inborn population were associated with physician-prescribed opiates, buprenorphine and methadone. Future efforts will involve development of a statewide registry to capture all live births in the state detailing true incidence of NAS, opiate exposure, clefting, and associations between them.

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Assessing Soft Palate Movement at 15 Frames per Second Using Real-Time MRI

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INTRODUCTION: Velopharyngeal insufficiency (VPI) is a condition in which the soft palate fails to block airflow into the nose in up to 28% of patients with cleft palate. Hypernasal speech is common in patients with VPI, where most consonant sounds are generated by inappropriate airflow through the nose. Current clinical measurements to assess speech are invasive, uncomfortable, or involve exposure to radiation. Advances in MRI technology and image reconstruction have led to fast image acquisition with high in-plane resolution. This emerging technology, so called real-time MRI, provides continuous imaging of moving structures, which allows functional, noninvasive assessment of internal organs. In this study, we developed a real-time MRI sequence to provide non-invasive, dynamic visualization of the soft palate in subjects while speaking.

METHODS: All studies were conducted at a 3T MRI Philips scanner following IRB approval. Subjects were examined in a supine position. High-resolution MR-images were acquired using a head MRI coil to visualize and plan the MR images. Real-time MRI studies were acquired at 15 frames per second using highly under-sampled RF spoiled radial FLASH MRI sequence (TR=2.22ms, TE= 1.44ms, flip angle 5°, spokes 25, slice thickness 10mm). Participants were asked to perform different speech assignments to assess the soft palate dynamic function. Image reconstruction by regularized nonlinear inversion was performed using algorithms written in MATLAB.

RESULTS: We developed a real-time MRI sequence that provided high image quality at a scan rate of 15 frames/sec. Besides the clinical demonstration of the feasibility of real time MRI in evaluating speech, the primary result provided detailed information regarding the soft palate and the posterior pharyngeal wall in motion while speaking.

CONCLUSION: Real-time MRI provides non-invasive, dynamic visualization of palatal movement during speech that can assess the soft palate function in patients who underwent cleft palate repair.

High Volume Centers are Associated with Improved Short-Term Outcomes Following Cleft Palate Repair

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PURPOSE: High volume centers (HVC) are commonly associated with increased resources and improved patient outcomes. Little analysis of hospital volume in the context of cleft palate repair has not been reported. The purpose of our study was to compare patient demographics and postoperative outcomes of cleft palate repair in high and non-high volume centers.

METHODS: Primary, revision, older (>15months), and total cleft palate procedures were identified in the Kids’ Inpatient Database from 2003–2009. HVC were defined by 90th percentile of case volume or higher (≥48 cases/year). Data were combed for demographics, perioperatives, complications, and
hospital data. Charleston Comorbidity Index was calculated and compared. Bivariate and multivariate analyses were conducted between high volume and non-high volume centers (NHVC) across all cohorts of cleft repair.

RESULTS: 4563 (61.7%) total cleft palate surgeries were performed in HVC and 3388 (38.3%) were performed in NHVC. NHVC treated a higher percentage of Medicaid patients, while HVC treated more patients with private insurance (p=0.005). Older and total patients treated at HVC were more often from higher income quartiles (p<0.001; p=0.018). HVC across all 4 groups had larger bedsizes (p<0.001), were more often government/private owned (p<0.001), and were more often teaching hospitals (p<0.001) located exclusively in urban settings (p<0.001).

Primary patients treated at HVC were repaired at significantly younger ages (p=0.008) and were more often males (p=0.032). Across total, primary, and older patients, the most common diagnosis at HVC was complete cleft palate with incomplete cleft lip, while the most common diagnosis at NHVC was incomplete cleft palate without lip. In older patients, both HVC and NHVC patients were most commonly diagnosed with complete cleft palate with incomplete lip. In the primary, revision, and total cohort, significantly more concurrent procedures were performed in HVC (p=0.047; p=0.001; p<0.001).

Overall, primary, and revision length of stay (LOS) was significantly longer in NHVC (p=0.048; p=0.001; p=0.010) and approached significance in the older group (p=0.060). Overall, HVC were associated with a lower specific complication rate (p=0.042). Primary HVC experienced lower specific complication rates (p=0.023) and pneumonia rates (p=0.009). Revision HVC were associated with fewer cardiovascular complications (p=0.040) and older HVC with less wound disruption, approaching significance (p=0.050), but also more hemorrhage (p=0.040).

CONCLUSION: The majority of cleft palate cases nationwide are performed at the top 10% case volume centers. Our analysis revealed HVC are associated with better short-term outcomes across all patient groups and surgery types. HVC may be better equipped to handle complex patients, such as those with more extensive defects receiving multiple concurrent procedures. Furthermore, HVC treated patients from higher income brackets with private insurance, while NHVC treated lower income patients paying with Medicaid. Among many factors, this may reflect challenges faced by disadvantaged patients living in rural areas in accessing HVC. We recommend future efforts to focus on equilibrating access to care for all patients seeking cleft palate surgeries, particularly to HVC.

NAM Vs Lip Adhesion: A Cephalometric Comparison

Presenter: Jack Brooker, MB BChir

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BACKGROUND: Patients with cleft lip and palate frequently undergo nasoalveolar molding (NAM) or lip adhesion (LA) to guide the cleft segments together in preparation for definitive repair. This study reports the effect of these primary interventions on eventual permanent incisor inclination.

METHODS: This is a retrospective study at a tertiary craniofacial center. Patients with unilateral or bilateral cleft lip and palate, who had undergone LA or NAM, with follow-up imaging between ages of 7–9 were included. Patients were further categorized based on gingivoperiostioplasty (GPP) status. Patients with phase one orthodontic therapy were excluded. Cephalogram analysis used Dolphin software (©Dolphin imaging and management solutions). Measures taken: U1-NA(mm) and U1-SN, U1-FN, U1-NA, SNA, SNB, ANB (°) and were compared to Bolton normative measurements.

RESULTS: Inclusion criteria yielded 50 children who received NAM (22 patients with GPP) and 18 children who received lip adhesion (2 patients with GPP). U1-SN angle was 73.6° for NAM and 88.4° for lip adhesion (p<0.0033). U1-FH angle was 83° for NAM and 96.3° for lip adhesion (p<0.0057). U1-NA angle was -2.1° for NAM and 10° lip adhesion (p<0.025). U1-NA distance was not significantly different between treatment groups. Differences in angles ANB, SNB and SNA were non-significant. Overjet (mm) was -7.07 and-1.65 for NAM and LA, respectively and for underjet 78 and 47.1%, respectively (P<0.002). Combining NAM and lip adhesion patients: U1-SN angle, U1-FH angle, U1-NA angle were 82.3, 91.1 and 7.6° respectively for unilateral cleft