

Key Points

1. Tethered Cord Syndrome (TCS) loosely refers to any of a number of conditions which lead to abnormal tension on the spinal cord
2. While well recognized in children; adult TCS is recently getting more attention
3. Study looked at surgical outcomes from 3 different centers for adults with congenital TCS
4. Most common symptoms were back pain, leg problems, and bladder/bowel problems
5. Surgical procedures were not standardized, but all attempted to free the spinal cord from tension
6. Overall results were good with more than 80% of symptoms improving or stabilizing; however symptom recurrence was a significant problem
7. Authors believe that while adult TCS is getting more attention, it is still widely under diagnosed because symptoms mimic common age-related problems

Definitions

congenital - something that is present at birth; as opposed to being acquired

dura - thick, outer layer covering the brain and spinal cord

duraplasty - surgical technique where a patch is sewn into the dura, thus making it bigger

filum terminale - small thread of tissue at the bottom of the spinal cord; if abnormal can result in TCS

lipomyelomeningocele - birth defect where a lump of fatty tissue which protrudes from the spinal canal through the spinal column

lumbar - the lower back area

sepsis - infection in the blood

Surgical Outcomes For Adult Tethered Cord Surgery

March 31, 2007 -- In the Chiari community there is a growing awareness of a clinical entity known as Tethered Cord Syndrome (TCS). While TCS is one of those things which lacks a precise definition, in general it is used to refer to any of a number of problems which result in the spinal cord being abnormally tense, or under traction. Such problems include a tight filum terminale (a threadlike tissue at the bottom of the spine) and lipomyelomeningocele, which is where a sac of fatty tissue protrudes from the spinal canal through the bony spinal column and tethers the spinal cord.

Symptoms of TCS usually involve the lower part of the body, such as the back and legs, and tend to progress over time. Tethered cord can be either congenital - meaning people are born with it - or acquired, such as when extensive scar tissue develops. Until recently, congenital tethered cord was largely thought to be associated with children (such as with spina bifida), but there is a growing recognition that in some people TCS may not be diagnosed until adulthood.

Thus, while it is well established in children that early surgical intervention increases the likelihood that symptoms will resolve, the management of adult TCS remains somewhat controversial. Indeed, as has been reported previously, even the diagnosis of TCS in adults is not always straightforward. While clear criteria exist for establishing TCS with imaging, some physicians now believe that TCS can also be present without any MRI evidence. Specifically, some surgeons believe that a tight filum terminale can put tension on the spine without showing up on MRI, and have begun to diagnose TCS patients based on symptoms and urological testing.

Although it did nothing to resolve the TCS diagnostic debate, a recent report in the Journal of Neurosurgery: Spine by a number of well known neurosurgeons did establish, with fairly strong evidence, the effectiveness of surgery for adult, congenital TCS. Specifically, the study looked at 61 adult patients who were treated at three different centers: the University of Wisconsin, the University of Alabama at Birmingham and Duke University, between 1994 and 2003.

The average age of the group was 36 years, and it was comprised of 45 women and 16 men. Only people with clearly identifiable congenital causes were included, and anyone with prior surgery, such as for childhood spina bifida repair was excluded. People with other conditions which could complicate the analysis, such as Chiari, were also excluded. Common causes of the TCS included lipomyelomeningoceles, tight filum terminales, cysts, and even syringomyelia. In twenty percent of the group, multiple causes of TCS were actually identified.

As to be expected the group suffered from a variety of lower body symptoms, with the most common being leg problems - such as pain, weakness, numbness and atrophy - back pain, and bladder and bowel problems (see Table 1). Two patients also suffered from sexual dysfunction and one person actually had upper extremity problems. Interestingly, one patient was essentially asymptomatic but was diagnosed because of an unusual hairy patch on their lower back.

Table 1
Symptoms Associated With Adult Diagnosed TCS (61 Patients)

Symptom	% With
LE Problems	79%
Back Pain	56%
Bladder/Bowel	34%
Sexual Dysfunction	3%
UE Pain	2%
Asymptomatic	2%

Notes: LE = lower extremity; UE = upper extremity; LE problems included pain, weakness, numbness and atrophy; asymptomatic patient was diagnosed due to an unusual hairy patch in the lumbar region

Since the surgeries took place at different locations and over a number of years, there was no standard surgical technique used and a variety of dural graft materials were used. However, in each case the goal of the surgery was to release the tension that the spinal cord was being put under.

Surgical outcomes were determined from the surgeons' clinical notes and the patients were followed for an average of 7.5 years. Overall, the results were good with 106 of the total symptoms exhibited by the 61 patients

TCS - Tethered Cord Syndrome; loose name for a spectrum of problems that all result in abnormal traction, or tension on the spinal cord

traction - a pulling force

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

Source

Rajpal S, Tubbs RS, George T, Oakes WJ, Fuchs HE, Hadley MN, Iskandar BJ. *Tethered cord due to spina bifida occulta presenting in adulthood: a tricenter review of 61 patients.* J Neurosurg Spine. 2007 Mar;6(3):210-5.

showing improvement (see Table 2), and an additional 28% stabilizing. While only 4% of the total symptoms got worse, symptom recurrence after initial improvement was an issue and occurred 12% of the time.

The authors also analyzed the outcomes by specific symptom (see Table 3 below), which showed that back pain and bladder/bowel problems improved the most (65% and 62% respectively).

Table 2
Overall Symptomatic Surgical Outcomes For 106 Symptoms/61 Patients

Outcome	%
Improved	56%
Stable	28%
Worse	4%
Recurred After Improvement	12%

Table 3: Surgical Outcomes By Symptom

Symptom	Improved	Stable	Worse	Recurred
Back Pain	65%	18%	3%	15%
LE Problems	46%	35%	4%	15%
Bowel & Bladder	62%	29%	5%	5%

This was somewhat surprising because many surgeons believe that bladder/bowel problems are particularly problematic and often do not get better in adults.

The overall complication rate was 10%, which is in line with other published reports, and included CSF leaks, infection, and pseudomeningocele. Overall, four patients had to undergo some level of re-operation and one patient actually died from a blood infection and respiratory distress.

Given the long time frame that the problem existed for in these patients, the results from this study are encouraging. However, recognizing TCS in adults still remains a problem. While awareness of the condition is increasing, the authors believe it is still widely under diagnosed because the symptoms often mimic age related problems. The end result is that even as an adult, patients often go years before being properly diagnosed and treated.

Finally, while Chiari patients were expressly excluded from this study, hopefully future research will look at the best way to treat people with both Chiari and TCS. Right now, for Chiari patients who also have symptoms associated with TCS, it is not clear whether Chiari surgery or TCS surgery should be performed first and what the expected results might be.

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