The Utility of Posterior Vertebral Column Subtraction Osteotomies for Tethered Cord Syndrome

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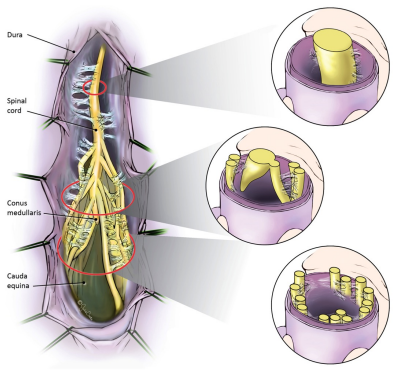
INTRODUCTION

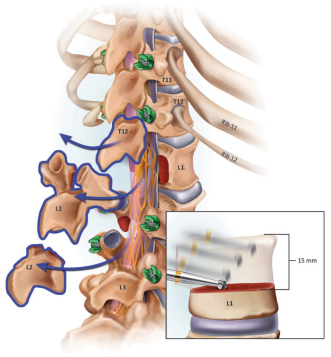
- 2 forms of tethered cord syndrome (TCS) - Congenital & Acquired
- **Congenital TCS**: due to thick filum, fatty filum, spinal lipoma, spinal dysraphisms
- **Acquired TCS**: due to arachnoiditis (intratrogenic - intradural surgery, infection, spinal subdural hemorrhage)
- Microsurgerical detethering historically been the treatment of choice for congenital TCS.
- **Recurrent TCS 5-80%**
- **Risks** of neurological injury, CSF leak, and wound breakdown increase with subsequent procedures.
- *Hsieh et al.* described PVCSO without microsurgical detethering to relieve stretch strain on the spinal cord for congenital TCS; however, there is a paucity of literature on its success.

METHODS

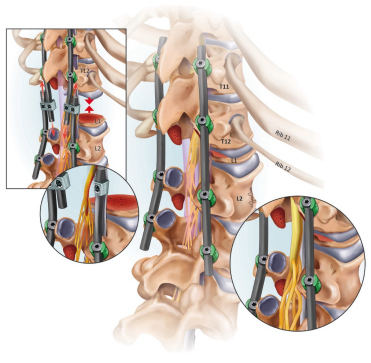
- A prospectively collected database patients with TCS who underwent PVCSO or were being monitored.
- A team of two neurosurgeons evaluated each patient for potential benefit from shortening osteotomies.
- Single stage posterior PVCSO conducted at a neutral level rostral to tethering site, **shortening by 10-15mm**. When present PVCSOs were concurrently utilized to correct deformities.
- Pre and postoperative neurological status assessed.



Severe arachnoiditis causing spinal cord tethering



Vertebral column shortening osteotomies above of tether



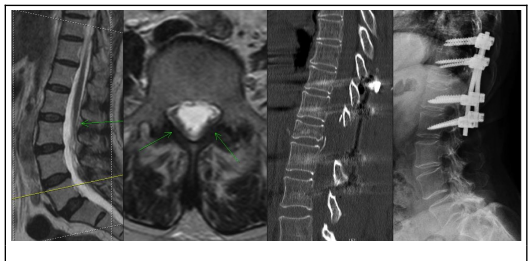
Closure of osteotomy & relief of neural stretching

RESULTS

- 6 patients were assessed.
- 4 patients had failed previous microsurgical detethering at least once.
- 4 patients underwent PVCSO due to worsening of symptoms: 2 with myelomeningocele repair and 2 with arachnoid adhesions after spinal subdural hematoma.
- **All had resolution of weakness, numbness, and radicular pain of legs.**
- Incontinence improved in the patient with arachnoid adhesions.
- There was no worsening of neurological function.
- 1 patient with spinal cord herniation and scoliosis had improved radiculopathy

Neurological Outcomes after PVCSO

Case	Age	TCS Etiology	Previous Detetherings	Procedure	Preop Symptoms	Postop Improvements	Persistent Symptoms
1	40	myelomeningocele	2	L3 VCR	4/5 LE weakness; 1/2 sensory; radicular pain; urinary incontinence; ambulatory with assist	5/5 strenght; 2/2 sensory; no pain; ambulatory without assist	urinary incontinence
2	63	spinal subdural hemorrhage	0	T12 VCR	4/5 LE weakness; 1/2 sensory; radicular pain; Urinary incontinence; ambulatory with assist	5/5 strenght; 2/2 sensory; no pain; no incontinence ambulatory without assist	-
3	56	spinal subdural hemorrhage	1	Microsurgical detethering & T8 VCR	3/5 LE weakness; 1/2 sensory; radicular pain; Minimally ambulatory with assist	4/5 LE weakness; 2/2 sensory; no pain Ambulatory with assist	-
4	33	myelomeningocele	4	T12 VCR	3/5 LE weakness; 0/2 sensory; radicular pain; urinary incontinence; nonambulatory	4/5 LE weakness; 1/2 sensory; reduced pain;	urinary incontinence; nonambulatory
5	64	spinal subdural hemorrhage	1	observation	2/5 weakness; 1/2 sensory; radicular pain; urinary incontinence nonambulatory	-	-
6	72	spinal cord herniation; scoliosis	0	Microsurgical detethering	back and leg pain	no leg pain	back pain



Acquired TCS from arachnoiditis after spinal SDH

CONCLUSIONS

- **Spinal shortening osteotomies can be utilized for both congenital and acquired TCS**.
- All patients who underwent PVCSO for TCS experienced improvement in motor, sensory, and pain symptoms.
- **Reduced risk of recurrence of symptoms and neurological injury** as there is no direct manipulation of neural elements.
- Indirect relief of in-line strain and stretch on the spinal cord is possible through PVCSO by shortening the spinal column

REFERENCES

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