

Brain Morphology in Nonsyndromic Unicoronal Craniosynostosis

KRISTINA ALDRIDGE,^{1*} ALEX A. KANE,^{2,3} JEFFREY L. MARSH,^{3,4}
JAYESH PANCHAL,^{3,5} SIMEON A. BOYADJIEV,^{3,6} PENG YAN,¹
DANIEL GOVIER,² WARDA AHMAD,⁵ AND JOAN T. RICHTSMEIER^{1,3}

¹Department of Anthropology, Pennsylvania State University,
University Park, Pennsylvania

²Cleft Palate and Craniofacial Deformities Institute, St. Louis Children's Hospital,
Section of Pediatric Plastic Surgery, Washington University School of Medicine,
St. Louis, Missouri

³Center for Craniofacial Development and Disorders, Johns Hopkins Hospital,
Baltimore, Maryland

⁴Cleft Lip/Palate and Craniofacial Deformities Center, Kids Plastic Surgery,
St. John's Mercy Medical Center, St. Louis, Missouri

⁵Oklahoma University Health Science Center, Oklahoma City, Oklahoma

⁶Johns Hopkins Medical Institutions, McKusick-Nathans Institute of Genetic
Medicine, Baltimore, Maryland

ABSTRACT

Studies of isolated craniosynostosis have shown biomechanical and biochemical influences on the craniofacial phenotype, resulting from both genetic and epigenetic factors. Much less attention has been directed toward the morphology of the brain, despite the interactive nature of the developing skull and developing brain. The aim of this study is to define the morphology of the brain in nonsyndromic unilateral coronal synostosis (UCS) in order to form more complete hypotheses about the cause of craniosynostosis. Landmark coordinate data were collected from 3D magnetic resonance image reconstructions of the brain in a sample of UCS patients and an age-matched morphologically normal cohort. These data were analyzed using Euclidean distance matrix analysis. The results of our study demonstrate that despite the basic similarity of overall shape of the brain and skull in UCS, the effects of craniosynostosis on the brain are not localized to structures immediately adjacent to the fused suture or to the endocranial surface of the skull. Rather, alterations are observed throughout the volume of the brain, with subcortical structures altered in conjunction with cortical changes. These results indicate that the morphological correlates are different for brain and skull and suggest that there is a large degree of independence in the developmental trajectories of the brain and skull. © 2005 Wiley-Liss, Inc.

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