

Hypotelorism in Metopic Craniosynostosis: Persistent Undercorrection Following Open Cranial Vault Repair (CVR)

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Introduction

Metopic Craniosynostosis (MC) is a condition characterized by premature fusion of the metopic suture, which normally remains open in the first year of life.

Early fusion results in impaired brain development, restricted growth of the frontal bones (leading to the characteristic trigonocephalic deformity shown), along with bitemporal narrowing, a prominent midline ridge and orbital hypotelorism.

Fronto-Orbital Advancement (FOA) is a key cranial vault repair technique used as a cornerstone treatment to correct these deformities.

FOA Technique:

- Bicoronal incision is made behind the hairline
- The frontal bone and supraorbital bandeau are removed and expanded
- Supraorbital bandeau is reshaped with cuts on the inner table to create a more natural curve, while the frontal bone is remodeled to fit the new cranial contour
- The remodeled bones are fixed into their new positions using absorbable plates/screws/wires
- The orbital rims are not directly manipulated

Hypotelorism, defined as an abnormally narrow distance between dacrya, is NOT addressed in standard FOA techniques.

We hypothesize that hypotelorism will not correct with growth after standard Fronto-Orbital Advancement.

Methods

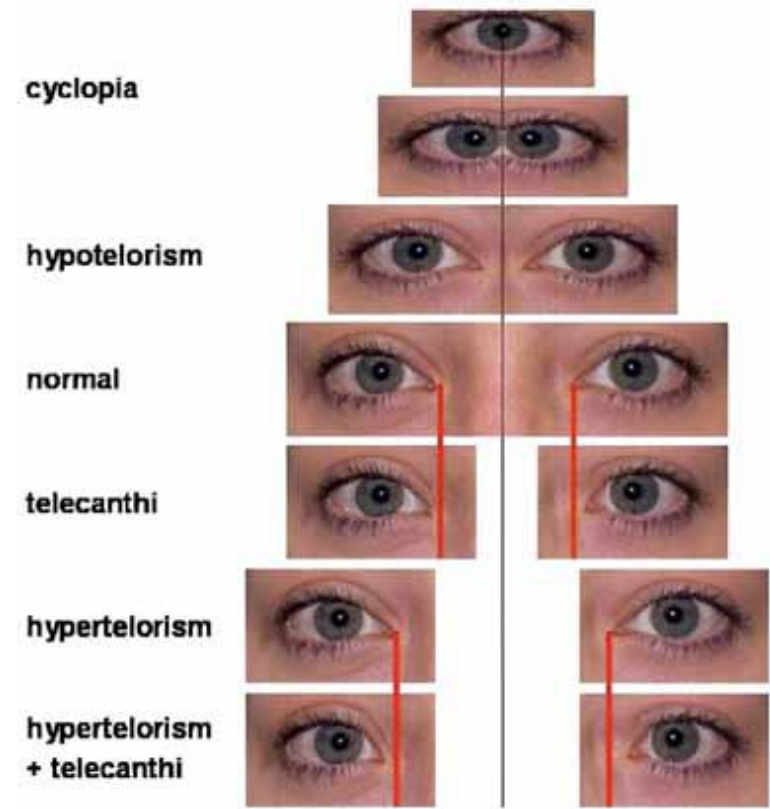
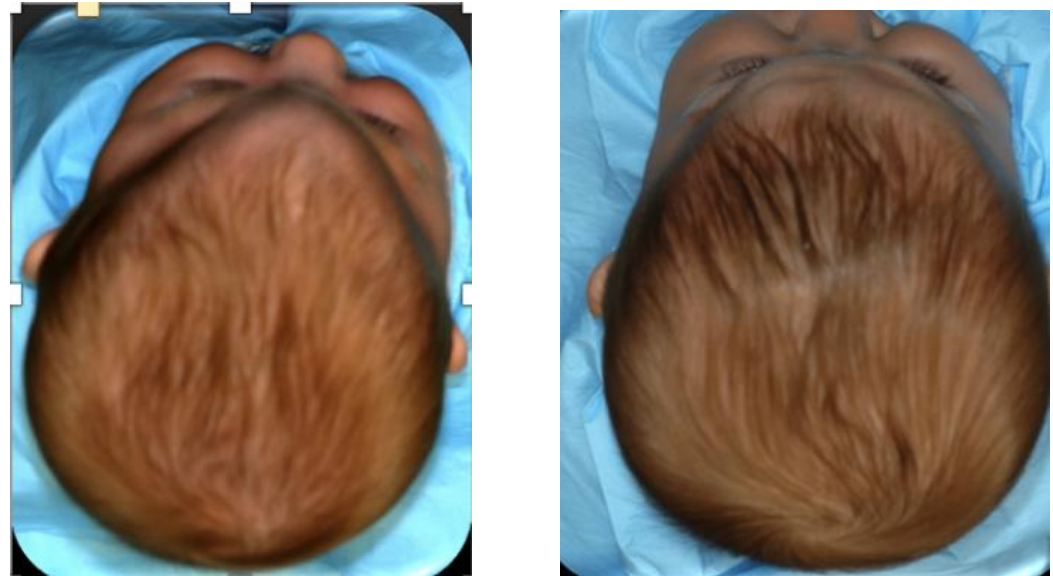
Sample: 20 patients with Metopic Craniosynostosis undergoing open FOA were divided into two groups based on timing of post operative imaging:

- One-Year-Group (0-13 months after repair)
- Two-Year Group (13.1-24.5 months after repair)

Institutional radiologists evaluated pre- and post-operative Computer Tomography (CT) scans for key cranial vault parameters.

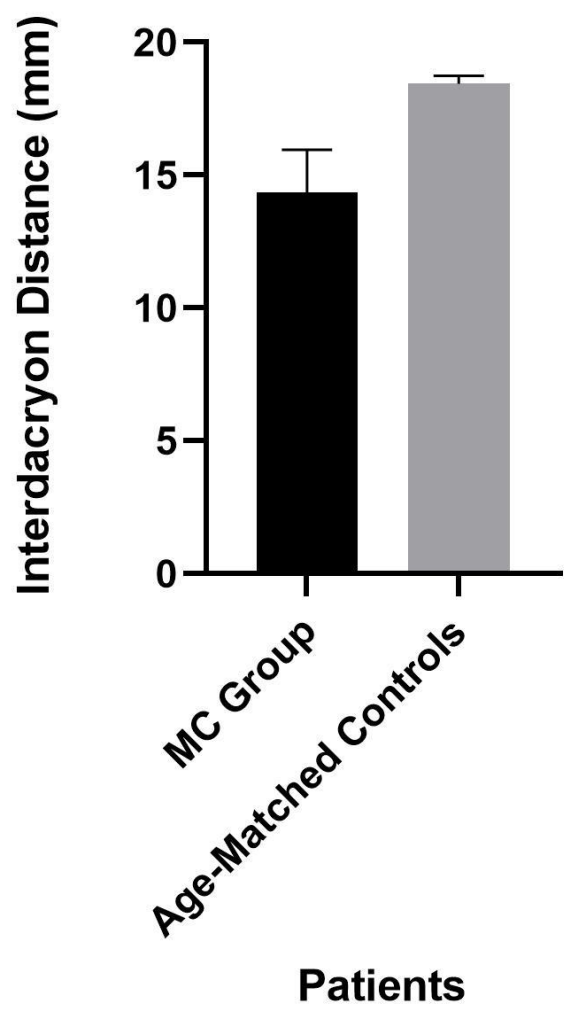
Parameters Evaluated:

- Interdacryon distance
- Endocranial bifrontal angle
- Inter-zygomaticofrontal (inter ZF) suture distance
- Left orbital rim angle
- Right orbital rim angle



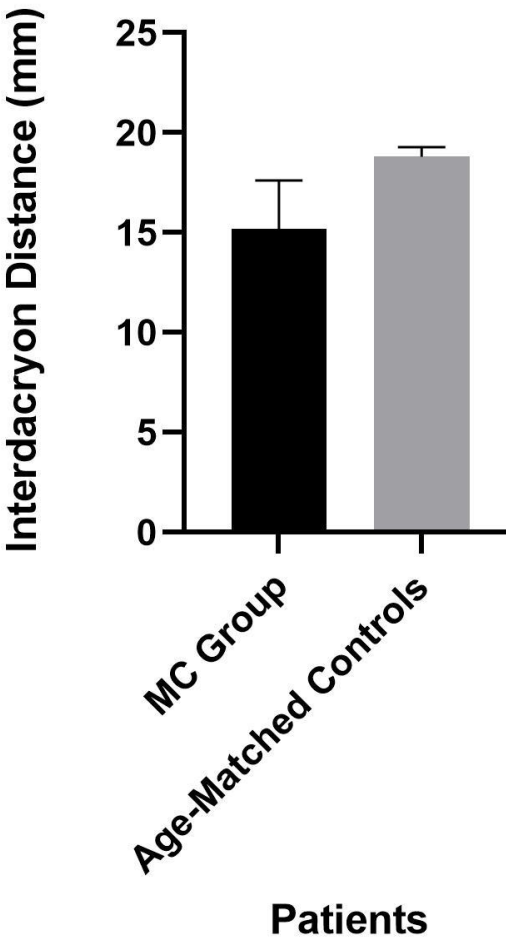
One-Year-Group

0-13 Months After Repair



Two-Year-Group

13.1-24.5 Months After Repair



Post Operative Differences in Interdacryon Distance Compared to Controls:

4.1mm

3.6mm

Results

Cranial Vault Parameter	Pre-operative distance (mm)	Post-operative distance (mm)	Difference After Repair (mm)
Interdacryon Distance	13.4	14.7	1.3*
Endocranial Bifrontal Angle	132.8	135.2	2.4
Inter-zygomaticofrontal Suture Distance	68.7	77.8	9.1
Left Orbital Rim Angle	49.8	50.4	0.6
Right Orbital Rim Angle	49.1	50.4	1.3*

* Indicates significance

Conclusions

Open FOA/CVR results in **improvement but not complete correction** of hypotelorism.

The present study challenges the assumption that hypotelorism spontaneously improves with growth after repair.

These insights play a crucial role in clinical decision making and optimizing surgical plans to prevent the need for additional procedures to correct unresolved deformity.



References