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Understanding Tethered Cord Syndrome and Scoliosis

A Simple Guide for Patients and Families

What Is Tethered Cord Syndrome?

The spinal cord normally floats and moves freely inside the spinal canal as we bend, twist, grow, and move.

In tethered cord syndrome (TCS), the spinal cord becomes attached or "tethered" to tissues lower in the spine. Instead of moving normally, the cord is held under tension and stretched during growth and movement.

Over time, this tension can affect:

- Nerve function
- Blood flow to the spinal cord
- Muscle control and coordination
- Bladder and bowel function
- Growth and alignment of the spine

Tethering may be visible on MRI, but some people have symptoms even when routine imaging appears normal.

What Causes Tethered Cord Syndrome?

TCS may be present from birth or develop later in life.

Common causes include:

- A tight or thickened filum terminale (a small tissue band attached to the end of the spinal cord)
- Spina bifida or previous spina bifida surgery
- Fatty tissue or lipomas around the spinal cord
- Split spinal cord malformations
- Scar tissue after surgery or injury
- Other developmental abnormalities of the spine

What Symptoms Can TCS Cause?

Symptoms vary widely and may develop slowly over many years.

Possible symptoms include:

Spine and Muscles

- Back pain
- Leg pain
- Muscle tightness or weakness
- Changes in walking or balance
- Fatigue with activity
- Scoliosis or abnormal spinal curves

Bladder and Bowel

- Urinary urgency or frequency
- Difficulty emptying the bladder
- Constipation
- Loss of bladder or bowel control

Legs and Feet

- Numbness or tingling
- Foot deformities such as high arches or hammertoes
- Leg weakness or clumsiness

In Children

- Delayed walking
- Progressive scoliosis
- Changes in bladder control
- Abnormal foot development

Can TCS Cause Scoliosis?

Yes.

A tethered spinal cord may pull unevenly on the muscles and nerves that help control the growing spine. This can contribute to the development or progression of scoliosis.

In some children, scoliosis may be the first or only sign of TCS.

Most scoliosis is not caused by tethered cord syndrome, but TCS becomes more important to consider when scoliosis has unusual features.

Warning signs include:

- A left-sided thoracic curve
- Rapid progression
- Significant pain

- Weakness or numbness
- Bladder or bowel symptoms
- Foot deformities
- Unusual skin findings on the lower back

Skin Signs That May Be Important

Certain skin findings over the lower back can sometimes indicate that the spinal cord did not develop normally.

These may include:

- A patch of extra hair
- A red birthmark or hemangioma
- A fatty lump under the skin
- An unusual skin tag
- A deep or unusual dimple
- A small opening that drains fluid

Most birthmarks and dimples are harmless. The concern increases when these findings occur together with neurological symptoms, bladder problems, foot changes, or scoliosis.

Can TCS Exist Even If the MRI Is Normal?

Sometimes, yes.

MRI is the most important imaging test for TCS, but a normal MRI does not completely rule it out.

Doctors may also use:

- A detailed neurological examination
- Bladder testing (urodynamic studies)
- Electrical nerve testing (SSEP)
- Specialized MRI techniques

Because of this, TCS remains primarily a clinical diagnosis based on the entire picture rather than a single test result.

TCS Can Cause Back Pain Without Scoliosis

Many people assume tethered cord syndrome always causes scoliosis. This is not true.

In adults, back pain is often the main symptom.

Typical features include:

- Pain that worsens with bending forward
- Burning, aching, or electric-like pain
- Symptoms that do not follow a typical nerve pattern
- Pain associated with bladder or bowel changes

Symptoms may worsen after:

- Growth spurts
- Pregnancy
- Injuries
- Spine surgery
- Repetitive spinal loading
- Age-related changes in the spine

Why Does Position Matter?

Bending forward stretches the spinal canal and may increase tension on a tethered spinal cord.

Many people with TCS notice worsening symptoms with:

- Prolonged sitting
- Slumped posture
- Sitting cross-legged
- Repeated bending
- Activities involving extreme flexibility

Helpful strategies may include:

- Sitting with good lumbar support
- Taking movement breaks every 20–30 minutes
- Avoiding prolonged slumped positions
- Sleeping with support under or between the knees
- Changing positions frequently throughout the day

These strategies can reduce symptoms but do not correct the underlying tether.

How Is TCS Treated?

Treatment depends on symptoms and severity.

Conservative Management

- Activity modification
- Physical therapy
- Symptom management strategies
- Positioning education

Surgical Treatment

For people with significant symptoms or neurological changes, surgery to release the tether ("untethering") may be recommended.

In children with scoliosis caused by TCS, treatment of the tether often occurs before scoliosis surgery because addressing the neurological problem may slow or stop curve progression.

When Should TCS Be Considered?

Talk with your healthcare provider if back pain or scoliosis occurs together with:

- Bladder or bowel changes
- Leg weakness or numbness
- Walking difficulties
- Foot deformities
- Unusual skin findings on the lower back
- Pain that becomes worse with forward bending

Key Takeaways

- Tethered cord syndrome occurs when the spinal cord cannot move freely within the spinal canal.
- Symptoms may involve the spine, nerves, bladder, bowel, legs, and feet.
- Scoliosis can sometimes be the first sign of TCS.
- Adults may have back pain without scoliosis.
- A normal MRI does not completely rule out TCS.
- Positioning changes may reduce symptoms but do not treat the tether itself.
- Early recognition and appropriate evaluation can improve outcomes.