Central Cord Syndrome: Early Surgery is the Better Option

Alpesh A. Patel MD FACS
Professor
Director, Orthopaedic Spine Surgery
Co-Director, Northwestern Spine Center
Director, Fellowship in Spinal Surgery
Department of Orthopaedic Surgery
Northwestern University  Feinberg School of Medicine
Consulting
  Amedica, Biomet, DePuy, Stryker Spine, Relievant, Pacira

Product Design/Royalties
  Amedica, Ulrich Medical, Biomet

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  Amedica, Vital5, Nocimed, Cytonics

Board
  Cervical Spine Research Society

Editorial Board
  Contemporary Spine Surgery, Surgical Neurology International,
  Journal of American Academy of Orthopaedic Surgery (Deputy Editor)
Background

• 1st described – Taylor JBJS 1948
• Central Cord Syndrome - Schneider Nsgy 1954
• Involvement of white matter – CS tract
Etiology

• Hyperextension injury (35-58%)
  – Pre-existing Stenosis/Spondylosis

• Unstable spine
  – Discoligamentous disruption

• Acute central disc herniation
Nonoperative Treatment

- Schneider et al. J Nsgy 1954
- Schneider et al. J Neuro Nsg Psyc 1958
- Schneider et al. Clin Nsgy 1973
- Bosche 1972
Nonoperative Treatment

- Level of Evidence: III, IV or V
  - Small number of patients
  - Not randomized
  - All retrospective
  - Mix of stable and unstable injury patterns
  - Limited standardized measures
Rationale for Non-operative Treatment

- Older patients
  - Co-morbidities
- Surgical risks
  - Neurological decline
- Good results from Nonoperative Treatment
  - Safe
  - Prognosis for recovery

Age 50s-60s
- Aarabi Neursug Focus 2008
- Kepler JNS 2015
“Patients get better”

• Neurological and functional improvement
  – Schneider (multiple publications)
    • 90% patients improved and able to return home
What really happens...

• Central cord injured do not return to normal function
  – Dvorak et al Spine 2005
    • ASIA motor score improved
    • BUT FIM and SF-36 significantly less than general population
    • Need to think beyond the motor score

• Progressive neurological decline

• Spasticity
“Surgery is Risky”

- No neurological decline
  - Guest et al 2002
  - Chen Spine 1997, 1998
  - Song Surg Neurol 2006
- Perioperative management
  - Blood pressure
  - Circulating volume

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Surgical Results

- Safe
- Significant Motor Improvement
  - Brodkey et al 1980
  - Bose et al 1984
  - Chen et al 1997
  - Chen et al 1998
  - Yamakazi et al 2005
  - Song et al 2006
Central Cord Syndrome = Acute Incomplete SCI

Compression
Hematoma
Necrosis
Secondary mediators
Animal Data

- **Primate**
  - Kobrine et al 1978, 1979
- **Feline**
  - Brodkey et al 1972
  - Croft et al 1972
- **Canine**
  - Bohlman et al 1979
  - Delamarter et al 1995
- **Rats**
  - Guha et al 1987
  - Zhang et al 1993
  - Dimar et al 1999
• Multicenter, Non-randomized
• 2002 to 2009
• Acute Cervical SCI – 313 patients
  – 182 Early (<24 hours): mean 14.2 hr
  – 131 Late (>24 hours): mean 48.3 hr
STASCIS

- SAFETY : Equivalent
- RECOVERY (p<0.05)

1 Grade Improvement

2 Grade Improvement
Is there proof in CSS?

  - Failure to improve 1 muscle grade at 9 days
  - 13 of 16 functionally improved
  - Quicker recovery, shorter hospital/rehab stay

- Yamakazi et al Surg Neurol 2005
  - Surgery <2 weeks better results
Our Recent Evidence

• Lenehan Spine 2010
  – 73 patients with spondyloptic CSS
  – Better AMS at 6 and 12 months with early (<24 hours) vs. late (>24 hours) or nonsurgical tx

• Kepler JNS 2015
  – 68 patients with CSS
  – No difference in outcome early (<1 day) vs. late
  – ICU stay, LOS, AMS improvement, Surgical complications, Mortality
  – Only 1 week AMS reported
  – AGE strongest predictor of outcome
Clinical Practice Guidelines
(Harrop, Fehlings et al. CNS Oral Presentations)

• Suggest that early surgery (<24 hours after injury) be considered as a treatment option in adult patients with traumatic central cord syndrome
  – Quality of Evidence: Low
  – Strength of Recommendation: Weak
Conclusion

• Surgery for Central Cord Injury is safe
• Motor improvements
  – Better than non-surgical treatment
• Early intervention
  – How early is early enough?
  – Adequately powered study with long term followup is needed
Thank You