Synthetic Graft May Be More Effective Than Autograft

November 30, 2008 -- A recent study from Johns Hopkins has found that a synthetic dural graft performed better than grafts taken from the patient's own tissue (autograft) in Chiari surgeries.

The dura (Figure 2-7, picture taken from Conquer Chiari: A Patient's Guide), is the thick, outer most layer of the meninges, which cover the brain and spinal cord. The dura is often opened as part of Chiari surgery in an attempt to relieve pressure and create more space for the flow of cerebrospinal fluid. The procedure, known as a duraplasty, also involves sewing a patch, or graft, into the dura to make it bigger.

Over the years, surgeons have tried many different graft materials, including ones taken from cows and human cadavers. Today, two of the more popular options are to use tissue from the patient's own body, known as an autograft, and synthetic dura substitutes. The ideal material for a dural patch must be flexible, easy to handle for the surgeon, watertight to prevent CSF leaks, and minimize scarring and adhesions. Scars and adhesions from dural patches is one of the main contributors to failed Chiari surgeries. While there is some research comparing graft materials, the choice usually comes down to an individual surgeon's preferences, and is often based on their own experience with different graft types.


The research involved 67 children who underwent Chiari surgery performed by two surgeons. The surgical techniques were very similar, however one surgeon used an autograft (40 patients) and the other surgeon used the synthetic graft (27 patients). The children were given MRIs both 3 months and 1 year after surgery. The medical records were reviewed to identify patients whose symptoms came back and those who needed additional surgery. Clinically, the patients in both groups exhibited similar symptoms prior to surgery, such as headaches, sensory disturbances, weakness, etc.

In terms of surgical complications, the researchers found no difference based on type of graft. The same was true for length of hospital stay. However, when the MRI records were reviewed, some key differences emerged (Figure 1). Although the number of pseudomeningoceles was not significantly different between the two groups, twenty-one percent of the children who received autografts showed decreased improvement in the reduction of syrinx sizes, on average, the synthetic graft group improved months before the autograft group.

Clinically, about the same number of patients experienced mild to moderate symptom recurrence in each group (Figure 2). However, while there were no revision surgeries in the synthetic group, 10% of the autograft group underwent additional surgery due to symptom recurrence. The need for additional surgery is perhaps the most directly relevant outcome measure from a patient's point of view, so the fact that there were no revisions in the synthetic graft group is impressive.

While the results from this study do indicate that the graft from W. L. Gore can be used with good results, because of the design of the study, it can not be stated conclusively that it is superior to autografts. To truly compare graft materials, patients would have to be randomly assigned to which type of graft they receive and the work should be done by only one surgeon. The fact that in this study each surgeon only used one type of graft means that the results could reflect the relative skill of the individual surgeons. In addition, it should be noted that one of the authors is a consultant to W. L. Gore.
meninges - layered covering of the brain and spinal cord

phase contrast MRI - type of MRI which can show CSF flow

pseudomeningocele - complication from surgery where an abnormal collection of CSF forms and can bulge into the surrounding tissue; some cases require surgical repair

radiographic - refers to medical imaging

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

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


Figure 1: Radiographic Outcomes, Synthetic vs Autograft

<table>
<thead>
<tr>
<th></th>
<th>Synthetic</th>
<th>Autograft</th>
<th>Sig?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pseudo</td>
<td>24%</td>
<td>11%</td>
<td>N</td>
</tr>
<tr>
<td>Loss of CSF Space</td>
<td>0%</td>
<td>21%</td>
<td>Y</td>
</tr>
<tr>
<td>Syrinx Improvement</td>
<td>52%</td>
<td>18%</td>
<td>N</td>
</tr>
</tbody>
</table>

Figure 2: Clinical Outcomes, Synthetic vs Autograft

<table>
<thead>
<tr>
<th></th>
<th>Synthetic</th>
<th>Autograft</th>
<th>Sig?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Symptom Recur.</td>
<td>11%</td>
<td>27%</td>
<td>N</td>
</tr>
<tr>
<td>Surgical Revision</td>
<td>0%</td>
<td>10%</td>
<td>N</td>
</tr>
</tbody>
</table>

Notes: Sig? refers to whether the difference was statistically significant, meaning it is unlikely to be due to chance. The surgical revisions difference approached statistical significance.

Related C&S News Articles:

Meta-Analysis Compares Duraplasty To No Duraplasty
Study Shows Few CSF Related Complications With Autologous Duraplasty
New Dural Patch Found To Be Safe And Effective
Do You Know What’s In Your Head? Study Compares Dural Graft Materials

Disclaimer: This publication is intended for informational purposes only and may or may not apply to you. The editor and publisher are not doctors and are not engaged in providing medical advice. Always consult a qualified professional for medical care. This publication does not endorse any doctors, procedures, or products.

© 2003-2020 C&S Patient Education Foundation