matrix = 96X96. Analysis of Functional Neuroimaging (AFNI) software was used to register and analyze imaging data, and identify neural networks demonstrating altered resting connectivity before and after surgery.

RESULTS: Early data acquisition was plagued by motion artifact and physiologic perturbation confounding the results. The focus of this report compares clean pre- and post-operative datasets in the same individual; preliminary analysis confirms improved resting state connectivity in both the visual and sensorimotor networks, both in amplitude of BOLD signal and the extent of the networks. Furthermore, the networks in general in several subjects show improved symmetry following surgery.

CONCLUSIONS: Resting-state connectivity fMRI is a sensitive and objective means of measuring functional impact on brain function of surgical treatment, and can be safely employed in infants. In cranial surgery the acute expansion of the intracranial space undoubtedly affects intracranial pressure dynamics, which impacts neuronal activity reflected in an altered BOLD signal. If preservation of brain function is the overarching goal of surgery, and not simply cosmesis, fMRI will provide the means to prove it, as well as have future application as an objective measure by which to validate more traditional neuropsychological testing in this population.

Endoscopic Strip Craniectomy Yields Better Results than Pi Craniectomy for Treatment of Sagittal Craniosynostosis

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BACKGROUND: There remains much controversy regarding the best treatment for sagittal craniosynostosis. We compared the open “Pi” craniectomy versus minimally-invasive endoscopic strip-craniectomy followed by helmet therapy. Our aim was to compare surgeries for sagittal craniosynostosis that are done at relatively young ages, and this is the first ongoing study to our knowledge that compares these two techniques. We compared the resulting cranial indices (CI) and examined effects of timing of surgery.

METHODS: This IRB-approved, retrospective study included 54 patients diagnosed with non-syndromic, single-suture sagittal craniosynostosis who were treated between 2009–2014 at Children’s National Medical Center with Pi-craniectomy (n=24) or endoscopic strip-craniectomy followed by helmet therapy (n=30). Patients included in the study had follow-up appointments more than 3 months after surgery.

RESULTS: Average age at surgery was slightly younger for endoscopic patients (3.07 months) compared to Pi patients (5.05 months). Both groups started with statistically similar cranial index measurements, but endoscopic patients experienced a 13.3% increase in CI (CI=0.683 to CI=0.774) with average f/u of 1.5 years compared to Pi patients’ 5.5% increase (CI=0.685 to CI=0.723) with average f/u of 2.4 years (p<0.05). Hospital stay (1.17 days vs. 1.96 days) and operation duration (69.2 minutes vs. 91.7 minutes) were shorter for endoscopic patients (p<0.05). Estimated blood loss (35.3 ml vs 48.5 ml) was less for endoscopic patients, resulting in a decreased intraoperative blood transfusion rate for endoscopic (16%) versus Pi (29%) patients. The results of endoscopic patients were better when their surgeries were done at younger ages (endoscopic +1.43%CI/month younger; Pi +0.39%CI/month younger), but their results were still better in absolute terms compared to Pi patients even when the endoscopic surgeries were done at older ages.

CONCLUSION: While both techniques were effective at treating sagittal craniosynostosis, endoscopic strip craniectomy showed superior results compared to Pi craniectomy. Younger age at surgery was more important for endoscopic cases for improved results, but endoscopic patients who had surgery at older ages still had better results compared to Pi patients.

Impact of Age at Whole-Vault Cranioplasty and Reoperation on Long-Term Neurocognitive Outcomes in Sagittal Craniosynostosis

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