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Analysis of venous outflow in children with craniosynostosis: the role of 2DTOF in the angioMRI

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Introduction: Patients with multisutural craniosynostosis commonly have venous drainage abnormalities such as enlarged emissary veins secondary to jugular veins stenosis or atresia. Disruption of enlarged collateral draining veins may result in massive intraoperative hemorrhage or intractable venous and intracranial hypertension, and, so, be life threatening. The objective of this studied is to analyse the role of the 2DTOF sequence of the angioMRI in patients with craniosynostosis.

Methods: We retrospectively studied the 2DTOF in the pre operative angioMRI of 19 children with a genetically confirmed Crouzon's syndrome, 6 patients with Apert's syndrome and 22 patients with non syndromic scaphocephaly. We analysed the sigmoid sinus, jugular vein, mastoidien and condylary emmissary veins, occipital sinus, marginal sinus and the anterior collateral circulation and we compared the 3 groups.

Results: In the Crouzon group, 18 out of 19 were found with abnormal venous drainage, and all of them presented collateral venous outflow. Three patients were found with a complete and bilateral jugular atresia. Sixteen patients presented anterior collateral circulation and 15 patients presented mastoidian collateral circulation. Intriguingly, only 5 patients with abnormal venous outflow were hydrocephalic whereas 12 patients with abnormal collateral circulation presented also a cerebellar tonsil herniation. Conversely, patients with Apert's syndrome and children with non syndromic scaphocephaly showed no complex collateral drainage, and they presented always at least one permeable jugular vein.

Conclusion: The 2DTOF sequence of angioMRI is a non invasive method, which allows the diagnosis of abnormal venous outflow in children with Crouzon's syndrome. Such venous study is of paramount importance in these patients that often need multiples surgical approaches affecting both the anterior and posterior aspect of the skull vault with a great risk of disruption of all the collateral draining veins.