Key Points

1. Sleep apnea is very common among Chiari patients, with some reports finding as many 70% suffer from it
2. With Chiari, the more serious central sleep apnea is more common
3. Group from Brazil looked at the effect of decompression surgery on apnea issues
4. Patients were given full night sleep testing before and at least one year after surgery
5. Out of 25 adult Chiari patients, found that 17 had sleep apnea
6. That group, on average, suffered from hundreds of respiratory events each night
7. Decompression surgery improved pretty much every sleep variable measured; however the apnea did not go away completely
8. Central sleep apnea improved much more than obstructive sleep apnea

Definitions

basilar invagination - condition where a bone in the spine protrudes upwards and presses into the brainstem

central sleep apnea - type of sleep apnea where the brain stops sending the signals to breathe during sleep

hypopnea - reduced oxygen intake during sleep

obstructive sleep apnea - type of apnea due to physical obstruction of the airway during sleep

polysomnography - sleep testing which involves subjects spending the night in a lab where breathing, brain waves, and other bodily functions can be monitored

respiratory - referring to breathing

sleep apnea - condition where a person temporarily stops breathing

Decompression Surgery Helps With Chiari Related Sleep Apnea

September 30th, 2009 -- Sleep apnea is one of the most common, and serious symptoms associated with Chiari. Common because some studies have shown that as many as 70% of people with Chiari have apnea. This compares to only 2-4% of the general population. Serious because research as also shown that Chiari patients tend to have high rates of the more serious central sleep apnea, and also because severe sleep apnea can have a profound effect on a person's life.

Sleep apnea is a disorder where a person actually stops breathing for an extended period of time during sleep and must wake up to breathe again. An adult is considered to have sleep apnea disorder when he or she suffers more than 5 such incidents per hour during the night, but severe cases can result in hundreds of such incidents each night.

There are two main types of sleep apnea, obstructive and central. Obstructive apnea is when breathing is disrupted by something blocking the throat - usually a narrowing of the windpipe. Central apnea is when there is a delay in the nerve signals from the brain which control breathing. Of the two, central apnea is considered to be more serious, and people with central apnea often are found to suffer from both central and obstructive episodes during the night.

The effects of prolonged apnea can be severe, especially in children. For adults, daytime sleepiness can result in reduced productivity at work and lack of energy. In children, chronic apnea can cause behavioral problems, interfere with normal growth and recent research has indicated that it can even affect brain development.

A research group in Brazil (Beotelho) has published several reports on Chiari and sleep apnea. In August, they continued their work with a study showing that decompression surgery helps Chiari related apnea, especially central sleep apnea.

The researchers prospectively recruited adult Chiari patients (age 15-70) and tested them with formal, full-night polysomnography both before and after surgery. The sleep testing evaluated the number and type of apnea and hypopnea events the Chiari group was enduring each night (Table 1).

TABLE 1: Definitions of polysomnographic parameters

Event	Definition
central apnea	event characterized by complete cessation of airway flow w/o respiratory effort; event lasts ≥10 sec
obstructive apnea	event characterized by complete cessation of airway flow w/ respiratory effort persistence; event lasts ≥10 sec
hypopnea	≥50% reduction in airflow for >10 sec or discernible reduction in airflow for 10 sec, w/ 3% desaturation, or termination w/ arousal
respiratory events	total no. of apnea & hypopnea events
AHI	total no. of apnea & hypopnea events ÷ total sleep time (normal value: <5)
CAI	no. of central apneas ÷ total sleep time

The researchers also used a quantitative scale to assess other Chiari related symptoms and a daytime drowsiness scale to assess the impact any apnea was having on their function.

In total, the team looked at 25 Chiari patients; 11 men and 14 women. Two had Chiari only, 17 had Chiari and syringomyelia, and 6 had Chiari and basilar invagination. Out of this group of 25, they identified 17 people with sleep apnea (index score greater than 5).

The researchers found that this group was not getting much sleep. The average number of respiratory events during the course of the night was 181 (Table 2), and the average apnea/hypopnea index was a whopping 26.

Most of the patients in the group underwent similar decompression surgeries, but there were some variations based on specific patient needs. About a year after surgery, the patients spent another night in the sleep lab to see if their apnea had improved.

Overall, the surgery had a significant, positive impact on pretty much every sleep variable measure. The total respiratory events dropped down to 69, the apnea index was cut in half, and the central apnea index went from

over and over during sleep

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

Source

The effects of posterior fossa decompressive surgery in adult patients with Chiari malformation and sleep apnea. Botelho RV, Bittencourt LR, Rotta JM, Tufik S. J Neurosurg. 2009 Aug 7. Epub ahead of print

14 to only 1.6.

Individually, all but two patients showed at least some improvement. The two who didn't improve were found to have very large throat tonsils, which when removed, improved their apnea scores.

It is important to note that the decompression surgery had a much stronger effect on central apnea issue than obstructive ones. Further, while the total apnea index was cut in half, the average was still above what is considered to be normal.

It could be that decompressing the area around the tonsils takes the pressure of the breathing center in the brainstem, but that the obstructive incidents are due to lax muscles in the throat area. If these are from nerve damage, or even if Chiari patients tend to be born this way, then decompression surgery may not have as strong an impact.

It goes without saying that anyone who suspects they are suffering from sleep apnea should see a medical professional as there are treatments available.

Table 2: Effects of Decompression Surgery on Respiratory Sleep Events in 17 CM Patients With Apnea

	Pre-op	Post-op
Total Respiratory Events	181	69
Obstructive Events	107	61
Central Events	38	8
Apnea Hypopnea Index	26	13
Central Apnea Index	14	1.6

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