

EVALUATION OF SURGICAL OUTCOMES IN CRANIOSYNOSTOSIS

Quantitative assessments in metopic and unicoronal synostosis

Akademisk avhandling

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av

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This thesis is based on the following studies, referred in the text by their Roman numerals.

- I. Spring-Assisted Correction of Hypotelorism in Metopic Synostosis.**
Giovanni Maltese, Peter Tarnow, Claes Lauritzen.
Plast Reconstr Surg. 2007 Mar;119(3):977-84.
- II. Correction of hypotelorism in isolated metopic synostosis.**
Giovanni Maltese, Peter Tarnow, Lars Kölby.
Submitted
- III. A novel quantitative image-based method for evaluating cranial symmetry and its usefulness in patients undergoing surgery for unicoronal synostosis.**
Peter Bernhardt, Annelie Lindström, Giovanni Maltese, Peter Tarnow, Jakob H. Lagerlöf, Lars Kölby.
J Craniofac Surg. 2013 Jan;24(1):166-9.
- IV. New objective measurement of forehead symmetry in unicoronal craniosynostosis – comparison between fronto-orbital advancement and forehead remodeling with a bone graft.**
Giovanni Maltese, Peter Tarnow, Annelie Lindström, Jakob H. Lagerlöf, Peter Bernhardt, Lars Kölby.
Submitted
- V. Intracranial volume before and after surgical treatment for isolated metopic synostosis.**
Giovanni Maltese, Peter Tarnow, Emma Wikberg, Peter Bernhardt, Jakob Heydorn Lagerlöf, Lars Kölby.
Submitted



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ABSTRACT

Background: A continuous and objective evaluation of surgical outcomes must be an integrated part of the technical development. The present thesis has the ambition to innovate the evaluation of surgical results allowing systematic and objective assessment of the surgical procedures used for metopic and unicoronal craniosynostosis (UCS).

Material & methods: The effect of springs on hypotelorism was studied by measuring the bony interorbital distance (BIOD) and the axes of the orbits on cephalograms. Thereafter, the pre- and post-operative BIOD in patients operated with spring-assisted surgery (SAS) was compared to that of patients operated using the traditional cranioplasty and to a control group. The effect on forehead symmetry of a fronto-orbital advancement (FOA) and of a more radical forehead substitution with a calvarial bone graft in UCS was measured. To be able to evaluate our results, a computer tool that measured frontal symmetry was developed. Intracranial volume in metopic synostosis, before and after surgery was measured by using a newly developed computer tool that measured volume in CT scans.

Results: 1. Springs had effect on hypotelorism and orbital shape. 2. SAS before 6 months of age normalized BIOD, a result previously not achieved. 3. The computer was simple to use and gave a precise assessment of forehead symmetry. 4. Forehead reconstruction with a calvarial bone graft gives better forehead symmetry than FOA in UCS. 5. Total intracranial volume in metopic synostosis was normal before surgery but significantly lower than in controls at 3 years of age. The ratio frontal-to-total volume before surgery was low in patients with metopic synostosis. The ratio was improved, but not normalized, by surgery.

Conclusion: Systematic evaluation with quantitative measurements of surgical results is important to be able to objectively assess outcomes and to develop and compare surgical techniques.