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

Authors: Suresh N. Magge, MD, Arthur R. Bartolozzi, Tiffani DeFreitas, John S. Myseros, MD, Chima Oluigbo, MD, Gary F. Rogers, MD and Robert F. Keating, MD

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Study Design: Retrospective Chart Review

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.