Key Points

1. Scoliosis is linked in an unknown way to CM/SM
2. Research has shown that CM/SM patients have unusual curve patterns even for scoliosis; however the size and location of syrinx is not related to curve severity
3. Batzdorf reviewed 169 SM surgery patients over a 20 year period
4. Found that patients undergoing a second operation were more likely to have a spinal deformity, such as scoliosis, than first time patients
5. Deformities also tended to be more severe among reoperations
6. Also found that the average laminectomy size was larger among the reop group and long term outcomes were not as good
7. Author believes that extensive laminectomies (below C1) combined with a syrinx leave people prone to spinal problems
8. Recommends a modified laminectomy lower on the spine

Definitions

cervical - upper part of the spine, neck area

kyphosis - abnromal forward curvature of the spine which effectively creates a hump

laminectomy - surgical technique where part of one or more bony vertebrae are removed

meningitis - infection or inflammation of the meninges, the layers which cover the brain and spine

scoliosis - abnormal spinal curvature

thoracic - the middle part of the spine, chest area

Extensive Laminectomy May Increase Risk Of Spinal Problems

September 30, 2007 -- Scoliosis, an abnormal curvature of the spine is widely known to be linked with Chiari and syringomyelia, yet the exact nature of the relationship is not clear. Research has shown that CM/SM patient tend to have abnormal curve patterns, even for scoliosis, and that decompression surgery often stops the progression of scoliosis in children. However, attempts to correlate syrinx size and location to the presence and severity of curves have failed. Despite this, it is still believed that syrinxes affect certain nerves in the spinal cord leaving people vulnerable to spinal problems such as scoliosis.

Now, a report from an experienced surgeon, Dr. Ulrich Batzdorf, in the August, 2007 issue of Neurosurgery (Batzdorf et al.) indicates that certain aspects of surgery to treat Chiari and syringomyelia may also contribute to spinal problems. In the study, Batzdorf reviewed 169 syringomyelia cases he had treated operatively over the previous 20 years.

Most of the patients had Chiari related syringomyelia (105) while the rest had primary SM due to trauma, tumors and meningitis. In the CM/SM group sixty-three of the patients were treated with an initial operation, while 42 had already had some type of decompression surgery and Batzdorf was performing a reoperation. In all cases MRIs were reviewed for signs of spinal abnormalities such as scoliosis and kyphosis.

Interestingly, the majority of patients in the first time surgery group had no significant spinal abnormality (58%), while the opposite was true for the reoperation group (see Table 1). Specifically, 57% of the reoperation group demonstrated significant spinal abnormalities. In addition, even when scoliosis was present in the first time group, it was usually mild, whereas the scoliosis found in the reoperation group was mostly classified as severe.

In comparing patients who did and did not have significant spinal abnormalities, the researchers found a major difference involving the amount of bone removed during laminectomies. Recall that a laminectomy is a procedure where part of one or more bony vertebra is removed. Usually a Chiari decompression will involve a laminectomy starting at the top vertebra and going down as far as the cerebellar tonsils descend. In addition, laminectomies are sometimes performed at the level of a syrinx to locally decompress the area or allow for the placement of a shunt to drain the syrinx. In this study the average amount of bone removal for patients with no spinal deformity averaged 2.6 vertebral segments. However, this jumped to 4.7 segments for the group with spinal deformities.

To assess long term outcomes, the researchers attempted to contact each patient and were able to ascertain the status of 163 out of the original 169. The contact was brief and simply designed to determine each person's status relative to how they were immediately after recuperating from surgery. Not surprisingly, the majority of patients reported they felt about the same, but there was a significant difference between the first time operation group and the reoperation group. Specifically, only 3 out of 62 people in the first time group reported being worse off, whereas 9 of the 41 people in the reoperation group were worse.

After looking at the data further, the researchers identified a subset of six patients whose severe spinal deformities coincided with the time and location of surgical procedures. Based upon all the results, Batzdorf believes that laminectomies beyond the top cervical vertebra (C1) increase the chance of spinal problems like scoliosis or kyphosis developing or becoming severe. Basically, the combination of nerve damage from a syrinx, combined with the structural changes from a laminectomy can weaken things to the point that problems develop.

Because of this, the authors recommend that if bone needs to be removed beyond the top vertebra (C1) that a modified technique be used which can preserve musculature and a key ligament. In comments published in the same journal issue, several surgeons agreed with Batzdorf's approach, although a couple did point out some problems with the design of the study and stressed the need for more research in this area.

Table 1
Percent of Patients With Spine Deformity (105 Total)

	First Chiari Surgery (63)	Chiari Reop. (42)
No Significant Deformity	58%	43%
Significant Deformity	41%	57%

Table 2

vertebra - one of the individual bony segments of the spine; referred to by region and number, for example C1 is the first segment in the cervical region

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

cerebellum - part of the brain located at the bottom of the skull, near the opening to the spinal area; important for muscle control, movement, and balance

cerebrospinal fluid (CSF) - clear liquid in the brain and spinal cord, acts as a shock absorber

Chiari malformation I - condition where the cerebellar tonsils are displaced out of the skull area into the spinal area, causing compression of brain tissue and disruption of CSF flow

decompression surgery - general term used for any of several surgical techniques employed to create more space around a Chiari malformation and to relieve compression

Source

Batzdorf U, Khoo LT, McArthur DL. Observations on spine deformity and syringomyelia. Neurosurgery. 2007 Aug;61(2):370-7

Average Laminectomy Size (Vertebral Segments) No Deformity vs Deformity

	Laminectomy Size
No Spinal Deformity	2.6
Significant Spinal Deformity	4.7

Note: Laminectomy size is measured in vertebral segments

Table 3
Long Term Outcome Status, First Surgery vs Reoperation

	Better	Same	Worse
Initial Surgery (62)	18	41	3
Reop. (41)	5	27	9

Note: Status is as compared to discharge after surgery; number of patients in each group is represented

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