Bilateral Endoscopic Suturectomy and Helmet Therapy for Bilateral Coronal Craniosynostosis: A Craniometric Evaluation

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Introduction

The best treatment for turricephaly associated with bilateral coronal synostosis (BCS) is early intervention to halt its development. Our center employs bilateral endoscopic coronal suturectomy with helmeting (BES) as a first treatment of BCS. We report a craniometric evaluation of our surgical outcomes compared to controls.

Methods

A retrospective study was completed of patients who underwent BES with pre- and postop CTs. Sagittal and axial views were measured by three examiners. Measurements included: anterior cranial base length (ACBL; sella-nasion), anterior bossing angle (ABA; sella-nasion-anterior frontal bone), cranial length (CL), and cranial width (CW). Cranial heights were measured perpendicular to ACBL at nasion (anterior), sella (middle), and basion (posterior). Cranial heights were normalized to ACBL (cranial height/ABCL). Ventricular widths were measured and frontal-occipital horn ratio (FOHR) was calculated.

Results

Twelve BCS patients had preop and postop CTs performed at 1.1mo (0.03-2.6) and 19.6mo (10.8-37.5). Thirteen trauma patients (mean age 1.3mo) and another 14 patients (mean age 18.5mo) served as controls. Turricephaly was greatest anteriorly. Preop anterior cranial heights (ACH) were significantly greater than controls (67.9 vs 40.7; $p<0.00001$). ACH increased only 2.8mm ($p=0.196$) while the ACBL increased 17.3mm ($p<0.00001$). The ACH/ACBL ratio improved significantly (1.92 to 1.63; $p=0.00149$) but remained higher than controls (1.36; $p=0.0058$). Frontal bossing resolved. Preoperative ABAs were significantly greater than controls (115.0 vs 105.6; $p=0.0014$). Postop values normalized (108.6 vs 109.3; $p=0.792$). The cephalic indices improved from 92.5 to 85.3 ($p=0.0002$). The mean FOHR was 0.3 for all groups. Standard deviation and Pearson's correlation coefficient were calculated to evaluate intra- and inter-observer repeatability. The results showed a strong correlation for both intra- and inter-observer Pearson's correlation coefficient (>0.88).

Conclusions

Early BES is a rational alternative to posterior distraction in ameliorating the deformity of BCS. This procedure reduces anterior turriciephaly, corrects frontal bossing, and improves the cephalic index. Our craniometric evaluation demonstrated consistency in intra- and inter-observer repeatability.

Learning Objectives

Participants will learn that endoscopic suture release with helmet therapy is a viable initial treatment option for patients with bilateral coronal craniosynostosis and will be presented with data documenting its efficacy in improving brachycephaly and turricephaly.

Figure 1. Bilateral Coronal Craniosynostosis

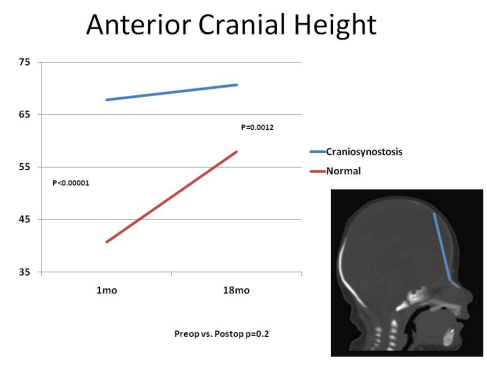

Figure 2. Anterior Cranial Base Height

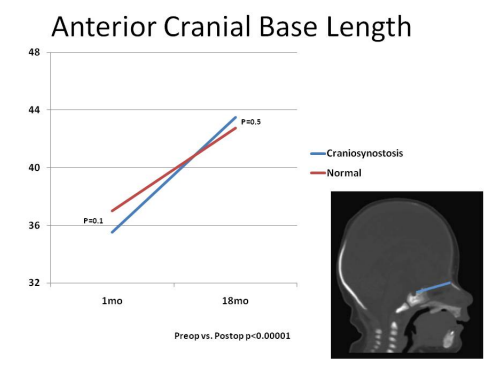

Figure 3. Anterior Cranial Base Length

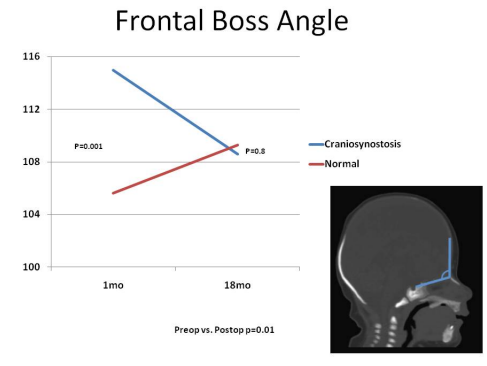

Figure 4. Frontal Boss Angle