Unicoronal Craniosynostosis

- Assessing Medical Student Attentional Bias in Unicoronal Craniosynostosis: An Eye-Tracking Study
- Leveraging novel diagnostic codes for craniosynostosis by suture type in surgical database research
- Anesthesia for Endoscopic Strip Craniectomy Repair: A Single-Center Retrospective Cohort Study
- Endoscopic Strip Craniectomy for the Treatment of Single Suture Craniosynostosis
- Extended Phenotype of Bilateral Coronal Craniosynostosis Due to Novel TCF12 Mutation
- Biomechanical study of an additively manufactured NiTi patient-specific device for the treatment of craniosynostosis
- Spontaneous Correction of Facial Torsion in Nonsyndromic Unicoronal Craniosynostosis: Does Time Heal All?
- Early Longitudinal Development in a Diverse Prospective Cohort with Sagittal, Unicoronal, or Metopic Craniosynostosis

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Unicoronal craniosynostosis is a type of nonsyndromic craniosynostosis and occurs when one of the two coronal sutures fuses before birth. The coronal sutures run from the front fontanelle down to the side of the forehead.

Anterior plagiocephaly is always due to unicoronal synostosis. Female to male ratio is 68%. Unicoronal synostosis produces regional growth restriction and compensatory expansion of adjacent regions and obvious fronto-orbital dysmorphology [1)]

Deraje V, Gopal S, Mendonca DA, Gujjalanavar RS. Endoscope-Assisted “Extended” Suturectomy for Unicoronal Craniosynostosis: A Technical Note. Plast Reconstr Surg. 2021 Oct 26. doi: 10.1097/PRS.0000000000008531. Epub ahead of print. PMID: 34705741.

Unicoronal Craniosynostosis: Classification

Unicoronal craniosynostosis is a **non-syndromic or syndromic** form of **anterior craniosynostosis**, caused by **premature fusion of one coronal suture** (left or right). It leads to **anterior plagiocephaly**.

By Laterality

- **Left unicoronal craniosynostosis** – fusion of the left coronal suture
- **Right unicoronal craniosynostosis** – fusion of the right coronal suture

By Etiology

- **Non-syndromic** (most common)
  - Isolated fusion without associated genetic syndromes
  - Typically unilateral
- **Syndromic**
  - Associated with genetic disorders, often bilateral
  - Examples:
    - **Crouzon syndrome**
    - **Apert syndrome**
    - **Muenke syndrome**
    - **Saethre-Chotzen syndrome**

By Morphological Pattern

- **Anterior plagiocephaly**
  - Ipsilateral frontal flattening
  - Retrusion of the supraorbital ridge
  - Nasal root deviation
  - Contralateral frontal bossing
  - Vertical dystopia and orbital asymmetry

By Clinical Severity (subjective)

- **Mild** – subtle asymmetry, primarily aesthetic
- **Moderate** – noticeable orbital/facial distortion
- **Severe** – marked asymmetry, functional compromise (e.g., vision)

By Age at Diagnosis

- **Early (<6 months)** – better surgical remodeling outcomes
- **Late (>12 months)** – more rigid skull, possible compensations

Radiological Criteria

- CT scan shows:
  - Premature fusion of one coronal suture
  - Open anterior fontanelle
  - Normal or patent other sutures
  - Orbital asymmetry on 3D reconstruction

Treatment of Unicoronal Craniosynostosis

Unicoronal craniosynostosis, which leads to anterior plagiocephaly, is primarily treated through

surgery. The main goal is to correct the craniofacial deformity and prevent long-term cosmetic and developmental issues.

Main Treatment

Fronto-orbital Advancement Surgery

This is the standard surgical procedure, typically performed between 6 and 12 months of age.

Key steps include:

- **Fronto-parietal craniectomy** to remove the fused coronal suture
- **Bilateral fronto-orbital advancement** to reposition the orbital rim
- **Bone remodeling on the surgical bench** to achieve symmetry
- **Radial osteotomies** in the parietal and temporal bones for anatomical adaptation
- **Fixation with resorbable plates and screws**
- **Reinsertion of the temporal muscle**
- **Layered closure and placement of a drainage system**

Timing is crucial: the skull is still malleable, and brain growth demands expansion.

Alternative Options

Endoscopic-Assisted Surgery

- Indicated only if diagnosed before 3–4 months of age
- Minimally invasive
- Requires **postoperative helmet therapy** for several months

Helmet Therapy Alone

- Only effective for **positional plagiocephaly**
- **Not effective** for unicoronal craniosynostosis due to the fixed bony fusion

Treatment Objectives

- Correct facial and orbital asymmetry
- Prevent functional complications (visual, neurodevelopmental)
- Improve aesthetic appearance
- Preserve normal brain development

Postoperative Follow-up

- Clinical and photographic assessments
- CT scan or 3D imaging if needed

- Neurodevelopmental evaluations
- Monitoring of scar and cranial shape

1)

G. Silav, G. Avci, M. Akan, G. Taylan, I. Elmaci, and T. Akoz, “The surgical treatment of plagiocephaly,” Turkish Neurosurgery, vol. 21, no. 3, pp. 304–314, 2011.