

School-Age Anthropometric And Cognitive Outcomes In Sagittal Craniosynostosis

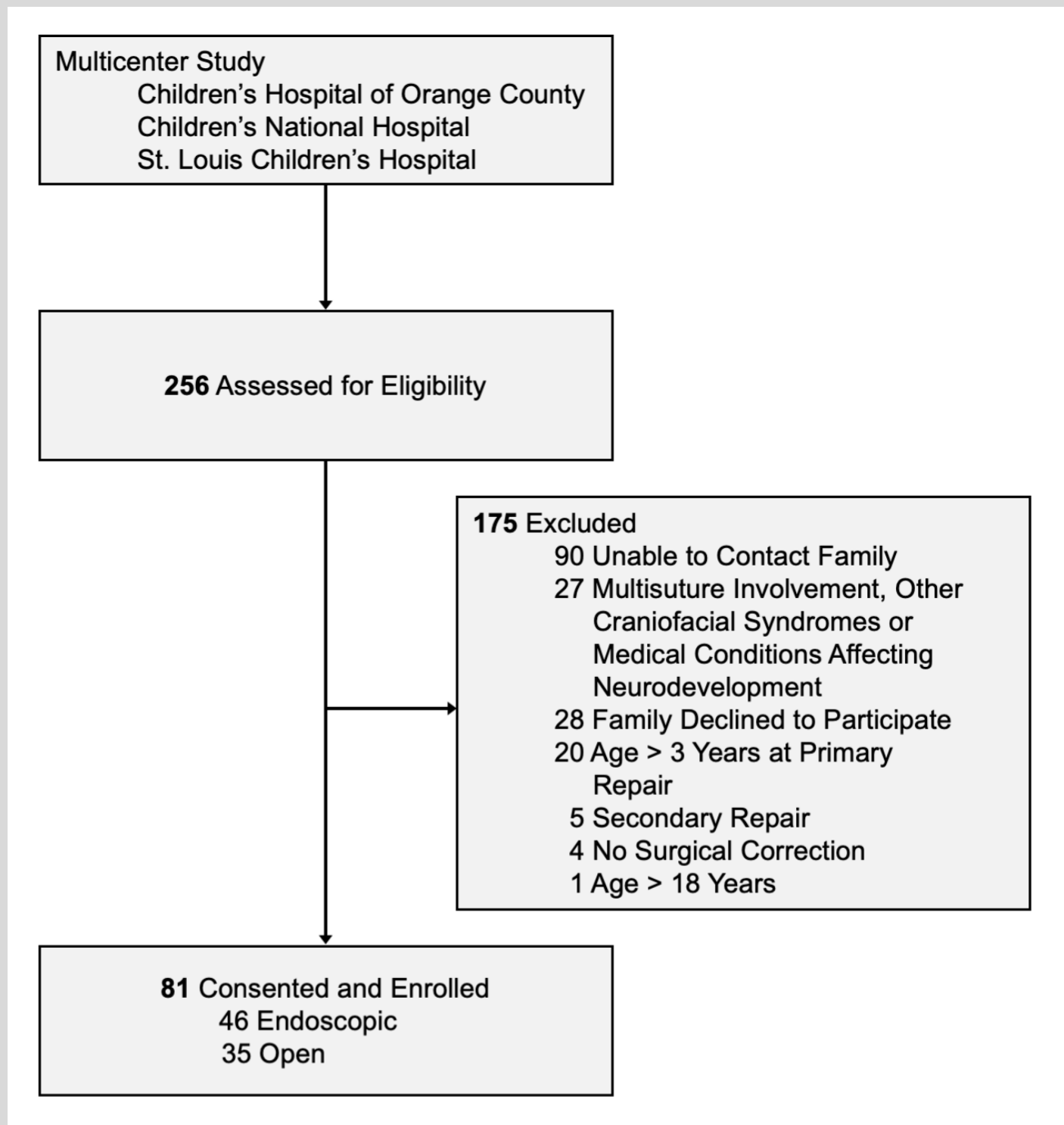
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PURPOSE

We evaluate school-age anthropometric and cognitive outcomes following either cranial vault remodeling (CVR) or endoscopic strip craniectomy with orthotic therapy (ESC) across three institutions.

METHODS

School-age children (4-18 years) with previously corrected sagittal craniosynostosis were enrolled. Upon inclusion, three-dimensional photographs were obtained, and measures of mean [95% confidence interval] cephalic index (CI) and head circumference Z-scores (HCZS) were calculated. Cognitive development was measured using the Differential Ability Scale-II General Cognitive Ability (GCA) score and compared to 141 unaffected controls. ANCOVA models were calculated.



RESULTS

Eighty-one participants (46 ESC, 35 CVR; median [range] age, 7 [4-15] years) were included. Mean school-age CI was significantly higher with ESC, though within normal range for both (78% [77%, 79%] versus CVR 76% [74%, 77%]; $p = 0.027$). Compared to preoperative measurements, mean school-age HCZS decreased significantly more with CVR (-1.6 [-2.2, -1.0] versus ESC -0.3 [-0.8, -0.2]; $p = 0.002$). After controlling for assessment age, sex, and socioeconomic status, ESC (100 [96, 104]) and CVR (103 [98, 108]) demonstrated no statistically significant or clinically meaningful differences in GCA scores ($p = 1.0$). Compared to controls, ESC GCA scores were significantly lower (mean difference [95% CI], 7 [1, 13], $p = 0.019$).

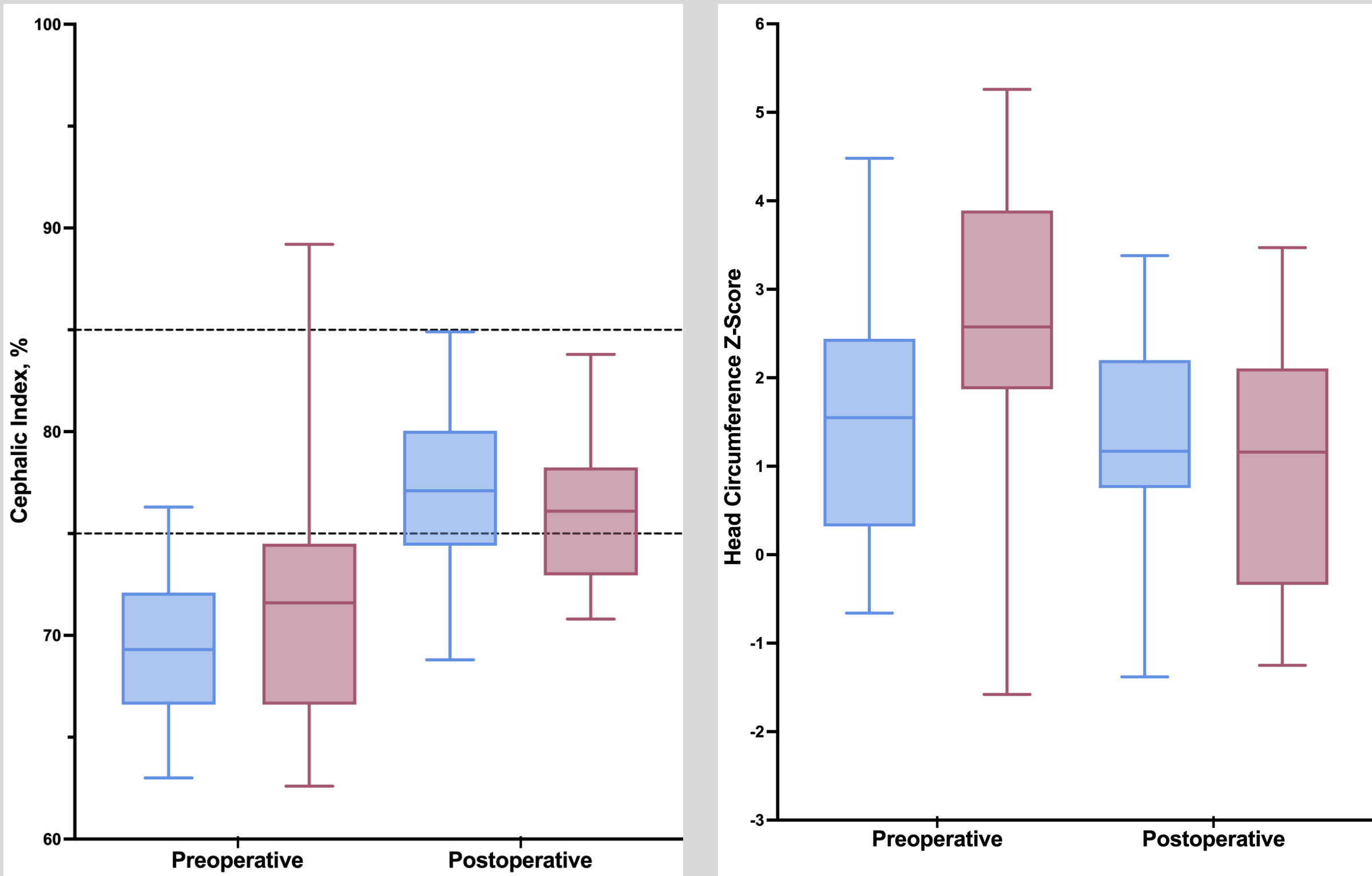
DAS-II Composite Outcome Mean (95% CI)	Adjusted ^b			Difference Between Repair Groups ^a (95% CI)	<i>p</i> [*]
	Control	Endoscopic	Open		
Global	107	100	103	-3	1.0
Cognitive	(105 to 109)	(96 to 104)	(98 to 108)	(-11 to 5)	
Verbal	107	101	101	0	1.0
Ability	(105 to 110)	(96 to 105)	(96 to 106)	(-9 to 8)	
Nonverbal	104	99	99	0	1.0
Reasoning	(102 to 107)	(94 to 103)	(94 to 105)	(-10 to 8)	
Working	104	98	101	-3	0.827
Memory	(102 to 106)	(93 to 102)	(97 to 106)	(-12 to 4)	
Processing	102	103	102	1	1.0
Speed	(100 to 104)	(99 to 108)	(96 to 107)	(-7 to 11)	

^a Calculated as endoscopic minus open repair.

^b Adjusted for age at DAS-2 assessment, sex, and socioeconomic status.

^{*} Pairwise comparisons corrected with the Bonferroni method.

Comparison of Mean IQ and Achievement Scores Among the Unaffected Controls, Endoscopic Repair, and Open Repair Cohorts



CONCLUSION

ESC and CVR effectively normalize school-age anthropometric outcomes. However, ESC produces a clinically meaningful and significantly greater improvement in CI, with maintenance of head growth. Consistent with previous studies, children with craniosynostosis scored lower than unaffected controls on a measure of cognition. However, the association with surgical procedure was negligible, suggesting equivalent cognitive outcomes for ESC and CVR.

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