Trigonocephaly diagnosis

- Extended Phenotype of Bilateral Coronal Craniosynostosis Due to Novel TCF12 Mutation
- Quantitative analysis of intracranial and intraorbital volume changes following craniosynostosis surgery: a retrospective imaging study
- Syndromic Craniosynostosis: The Hidden Burden of Comorbidities on Surgical Outcomes
- Laryngeal and pleural ultrasound and acoustic radiation force impulse elastography in dogs with brachycephalic obstructive airway syndrome
- Translation and evaluation of the Infant Characteristics Questionnaire in a sample of Swedish patients with craniosynostosis
- Objective Evaluation of 3D Morphology by Statistical Shape Modeling or Geometric Morphometrics Enabling Patient-Specific Treatment in Craniosynostosis-A Systematic Review
- Non-Surgical Management of Trigonocephalic Patients: An OCT and 3D-CT Based Follow-up Study
- Continuous automated analysis of facial dynamics of brachycephalic and normocephalic dogs in different contexts

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The diagnosis of trigonocephaly typically involves a combination of the following:

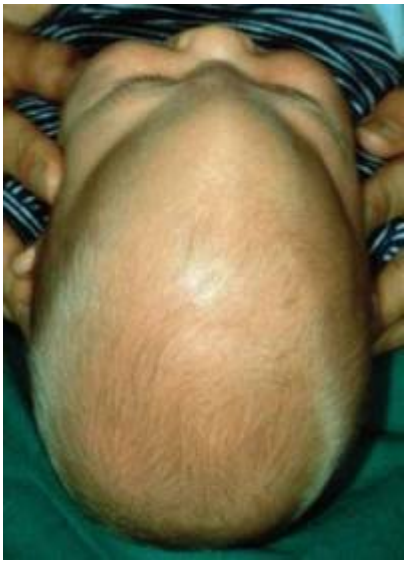
Physical examination: A healthcare provider, such as a pediatrician or craniofacial specialist, will visually inspect the shape of the child's head and feel the skull to assess the fusion of the metopic suture. Imaging tests:

CT (computed tomography) scan: This imaging test provides detailed, three-dimensional images of the skull, allowing the healthcare provider to confirm the premature fusion of the metopic suture and the characteristic triangular shape of the skull. MRI (magnetic resonance imaging): In some cases, an MRI may be used to further evaluate the brain and assess any potential associated brain abnormalities.

Genetic testing: In some cases, genetic testing may be performed to identify any underlying genetic conditions that may be associated with trigonocephaly.

Early diagnosis is important, as it allows for timely treatment and management of the condition. Treatment typically involves surgical intervention, such as cranial vault remodeling or distraction osteogenesis, to correct the skull shape and allow for normal brain and facial development. It's important to note that trigonocephaly can also be associated with other congenital conditions, such as Apert syndrome or Crouzon syndrome, so a comprehensive evaluation by a craniofacial specialist is recommended for accurate diagnosis and management.

Diagnosis can be characterized by typical facial and cranial deformities. Observatory signs of trigonocephaly are: a triangular - forehead seen from top view leading to a smaller anterior cranial fossa. a visible and palpable midline ridge.



The diagnosis of metopic suture synostosis remains controversial. The purpose of a study was to clarify, using geometric morphometric analysis, if a metopic ridge alone observed in cases of mild trigonocephaly represents a pathological phenomenon.

Three different cranial morphologies were compared among patients up to 2 years old who were categorized into the true group, the mild group, and the normal group, based on the presence or absence of specific symptoms, history of cranioplasty for trigonocephaly, or lack of any abnormality on computed tomography. Using the obtained computed tomography images, 235 anatomical landmarks and semi-landmarks were plotted on the entire cranial surface for analysis of neurocranial morphology, and the cranial shapes represented by landmarks were analyzed using geometric morphometrics. Principal components of shape variations among specimens were then computed, based on the variance-covariance matrix of the Procrustes residuals of all specimens, and statistically analyzed.

The principal component analyses of the variations in endocranial shape, frontal bone shape, and occipital bone shape did not show any significant differences in cranial morphology between mild trigonocephaly and normal skulls; however, true trigonocephaly was found to differ significantly from mild trigonocephaly and normal skulls.

These findings suggest that in assessments of cranial morphology, the presence of a ridge alone cannot be diagnosed as fundamentally pathological, and may represent normal morphology [1)]

Applegren et al. sought to determine the relationship between mild-to-moderate trigonocephaly and anterior cranial volume using a noninvasive laser shape digitizer (STARscanner) in patients with abnormal head shape.An IRB-approved retrospective review of a prospectively maintained database and medical records was performed. Two hundred three patients less than 1 year of age with abnormal head shape were categorized as having a metopic ridge with mild-to-moderate trigonocephaly, metopic ridge without trigonocephaly, or no ridge. Measurements of cranial volume, circumference, and symmetry were calculated by the STARscanner, which quantifies three-dimensional shape of the cranial surface. Measures were analyzed using a series of analyses of variance and post-hoc Tukey honest significant difference.

The authors results showed ACV was significantly reduced in patients with mild-to-moderate trigonocephaly compared with those without metopic ridge ($P = 0.009$), and trended toward

significance compared with those with a ridge but without trigonocephaly (P = 0.072). The ratio of anterior-to-posterior cranial volume was significantly reduced in those with mild-to-moderate trigonocephaly compared with those without metopic ridge (P = 0.036).

Patients with milder anterior cranial deformities demonstrated an association between a metopic ridge with mild-to-moderate trigonocephaly and reduced anterior cranial volume [2].

1)
Sakamoto Y, Amano H, Ogihara N, Miwa T, Tamada I, Hikosaka M, Imai K. Geometric Morphometric Study on Distinguishing Metopic Craniosynostosis from Metopic Ridging. Plast Reconstr Surg Glob Open. 2024 Aug 7;12(8):e6034. doi: 10.1097/GOX.0000000000006034. PMID: 39114798; PMCID: PMC11305778.
2)
Applegren ND, Shock LA, Aldridge KJ, Derrick CD, Tanaka T, Baker CL, Muzaffar AR. Relationship of a Metopic Ridge and Anterior Cranial Volume Measured by a Noninvasive Laser Shape Digitizer. J Craniofac Surg. 2017 Oct 23. doi: 10.1097/SCS.0000000000004065. [Epub ahead of print] PubMed PMID: 29065051.