Key Points

1. There is ongoing debate on the benefit of fully opening the dura during Chiari decompression
2. Previous research has found that a minimal surgery can be successful for children and Chiari only
3. Study found that even adults with Chiari and syringomyelia can benefit from a less invasive decompression, but patient selection is important

Definitions

arachnoid - middle layer of the meninges

dura - tough, outer layer of the meninges

duraplasty - surgical technique where the dura is opened and expanded using a patch

meninges - term for the three layers that line the brain and spinal cord

Valsalva maneuver - straining, a Valsalva headache is one brought on by straining

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

syringomyelia - condition where a

Less Invasive Surgery Shows Promise Even w/ Syringomyelia

November 1st, 2012 -- In the medical world, advances don't often come in giant leaps, but rather in small increments over time, as doctors and surgeons refine treatments on their own patient base and share their experiences with others through journal papers and conferences.

Chiari is a good example of this. While it may seem like there hasn't been any progress in the last decade, with more than 10,000 decompression surgeries performed annually in the US alone, surgeons have been refining their techniques in order to maximize outcomes and minimize complications. As reported many times in this publication, one of the main focus areas of this refinement has been the dura, or the covering of the brain and spine.

Originally, part of Chiari decompression surgery entailed fully opening the dura and expanding it with a patch (duraplasty) in order to make more room around the crowded cerebellar tonsils. Over time, however, some surgeons, in an effort to minimize trauma and complications, tried what are called bone only decompressions and left the dura intact. When this was shown to be effective in some cases, even more techniques were put to the test, such as scoring the dura, or opening the dura but leaving the arachnoid underneath in tact.

While this subject is far from settled, the boundaries of the argument have begun to take shape. Specifically, it has been shown several times that preserving the dura (or not opening it completely) reduces time in surgery, time in the hospital, and most significantly the incidence of serious complications. However, it has also been shown that in general, there is a higher re-operation rate associated with these types of minimal decompressions. Therefore, it becomes an issue of patient selection; meaning how do you identify patients who will do well with less invasive surgery?

To date, the published papers on this subject have tended to focus mostly on pediatric cases with Chiari only. In fact, at the Conquer Chiari Research Conference two years ago several surgeons who were beginning to accept the notion of a reduced surgery in Chiari only cases, still expressed that they would still fully open the dura if syringomyelia was present.

Recently, however, a group from South Korea (Lee et al.) has shared positive results using an arachnoid preserving technique on adults with syringomyelia. Specifically, over the course of several years, 25 of their adult patients – without prior surgery, bony abnormalities, or indications of hydrocephalus, but with Chiari and syringomyelia – underwent decompression surgery where the surgeons opened the dura but tried to preserve the arachnoid underneath. This meant that the cerebrospinal fluid underneath was not exposed during the procedure. It should be noted, though, that 20 of the patients still had a duraplasty, while 5 did not.

The group was followed for a minimum of 2 years, with clinical visits and MRIs. The surgical team found that 20 out of 25 (80%) had a significant improvement in symptoms (Table 1), while 4 stabilized, and only one got worse. Similarly, the syrinxes of 17 of the patients collapsed completely or improved significantly, while 7 stabilized, and one got worse. Interestingly, in 24 out of the 25 cases, the cerebellar tonsils ascended back into the skull and took on a more normal, rounded shape.

Not surprisingly, given that the CSF space was not penetrated, there were no significant complications. Rather there were a couple cases of transient headaches, weakness, and superficial infection. Of note, however, was a complication not seen in a full decompression, namely accidental opening of the arachnoid.

While encouraging, these results need to be approached with caution for two reasons. First, the surgeons suggest in their article that they only preserved the arachnoid when they could visualize good flow of CSF during the surgical procedure. This then gets back to the idea of patient selection, either before or during surgery, as a key to the success of minimal decompressions.

Secondly, and more difficult to get around, is the continued problem of Chiari publications which are not well structured scientifically and only report on a few patients. Recently the popular press reported on a general study which found that a very high percentage of medical publications which find a highly positive effect are later proven to be false because the initial work involved too few subjects.

But keeping these factors in mind, it is encouraging that surgeons continue to refine the techniques associated with Chiari decompressions and push them towards minimal trauma and complications.

Table 1
Clinical and Radiological Outcomes
(25 Patients)

fluid filled cyst forms in the spinal cord

Source

Surgical results of arachnoid-preserving posterior fossa decompression for Chiari I malformation with associated syringomyelia. Lee HS, Lee SH, Kim ES, Kim JS, Lee JI, Shin HJ, Eoh W. *J Clin Neurosci. 2012 Apr;19(4):557-60. Epub 2012 Feb 1.*

	Clinical	Radiological
Improved	20	17
Stable	4	7
Worse	1	1

Table 2
Predictors of Poor Outcomes

Transient Headache	3
Transient Weakness	1
Superficial Infection	2

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