Late Teenage Tethered Cord Syndrome – Accurate Diagnosis and Proper Treatment

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Introduction

Tethered cord syndrome (TCS) is a stretch-induced functional disorder of the spinal cord. TCS in adolescence presents with unique problems. Because most of diagnostic reports have relied on imaging studies, essential signs and symptoms are often overlooked. Consequently, surgical indications were not well determined. The authors discuss the combination of neurological and imaging studies for accurate diagnosis.

Methods

The authors selected 54 TCS patients. Of those, untethering surgery was performed on 17 patients with age ranging from 14 to 20 years, and on 37 patients older than 20 years, whose neurological symptoms started at late teenage. Their symptomatology and MRI findings were retrospectively analyzed. Examinations specified by our protocol for TCS were adopted, including back pain aggravation by flexion of lumbosacral spine as the main source of information, e.g., 3Bs sign (sitting in Buddha pose with legs crossed, bending over the sink as dishwashing, and holding a baby at the waist level), and ruling out nerve root compression sign.

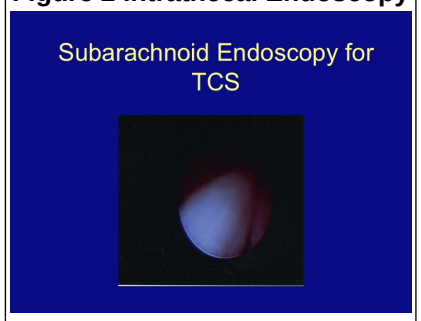
Results

All patients complained of back and leg pain, mainly of muscle aching in nature. The motor and sensory dysfunction and incontinence are common clinical findings, and on exams, 90% of 30 protocol items were positive in all patients. Neurological sings for true TCS were correlated with the dysfunction of the spinal cord segments above the tethering site. Posterior displacement of the flum and conus touching the posterior arachnoid membrane was 100% positive (Figure 1), and confirmed by intraoperative intrathecal endoscopy before widely opening the dura and arachnoid (Figure 2). Stretch test at surgery indicated inelastic nature of the fibrous or fibroadipose filum. Only half of the patients had a combination of elongated cord and thickened filum (2 mm or greater) (Figure 3). After untethering surgery, back and leg pain was relieved in all patients within 1 month - 1&1/2 years, and they regained professional or academic activities before complete pain relief.

Figure 1 T1-MRI L-S Level

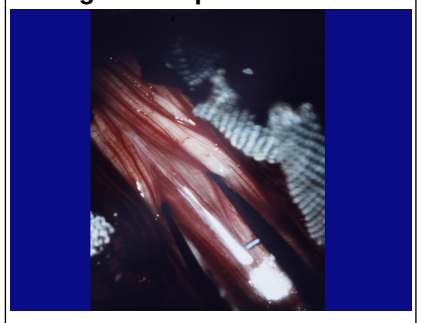
Posteriorly displaced Conus (Lt), Filum (Rt)

Figure 2 Intrathecal Endoscopy



Filum Terminale touching the posterior arachnoid

Figure 3 Operative Field



Posteriorly displaced conus and fibrous filum (<2mm thick)

Conclusions

Strict adherence to our diagnostic methods carried out by following the protocol is emphasized for accurate diagnosis and prognosis prediction with untethering surgery.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the importance of identifying typical signs and symptoms of adolescence TSC correlated with MRI findings. 2) Discuss, in small groups, diagnosis of late teenage TCS in correlation with prognosis, 3) Identify an effective treatment by untethering procedure when the patient presents with significant signs and symptoms of TCS, and the diagnosis is established.

References

1. Yamada S, Zinke D, Sanders D: Pathophysiology of "tethered cord syndrome". J Neurosurg 54: 1981, 494-503

2. Yamada S, Lonser RR: Adult tethered cord syndrome. J Spinal Disord. 13: 2000, 319-323

3. Yamada S, Won DJ, Yamada SM, Hadden A, Siddiqi J: Adult tethered cord syndrome relative to spinal cord length and filum thickness. Neurol Res 26(10): 2004, 732-734

4. Yamada S, Siddiqi J, Won DJ, Kido D, Hadden A, Spitalieri J, Everett BA, Obasi CG, Goldenberg TM, Giles LGF: Symptomatic protocols for adult tethered cord syndrome. Neurol Res 26(10): 2004,741-744

5. Yamada S, Won DJ: What is the true tethered cord syndrome? (Invited paper) Childs Nerv Syst 23: 2007, 371 - 375

6. Woods KRM, Colohan ARTC, Yamada S, Yamada SM, Won DJ: Intrathecal endoscopy to enhance the diagnosis of tethered cord syndrome. J Neurosurg 13: 477-483, 2010