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Posterior calvarial augmentation in patients with strong occipital flattening or constrained intracranial volume

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In craniosynostosis-related brachycephaly with shortening of the fronto-occipital skull diameter, the most often performed surgical procedure is fronto-orbital advancement. When the forehead is already prominent - the rule rather than the exception in synostotic brachycephaly -, an enlargement of the posterior calvaria is a good option to correct the head shape. Most common surgical techniques published over the last decades include the formation of free bone flaps that are re-modelled and re-inserted in a different position to reshape the occipital head contour. We have developed and describe here our experience with a surgical technique of posterior calvarial augmentation without the use of plates or screws and avoiding the formation of free bone flaps. The procedure was applied in six infants at the age of 7 to 57 months (median, 9 months); four of them were less than one year old. The diagnoses were Mercedes-Benz syndrome in four, Kleeblattschädel (fronotoorbital advancement 3 years before) in one and excessive posterior plagiocephaly in one patient. Calvarial bone strips (2 cm) were build with the craniotome, parallel to the sagittal suture. They stood with their base at the calvaria, alternatively towards the base or towards the apex. They were elevated, bent in a manner to expand the posterior calvaria, provisionally held in place by underlying gelfoam pieces and fixated with absorbable 2.0 sutures. This resulted in an eventual distance between bone and dura of up to 3 cm. There were no intra- or postoperative complications. The posterior skull flattening was sufficiently corrected in all cases, the amelioration of the head shape was convincing also in the long term. A postoperative helmet therapy was not necessary.

In one patient with Kleeblattschädel, operated on three years before in another hospital, a postoperative large frontal bone defect with grotesque bulging of brain tissue under the skin, posterior augmentation allowed to subsequently close the frontal bone defect one month later.

The proposed surgical technique is feasible, effective, and is recommended for infants with strong occipital flattening, preferably in their first year of life. The avoidance of foreign implants or of the formation of free bone flaps should lessen the risk of infections.