

**Trigonocephaly: Are we able to establish objective clinical parameters without the need for CT-based analysis?**

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**INTRODUCTION:** The majority of studies of patients with metopic synostosis have focused on CT-based parameters to characterize resultant trigonocephaly. However, with increasing concern over radiation in infants, a simpler form of objective testing is essential. The present study seeks to develop a non-invasive, reproducible tool by which to characterize trigonocephaly.

**MATERIALS AND METHODS:** A retrospective chart review identified patients with trigonocephaly for whom the senior surgeon (AKG) recommended surgery. These patients all underwent baseline CT scan. A second group of patients was identified with metopic ridging without trigonocephaly, and a third group of normal age-matched controls was evaluated. Cranial vault caliper measurements were compared across groups. In addition to traditional cranial vault measurements, two unique measures of anterior vault constriction in the bitemporal region were developed: (1) ratio of the bitemporal width at the mid-forehead to the biparietal width (MF/BP), and (2) ratio of the bitemporal width at the lateral brow to the biparietal width (LB/BP). Groups were compared by ANOVA and post-hoc Tukey's HSD test.

**RESULTS:** 19 trigonocephaly patients and 8 metopic ridge patients with caliper measurements at the time of consultation were identified. Caliper measurements from 19 normal controls were obtained. Cranial indices were not significantly different across groups (0.82 vs 0.83 vs 0.82,  $p>0.05$ ). The MF/BP ratio was significantly lower in trigonocephaly compared to both metopic ridges and normal controls (0.71 vs 0.76 vs 0.76,  $p<0.05$ ); there was no difference between metopic ridges and normal controls. The LB/BP ratio was significantly different between all three groups (0.63 vs 0.68 vs 0.75,  $p<0.01$ ). Furthermore, a subset of 3 trigonocephaly patients that were noted to be "mild" on presentation had MF/BP and LB/BP ratios similar to the metopic ridge group (0.76 vs 0.76, 0.66 vs 0.68).

**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.