

Key Points

1. Controversy continues over whether the dura should be opened during Chiari decompression surgery
2. Opening the dura reduces the re-operation rate, but also increases the chance of surgical complications
3. Study looked at procedure which peeled back the top layer of the dura but did not open it completely
4. Procedure was performed on 11 adult Chiari patients with a range of herniations, syrinxes, and symptoms
5. Six patients experienced complete resolution of symptoms, three continued to have minor symptoms, and two continued to have paresthesia
6. None required additional surgery and there were no significant surgical complications
7. It will likely take a long time and many more publications until some type of consensus is reached in the surgical community

Definitions

cervical - neck area

craniectomy - surgical procedure where part of the skull, or cranium, is removed

dura - thick, outer covering of the brain and spine

foramen magnum - opening in the base of the skull through which the brain and spine connect

paresthesia - abnormal sensations, such as burning or tingling, associated with nerve damage

posterior fossa -region in the back of the skull where the cerebellum is situated

Dura Splitting Surgical Technique Shows Good Results

September 30th, 2009 -- Regular readers of this publication are likely painfully familiar with the fact that there are many variations to Chiari surgery. While the goal of Chiari surgery is straightforward - namely to create more space - surgeons have developed a variety of methods to achieve that goal. One of the most controversial, and studied, variations involves whether to open the dura. The dura covers the entire brain and spinal cord and encloses the cerebrospinal fluid.

In short, some surgeons believe strongly that the dura should be opened, and expanded, during surgery using a procedure called a duraplasty. Research in support of this position shows that if the dura is not opened, there is a higher rate of re-operation. On the other hand, in recent years there have been a number of publications which have shown that not opening the dura dramatically reduces serious complications and in most cases provides adequate decompression.

A number of years ago, a technique was proposed which literally split the difference between the two camps. Specifically, the idea was to not open the dura completely, but rather to peel back the thick top layer of the dura. In theory, this means that the CSF space is not exposed which should reduce complications, and since the underlayer of the dura is flexible, it should also provide for expansion of the space around the cerebellar tonsils.

A publication from France (Chauvet) in the October issue of the journal *Neurosurgical Review*, suggests that a dura splitting technique can do just that. The French report involved 11 adult Chiari patients aged 18-55. On average, they had experienced symptoms for more than 4 years and 5 of the 11 had syrinxes. Not surprisingly, 9 of the 11 suffered from headaches and/or neck pain. Additional symptoms included dizziness and paresthesia in the arms and hands. Most of the group had average sized herniations which extended to the first cervical vertebrae (Table 1), but 3 had larger ones which went all the way to C2.

Each patient underwent surgery with a dura splitting technique where the top layer of the dura was separated and peeled away. Without opening the dura completely, the average time spent in the operating room was only 85 minutes. The group was followed for an average of more than a year after surgery, including follow-up MRIs.

As has been seen with other patient groups, not opening the dura kept surgical complications to a minimum. In fact, there were no serious complications and only one minor one, a superficial wound infection. Symptom-wise, more than half of the patients (55%) experienced a complete resolution of their symptoms after surgery (Table 2), while three continued to have minor dizziness, and two continued to have paresthesia. However, none of the residual symptoms were severe enough to warrant additional surgery.

On MRI, it was the authors' opinion that 10 of the 11 patients showed an adequate decompression, meaning there was sufficient space around the tonsils, while one person, for reasons that were not clear, only showed a partial decompression. Of the 5 patients with syrinxes, two resolved completely, two shrank in size, and one remained unchanged.

Although the number of patients in this group was fairly small, the authors believe that the results indicate that dura splitting should be considered as a less invasive alternative. Historically, some surgeons have suggested that herniations which extend to C2 would always require opening the dura; but the French team points out that three of their patients did have herniations of this size. While there were some residual symptoms, they did not require a second surgery. Some surgeons who favor opening the dura, believe that it is necessary to remove adhesions and scarring which can block the flow of CSF. While this may be the case, the authors point out that the very act of opening the dura completely and exploring beneath it can in and of itself lead to scarring and adhesions which would defeat the purpose of opening the dura in the first place.

Unfortunately for patients, it is difficult to evaluate the relative merits of the various surgical approaches, given the lack of specific, comparable ways to measure their success. That is one reason Conquer Chiari continues to support the development of advanced MRI based techniques which can produce quantitative measures indicative of symptomatic Chiari. If a simple test can be developed which indicates symptomatic Chiari, then by extension, the same test should be able to evaluate the success of surgery and provide a true way to compare surgical techniques.

Table 1: Extent of Tonsillar Herniation in 11 Patients

Level	# of Patients
Below Foramen Magnum	2

Common Chiari Terms

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

syringomyelia - condition where a fluid filled cyst forms in the spinal cord

At C1	6
At C2	3

Table 2: Residual Symptoms After Dura Splitting (11 Total Patients)

Symptom	# With
None	6
Dizziness	3
Paresthesia	2

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Source

Source: [Dura splitting decompression in Chiari type 1 malformation: clinical experience and radiological findings](#). Chauvet D, Carpentier A, George B. Neurosurg Rev. 2009 Oct;32(4):465-70.

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