

MRI MEASUREMENTS IN CAUDA EQUINA SYNDROME: REPRODUCIBILITY AND PREDICTION OF CLINICAL OUTCOME

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What is cauda equina syndrome?

- A spectrum of low back pain, uni / bilateral sciatica, saddle anaesthesia and motor weakness in the lower extremities with variable rectal and urinary symptoms

Posterior Disk Displacement: Morphologic Assessment and Measurement Reliability—Lumbar Spine

Jeffrey R. Cooley, DC,^a Clark D. Danielson,^b Gary D. Schultz, DC,^c and Timothy A. Hall, DC^d

- Reproducibility of disc displacement assessments and digital vs. handruler measurements on MRIs
 - Inter-observer agreement good
 - Intra-observer agreement lower than expected
- Small discs
- No clinical correlations

JMPT 2001; vol.24: pgs.317-26.

Observer Variability in Assessing Lumbar Spinal Stenosis Severity on Magnetic Resonance Imaging and Its Relation to Cross-Sectional Spinal Canal Area

Alex C. Speciale, MD, Ricardo Pietrobon, MD, Chris W. Urban, MD, William J. Richardson, MD, Clyde A. Helms, MD, Nancy Major, MD, David Enterline, MD, Lloyd Hey, MS, MD, Michael Haglund, MD, PhD, and Dennis A. Turner, MA, MD

- MRI reproducibility in lumbar stenosis
 - Fair level of agreement
- No clinical correlations

Spine 2002; vol.27: pgs.1082-6.

Cauda Equina Syndrome Secondary to Lumbar Disc Herniation

A Meta-Analysis of Surgical Outcomes

Uri Michael Ahn, MD,* Nicholas U. Ahn, MD,* Jacob M. Buchowski, MS,* Elizabeth S. Garrett, PhD,[†] Ann N. Sieber, RN, MSN,* and John P. Kostuik, MD*

- Largest meta-analysis
- 222 patients - all prolapsed discs
- "there was a significant advantage to treating patients [by decompression] within 48 hours versus more than 48 hours after the onset of cauda equina syndrome"
- > 48 hrs odds ratio persisting deficit:
 - Sensory (3.5), motor (9), bladder (2.5) and bowel function (9)

Spine 2000; vol.25: pgs.1515-22.

Medico-legal

Delayed Operation or Missed Diagnosis

Poorer Outcome

£250,000 Compensation

MRI

Previous presentation showed delayed surgery associated with worse bowel outcome (long term)

Aims and Objectives

1. Determine whether initial MRI findings correlate with clinical outcomes
2. Study the reproducibility of MRI measurements of large disc protrusions
3. Estimate the ability to predict CES based on MRI alone

Study Design

1994-2002 Identified 96 patients with CES (coded)

Case note review

31 "true" CES 2° disc -
Evidence of sphincteric disturbance
and positive MRI available

Invited back to clinic

History and Examination and Outcome measures

Outcome Measures

Pain Outcome

Visual Analogue Score
Oswestry Disability Index

Back Disability

Oswestry Disability Index
Low Back Outcome Score

Generic Health

Short Form 36 Health
Questionnaire

Psychometric

Modified Somatic
Perception Score
Modified Zung Depression

Male Urogenital

Male Sexual Health
Questionnaire
International Prostate
Severity Score

Female Urogenital

Sheffield Female Pelvic
Floor Questionnaire

Study Design

19 Random patients undergoing discectomy
(with MRI available) identified

Persistent radiculopathy
No sphincteric disturbance

All had a surgical target

Study Design

Digital photographs of all 50 MRIs taken

T2 mid-sagittal image and the
Axial image with greatest disc protrusion

Pairs of images randomized
(numbers from a hat)

50 slide PowerPoint presentation

Observers unaware of numbers in each group

Study Design

Observers:

1 Consultant Radiologist
2 Consultant Spinal Surgeons
1 Senior House Officer

Estimated percentage spinal
canal compromise on each view
(0-25, 25-50, 50-75
and 75-100%)

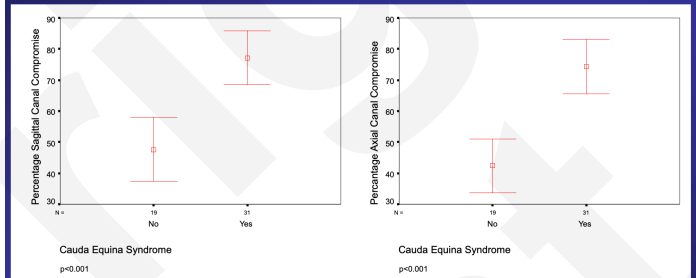
Indicated whether they
thought the
scan findings could
produce CES?

Repeated after 2 weeks

Results

- 26 / 31 patients attended follow up
- Mean age 42yrs (27-67)
- 15M : 9F
- Mean follow up = 51/12 (25-97)

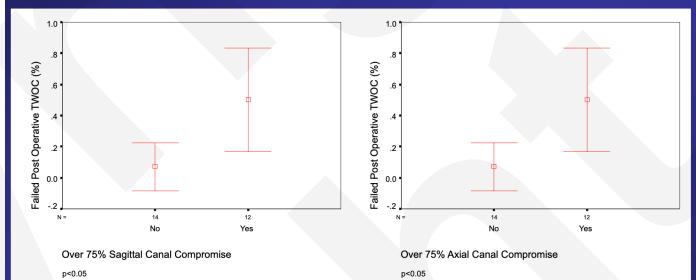
Results



Results - MRI Canal Compromise

- 12 / 26 patients had, on average, >75% canal compromise
- No direct association between canal compromise and clinical outcome
- But...

Results



- Failed TWOC found to be associated

Results - MRI

- Level of CES
- Presence of other disc protrusions
- Presence of other disc degeneration
- No association with outcomes

Results - Reproducibility

	Intra-observer Agreement (Kappa value)	Inter-observer Agreement (Kappa value)
Sagittal Canal Compromise	0.52 - 0.85	0.64
Axial Canal Compromise	0.52 - 0.76	0.64
Correct Identification of CES	0.4 - 0.8	0.64

Substantial Agreement

(K>0.6)

Results - CES

- Based on MRI alone the correct identification of CES has
 - Sensitivity 68% **1 in 3 false negative**
 - Specificity 78% **1 in 5 false positive**
 - PPV 84% **MRI CES+ Correct 84%**
 - NPV 58% **MRI CES- Correct 58%**

Conclusions

- Largest radiological case series of CES with mean 4 years follow up
- (1) Canal compromise does not appear to directly predict clinical outcome
- (2) Reproducibility of MRI measurements has substantial agreement

Conclusions

- CES is a clinical diagnosis supported by an MRI scan
- (3) In less clear cases (i.e. equivocal symptoms / signs) the presence of a large disc on an MRI scan supports a diagnosis of CES (PPV 84%)

Thank
you

