

Key Points

1. Study reviewed the outcomes of 96 Chiari/syringomyelia pediatric patients
2. Patients were grouped by syringomyelia/no syringomyelia, clinical symptoms, and surgical technique used (see below)
3. Overall, surgery significantly improved symptoms 70% of the time
4. Children without SM improved 76.4% of the time, children with SM improved 58.5% of the time; this difference was not statistically significant
5. Neither type of symptoms, or type of surgery, had an impact on surgical outcome
6. Children under 8 years old were 3 times more likely to improve after surgery than children over 8
7. Overall complication rate was 16.6%; the complication rate was much higher with procedures that opened the dura
8. Authors favor "scoring" the dura and using ultrasound to verify adequate decompression

Definitions

asymptomatic - having no symptoms

brainstem - the lowest part of the brain which connects with the spinal cord and controls automatic functions such as breathing and swallowing

central canal - very center of the spinal cord, so named because it starts as a hollow tube which closes in most people as they age

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

Large Study Examines Surgical Outcomes In Children

[Ed. Note: The medical paper described below used the term hydromyelia. Some physicians use the term hydromyelia to refer to a syrinx in the central canal portion of the spinal cord, while others use it interchangeably with syringomyelia. For simplicity, this article uses the term syringomyelia to refer to a syrinx inside, or outside the central canal.]

One of the most common questions patients ask is, "Will this surgery work?" One of the biggest controversies about Chiari surgery is whether to open the dura - the covering of the brain - as part of the decompression. Now, a paper from pediatric neurosurgeons at Northwestern University Medial Center weighs in on both these issues.

Dr. Ramon Navarro and his colleagues examined the medical, surgical, MRI records, and clinical outcomes of 96 children they had treated for Chiari and/or syringomyelia between 1989-2001. The published their findings (on-line) in the journal *Child's Nervous System*, in March, 2004.

In order to analyze the outcomes of their cases, the team grouped the children in three different ways: whether they had syringomyelia, the type of clinical symptoms they demonstrated, and the surgical technique used in their treatment (see Figure 1). Fifty-five children did not have signs of a syrinx, while 41 did. As might be expected, the majority of the children suffered from headaches and neck pain (53), while 17 exhibited problems with their brainstem, cranial nerve, or cerebellum. Those children with symptoms directly attributable to their syrinx were divided into those with scoliosis and those without.

The majority of the children underwent a decompression surgery where the dura was not opened completely. Instead, the surgeons used what they refer to as "dural scoring"; namely, instead of sewing a patch into the dura, a series of cuts are made in the dura- but not completely through - in order to allow for expansion. Ultrasound is used after this step to ensure the space around the cerebellar tonsils is adequately decompressed. Some of the children (24) did undergo a classic duraplasty, and some (14) even had part of their cerebellar tonsils removed to create more space.

Surgery was considered a success if the patient became asymptomatic or if their symptoms resolved to the point where their quality of life was markedly better. Obviously, if there were little or no improvement, or if things got worse, the surgery was not considered a success.

The overall success rate for the group was around 70%, with those undergoing the dural scoring having a slightly higher success rate than those with a duraplasty. However, the difference was not statistically significant, and in fact the surgical technique used did not have a significant effect on the clinical outcome of the patients.

While this would seem to indicate that duraplasty is not necessary for a successful outcome, care must be used in interpreting this result. In order to truly compare one surgical technique with another, patients would have to be randomly assigned to the type of surgery they will have prior to the surgery itself. In this study, the surgeons chose what technique to use during the surgery itself - presumably based on the patient and their own clinical judgment - and only afterward were the patients divided into groups. So the fact that there was no difference between the techniques could be due to the fact that the surgeons consistently knew what technique to use, and if the techniques were applied randomly to patients, there may be significant differences between them in terms of clinical outcome.

Interestingly, the symptom categories the doctors came up with also had no effect on patient outcomes, however age at time of surgery did. The group found that children under the age of 8 were three times more likely to improve after surgery than those older than 8. One reason for this may be that the older children actually had the disease for a longer period of time, which other research has shown can lead to poorer outcomes.

The overall complication rate was a fairly high 16% with the majority of complications involving CSF problems and occurring in the first 3 weeks after surgery. The complication rate among the duraplasty groups was much higher than among the dural scoring patients, implying that opening the dura involves more risk for the patient. In addition, 13 patients (13.5%) required additional surgeries. This is in-line with the re-operation rate of other surgeon's patient groups.

Based on their results, the doctors recommend performing dural scoring when possible and using ultrasound to verify decompression. If a duraplasty is required, they further recommend that the arachnoid - the covering underneath the dura - not be opened, as to avoid complications. While the results from this study are interesting, many surgeons feel strongly that duraplasty is necessary - especially in syringomyelia cases - to achieve proper decompression, and it is not clear that there will be a consensus about the best surgical technique anytime soon.

cranial nerve - one of 12 pairs of nerves that originate in the brain as opposed to the spinal cord

dura - thick outer covering of the brain and spinal cord; beneath the dura are the arachnoid and the pia

dural scoring - surgical technique where a series of cuts are made into the dura, but the dura is not completely opened

duraplasty - surgical technique where a patch is sewn into the dura

hydromyelia - cyst in, or swelling of, the central canal; sometimes used interchangeably with syringomyelia

posterior fossa - depression on the inside of the back of the skull, near the base, where the cerebellum is normally situated

syringomyelia (SM) - neurological condition where a fluid filled cyst forms in the spinal cord

tonsillar manipulation - surgically removing part, or all, of the cerebellar tonsils

ultrasound - imaging technique which uses sound waves to create pictures of internal organs and body parts

Patient Groupings (Number of Patients)

Grouping 1 -

- Syringomyelia - 41
- No Syringomyelia - 55

Grouping 2 - Symptoms

- Headache, neck pain - 53
- Brain stem/cranial nerve - 17
- Symptomatic SM, scoliosis - 14
- Symptomatic SM, no scol. - 12

Grouping 3 - Surgical Technique

- Posterior fossa decompression with dural scoring and intraoperative ultrasound - 71
- Posterior fossa decompression with duraplasty - 24
- Posterior fossa decompression with duraplasty and tonsillar manipulation - 14

Source

Navarro R, Olavarria G, Seshadri R, Gonzales-Portillo G, McLone DG, Tomita T. [Surgical results of posterior fossa decompression for patients with Chiari I malformation.](#) Childs Nerv Syst. 2004 Mar 12 [Epub ahead of print]

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