Trigonocephaly Classification

In this pathology different degrees of dysmorphia of the anterior cranial fossa and the presence of associated anomalies of the skull might enable specific subgroups to be identified.

Metopic synostosis can be divided into two distinct severity indices. The severe group has significantly narrower orbitofrontal dimensions, whereas the moderate group does not differ from control. Characterization of trigonocephaly may shed light on the etiopathogenesis of disease [1)].

Previous studies have demonstrated that anthropometric indices can be successfully used in the assessment of metopic synostosis. Kolar and Salter [2)] assessed 24 anthropometric measurements in patients with trigonocephaly and calculated 11 cranial indices. They found that the cephalic index (CI), the EuD taken over the glabella-opisthocranion diameter, did not differ significantly between controls and patients with trigonocephaly. However, they also described the frontoparietal index (FPI), calculated from the frontotemporal diameter taken over the EuD, which was significantly lower in patients with metopic synostosis [3)].

Wang et al. described the metopic index (MI), a simple anthropometric cranial measurement. The measurements can be obtained from CT scans and, more importantly, from palpable cranial landmarks, and the index provides a rapid tool for evaluating patients in both pre- and postoperative settings.

High-resolution head CT scans obtained in 69 patients (age range 0-24 months) diagnosed with metopic craniosynostosis were retrospectively reviewed. Preoperative 3D reconstructions were available in 15 cases, and these were compared with 3D reconstructions of 324 CT scans obtained in a control group of 316 infants (age range 0-24 months) who did not have any condition that might affect head size or shape and also in a subset of this group, comprising 112 patients precisely matched to the craniosynostosis patients with respect to age and sex. Postoperative scans were available and reviewed in 9 of the craniosynostosis patients at a mean time of 7.1 months after surgical repair. 3D reconstructions of these scans were matched with controls based upon age and sex.

The mean preoperative MI for patients with trigonocephaly was 0.48 (SD 0.05), significantly lower than the mean values of 0.57 (SD 0.04) calculated on the basis of all 324 scans obtained in controls ($p < 0.001$) and 0.58 (SD 0.04) for the subset of 112 age- and sex-matched controls ($p < 0.001$). For 7 patients with both pre- and postoperative CT scans available for evaluation, the mean postoperative MI was 0.55 (SD 0.03), significantly greater than their preoperative MIs (mean 0.48 [SD 0.04], $p = 0.001$) and comparable to the mean MI of the controls ($p = 0.30$). In 4 patients, clinically obtained postoperative MIs by caliper measurement were comparable to measurements derived from CT ($p = 0.141$).

The MI is a useful measurement of the severity of trigonocephaly in patients with metopic synostosis. This simple quantitative assessment can potentially be used in the clinical setting to guide preoperative evaluation, surgical repair, and postoperative degree of correction [4)].

1)

Beckett JS, Chadha P, Persing JA, Steinbacher DM. Classification of trigonocephaly in metopic synostosis. Plast Reconstr Surg. 2012 Sep;130(3):442e-447e. doi: 10.1097/PRS.0b013e31825dc244. PMID: 22929268.
[2)]
Kolar JC, Salter EM: Preoperative anthropometric dysmorphology in metopic synostosis. Am J Phys Anthropol 103:341–351, 1997
[3)] [4)]
Wang JY, Dorafshar AH, Liu A, Groves ML, Ahn ES. The metopic index: an anthropometric index for the quantitative assessment of trigonocephaly from metopic synostosis. J Neurosurg Pediatr. 2016 Sep;18(3):275-80. doi: 10.3171/2016.2.PEDS15524. Epub 2016 May 6. PMID: 27153376.