

Key Points

1. MRI's have shown that CM/SM are present in a significant number of idiopathic scoliosis cases
2. Other studies have suggested when an MRI is necessary for idiopathic scoliosis
3. Scoliosis surgery, in the presence of CM/SM, is risky unless decompression surgery is performed first
4. This study looked at the incidence of CM/SM in idiopathic scoliosis cases
5. Found 18% of patients showed abnormal MRI's
6. Of the 44, 12 underwent decompression surgery before scoliosis surgery
7. None of the 44 experienced any adverse events due to scoliosis surgery
8. Shows that decompression surgery is not always necessary before scoliosis surgery, if there are no other symptoms

Definitions

asymptomatic - having no symptoms

cerebellar tonsils - portion of the cerebellum located at the bottom, so named because of their shape

Cobb Angle - technique used to measure the severity of a spinal curve - in degrees - from spinal images

foramen magnum - large opening at the base of the skull, through which the spinal cord passes and joins with the brain

idiopathic - due to an unknown cause

kyphosis - abnormal outward curvature of the spine, such as a hunchback

MRI - Magnetic Resonance Imaging; diagnostic device which

Decompression Before Scoliosis Surgery?

As reported previously by this publication, the relationship between Chiari, syringomyelia, and scoliosis is complex and not well understood (see [Related Stories](#)). MRI's have shown that a significant number of so-called idiopathic scoliosis cases actually involve some form Chiari or syringomyelia, but the exact link between the conditions is not yet known. Despite this, doctors and researchers have made progress in understanding the practical implications of this complicated relationship.

Recently, researchers have proposed different models for when someone with scoliosis should have an MRI to look for Chiari. Others have shown that treating the underlying Chiari or syringomyelia can actually stop the progression of the scoliosis in some cases. On the flip-side, it is becoming all too clear that performing spinal surgery to correct scoliosis without first treating an active syrinx can be very risky. In fact, some studies have shown that up to 1/3 of such surgeries can lead to worsening, or permanent, neurological problems.

To complicate matters, the increased use of MRI's in scoliosis cases has led to the discovery of otherwise asymptomatic Chiari and SM. In such cases, where scoliosis is the only real symptom of an MRI identified Chiari or syrinx, the question becomes is decompression surgery really necessary before a spinal correction surgery to treat the scoliosis?

Dr. Masatoshi Inoue, an orthopedic surgeon, and his colleagues at Chiba University, in Japan, set out to answer this question, and identify the prevalence of CM/SM in idiopathic scoliosis, by prospectively studying 250 children they treated between 1998-2001. They published their results in the January 1, 2005 issue of the journal Spine.

The patient group consisted of 207 girls and 43 boys. The average age when they were first seen was 12 years, and the average age at surgery was 15. Two patients had infant scoliosis, 72 had juvenile, and 176 had adolescent. Each patient had a severe enough curve(s) to warrant surgical intervention.

Every child underwent an MRI and neurological exams. The MRI's revealed an abnormality in 44 of the children (18%) [see Table 1]. Twenty-two children had Chiari with syringomyelia, 13 had just Chiari, 6 had tonsillar ectopia, and two had tonsillar ectopia with syringomyelia [Ed. Note: demonstrating that defining Chiari and tonsillar ectopia in this way is not really necessary].

Table 1
Abnormal MRI Findings, Neurological Exam Findings & Surgery

Finding	# of Patients
Chiari w/syrinx	22
Chiari	13
Tonsillar Ectopia	6
Ectopia w/syrinx	2
Other	1
Total	44
Abnormal Neurological Exam Findings	26
Normal Neurological Exam	18
Decompression + scoliosis surgery	12
Scoliosis Surgery	32

Notes: Chiari defined as herniation greater than 5mm; tonsillar ectopia as herniation between 1mm-5mm

In addition, there were significant differences between the children with MRI findings and the children without. Specifically, being younger than 11 at first visit, a left-sided curvature, a thoracic kyphosis of more than 30 degrees, neurological deficits, and moderate/severe pain, all were related to finding CM, SM, or tonsillar ectopia upon MRI.

A similar number of the children, 46 (18%), were found to have abnormal neurological findings upon physical examination. However, only 26 of this group also had an abnormal MRI finding. This means that 18 children showed Chiari or SM on MRI, but had no neurological signs or symptoms, including 4 with both CM and SM. Of the 26 who had both MRI and neurological exam findings, 12 underwent decompression surgery before spinal surgery. These children were selected based on the MRI findings plus severe pain (headache, back pain, or limb pain), abnormal reflexes, motor weakness, or sensory deficits. None of the 12 experienced any problems during

uses a strong magnetic field to create images of the body's internal parts

prospective - a study in which the experiment is designed before the data is collected

scoliosis - abnormal curve of the spine

syringomyelia (SM) - neurological condition where a fluid filled cyst forms in the spinal cord

syrinx - fluid filled cyst in the spinal cord

thoracic - the middle part of the spinal cord; chest area

tonsillar ectopia - in this study, descent of one or both cerebellar tonsil between 1mm-5mm below the foramen magnum

tonsillar herniation - descent of the cerebellar tonsils into the spinal area; often measure in mm

vertebra - segment of the spinal column, noted as region plus number (C = cervical, T = thoracic, L = Lumbar)

the subsequent spinal surgery to treat their scoliosis.

Dr. Inoue and his group were most interested in seeing how the remaining 32 children with MRI diagnosed CM or SM did during surgery to treat their scoliosis. During the procedure, their neurological status was monitored and they were given thorough neurological exams after the surgery. As Dr. Inoue hypothesized, none of the 32 children experienced any problems during the surgery, or had any permanent neurological problems as a result of the surgery.

While the risks of spinal surgery in the presence of untreated Chiari and syringomyelia are well documented, Dr. Inoue and his group appear to have identified a more precise criteria for when decompression surgery is necessary before scoliosis surgery. If further research proves them to be correct, then their model might spare some children unnecessary surgery when there are no neurological signs or symptoms.

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[Study Identifies Types Of Scoliosis That Indicate Chiari](#)

[Chiari, Syringomyelia, Scoliosis, and Surgery.](#)

[How to treat syringomyelia related scoliosis in children.](#)

Source

Inoue M, Minami S, Nakata Y, Otsuka Y, Takaso M, Kitahara H, Tokunaga M, Isobe K, Moriya H. *Preoperative MRI analysis of patients with idiopathic scoliosis: a prospective study.* Spine. 2005 Jan 1;30(1):108-14.

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