CONCLUSIONS: Bitemporal to biparietal ratios are a quantitative, objective clinical measure that can be used to differentiate patients with significant trigonocephaly from those with metopic ridging but no significant cranial deformity. In no case of trigonocephaly did CT scan provide information that would alter surgical planning beyond that obtained from caliper measurements. These findings confirm that caliper-derived indices can accurately characterize surgically relevant cranial vault deformities secondary to metopic synostosis. Caliper-derived measures can reliably replace CT-based analysis, keeping pace with changing demands for health care delivery in infants with metopic synostosis.

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Language Phoneme Discrimination in Infants with Sagittal Craniosynostosis: An ERP Study

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PURPOSE: Neurocognitive deficits associated with craniosynostosis in infancy are poorly characterized. With school-age neurocognitive studies of craniosynostosis revealing impairments in language-related abilities (e.g., reading and spelling), early language processing is of particular interest. We compared neural response to speech sounds in infants with nonsyndromic sagittal craniosynostosis (NSC) using event-related potentials (ERPs) to characterize differences in language processing. Given its association with language impairments in infancy (e.g. dysphasia, cleft palate), we analyzed the mismatch negativity (MMN) component evoked by distinct speech sounds. Studying the MMN expands on our previous work examining other auditory ERPs in NSC infants.

METHODS: EEG was recorded while 39 infants (12 NSC, 27 control; ages 2 to 8 months) listened to the Hindi dental /da/ and retroflex /da/ phonemes (non-native phonemic discrimination task). Frontal and central electrodes were used for analysis. The MMN was extracted as the peak amplitude of the largest negative deflection in the difference wave (retroflex minus dental) over 80-300ms post-stimulus. Differences in MMN were analyzed using repeated measures analysis of variance (group as between subjects factor; region, hemisphere as within subjects factors).

RESULTS: MMN amplitude was lower in magnitude in the NSC infants compared to controls (p=0.047). A significant region by group interaction (p=0.045) was observed, and pairwise comparisons revealed that NSC infants displayed attenuated MMN in the frontal electrodes compared with controls (p=0.010). A significant region by hemisphere interaction (p=0.012) was also observed, and pairwise comparisons revealed a trend of higher magnitude MMN in the frontal region compared to central region in the left hemisphere (p=0.074).

CONCLUSION: The MMN was significantly attenuated in NSC infants compared to controls. This finding suggests atypical neural response to language in NSC infants. Given the association of these brain responses with phoneme discrimination, our findings have important implications for the understanding the later language impairments observed in school-aged individuals with NSC.

Standardized Protocol for Visual Surgical Plan and Three Dimensional Surgical Template-Assisted Single-Stage Mandible Contour Surgery

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BACKGROUND: Mandible contour surgery, such as reduction gonioplasty and genioplasty, has become increasingly popular in East Asia. However, it is technically challenging, and hence, leads to a long learning curve, high complication rates, and often needs secondary revisions. The increasing use of three-dimensional (3D) technology makes accurate single stage mandible contour surgery with minimum complication rates possible with a virtual surgical plan (VSP) and 3D surgical templates. This study is to establish a standardized protocol for VSP and 3D surgical templates-assisted mandible contour surgery and evaluate the accuracy of the protocol.

METHODS: In this study, we enrolled 20 patients for mandible contour surgery. Our protocol is to perform VSP based
on 3D CT data. Then design and 3D print surgical templates based on preoperative VSP. The accuracy of the method was analyzed by 3D comparison of VSP and post-op results utilizing detailed computer analysis.

RESULT: All patients had symmetric, natural osteotomy lines, and satisfactory facial ratios in a single-stage operation. The average relative error of VSP and post-op result on the entire skull was 0.41 ± 0.13 mm. The average new left gonial error (Go’-L Error) was 0.43 ± 0.77 mm. The average new right gonial error (Go’-R Error) was 0.45 ± 0.69 mm. The Average pognion error (Pg error) was 0.79 ± 1.21 mm. Patients were very satisfied with the aesthetic results. Surgeons were also very satisfied with the performance of surgical templates to facilitate the operation.

CONCLUSION: Our standardized protocol of VSP and 3D printed surgical templates assisted single-stage mandible contour surgery result in accurate, safe, and predictable outcome in a single-stage.

Conflicts of Interest and Source of Funding

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Nasal Monobloc for Late Nasal and Orbital Asymmetry of Unicoronal Synostosis

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PURPOSE: Patients with unicoronal synostosis may develop asymmetries of the orbits and nasal complex long after fronto-orbital advancement. To address these asymmetries, the nasal monobloc procedure was designed at our institution. A nasal monobloc mobilizes a united nasal and medial orbital segment of bone to perform corrective translational and rotational movement. The purpose of this study was to examine the surgical outcomes of nasal monobloc for orbital and nasal asymmetry related to unicoronal synostosis.

METHODS: A retrospective review of all patients treated with nasal monobloc at our institution was performed. Demographic information was recorded, and relevant imaging (3D and 2D photographs) was utilized for outcome analysis. From imaging, nasal deviation on frontal view, nasal deviation on basal view, and orbital aperture width were assessed. Aperture index (Left aperture width/right aperture width) was calculated from aperture width measurements to compare orbital symmetry. Patients without imaging were excluded.

RESULTS: Inquiry yielded ten patients treated with nasal monobloc, and of these, six patients (3 males, 3 females) had adequate imaging for analysis. Three patients had 3D images, and in the remaining three patients 2D photographs were utilized. 3D images (n=3) exhibited correction of frontal nasal deviation by 67.24% (5.35 degrees), basal nasal deviation by 62.47% (4.52 degrees), and aperture index asymmetry by 79.95%. 2D images (n=3) revealed improvement of frontal nasal deviation by 53.14% (2.95 degrees), basal nasal deviation by 49.75% (2.40 degrees), and aperture index asymmetry by 59.22%. Follow was 3.5 to 68.1 months (mean=22.6 months). All patients were satisfied with their outcome, and no revisions were undertaken.

CONCLUSIONS: Nasal monobloc is a reasonable surgical treatment to improve the long-term sequelae of unicoronal synostosis, including frontal nasal deviation, basal nasal deviation, and orbital aperture asymmetry.

Osseointegrated Orbital Reconstruction: A 24-Year Experience

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PURPOSE: Osseointegrated implants have been used for craniofacial prosthetic reconstruction since 1979. Since then, they have been used for prosthetic rehabilitation of a variety of facial defects. The authors sought to review long-term results of osseointegrated orbital reconstruction at the Institute for Reconstructive Sciences in Medicine (iRSM).

METHODS: 26 patients have undergone osseointegrated orbital prosthetic (OOP) reconstruction at the iRSM since 1990. A retrospective chart review was performed to determine demographics, skin reactions and implant failures. 7 patients are deceased; therefore a satisfaction survey was sent to the remaining 19 patients. Patient satisfaction was assessed through a questionnaire used in previous osseointegration studies. Multivariate binary logistic regression