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Chiari Children With Scoliosis Report Fewer Headaches

Children with Chiari 1 and scoliosis were significantly less likely to report headaches and cognitive difficulties than children without scoliosis, according to a new study from the University of Rochester. Interestingly, children with scoliosis were also about three times as likely to have syringomyelia, raising questions about how these conditions interact and influence Chiari symptoms.

The researchers retrospectively reviewed 79 patients, aged 21 or younger, who underwent posterior fossa decompression between 2012 and 2023. Of these, 23 had scoliosis and 56 did not. The groups were similar in age, sex, and other demographic characteristics, with an average age of approximately 10 years.

In comparing those with and without scoliosis, three differences stood out:

	With scoliosis (n=23)	Without scoliosis (n=56)
Headaches	61%	84%
Cognitive Issues	17%	43%
Syringomyelia	87%	29%

All three differences were statistically significant. Other symptoms, including coordination difficulties, numbness, weakness, and sleep problems, did not differ significantly between the groups.

The strong association between scoliosis and syringomyelia was not unexpected. Previous research has suggested that a syrinx, or fluid-filled cavity within the spinal cord, can contribute to scoliosis by disrupting the nerves controlling muscles that support the spine. However, the relationship is not absolute. In this study, three children had scoliosis without a syrinx, while 16 had a syrinx without scoliosis.

In trying to explain the headache finding, the authors suggested that children with scoliosis may be diagnosed with Chiari earlier because spinal curvature is visible and often prompts additional imaging. As a result, they may undergo treatment before developing the symptoms that typically lead other patients to seek medical attention.

Another possibility, not explored by the authors, involves the development of syringomyelia itself. In Chiari, restricted cerebrospinal fluid (CSF) movement at the base of the skull can produce abnormal pressure fluctuations with each heartbeat. Some researchers have speculated that the formation of a syrinx provides an alternative space for some of these fluid-pressure fluctuations, partially compensating for the obstruction. If so, this might reduce certain pressure-related symptoms, such as headaches, even as fluid accumulation within the spinal cord creates a different set of problems.

This is speculative, and the study provides no direct evidence for such a mechanism. The researchers did not compare headache rates according to syrinx status independently of scoliosis, nor did they measure CSF pressure or flow. Nevertheless, the combination of substantially more syringomyelia and fewer headaches raises an interesting physiological question. A syrinx could potentially represent both a consequence of abnormal CSF dynamics and a partial compensatory response to them.

The lower frequency of reported cognitive impairment is also noteworthy: approximately 17% of children with scoliosis compared with 43% of those without it. Whether this difference reflects earlier diagnosis, differences in underlying physiology, or other factors is unknown. Importantly, cognitive impairment was based on patient or parent reports rather than standardized neuropsychological testing.
In terms of the actual surgery, the study found the two groups underwent somewhat different surgical procedures. Surgeons performed arachnoid dissection, which involves opening or separating tissue surrounding the brainstem and spinal cord, in 65% of patients with scoliosis compared with 23% without it. This may reflect the higher prevalence of syringomyelia and surgeons' efforts to address potential obstructions to CSF flow.

Despite these differences, the researchers found no statistically significant differences in reported symptom improvement at three months or later, or in postoperative complications. After accounting for demographic factors and follow-up time, children with scoliosis had fewer postoperative emergency department visits, although the clinical significance of this finding is unclear.

Interestingly, these pediatric findings contrast with research involving adults. In a 2007 study of 27 adults with Chiari 1 and syringomyelia, Ono and colleagues found that patients with scoliosis had significantly worse neurological function both before and after decompression surgery. They also had longer syrinxes and substantially longer symptom histories.

It should be pointed out that this pediatric study was relatively small, particularly the scoliosis group, and its retrospective design limited the conclusions that could be drawn. The researchers also did not examine scoliosis severity, syrinx size, or the relationship between syrinx presence and individual symptoms.

As with nearly all Chiari topics, more studies will be required to achieve a full understanding of why scoliosis develops, and how it affects children and adults with Chiari.

Sources:

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