

### Key Points

1. There have been several surgical reports involving large numbers of patients which have shown about an 80% improvement rate after surgery
2. Study from China reported surgical outcomes for 128 patients
3. Overall success rate was good; researchers separated cases into simple and complex
4. Simple cases had good outcomes 95% of the time, while complex ones only had good outcomes 74% of the time
5. Of all the cases that had poor outcomes, patients who required some type of fusion for stability had poorer outcomes

### Definitions

**arachnoid** - thin, middle layer of the coverings of the brain and spinal cord

**autogenous** - taken from the patient's own body

**central canal** - tube like center of the spinal cord; usually collapses as people age

**Chiari II** - more serious form of Chiari; associated with spina bifida

**craniectomy** - surgical technique where a piece of the cranium, or skull, is removed

**dura** - thick, outer covering of the brain/spinal cord

**duraplasty** - surgical technique where the dura is expanded with a patch or graft

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

**mortality** - death rate

**obex** - opening at the top of the central canal of the spinal cord

**vertebra** - one of the bony

## Complex Chiari Cases Have Poorer Outcomes

**September 30, 2007** -- Complex Chiari cases, defined as the existence of additional abnormalities such as fused vertebra or basilar invagination, have poorer surgical outcomes than simple Chiari cases. That was one of the findings from a study published recently in the journal, *Pediatric Neurosurgery*.

The study, from a group of doctors in China (Guo et al.), reported on the surgical outcomes of 128 Chiari cases treated over several years at Zhengzhou University. At this point there have been several surgical outcome reports involving a large number of patients, which has pretty much established that about 80% of patients experience at least some type of relief as a result of surgery. However, the Chinese team went a step further and separated their patients into what they called simple and complex cases.

Their study involved 128 consecutive patients, with MRI confirmed Chiari of at least 5mm, who underwent decompression surgery. Most of the patients were adults (112) and the majority had Chiari I (115). Surprisingly, 95% of the large group also had at least one syrinx. As to be expected, there were a variety of symptoms, with motor weakness and temperature and touch sensory disturbances being the most common (see Table 1).

The surgery was tailored to each patient's individual needs, but generally involved a craniectomy, laminectomy and duraplasty, with removal of the cerebellar tonsils as needed. In addition, 28 patients required fusion of the vertebra with an autogenous bone graft and 5 required stabilization with plates and screws.

For the purposes of analysis, outcomes were categorized as resolved, improved, unchanged and worsened, with resolved or improved considered a good outcome and unchanged or worsened a poor outcome. Patients were evaluated immediately after surgery and for an average of three years post-operatively, although 24 patients did not return for long term follow-up.

Overall, outcomes were good with 81% of the pediatric patients and 90% of the adults showing improvement in symptoms immediately after surgery. In addition, post-surgical MRIs showed that syrinxes collapsed or shrank in 79% of the patients with SM.

To look deeper into the data, the researchers next categorized all the patients as having either a simple case of Chiari or a complex one. Complex cases were defined as having one or more additional abnormalities, such as congenital fusion of the top two vertebrae or basilar invagination. Using this definition, there were 90 simple cases (70%) and 38 complex ones (30%).

When they broke the data up this way, they found a significant difference between the outcomes for the simple and complex cases. Specifically, while an impressive 95% of the simple cases had good outcomes, only 74% of the complex cases did (see Table 2). As an extension of this, the surgeons also found that patients who underwent fusion as part of their surgery were significantly more likely to have a poor outcome. This makes sense, seeing as how many of the structural problems which define a complex Chiari case may require fusion to provide stability. And while it seems intuitive that complex cases may not fare as well, it is very useful to see the data broken out this way to quantify it.

Long term follow-up averaged 3 years and showed that overall there was complete resolution of symptoms for 28% of the patients, while an additional 59% experienced significant improvement. Many studies would combine these two categories as a measure of success, which would produce a pretty impressive 87% success rate for the surgery.

While the overall success rate was high, there was also an unusually high rate of complications. There were no mortalities associated with the surgery, but 28% of the patients did experience complications such as fever, CSF leak and instability.

There are now enough surgical outcome reports such as this one to say that decompression surgery improves symptoms for a majority of patients. However, since this type of report is one of the most common in the Chiari literature, it would be useful if surgeons began to dig deeper into how they classify patients and outcomes. This study represented a good step in that direction by looking at simple versus complex cases and breaking outcomes into four distinct categories.

**Table 1**  
**Common Symptoms (128 Chiari Cases)**

|  |
|--|
|  |
|--|

segments of the spine

**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**

Guo F, Wang M, Long J, Wang H, Sun H, Yang B, Song L. [Surgical management of Chiari malformation: analysis of 128 cases](#). *Pediatr Neurosurg*. 2007;43(5):375-81.

| Symptom                     | % With |
|-----------------------------|--------|
| Motor Weakness              | 60     |
| Loss of Temperature Sensing | 59     |
| Loss of Touch Sense         | 58     |
| Headache                    | 35     |
| Neck Pain                   | 30     |
| Limited Neck Motion         | 46     |

**Table 2**  
**Surgical Outcomes, Simple vs Complex Chiari Cases**

|                     | Good | Poor |
|---------------------|------|------|
| <b>Simple (90)</b>  | 95%  | 5%   |
| <b>Complex (38)</b> | 74%  | 26%  |

**Note:** Complex refers to Chiari in combination with other abnormalities, such as congenital fusion or basilar invagination; Good = resolved or improved; Poor = unchanged or worsened

**Table 3**  
**Long-Term Surgical Outcomes (104 Cases)**

|                  | Pediatric (15) | Adult (89) |
|------------------|----------------|------------|
| <b>Resolved</b>  | 4              | 25         |
| <b>Improved</b>  | 8              | 53         |
| <b>Unchanged</b> | 2              | 6          |
| <b>Worsened</b>  | 1              | 5          |

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