

## Cranial Volume Change – Best Measure for Surgical Outcome in Craniosynostosis

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Cephalic index classifies the types of craniosynostosis. Increasing the cranial volume is a main objective when operating in such children. However, there is little understanding on how these two values change relative to preoperative values after standard surgery. A sample of patients (n=18) who underwent surgery for craniosynostosis from 2017 to 2024 were reviewed and cranial length, width and height were calculated using CT / MRI scans before and after surgery. The pre and post operative cranial index and intracranial volume were calculated and compared. Intracranial volume was calculated using the following validated equation – for males =  $0.000337 (L-11) (B-11) (H-11) + 406.01 \text{ cm}^3$  and for females =  $0.000400 (L-11) (B-11) (H-11) + 206.60 \text{ cm}^3$  (L= Maximum Antero Posterior diameter, B = Eurion to Eurion diameter, H= Auricular height). Pre-operatively 12 (66.67%) had brachycephaly, 4 (22.22%) had normocephaly and 2 (11.11%) had scaphocephaly while post-operatively 13 (72.22%) had brachycephaly, 5 (27.78%) had normocephaly and none had scaphocephaly. After surgery 3 (16.67%) were transitioned to normocephaly. Average calculated intracranial volume before surgery was 803.82 cm<sup>3</sup> and after surgery 914.24 cm<sup>3</sup> (13.73% increase in the average volume). Only one (5.56%) patient had a slight reduction in volume (0.89 cm<sup>3</sup>) while the rest (n=17, 94.44%) had an increase. Cranial volume increased while normocephaly was not achieved in most. Intracranial volume change focusing on assessing reduction in intracranial pressure while CI looks at cosmesis. A larger sample study is necessary to substantiate our findings.

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