multiple advantages. This technique closes the nasal floor at the time of primary lip repair, when visualization is easiest. The repair is simple to perform and has a high success rate. Closure of the alveolar region with soft tissue likely improves quality of life by preventing fluid or food regurgitation into the nose. The nasal floor closure does not prevent the need for bone grafting, but can make the surgery easier since the nasal side is already closed.

RESULTS: A total of 329 patients with CLP and 131 controls were included in the study. Upon bivariate analysis, the following factors were associated with CLP: maternal tobacco exposure (p<0.001), complications during pregnancy (p<0.001), maternal hypertension (p=0.01), mother not on any medications (p<0.001), mother not receiving vaccinations (p<0.001), and lower socioeconomic status (p<0.001). After adjustment for these variables, having a smoking parent was associated with a 2.09 times increased odds of the child developing CLP (95% CI 1.22–3.58). Complications during pregnancy (OR=2.38, 95% CI 1.45–3.90), mother receiving vaccinations (OR = 0.32, 95% CI 0.16–0.64), and higher socioeconomic status (OR = 0.15, 95% CI 0.04–0.63) were also associated with CLP.

CONCLUSION: While previous studies have consistently shown maternal tobacco exposure to be associated with development of orofacial clefts in the child, this study identifies and accounts for possible confounding variables in a case-control design, thereby providing a quantified estimate of the risk conferred by maternal tobacco exposure. This finding will be of value to providers in the context of perinatal counseling.

Reference Citations:
1. Wyszynski DF, Duffy DL, Beaty TH. Maternal Cigarette Smoking and Oral Clefts: A Meta-analysis. Cleft Palate-Craniofacial J. 1997;34(3):206–210. doi:10.1597/1545–1569(1997)034<0206:MCSAOC>2.3.CO;2.
2. Little J, Cardy A, Munger RG. Tobacco smoking and oral clefts: a meta-analysis. Bull World Health Organ. 2004;82(3):213–218.
3. Xuan Z, Zhongpeng Y, Yanjun G, et al. Maternal active smoking and risk of oral clefts: a meta-analysis. Oral Surg Oral Med Oral Pathol Oral Radiol. 2016;122(6):680–690. doi:10.1016/j.oooo.2016.08.007.