Opening the Dura Did Not Show Clear Benefit in Pediatric Surgery

A new meta-analysis of 26 studies involving nearly 6,000 children with Chiari 1 found no statistically significant difference in clinical improvement, syrinx reduction, or repeat surgery between decompression procedures that opened the dura and those that left it intact. However, opening the dura was associated with more postoperative complications, particularly those involving cerebrospinal fluid (CSF).

The researchers, led by investigators at the University of Oxford in the United Kingdom, combined results from studies comparing two common approaches to posterior fossa decompression. In both procedures, surgeons remove a small section of bone at the base of the skull to create more room around the cerebellar tonsils and improve CSF flow. In one approach, the dura, the protective membrane surrounding the brain and spinal cord, is left intact. In the other, surgeons open the dura and sew in a patch to further expand the available space, a procedure known as duraplasty.

The analysis included 5,977 children, of whom 2,641 underwent decompression without duraplasty and 3,336 underwent decompression with duraplasty. Not every study reported every outcome, so the number of patients included in each comparison varied.

Among patients with reported clinical outcomes, 71% improved following decompression without duraplasty, compared with 80% of those who underwent duraplasty. Similarly, syringomyelia improved in 55% and 64% of patients, respectively. Although both outcomes numerically favored duraplasty, neither difference was statistically significant. Headache improvement was also similar, occurring in approximately 76% and 79% of patients, respectively. Repeat surgery rates were 4.7% without duraplasty and 5.5% with duraplasty, again without a statistically significant difference.

Complications showed a clearer pattern. Overall, complications were reported in 12.4% of patients without duraplasty compared with 17.9% of those with duraplasty. CSF leaks occurred in 1.4% versus 6.1%, and pseudomeningoceles, collections of CSF near the surgical site, occurred in 2.5% versus 6.8%. Procedures involving duraplasty also took approximately 64 minutes longer and were associated with hospital stays that averaged 1.2 days longer.

These findings are not particularly surprising in pediatric Chiari patients. Children generally have more flexible tissues than adults, including a more compliant dura, so removing bone alone may be sufficient to relieve crowding and restore CSF flow in many cases. At the same time, opening the dura creates additional opportunities for CSF-related complications.

Importantly, the results do not establish that one approach is best for every child. Some surgeons continue to have a strong preference for opening the dura, particularly when syringomyelia is present, because they believe a more extensive decompression provides a better opportunity for restoring CSF flow and reducing the syrinx. In fact, the researchers found that studies with a higher proportion of patients with syringomyelia tended to report greater clinical improvement following duraplasty. However, this association was based on comparisons between study populations, not individual patients, and does not establish that children with a syrinx benefit more from duraplasty.

The analysis also had important limitations. Most studies were retrospective, and surgeons generally selected the procedure based on their assessment of each patient's symptoms, anatomy, and disease severity. Children with larger syrinxes or more complicated presentations may have been more likely to undergo duraplasty, making direct comparisons difficult. In addition, the studies varied considerably in how they defined and measured improvement.

Overall, the findings support the use of decompression without duraplasty as a reasonable option for many pediatric Chiari patients, while leaving open the possibility that duraplasty is preferable in certain situations. These are group-level results, and a lack of statistically significant differences does not mean the procedures are equally effective for

every individual. The choice of surgical technique still requires consideration of the patient's specific anatomy, symptoms, syrinx characteristics, and the surgeon's clinical judgment and experience.

Source: Nischal SA, Kale KM, Patel S, et al. Posterior fossa decompression in pediatric Chiari malformation type I: a meta-analysis and meta-regression of outcomes with and without duraplasty. *Journal of Neurosurgery: Pediatrics*. Published online November 13, 2026. doi:10.3171/2026.5.PEDS25675.

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