Behavior Issues In Chiari II Children Traced To Sleep Problems

May 31st, 2009 -- In an opinion piece for Chiari & Syringomyelia News, Dr. Regina Bland, a working pediatrician with Chiari (and a member of the Conquer Chiari Research Committee) discussed the fact that many people with Chiari report cognitive problems: Let's Think About Thinking - The Cognitive Effects Of Chiari. Dr. Bland pointed out, however, that it is not clear if the malformation itself is the cause of cognitive issues, or if they are due to secondary effects from things like pain, medication, and lack of sleep.

At this point, the sleep problems associated with Chiari have been well established. Research has shown that a high percentage of Chiari patients suffer from sleep apnea, and that many of these cases are the more severe form, known as central sleep apnea. Sleep apnea is when a person repeatedly stops breathing during sleep and begins to wake up in order to start breathing again. Sufferers can endure this hundreds of times a night, resulting in completely disrupted sleep patterns and daytime fatigue and grogginess.

Episodes of apnea are categorized as either obstructive or central. Obstructive refers to when there is a physical blockage of the airway, such as from enlarged tonsils or swelling from allergies. Central apnea arises when the brain’s sleep center, in the brainstem, doesn’t signal the body to breathe.

Interestingly, beyond Chiari, research has linked sleep disorders with both cognitive and behavioral problems. It was behavioral issues that two Brazilian researchers (Filho and Pratesi) chose to focus on in a recent publication in the journal, Arquivos de Neuro-Psiquiatria, and their results seem to support the possibility which Dr. Bland raised. Specifically, they hypothesized that Attention Deficit Disorder in children with Chiari II was due to sleep problems rather than arising directly from the brain malformation.

To study this, they performed sleep studies and behavioral diagnoses on 24 Chiari II children and compared them to 24 age and gender matched healthy controls. The Chiari group was comprised of 15 boys and 9 girls, ranging in age from 7 to 16 years. Each had been born with spina bifida, had undergone corrective surgery as a newborn, and had Chiari II confirmed by MRI. Since many Chiari II children have hydrocephalus, and hydrocephalus can have a profound cognitive impact, in order to control for this, the children in the study also had to be in a mainstream classroom at their age appropriate grade level and be in the normal range of intelligence as determined by testing. Finally, children with respiratory, heart, or other neurological conditions, and children on medications which could interfere with sleep were excluded.

As mentioned previously, both groups of children underwent full-night polysomnography, which means they slept in a lab which monitored their breathing and brain activity while they slept. The researchers were looking for sleep disorders such as apnea, periodic limb movement (which is often associated with spinal problems), and disturbances in the important REM stage of sleep. In addition, the children were evaluated for Attention Deficit as defined by the DSM-IV psychiatric manual using scales which measured hyperactivity, independent functioning, inattention, socialization, and anxiety.

Not surprisingly, the sleep studies revealed that 58% of the Chiari II children suffered from central sleep apnea, while nearly half had periodic limb movement, and one-fourth had REM sleep disturbances (Fig. 1). In the control group, the only sleep problem found was obstructive sleep apnea (not uncommon in children) which appeared in a quarter of the control group. In terms of the psychological testing, six children were identified in each of the two groups (Chiari II and control) as exhibiting ADD.

<table>
<thead>
<tr>
<th>Sleep Problems Among Chiari II Patients (24) and Controls (24)</th>
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<tbody>
<tr>
<td>% With, CM II Group</td>
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<tr>
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</tr>
<tr>
<td>Central Apnea</td>
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<tr>
<td>Obstructive Apnea</td>
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<td>PLMS</td>
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<td>RBD</td>
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Note: PLMS = periodic limb movement syndrome; RBD = REM sleep behavior disorder.
**polysomnography** - sleep testing; patients spend the night in a sleep lab where there oxygen levels, breathing, and brain activity are monitored

**REM sleep** - stands for rapid eye movement; important phase of sleep associated with dreaming

**sleep apnea** - sleep disorder characterized by frequent interruptions in breathing, resulting in the person waking up many times during the night

**spina bifida** - birth defect, also known as myelomeningocele, where the spinal cord is exposed; often accompanies by hydrocephalus and Chiari II

**Common Chiari Terms**

**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 2: ADD as Related to the Presence of Sleep Disorders (SD) in Chiari II and Controls**

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<thead>
<tr>
<th></th>
<th>CMII</th>
<th>Controls</th>
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<tbody>
<tr>
<td></td>
<td>SD</td>
<td>No SD</td>
</tr>
<tr>
<td>ADD</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>No ADD</td>
<td>8</td>
<td>10</td>
</tr>
</tbody>
</table>

Note: In both groups (CMII and controls), the difference between those with ADD and a sleep disorder versus those with ADD and no sleep disorder (which is actually no one) is statistically significant

Although at first glance one might say wait a minute, the result was the same for Chiari kids and the controls kids, so what did the researchers really prove; the reality is that this result actually strongly supports their hypothesis. The researchers hypothesized that behavior issues in Chiari II children (specifically ADD) were a result of sleep problems and not directly due to Chiari. The fact that they found a strong correlation between sleep disorders and ADD in both Chiari children and healthy controls shows pretty strongly that sleep problems can lead to behavior problems. Naturally, as an extension, since sleep problems are more prevalent in the Chiari community, one would expect to find more behavior issues, at least ADD, among Chiari children. Indeed, this would be an interesting follow-up study to undertake.

It would also be interesting to extend this line of research to Chiari I and cognitive issues. In other words how Chiari patients who report cognitive problems have verifiable sleep disorders?

It is well known that sleep is vital to both a person’s physical and mental well-being. Given the prevalence of sleep problems found with Chiari, and the potential consequences, it is important for patients to know whether their sleep is being disturbed.

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**Related C&S News Articles:**

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- Strong Link Between Chiari And Sleep Apnea
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**Source**
