

Key Points

1. There has been an ongoing debate in the surgical community about whether to open the dura as part of Chiari surgery
2. Those in favor of opening the dura say that not doing so increases the risk of needing additional surgeries
3. Those in favor of not performing duraplasty in some cases say that opening the dura increases the risk of CSF related complications
4. Researchers looked for published studies which directly compared results for opening and not opening the dura
5. Using strict criteria, identified found 7 studies involving 582 total patients
6. The combined results of these studies showed that the reoperation rate was much higher in the non duraplasty group
7. However the CSF complication rate was much higher in the duraplasty group
8. This basically supports the premise of each side of the dura debate

Definitions

dura - thick, outer covering of the brain and spinal cord

duraplasty - surgical technique where the dura is expanded by sewing a patch into it

meta-analysis - type of study which uses statistical techniques to try to combine and integrate the results of previous studies

posterior fossa decompression (PFD) - in this study, refers to Chiari surgery in which the dura was not opened

posterior fossa decompression with duraplasty (PFDD) - in this

Meta-Analysis Compares Opening The Dura To Not

July 31, 2008 -- For years now there has been a debate among Chiari neurosurgeons (especially pediatric) about whether to open the dura, which is the outer covering of the brain and spinal cord. Those who advocate leaving the dura untouched - or not completely opening it - point out that cutting open the protective covering of the brain greatly increases the risk of complications, including CSF leaks, infections, and additional scarring of the dura itself, and results in more pain and longer hospital stays. They believe that most of the benefits of decompression surgery come from removing the bone - both skull and vertebra - and that opening the dura completely is not worth the added risk. In fact, one study seemed to show just that; electrical tests during surgery showed that most of the decompressive effect on the brainstem occurred after the bone removal.

On the other hand, those who advocate opening the dura point out that one of the main goals of decompression surgery is to restore normal CSF flow and that there are often obstructions to this flow - from scarring and adhesions - underneath the dura. Their position is supported by several reviews which have showed that many failed surgeries are due to just such issues.

To date, there have been no randomized clinical studies directly comparing opening the dura to not opening the dura, however two researchers from Dartmouth (Durham, Fjeld-Olenec) published a meta-analysis comparing outcomes and complication rates of posterior fossa decompression with duraplasty (PFDD) and without duraplasty (PFD) in children. A meta-analysis uses statistical techniques in an attempt to combine and compare the results from previous studies. Their work was published in the July, 2008 issue of the Journal of Neurosurgery: Pediatrics.

The researchers started by searching medical databases (and Google) for studies which met four criteria:

1. They involved the surgical treatment of Chiari 1
2. They described posterior fossa decompression as the treatment
3. They compared patients who received PFD with and without duraplasty in the same series
4. Patients were under 18 years of age

The initial search turned up 173 citations of surgical treatment of pediatric Chiari cases. However most of these (132) were excluded because they did not describe the surgical treatment, involved other conditions, or involved other treatments as well. The remaining 41 were then reviewed in detail. Of these, more studies were excluded because they did not describe the PFD technique, did not compare PFD and PFDD surgery, or the age of the patients was not clear. In the end, the researchers found 7 studies (published between 2000-2007), involving a total of 582 patients which met their criteria.

Within the combined patient group, 316 of the children underwent surgery with duraplasty and 266 had surgery without. For outcome measures, the researches looked at how often reoperation was required, overall clinical improvement, and whether syringes were reduced. For complications, they looked at CSF related problems, wound infection, occipital neuralgia, and bleeding (Figure 1).

Interestingly only reoperation rates and CSF complications were significantly different between the two groups. Specifically, only 2.1% of the PFDD patients required additional surgery, as compared to more than 12% for the PFD group. However, CSF complications were much higher in the PFDD group (18.5%) than the PFD group (1.8%). These results, in essence, validate the arguments of each side of the debate. The duraplasty group says that not opening the dura increases the risk of additional surgery, and the non-duraplasty group says that a bone only decompression involves much lower risks of complication.

The authors readily state that the meta-analysis has significant limitations. Basically, they discovered what this publication has talked about for quite awhile; namely that Chiari research tends to not specify the criteria for patient selection and that outcome measures are poorly defined and inconsistent. Because of these limitations, their analysis was not able to identify any patient sub-groups who can benefit from the no-duraplasty procedure without an increased risk of reoperation.

It is this precise point - patient selection - which will finally resolve the great dura debate. Not in the sense that one technique will be proven better than the other, but in the sense that doctors will agree on when each technique should be used. However to develop these guidelines scientifically will require research at a level of scientific rigor which is not often seen with Chiari.

1. There has been an ongoing debate in the surgical community about whether to open the dura as part of Chiari surgery

study, refers to Chiari surgery which included duraplasty

prospective - type of research study which follows patients forward from a point in time

retrospective - type of research study which uses medical records to look back in time

ultrasound - imaging technique which is sometimes used during Chiari surgery to determine if the dura needs to be opened

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 fluid filled cyst forms in the spinal cord

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Figure 1: Comparison of Duraplasty (PFDD) and No Duraplasty (PFD) Outcomes and Complications

	PFDD	PFD	Sig?
Reoperation	2.1%	12.6%	Y
Clinical Improvement	78.6%	64.6%	N
Syrinx Reduction	87%	56.3%	N
CSF Complication	18.5%	1.8%	Y
Wound Infection	3.7%	0.9%	N
Occipital Neuralgia	0.7%	0.0%	N
Bleeding Complication	1.5%	1.8%	N

Notes: Not every study had necessary data for each; for example 5 studies were used for reoperation rate; Sig? refers to whether the difference between the PFDD and PFD groups was statistically significant

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Source

Source: Durham SR, Fjeld-Olenec K. [Comparison of posterior fossa decompression with and without duraplasty for the surgical treatment of Chiari malformation Type I in pediatric patients: a meta-analysis.](#) J Neurosurg Pediatrics. 2008 Jul;2(1):42-9