

Anika Y. Kim, MS; Meryem Guler, BS; Caroline C. Kreh, BS; Artur Manasyan, BS; Idean Roohani, MD; Jeffrey A. Hammoudeh, DDS, MD; Mark M. Urata, DDS, MD

Introduction

- Orbital hypertelorism encompasses a spectrum of conditions characterized by increased interorbital distance. Surgical correction aims to restore normal intercanthal distance and improve functional and aesthetic outcomes.
- Facial bipartition (FB) and box osteotomy are two established approaches. FB splits the midface and rotates segments medially, while box osteotomy removes a central midface segment to reduce interorbital distance. Box osteotomy additionally provides anteroposterior (AP) advancement of the midface.
- Although both procedures have been widely described, the degree of anterior advancement achieved by box osteotomy compared to FB has not been quantified using three-dimensional computed tomography (3D CT) analysis.

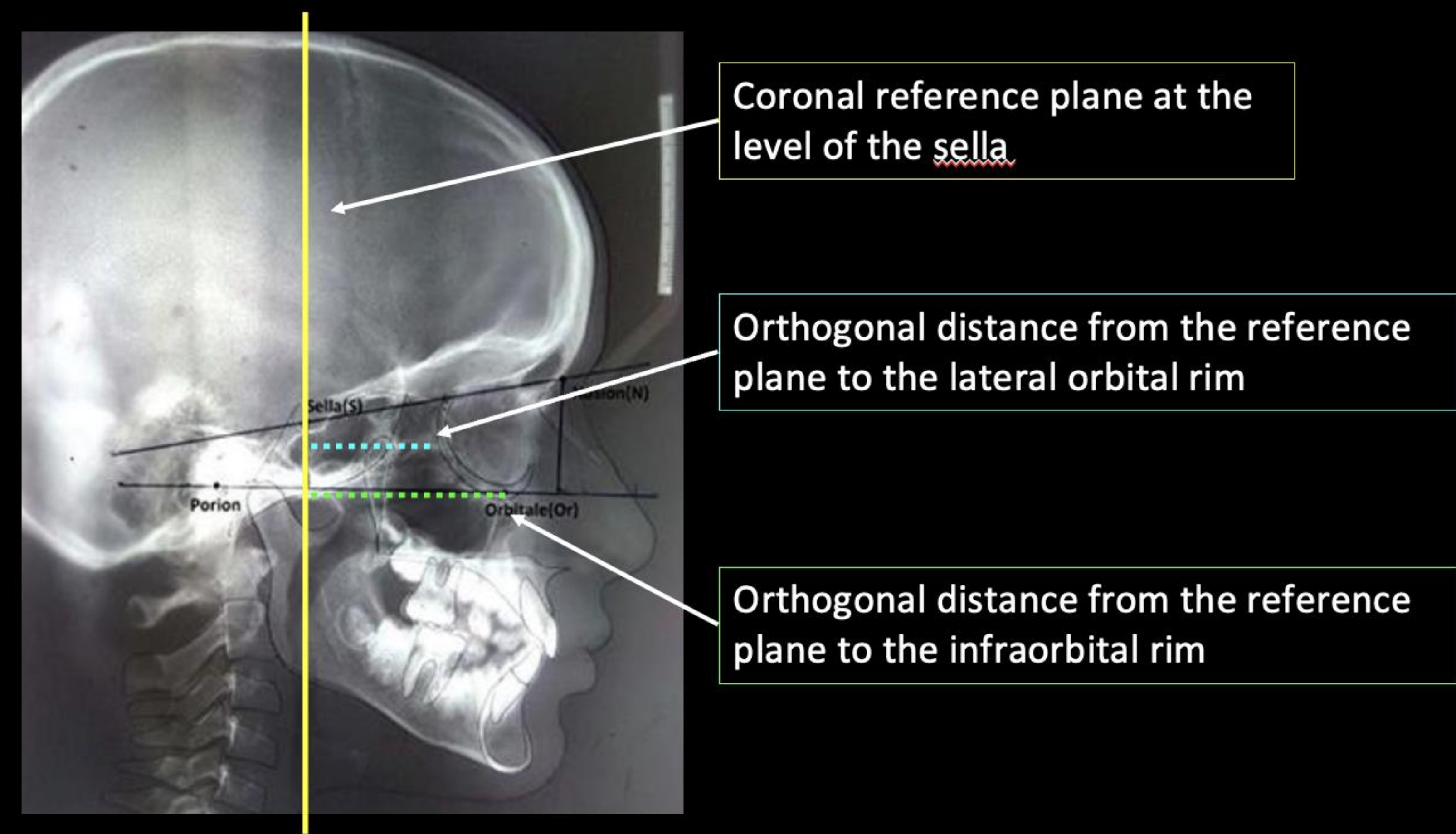
Objective

Aim: To evaluate and compare the anterior advancement achieved by box osteotomy versus facial bipartition using 3D CT analysis in pediatric patients with orbital hypertelorism

Methods

- Retrospective review of patients undergoing box osteotomy or facial bipartition at a single tertiary pediatric center (2000–2025). Three-dimensional CT reconstructions were generated using Mimics software.
- A sella coronal reference plane was established for standardized measurements. Anterior displacement of the lateral and infraorbital rims was quantified. Growth adjustment was performed using the sella–nasion distance. Groups were compared using Student’s t-test and multivariate regression.

3D Image Analysis

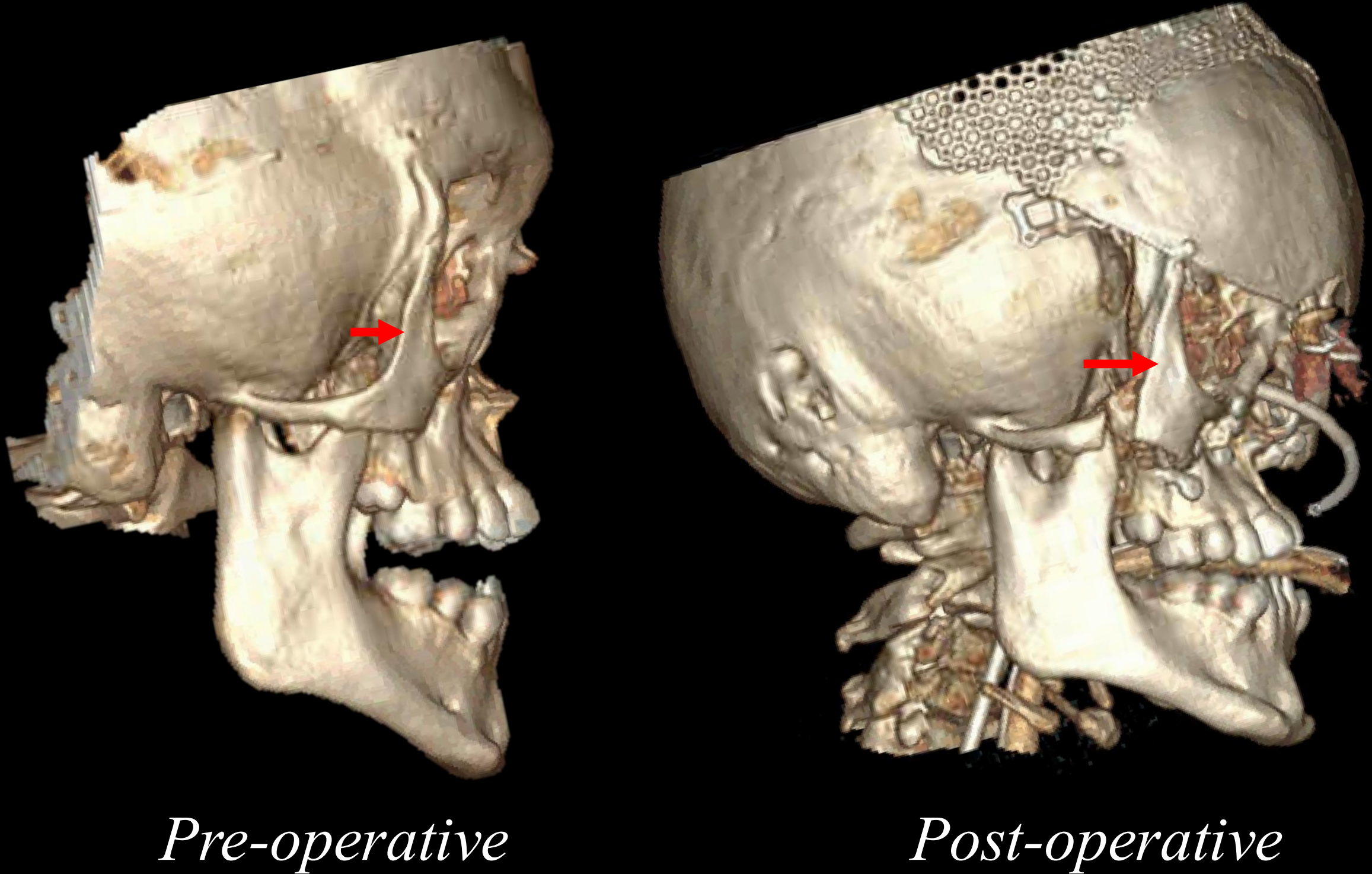


Multi-variate regression analysis

Landmark (mm)	Coefficient	95% CI	p-value
<i>Outcome (net change)</i>			
Right lateral orbital rim	9.93	(4.68, 15.18)	0.001
Left lateral orbital rim	14.2	(4.21, 24.18)	0.007
Right infraorbital rim	5.62	(1.10, 10.15)	0.017
Left infraorbital rim	4.13	(-2.16, 10.42)	0.187
<i>Outcome (% change)</i>			
Right lateral orbital rim	0.19	(0.06, 0.32)	0.006
Left lateral orbital rim	0.43	(0.08, 0.77)	0.017
Right infraorbital rim	0.09	(0.02, 0.16)	0.014
Left infraorbital rim	0.08	(-0.03, 0.19)	0.150

Results

- Twenty-eight procedures were analyzed (11 box osteotomies, 17 FB). Box osteotomy achieved significantly greater net anterior advancement of the lateral orbital rims compared to FB (>10 mm vs. ~1 mm; p = 0.01 right, p = 0.009 left). Infraorbital rim advancement was also significantly greater with box osteotomy (6.5–7.7 mm vs. ~2 mm; p = 0.012 right, p = 0.036 left).
- Multivariate regression confirmed that procedure type was an independent predictor of anterior advancement after adjusting for age, sex, and previous procedures.
- There were no significant differences in interorbital distance correction between the two procedures. Both demonstrated comparable complication rates and stable long-term outcomes at follow-up.



Conclusions

Box osteotomy achieves significantly greater anterior midface advancement compared to FB, while providing equivalent interorbital distance correction. These findings support the versatility of box osteotomy beyond the traditional hypertelorism indication, particularly for patients who would benefit from concurrent anteroposterior projection.