Total vault remodeling

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Cranial vault remodeling is a broader term that encompasses a range of surgical techniques used to reshape the cranial vault, but it does not necessarily involve the complete removal and reconstruction of the skull bones. Instead, it often involves less invasive approaches, such as osteotomies (bone cuts) and reshaping the bones while leaving them in place. Cranial vault remodeling may be used for milder cases of craniosynostosis or cosmetic purposes when there are head shape concerns.

In summary, cranial vault reconstruction is a specific type of cranial surgery that involves a more extensive reconstruction of the skull bones, while cranial vault remodeling is a broader term that includes various surgical techniques used to reshape the cranial vault. The specific procedure chosen depends on the severity of the condition and the surgical goals.

Remodeling the cranial vault in an attempt to increase the intracranial volume and thus control intracranial hypertension, whilst at the same time improving the patient's appearance, has been the mainstay of surgery for syndromic craniosynostosis. We report a case of craniosynostosis in whom cranial vault expansion was followed by the development of hind-brain herniation and hydrocephalus. This prompted a review of our other cases of craniosynostosis who had been evaluated by magnetic resonance imaging following surgery in order to assess the frequency of hind-brain herniation and hydrocephalus in these children. Magnetic resonance imaging had been performed in the postoperative evaluation of 34 cases of craniosynostosis who had undergone procedures intended to increase the intracranial volume. The position of the cerebellar tonsils and the presence or otherwise of hydrocephalus was recorded for all cases. The effectiveness of surgery in treating raised intracranial pressure (ICP) was evaluated by means of postoperative ICP monitoring and had been performed in 22 cases. Herniation of the hind-brain below the level of the foramen magnum was observed in 18 cases (53%). Hydrocephalus, requiring the insertion of a ventriculoperitoneal shunt, was present in 14 cases (41%) and had developed after the cranial vault procedure in 9. The mean sleeping ICP measured postoperatively was normal (<10 mm Hg) in 5, borderline (10-15) in 7, and raised (>15 mm Hg) in 10 cases. Cranial vault expansion in complex craniosynostosis may fail to address the underlying aetiology of intracranial hypertension. Furthermore, both hydrocephalus and hind-brain herniation may develop following such surgery. Neither the increase in intracranial volume

afforded by cranial vault expansion nor the shunting of hydrocephalus precludes the persistence of abnormal ICP. These findings are discussed in the light of possible mechanisms, in addition to cephalocranial disproportion responsible for intracranial hypertension in complex craniosynostosis [1].

The study aimed to compare the results of two surgical techniques for the treatment of isolated sagittal synostosis (ISS) using 3D stereophotogrammetry. One technique, Renier's H technique (RHT) comprised a biparietal expansion, and the other, the total vault remodeling (TVR) included also frontal remodeling.

The two groups of operated children were compared with a third control group of normocephalic children. The 3D scanning was performed on all children between 12 and 245 months of age. On each 3D image six measurements and indices have been made, to evaluate not only the length and width of the head but also the height. The cranial index (CI) was measured in a plane parallel to the nasion-tragus plane, at the intersection with the opisthocranion.

Each of the three groups (RHT, TVR, control group) included 28 children. The measurements that were influenced by the correction of the frontal bossing, namely the CI and the sagittal length, were closer to normocephaly after TVR than after RHT. Lesser or no statistical difference was documented in the measurements evaluating the biparietal aspect and the height of the vertex, indicating that the biparietal expansion is effective in both procedures.

Based on the results TVR results in a better esthetical outcome, particularly about the direct surgical remodeling of the frontal bossing [2]

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2)
Spazzapan P, Verdenik M, Velnar T. Biparietal remodelling and total vault remodelling in scaphocephaly-a comparative study using 3d stereophotogrammetry. Childs Nerv Syst. 2024 Feb;40(2):517-526. doi: 10.1007/s00381-023-06115-8. Epub 2023 Aug 22. PMID: 37606834; PMCID: PMC10837263.