Tethered Spinal Cord

- Tethered cord syndrome (TCS), tight filum terminale syndrome (TFTS)
- Tethering stretches nerve fibers, arterioles, and venules → impairs oxidative metabolism of conus and nerve roots → syringohydromyelia, myelomalacia
- Conus ends below L2 inferior endplate; tethered by thickened filum ± fibrolipoma, terminal lipoma

Tethered Spinal Cord

- Symptomatic presentation most common during rapid somatic growth (school age 4-8 years and adolescent growth spurt), or 2° to kyphosis (elderly)
- Prevalence in adults probably underestimated
- Symptoms
  - Low back and leg pain; worst in morning, exacerbated by exertion
  - Gait spasticity, weakness, muscular atrophy
  - ↓ sensation, abnormal lower extremity reflexes
  - Urinary bladder dysfunction

Tethered Spinal Cord

- Primary tethered cord syndrome occurs as an isolated anomaly
- Secondary tethered cord syndrome
  - occurs in the setting of other abnormalities, e.g. myelomeningocoele, filum terminale lipoma, trauma
  - Tethering may also develop after spinal cord injury and scar tissue can block the flow of fluids around the spinal cord.

Clinical

- Adults and children present differently
  - Adults: Pain 1st (2° to degenerative changes), followed later by weakness ± incontinence
  - Children: Incontinence, scoliosis, weakness
- Tight filum terminale syndrome (TFTS): Clinical findings of tethered cord with normal conus position

Imaging

- **T1WI**
  - Thickened filum ± hyperintense lipoma
    - Filum > 2 mm (L5-S1, axial MR)
  - ± low-lying conus; may be difficult to distinguish transition from thickened filum
  - Dorsal positioning of conus medullaris, filum terminale in thecal sac
    - Noted even in prone position; normally cord falls into anterior 2/3 of canal when prone
- **T2WI**
  - Findings similar to T1WI
  - ± hyperintense dilatation of conus central canal 2° to syringohydromyelia or myelomalacia (25%)
  - Fatty filum → chemical shift artifact
  - Dural sac widened; dorsal dura tense, tented posteriorly by thickened filum
- **MR cine**
  - ↓ spinal cord motion; ≤ 1/3 return to normal cord motion after untethering, even if symptoms resolve

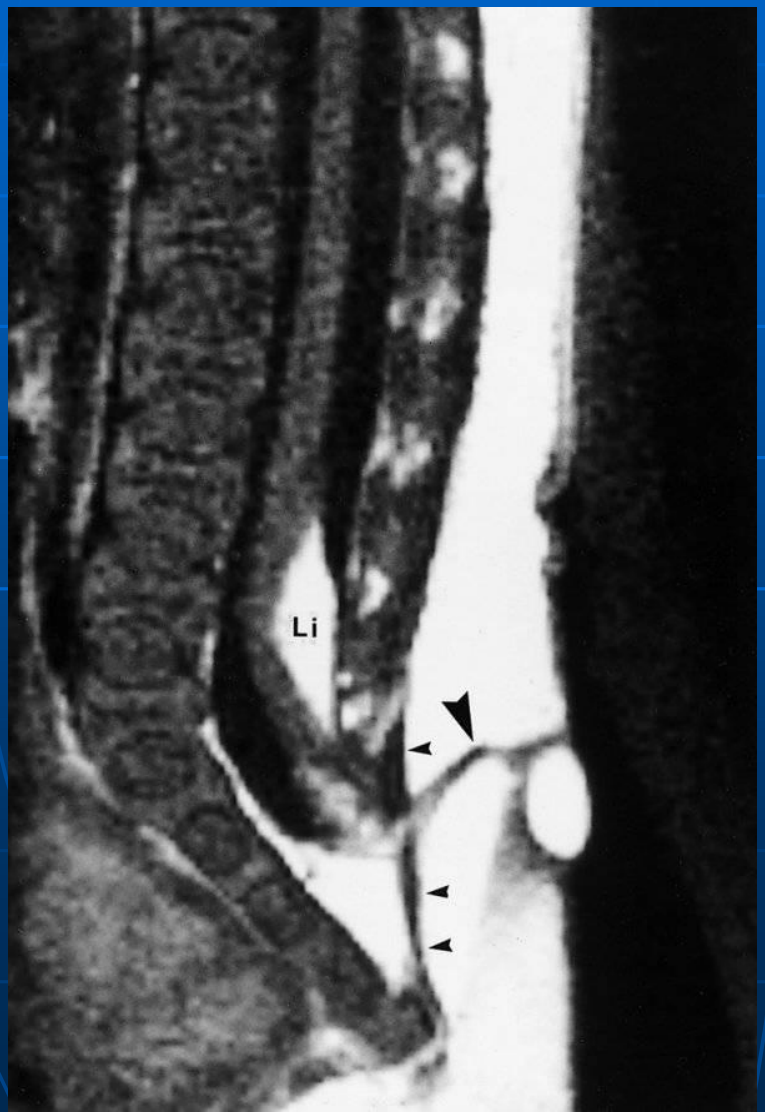
- Prone imaging may be useful in patients who have undergone tethered cord surgery or in those in whom clinical suspicion is high while supine MRI imaging demonstrated no abnormalities.
- Prone MRI imaging is however of little value when supine MRI has demonstrated the defect.

Sagittal graphic of the lumbosacral spine depicts composite tethered cord syndrome (TCS) findings of low-lying, hydromyelic tethered cord with thickened filum and fibrolipoma inserting into a terminal lipoma that is contiguous with subcutaneous fat through dorsal dysraphism.

Sagittal T1WI MR (clinical TCS symptoms) confirms an elongated low-lying spinal cord extending to the S2 level and ending in a small terminal lipoma (black solid arrow). Focal sacral posterior dysraphism is also conspicuous. In general, lipomas are considerably more conspicuous on T1WI than T2WI.

Sagittal T2WI MR demonstrates a taut appearance of the posteriorly positioned low-lying conus (white open arrow), with tip at L4. Careful inspection of the sagittal image also reveals a dermal sinus tract (white solid arrow).

Dermal Sinus with tethered cord and lipoma



Should not go below L2

Tethered Cord attached to lipoma