

Rotation of the Ipsilateral Supraorbital Rim Around the Horizontal Axis in Unilateral Coronal Synostosis: A Craniometric Analysis of the Emergence Profile

Presenter: Paymon Sanati-Mehrizy, MD

Co-Authors: Ilana Margulies, MS, Pedram Goel, BS, Peter M. Som, MD, Mark M. Urata, MD, Peter J. Taub, MD

Affiliation: Icahn School of Medicine at Mount Sinai, New York, NY

Introduction: Unilateral coronal synostosis (UCS) results in well-defined dysmorphic changes including sphenoid malposition yielding posterior displacement of the orbital bandeau. Although ipsilateral supraorbital bar rotation along the *horizontal* axis has been suggested, it has not been previously investigated. Thus, the authors sought to characterize the rotation of the ipsilateral supraorbital bar in UCS through craniometric analysis.

Methods: 35 non-syndromic UCS patients (0-18 months) with CT images obtained prior to operative intervention and 16 control patients (0-24 months, 32 orbits) were included and divided into age matched groups. Prior to analysis, the sagittal CT images depicting the largest area of each orbit were isolated and the angulation of each cranial base was standardized at 0° horizontal. Craniometric measurements were taken in ImageJ 1.52a, and statistical analysis comparing the ipsilateral supraorbital bar in UCS patients with both sides of control patients was performed in GraphPad Prism 8 using unpaired t-test ($p < 0.05$). Interaction analysis was performed in SAS 9.4 (Cary, N.C.) using a two-way ANOVA model ($p < 0.05$).

Results: The ipsilateral supraorbital bar was significantly rotated around the horizontal axis when measured in reference to the 0° vertical in UCS vs. control patients by an average difference of 7.1° to 10.9° across age groups ($p < 0.05$). No significant effect modification was detected between age and UCS on ipsilateral supraorbital bar rotation ($p > 0.05$). Additional angles with vertices around the superior orbital circumference were then measured to locate the likely apex of rotation, and revealed a significant decrease in the posterior orbital roof to 0° horizontal in UCS patients by an average of 8.4° to 22.5° across age groups ($p < 0.05$).

Conclusion: Rotation of the ipsilateral supraorbital bar around the horizontal axis in UCS is confirmed and quantified, and the apex of this rotation likely lies at the posterior orbital roof. The novel characterization and quantification of this deformity will better inform the operative approach and enable a more accurate surgical correction.