

Key Points

- During REM sleep, sleep apnea interrupts the normalcy of breathing; it may also awaken the subject suffering from disruptive sleep as well.
- 50%-70% of Chiari patients experience sleep apnea.
- Adolescents, as well as adults, suffering from interrupted breathing during sleep have immense pressure placed upon their brainstem.
- There are two types of sleep apnea: central and obstructive. However, those with central sleep apnea may also have obstructive sleep apnea as well.
- Decompression surgery significantly helps sleep apnea.

Source

[MRI findings and sleep apnea in children with Chiari I malformation](#) Khatwa U, Ramgopal S, Mylavarapu A, Prabhu SP, Smith E, Proctor M, Scott M, Pai V, Zarowski M, Kothare SV. *Pediatr Neurol.* 2013 Apr;48(4):299-307

Children Suffering from Sleep Apnea Caused by Chiari 1 Malformation

April, 2014 - As discussed in previous articles, sleep apnea interrupts the normalcy of breathing during the night; it may also cause individuals to awaken at different intervals during REM sleep. In Conquer Chiari's previous article titled [Sleep Apnea Causes Brain Changes In Children](#), we learned that as many as 50%-75% of Chiari patients may experience sleep apnea. Those diagnosed with Chiari suffer from this sleep disorder because weakened muscles in the throat, specifically the larynx, block the airway and the presence of herniated cerebellar tonsils increase pressure on the brainstem (Halbower et al).

This month's clinical article discusses children who have been diagnosed with a Chiari 1 malformation and pronounced sleep apnea. According to Dr. Khatwa and his neurological team, adolescents as well as adults suffering from interrupted breathing during sleep have immense pressure placed upon their brainstem depending on the length of cerebral tonsil descent. The team concluded that sleep apnea – along with other symptoms - significantly improves with decompression surgery.

Doctors have defined two types of sleep apnea: obstructive and central. According to our article, [Majority of Chiari Patients Suffer from Sleep Apnea](#), when a windpipe is too narrow, it blocks, or disrupts, the breath within the throat—this is known as obstructive apnea. Central apnea is known to be the more serious of the two because the brain's nerve signals which control breathing are delayed. Sometimes those who suffer from central apnea have obstructive incidents as well (Dauvilliers et al).

Twenty-two children (11 males, 11 females) participated in this study and ranged in age from one to eighteen. The young Chiarians underwent polysomnography, or a sleep study, over a 3-year time span; those who underwent decompression surgery approximately six months before the sleep examination began were also involved. Three children with central sleep apnea lacked an effort to breathe for over 20 seconds while five others, with obstructive sleep apnea, had 90% reduction of breath with an increased attempt to breathe lasting over two breaths. One patient suffered from both central and obstructive sleep apnea and the thirteen remaining did not have a sleep-related respiratory disorder.

Dr. Khatwa and his team discovered that sleep apnea was more apparent in those with a larger herniation of the cerebral tonsils. Other conditions related to tonsillar descent include weakened spinal fluid flow, existence of syrinx, and the angle of the second vertebra in the neck. Decompression surgery was performed on the three children who suffered from central sleep apnea and the one who was diagnosed with both central and obstructive sleep apnea. All four children showed tremendous improvement after the operation was completed. One patient was entirely cured of their sleep disorder while another had lingering effects of central sleep apnea 6 months after surgery which was treated with therapy. Overall, central sleep apnea improvement after decompression surgery was 84.2%.

Pediatric and adult patients diagnosed with a Chiari 1 malformation are affected in similar ways in the cases of central sleep apnea and obstructive sleep apnea. However, the lack of breathing during REM sleep caused by central apnea is known to be worse in children. It is uncertain why some adolescents develop central sleep apnea and others obstructive apnea, but it could possibly be related to where the brainstem is compressed. The existence of a syrinx is commonly associated with the diagnosis of central apneas, but other pre-existing factors could cause that type of condition.

To some effect, MRIs can be used to figure out if patients may suffer from sleep-disorders such as central apnea or obstructive apnea. Those who have an asymptomatic Chiari I malformation can undergo sleep testing to recognize any interrupted breathing during sleep by doctor recommendation. Not treating a condition like sleep apnea may increase detrimental cardiovascular and neurocognitive outcomes in children. Therefore, by monitoring sleep habits, parents can support the health of their child while also advancing Chiari and sleep apnea research.

Although decompression is not 100% effective, additional approaches and processes to predict sleep apnea in Chiari patients are needed to better assist sleep specialists and doctors; furthermore, determining who suffers from sleep-disordered breathing and helping him or her effectively manage the condition is of the utmost importance to all clinicians.

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Ms. Eubanks is a professional writing and researching scholar from Purdue University Northwest. After being diagnosed with a Chiari I Malformation in 2011, she quickly decided that being conquered was not an option—she was committed to fight and pursue a budding love of healthcare/medical writing. Spreading awareness

and hope to others battling Chiari is her largest motivator alongside educating others who have not heard about the condition. Reporting for Ideas in Motion Media and tutoring at the Writing Center (Purdue University North Central) has been immensely beneficial to her success as well as all the remarkable individuals who helped her become the composer and analyst she is today.



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