

Total CSF Blockage Increases Odds of Re-operation in Children

Despite years of research effort, there is still no simple, widely accepted imaging marker that reliably identifies patients at higher risk for poor surgical outcomes. Now, however, a new study found that a simple MRI observation, rather than a quantitative measure may be associated with an increased change of additional surgery.

The researchers introduced the term cervicomedullary CSF space obliteration (CMSO). On a standard MRI, the brainstem and cerebellar tonsils are normally surrounded by CSF. In some patients, however, the crowding is so severe that this fluid space disappears completely. Rather than relying on complex measurements or specialized imaging, the authors simply classified patients as either having CMSO (total blockage) or non-CMSO (not total blockage).

The study included 272 children who underwent their first Chiari decompression surgery at a single medical center. Slightly more than half (57%) were classified as having CMSO before surgery. These patients generally had signs of more severe neurological involvement. Compared with patients who still had visible CSF around the brainstem, they were more likely to have difficulty with balance, weakness, swallowing problems, sleep apnea, and cranial nerve symptoms. They also tended to have larger herniations.

The patients with CMSO were significantly more likely to require another Chiari operation. About 20% of patients with CMSO eventually underwent a second surgery compared with 9% of patients without CMSO. After accounting for age and sex, the presence of CMSO was associated with approximately 2½ times greater odds of reoperation. Interestingly, the CMSO patients were also more than four times as likely to develop hydrocephalus after the surgery, although this finding should be interpreted cautiously given the relative small number of cases involved.

The CMSO categorization can be easily assessed on routine MRI scans. To determine whether different physicians would classify cases the same way, the researchers asked 68 pediatric neurosurgeons to independently review MRI scans. Agreement between surgeons was high, suggesting that the finding is relatively reproducible and could be adopted across different centers.

As with all retrospective studies, several limitations should be kept in mind. All patients were treated by a single surgeon at one institution over a twelve-year period, so surgical decision-making and treatment strategies may have changed over time. Importantly, the operating surgeon knew each patient's MRI findings before surgery, meaning that both the initial operation and the decision to perform a second surgery could have been influenced by the presence of CMSO. Because of this, the study cannot prove that CMSO itself causes poorer outcomes.

As more research is done it will be interesting to see if this leads to CMSO patients being treated differently with the initial surgery than non-CMSO patients.

Source: Yengo-Kahn AM, Gomes FC, Tenhoeve SA, Self SA, Mesina-Estarrón I, Gramer RM, Kurudza E, Ludwick A, Brockmeyer DL. Cervicomedullary CSF space obliteration as a risk factor of reoperation in Chiari malformation type I. *Childs Nerv Syst.* 2026 Jul 7;42(1):287. doi: 10.1007/s00381-026-07388-5. PMID: 42409959.

Please consider a \$10 donation as Conquer Chiari's educational material is free to read, but not free to produce:



<https://www.conquerchiari.org/donate>

Conquer Chiari's research updates highlight and summarize interesting publications from the medical literature while providing background and context. The summaries do contain some medical terminology and assume a general understanding of Chiari. Introductory information and many more research articles can be found in the [Conquer Chiari Library](#).

Conquer Chiari is a 501(c)(3) public charity dedicated to improving the experiences and outcomes of Chiari patients through education, awareness and research.