Research Paper:
Cerebrospinal Fluid Dynamics Study: a Unique Tool for management of Chiari 1 Malformation Patients

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A B S T R A C T

Background and Aim: Chiari I malformation (CIM) is defined as descent of cerebellar tonsils 5mm or more below the foramen magnum, with or without associated syrinx. Degree of tonsillar descent has a poor correlation with the progression of disease and symptomatology. Abnormal CSF dynamics at foramen magnum is the main pathophysiological factor responsible for the progression of tonsillar descent, syrinx formation and hence symptomatology. The aim of this study is to correlate CSF dynamic changes with the clinicoradiological profile of CIM patients.

Methods and Materials/Patients: A prospective longitudinal study was done in 25 patients of CIM out of which 24 patients underwent standard midline suboccipital craniectomy with augmented duraplasty and 1 patient had ventriculoperitoneal shunt surgery for hydrocephalus. CSF flow study was done in sagittal as well as in axial sections at the level of foramen magnum using cine flow magnetic resonance imaging (MRI). Clinical and radiological assessment in reference to CSF flow parameters was done before and after decompression surgery.

Results: After suboccipital decompression 23 out of 24 patients had relief in their symptoms and 1 patient had progressive syringomyelia. Postoperative MRI scan at 3 months showed round shaped tonsils in all 24 patients. Ten out of 11 patients with syrinx had reduction in diameter of syrinx cavity. Peak CSF flow velocities reduced significantly (p value < 0.05) in the postoperative period and correlated well with the clinicoradiological improvement.

Conclusion: Abnormal CSF flow dynamics is responsible for the progression of disease and symptomatology in CIM patients. Cine flow MRI is a useful tool in the management of CIM patients both for proper selection of surgical candidates and in post-operative follow-up.

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