Key Points

1. Tethered cord is a condition where the spinal cord is under tension due to several possible causes
2. Symptoms include leg pain and weakness and bowel and bladder problems
3. Surgery is focused on releasing whatever is causing the spinal cord to be tethered
4. Some Chiari patients also have tethered cord; it is controversial whether tethered cord actually causes Chiari
5. Surgeons explored the feasibility of performing Chiari decompression and tethered cord surgery concurrently on 4 children with both
6. There were no surgical complications and outcomes were good
7. Advantage of this is that it reduces risk of further damage during recovery period between surgeries
8. More work needed to establish patient selection criteria

Definitions

concurrent - at the same time

conus medullaris - the bottom or the spinal cord structure; its location relative to the bony spine is in part to determine tethered cord

dysphagia - trouble swallowing

filum terminale - threadlike structure at the very bottom of the spinal cord

pediatric - referring to children

tethered cord syndrome (TCS) - condition where the spinal cord is under abnormal tension due to a number of possible causes

thoracic - the lower part of the spinal cord

cerebellar tonsils - portion of the cerebellum located at the bottom, so named because of their shape

Feasibility of Chiari Decompression and TCS Surgery

June 30th, 2011 -- A group from the University of Chicago (Glunic et al) has announced that it is feasible to perform Chiari decompression and tethered cord surgery concurrently. Although the subject of whether tethered cord can cause Chiari remains controversial, there is no dispute that a subset of pediatric patients suffer from both Chiari symptoms and tethered cord symptoms.

Tethered cord is a condition where the spinal cord is put under abnormal tension resulting in leg pain and weakness and often progressive bowel and bladder problems. If not diagnosed and treated promptly, the tension on the spinal nerves can cause permanent damage. Tethered cord can arise from a number of different causes, including scar tissue from previous surgeries and a tight filum terminale at the end of the spinal cord.

Tethered cord has historically been diagnosed using imaging to identify the position of the conus medullaris relative to the bony spine. If the conus is lower than normal, then the assumption is that the spinal cord is being pulled down. Recently however, controversy has arisen over whether the spinal cord can be under tension, and symptoms present, even if the conus is in what is considered to be a normal position. Some surgeons have begun to rely more on the presence of tethered cord symptoms and urodynamic testing to diagnose tethered cord.

Also controversial is whether a tethered spinal cord can actually cause a Chiari malformation to occur. To date, there has been research to both support and refute this notion so the debate is not likely to be settled anytime soon (it should be noted that even supporters of the theory that tethered cord can cause a Chiari malformation think this only represents a small fraction of Chiari cases). Like Chiari, tethered cord is treated surgically, with the surgery focusing on what is causing the tension. In the case of a tight filum, the filum is cut which allows the spinal cord to relax and move up to its natural position.

The Chicago group decided to explore the feasibility of doing the two surgeries in the same operation because of the risk of nerve damage developing when the procedures are done with a recovery period in between. They identified 4 children with clear and progressing symptoms of both Chiari and tethered cord (Table 1):

Case 1: A 2 year old boy who was diagnosed with Chiari due to headaches and gagging. Over time he progressively had trouble walking and follow up MRI found a thoracic syrinx, a low lying conus, and signs of a fatty, tight filum.

Case 2: A 4 year old girl who had been diagnosed with Chiari and a thoracic syrinx at a different institution. The previous doctors had shunted her syrinx. She suffered from headaches, vomiting, and trouble walking. MRI showed scarring and tethering around the shunt and the syrinx had returned.

Case 3: An 11 year old girls with trouble walking, balance problems, headaches, and trouble swallowing. She had had a skin tag removed from the lower part of her back (this can be a sign of tethered cord along with blemishes, dimples, and patches of hair). MRI showed both tethered cord and Chiari.

Case 4: A girl, now 3 and a half, who had been treated with a shunt for a syrinx at the age of 2 at another institution. Her symptoms came back and included headaches and trouble walking. MRI showed a Chiari malformation, tethering at the shunt site, and also signs of an abnormal filum.

All four children underwent Chiari decompression and tethered cord surgery as part of the same operation. There were no surgical complications. On average, the children were walking after 3 days and went home from the hospital after 6 days. Two of the children (50%) experienced a complete resolution of their symptoms, while 2 had a significant improvement (Table 2).
The authors believe that these cases demonstrate that concurrent Chiari decompression and tethered cord surgery is feasible. They hope to focus future efforts on defining structured patient selection criteria in order to maximize outcomes.

Table 1: Chiari and TCS Symptoms of 4 Pediatric Patients

Gender	Age	CM Symptoms	TCS Symptoms
M	23mos	headaches, dysphagia	trouble walking
F	12mos	headaches, dysphagia	balance problems
F	11yrs	headaches, vomitiing	leg and foot pain
F	3.5yrs	headaches, hand clumsiness	trouble walking

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

Concurrent Chiari decompression and spinal cord untethering in children: feasibility in a small case series. Gluncic V, Turner M, Burrowes D, Frim D. Acta Neurochir (Wien). 2011 Jan;153(1):109-14

Table 2: Outcomes of 4 Patients Undergoing Concurrent Decompression and TCS Surgery

Outcome	Percent (%)
Significant Improvement in Symptoms	50%
Complete Resolution	50%

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New Study Casts Doubt On Tethered Cord Causing Chiari

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