

Learning Objectives

Investigate the predictability of current cervical deformity classification systems in regards to spinal canal/cord compression, as well as determine associations between canal/cord dimensions and neurologic clinical symptoms.

Introduction

The Ames cervical deformity (CD) classification provides a paradigm for CD based on measurements taken from x-ray films. Whether these measurements of deformity correlate with the degree of stenosis and compression of the cervical spinal cord as found on MRI is unknown.

Methods

- **Inclusion:** CD patients (C2-C7 Cobb > 10°, CL > 10°, cSVA > 4cm, or CBVA > 25°) with deformity apices below the C2 level and BL MRI images
- Spinal canal and cord cross sectional area (CSA) were measured at each C2-C7 body and interspace.
- Stenotic levels (canal/body ratio < 0.82) and a canal/disc ratio were measured via Pavlov's method.
- Maximal cord compression (MCC) CSA was recorded, and normalized by MCC ratio (MCC/C2 cord CSA).
- Correlations between MRI metrics and patient reported outcome measures (PROMS) were gauged using spearman's rho.

Results

- 55 CD patients were included (Age: 57.1, Gender 61.8%F, 83.9% White, 9.7% Black, BMI 29.9, CCI: 0.37).
- BL radiographic presentation: TS-CL 29.3°, CL 3.0°, cSVA 28.8mm, PI-LL -0.9, PT 18.2, SVA 1.8.
- Ames deformity descriptors: 55% C, 35% CT, 10% T. Mean BL C2-C7 canal CSA was 258.2±56.6mm², mean C2-C7 cord CSA was 70.2±11.3mm², mean MCC was 58.0±14.6mm², mean MCC Ratio was 0.77±0.16, mean Pavlov ratio was 0.78±15, mean canal/disc ratio was 0.56±0.12 and mean # of stenotic levels was 3.7±1.9.
- BL MRI metrics and BL sagittal radiographic parameters did not correlate.
- Lower BL C2-C7 canal CSA correlated with lower BL mJOA scores (Rs: .376, P=.018), while lower BL C2-C7 canal CSA (Rs: .485, P=.014) and cord CSA (Rs: .484, P=.049) correlated with BL gait impairment.
- Lower MCC was associated with a positive Hoffman's test (Rs: 0.474, P=.047).

Conclusions

Current CD x-ray measurements do not predict the degree of cord compression or canal compromise found on MRI. Increased mean C2-7 spinal canal stenosis correlates with increased cord dysfunction as assessed by mJOA and clinical examination. Smaller area of maximal cord compression on axial MRI correlates with a positive Hoffman's sign.

References

1. Chi JH, Tay B, Stahl D, Lee R. Complex Deformities of the Cervical Spine. *Neurosurg Clin N Am.* 2007;18(2):295-304. doi:10.1016/j.nec.2007.01.003.
2. Lu DC, Chou D. Flatback syndrome. *Neurosurg Clin N Am.* 2007;18(2):289-294. doi:10.1016/j.nec.2007.01.007.
3. Booth KC, Bridwell KH, Lenke LG, Baldus CR, Blanke KM. Complications and predictive factors for the successful treatment of flatback deformity (fixed sagittal imbalance). *Spine (Phila Pa 1976).* 1999;24(16):1712-1720. <http://www.ncbi.nlm.nih.gov/pubmed/10472106>.

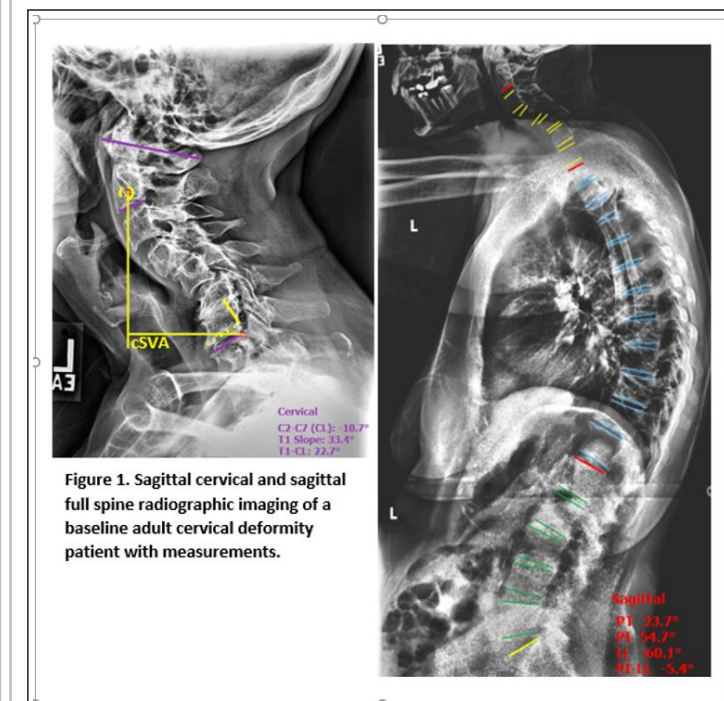


Figure 1. Sagittal cervical and sagittal full spine radiographic imaging of a baseline adult cervical deformity patient with measurements.