CRANIOFACIAL ABSTRACTS

Intracranial Hypertension and Cortical Thickness in Syndromic Craniosynostosis

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INTRODUCTION: Intracranial hypertension (ICH) is a frequent indication for surgical intervention in syndromic craniosynostosis. Various clinical risk factors have been described, but potential effects on underlying brain morphology have not been investigated. This study seeks to evaluate the impact of ICH risk factors on cerebral cortex thickness in syndromic craniosynostosis.

METHODS: Patient records and imaging were reviewed for ICH risk factors and demographic data including papilledema, hydrocephalus, moderate to severe obstructive sleep apnea, cerebellar tonsillar position, occipitofrontal circumference curve deflection, age at the time of scan, and sex in 107 syndromic (Apert, Crouzon, Pfeiffer, Muenke, Saethre-Chotzen) craniosynostosis patients. One hundred seventy-one magnetic resonance imaging scans of these patients were then analyzed. Average cortical thickness estimates were obtained via an auto-segmentation/auto-parcellation image processing software (FreeSurfer) and exported for statistical analysis. A linear mixed-effect model accounting for repeated measurements, age, gender, and syndrome influences was developed to determine impact of ICH risk factors on cerebral cortex thickness changes (significance $P < 0.05$).

RESULTS: Average cortical thickness in this cohort was 2.78 ± 0.17 mm with an average age of 8.88 years (range, 1.15–34.03) at the time of scan. Cortical thickness did not vary significantly by sex ($P = 0.534$) or syndrome ($P = 0.896$) as independent predictors. A history of papilledema ($P = 0.036$) or hydrocephalus ($P = 0.007$) before scan date was associated with thinner cortices than those without. Average cortical thickness was also shown to significantly vary with the age of the patient at the time of magnetic resonance imaging ($P < 0.001$), with older patients having thinner cortices. History of moderate to severe obstructive sleep apnea (oAHI > 5) ($P = 0.464$), cerebellar tonsil position ($P = 0.682$), or history of occipitofrontal circumference curve deflection ($P = 0.375$) before scan date did not result in significant cortical thickness changes.

CONCLUSIONS: Our results indicate that a history of hydrocephalus or papilledema results in a thinner cerebral cortex on average in syndromic craniosynostosis patients. This suggests structural consequences from the development of ICH and may support early intervention to avoid such effects. Further investigation is needed to evaluate the link between these findings, timing of intervention, and neuropsychological development.

Increasing Incidence of Craniosynostosis in the United States: Is Folic Acid Supplementation Responsible?

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PURPOSE: Craniosynostosis, the premature fusion of cranial sutures, has increased in both prevalence and incidence as reported by international studies.[1,2] To our knowledge, no recent studies have evaluated increasing incidence in the United States; therefore, we sought to evaluate if there was a significant increase in our national incidence of craniosynostosis. Methotrexate, a folic acid antagonist, has been associated with an increase in craniosynostosis.[3] There has been a decrease in the incidence of cleft anomalies following the implementation of the folic acid supplementation program in 1998 within the United States. Both of these anomalies seem affected by folate. We hypothesize that there is a reciprocal relationship between cleft and craniosynostosis and seek to investigate the theory that as folate supplementation penetrates the population, we see a gradual increase in the incidence of craniosynostosis.

METHODS AND MATERIALS: The National Inpatient Sample Database was consulted to identify infants born with craniosynostosis between 2004 and 2013. Data were collected from the US Center for Disease Control and Prevention, including incidence of influenza virus infection according to year and month. Using multivariable logistic regression, we examined the relationship between craniosynostosis and the independent variables month and year. We then utilized mixed-effects logistic regression to estimate the odds ratio of occurrence of craniosynostosis in