Most Syringes Shrink Three Months After Surgery

March 31, 2008 -- For the first time, researchers at the Mayo Clinic and the National Institutes of Health (Wetjen, Heiss, Oldfield) have used serial MRIs to create a time line for when syringes resolve after decompression surgery. Specifically, the group prospectively studied the syringes of 29 Chiari patients before and after surgery. They published their findings in the February, 2008 issue of the Journal of Neurosurgery: Pediatrics.

A syrinx, which is a collection of fluid in the spinal cord, is potentially the most damaging symptom of Chiari. As fluid collects in the cord, the syrinx expands and stretches and damages the spinal tissue. This can result in painful sensations (dysesthesia), loss of sensation, muscle weakness and atrophy, urinary and bowel problems, and in some cases even paralysis.

Although syringes can be caused by tumors, trauma, and infection, by far the leading cause is Chiari. There are several theories on how Chiari leads to syrinx formation, with one of the most prominent being the Piston Theory (which was developed by the same NIH researchers as this study). The Piston Theory holds that with Chiari, the dura mater (the thick, outer covering of the brain and spinal cord) is pushed downward, limiting the natural egress of cerebrospinal fluid (CSF). The syrinx, which is a collection of fluid in the spinal cord, is potentially the most damaging symptom of Chiari. As fluid collects in the cord, the syrinx expands and stretches and damages the spinal tissue. This can result in painful sensations (dysesthesia), loss of sensation, muscle weakness and atrophy, urinary and bowel problems, and in some cases even paralysis.

In looking at the MRIs, the surgeons found that all the syringes got smaller in size, but reduced their size to the point where they were no longer stretching the cord. This dropped to 68% two years after surgery, which of course still means that more than half of the group still suffered from some symptoms. The most common residual symptoms were painful dysesthesia and objectively measured loss of sensation.

Interestingly, a significant number of syringes, 41%, never resolved completely. However, there was no relationship between whether a syrinx collapsed completely or not and the clinical, symptom based outcome. The surgeons believe that in these cases, the syrinx had caused so much tissue damage that an actual cavity, or hole, was formed which remains filled with fluid even after decompression surgery. However this does not mean the surgery was a failure, or that the remaining fluid is a problem. Finally, the researchers were unable to find any factors that were related to how long it took for the syringes to narrow. They looked at age, sex, symptom duration, syrinx length, syrinx width, syrinx location, and amount of herniation, but none of these were statistically related to how long it took for a syrinx to shrink.

In the end, this study provided a mixed bag for Chiari patients. It is good to establish a timeline for how long it can take some syringes to reduce in size to the point they are no longer putting pressure on the spine; but it is also
spinal cord - column of nerve tissue which runs down from the brain through the bony spine

syringomyelia - neurological condition where a syrinx forms in the spinal cord, causing pain, weakness, and sometimes paralysis

syrinx - a fluid filled cavity, or cyst, in the spinal cord

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

discouraging that so many patients continued to suffer from symptoms even after successful surgery. This shows that damage caused by a syrinx is often permanent, and highlights the need for rapid diagnosis and treatment.

**Figure 1**
Patients With Residual Symptoms After Surgery (29 Total)

<table>
<thead>
<tr>
<th>Follow-Up Period</th>
<th>% With Residual Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 Months</td>
<td>78%</td>
</tr>
<tr>
<td>1 Year</td>
<td>71%</td>
</tr>
<tr>
<td>&gt; 2 Years</td>
<td>68%</td>
</tr>
</tbody>
</table>

Note: Painful dysesthesia and loss of sensation were the most common residual symptoms

**Figure 2**
Time Course of Syrinx Narrowing After Surgery (29 Total)

<table>
<thead>
<tr>
<th>Follow-Up Period</th>
<th>% Syringes Narrowed</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-6 Months</td>
<td>86%</td>
</tr>
<tr>
<td>1 Year</td>
<td>91%</td>
</tr>
<tr>
<td>2 Years</td>
<td>100%</td>
</tr>
</tbody>
</table>

Note: Syrinx narrowing is defined as a 50% or greater reduction in the maximum diameter of the syrinx

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