

Adding Spinal Fixation Did Not Improve Chiari Surgical Outcomes in New Study

A study of 290 adults with Chiari 1 and syringomyelia found that surgical approaches involving spinal fixation did not produce better neurological outcomes than standard posterior fossa decompression. Both groups showed substantial improvement six months after surgery, and their syrinxes decreased in size by similar amounts. However, fixation procedures involved longer operations, greater blood loss, and more serious postoperative complications.

The study, conducted at Lanzhou University in China, examined an ongoing debate about whether some Chiari patients benefit from surgically stabilizing the junction between the skull and upper spine. Standard posterior fossa decompression creates more room around the cerebellar tonsils to relieve crowding and improve cerebrospinal fluid (CSF) flow. Fixation, on the other hand, uses screws and rods to stabilize the upper cervical spine, potentially addressing abnormal movement or alignment that may contribute to Chiari symptoms.

While decompression remains the conventional surgical treatment for symptomatic Chiari, some surgeons believe that instability between the first two cervical vertebrae (C1 and C2) plays an important role in certain cases. This has led to the use of fixation either in combination with decompression or, in selected patients, as an alternative to it. Other surgeons generally reserve fixation for patients with clear evidence of instability or significant structural abnormalities.

The researchers reviewed 362 adults who underwent surgery between 2022 and 2024. Of these, 162 had decompression alone and 200 had procedures involving fixation. Importantly, the two groups were quite different before surgery. Patients selected for fixation were more likely to have abnormalities involving the alignment of the skull and upper spine, including basilar invagination, in which the upper spine projects abnormally toward the skull, and atlantoaxial dislocation, involving abnormal alignment of C1 and C2.

To account for these differences, the researchers used a statistical technique called propensity score matching. They calculated how likely each patient was to receive fixation based on ten characteristics measured before surgery, including age, sex, symptom duration, syrinx size, neurological function, and several measurements of skull and spinal anatomy. They then matched patients from the two treatment groups who had similar predicted likelihoods of receiving fixation.

This produced 145 matched pairs, or 290 patients, whose measured characteristics were closely comparable. Matching can make an observational comparison more meaningful, but it does not make the groups equivalent to those in a randomized trial. In particular, the researchers lacked consistent measurements of dynamic instability—abnormal movement between vertebrae—which may have influenced surgeons' decisions to perform fixation. As a result, the matched patients could still have differed in clinically important ways.

At six months, both groups had improved substantially on a 0–10 neurological dysfunction scale, where higher scores indicated worse function. The decompression-only group improved from an average of 5.3 to 2.0, while the fixation group improved from 5.3 to 2.1. Approximately 81% of decompression patients and 79% of fixation patients improved by at least two points. Neither difference between groups was statistically significant.

Syrinx measurements showed a similar pattern. Among the 197 matched patients with usable follow-up MRIs, average syrinx width decreased by 3.6 mm after decompression alone and 2.9 mm after procedures involving fixation. At least a 50% reduction in syrinx width occurred in 61% and 49% of patients, respectively. Although the results numerically favored decompression alone, the differences were not statistically significant.

The most pronounced differences involved the operations themselves and postoperative recovery. Fixation procedures lasted a median of 4.6 hours compared with 4.0 hours for decompression alone. Median blood loss was 120 mL versus 40 mL, and patients undergoing fixation spent approximately four additional days in the hospital.

Overall complication rates were 28% for fixation and 22% for decompression, a difference that was not statistically significant. However, serious postoperative events occurred in 19 fixation patients (13%) compared with none in the decompression

group. The researchers defined these events as intensive care stays longer than 24 hours, prolonged mechanical ventilation, unplanned reintubation, or tracheotomy.

One complication in interpreting the results is that the fixation group included two substantially different surgical approaches: 92 patients underwent decompression plus fixation, while 53 underwent fixation alone. The researchers therefore performed a separate analysis comparing decompression alone with decompression plus fixation. After creating 88 new matched pairs, they again found no significant difference in neurological improvement or syrinx reduction, while serious complications occurred in nine patients receiving fixation and none receiving decompression alone.

These findings add to a continuing disagreement over the role of spinal instability in Chiari. Previous reports have described favorable outcomes with fixation, including fixation without decompression, but many of those studies lacked comparable control groups. The new study provides a more structured comparison, although its retrospective design, relatively short follow-up, and inability to account fully for dynamic instability remain important limitations. In addition, neurological recovery was measured using a scoring system developed at the institution that has not been formally validated for Chiari patients.

The results should not be interpreted to mean that fixation is unnecessary or inappropriate. Patients with demonstrable instability, significant spinal deformity, or compression of the brainstem may have specific reasons to undergo stabilization that are not adequately represented by a statistical comparison. Rather, this study found no additional neurological or syrinx-related benefit from fixation among patients who could be matched on the available clinical and anatomical measurements, while identifying a greater burden of surgery and serious postoperative events.

Further studies incorporating objective measurements of spinal instability and longer follow-up will be needed to clarify which Chiari patients benefit from stabilization.

Source: Yuan S, Yan Q, Chen R, et al. Posterior Fossa Decompression Alone versus Craniovertebral Junction Fixation-Inclusive Strategies in Chiari I Malformation with Syringomyelia: A Propensity Score-Matched Retrospective Cohort Study. *Journal of Multidisciplinary Healthcare*. Published October 14, 2026. doi:10.2147/JMDH.S642693.

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