

Key Points

1. Study compared morbidity versus recurrence in patients who received duraplasty and those who didn't
2. Patients received a duraplasty if they had a syrinx or if bone only decompression did not restore enough space
3. Recurrence rate was higher (12.3%) for no duraplasty group vs the duraplasty group (3.1%)
4. However, there were no surgical complications in the no duraplasty group versus 3 in the duraplasty group
5. No duraplasty patients also had significantly lower OR time, time in the hospital, post-op medication use and less medical costs incurred
6. Authors point out that quantitative data can be used to help make decision on whether dura should be opened
7. More research is needed to better identify patients who require duraplasty

Definitions

antiemetic - medicine that helps reduce nausea and vomiting

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

duraplasty - surgical procedure where the dura is opened and enlarged with a patch

morbidity - a complication resulting from surgery

pseudomeningocele - an abnormal collection of spinal fluid which can occur as a complication from surgery

recurrence - in this context of this article, refers to the need for additional surgery

subarachnoid space (SAS) - space just above the nerve tissue in the brain and spine where CSF flows

Study Quantifies Tradeoffs In Opening Dura During Surgery

June 1st, 2010 -- Probably the most active ongoing debate in the Chiari surgical community today - especially among pediatric neurosurgeons - is whether it is necessary to open the dura during decompression surgery. The dura is the outer covering of the brain and spinal cord. A duraplasty - where the dura is cut open and a patch is sewn in to expand the dural surface - is traditionally part of Chiari decompression surgery.

However, a number of years ago surgeons began to try operating on children by only removing bone to create more space and not opening the dura. The motivation for not opening the dura is that the risk of complications, including serious ones, increases when the dura is opened. The downside to not opening the dura, as research has begun to show, is that there is an increased risk that additional surgery may be required.

When the concept of a bone only decompression was first introduced, it was extremely controversial and for a number of years the debate centered on the basic question of should the dura be opened or not. But, as time went by and evidence mounted that not opening the dura was effective for a significant number of patients and greatly reduced surgical complications, the debate shifted from one procedure versus the other, to how can patients be identified who will benefit from a surgery without opening the dura.

While a recent publication out of Louisville, Kentucky (Mutchnick et al) doesn't completely answer this question, it does go a long way in quantifying the tradeoffs in opening the dura versus not opening the dura. Specifically the study retrospectively compared morbidity versus surgical recurrence for over 100 Chiari children operated on over a five year period.

The group included 121 children in total, with 58 boys and 63 girls. The average age of the group was 11.1 years. Of the 121, 56 of the patients underwent surgery without opening the dura, while 64 underwent surgery which included opening of the dura and duraplasty. The primary criteria for deciding which procedure the patients had was the presence of a syrinx. Patients with a syrinx were given a duraplasty, whereas for those without a syrinx, the dura was generally not opened. However, if the surgeon felt that only removing bone did not restore enough CSF flow, then the decision was made during the operation to open the dura.

In looking at the primary outcome variables (Table 1), as expected, the duraplasty group had a lower rate of surgical recurrence (meaning a patient required additional surgery), at 3.1% versus 12.5% for the no duraplasty group. Also as expected, the no duraplasty group had a lower complication rate. In fact there were no complications among the no duraplasty group versus 2 pseudomeningoceles and one superficial wound issue in the duraplasty group.

The researchers also looked at average time spent in both the operating room and the hospital and found significant differences in both. On average, operative time for the no duraplasty group was 127 minutes versus 201 minutes for the duraplasty group. Similarly, the average hospital stay for the no duraplasty group was 2.7 days versus 4 days. Also not surprisingly, the surgeons found that the no duraplasty patients used significantly less (and less strong) narcotics, muscle relaxants, and antiemetics. In fact, the usage rate of the medicines in general dropped much more quickly for the no duraplasty patients.

Finally, the research team found that the above differences translated into a very significant difference in the cost of care between the two groups. On average, the hospital costs for the duraplasty group were nearly double the no duraplasty group, at \$27,210 versus \$14,305 respectively (note these are the actual costs incurred, not what was charged to insurance or the patients).

In discussing these results, the authors stress they are not advocating a specific procedure, but rather trying to provide more data so that families can make an informed decision with their doctor and balance the risk of requiring more surgery with the benefit of few complications, shorter hospital stays, and less trauma. While the researchers point out that more work is required to better identify who can benefit from a no duraplasty surgery, the criteria they used - the presence of a syrinx - provided pretty good results.

It is also interesting to look at how far Chiari surgery has progressed over the years. In the background section of their publication the authors cite an article from 1938 where 50% of surgical patients died within 5 weeks of surgery. By the 60's, the mortality rate had improved by was still reported at 7% by Gardner, who also said surgery, "[entails] definite risk and should be reserved for those patients in whom total disability is threatened by progression of symptoms". These cases were likely severe and associated with spina bifida or a syrinx because mild to moderate Chiari I would not have been identified back then, but it is interesting to see how as the risk of surgery decreases the more it can be used to help people with less severe symptoms.

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

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

Source

Decompression of Chiari malformation with and without duraplasty: morbidity versus recurrence. Mutchnick IS, Janjua RM, Moeller K, Moriarty TM. J Neurosurg Pediatr. 2010 May;5(5):474-8.

Table 1: Duraplasty vs No Duraplasty

	No Duraplasty	Duraplasty
# of Patients	56	64
Surgical Recurrence Rate	12.5%	3.1%
Number of Complications	0	3
Avg Time in OR	127 min	201 min
Avg Time in Hospital	2.7 days	4 days
Avg Hospital Costs	\$14,305	\$27,210

Note: Hospital costs reflect the actual costs incurred by the medical facility/provider which is different than what patients were charged and what may have been reimbursed by insurance

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