


Complicated Spine Cases

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August 6, 2022




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**2022 IAIME
Mid-Year MedicoLegal Training Conference**

PRESENTER FINANCIAL DISCLOSURE

I, Diana Kraemer, MD, have nothing to disclose

I do not have any relationships to report with ACCME defined companies.

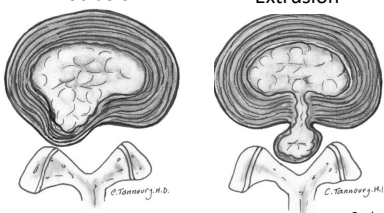


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Protrusion vs Extrusion

Is one of these more likely to be symptomatic?

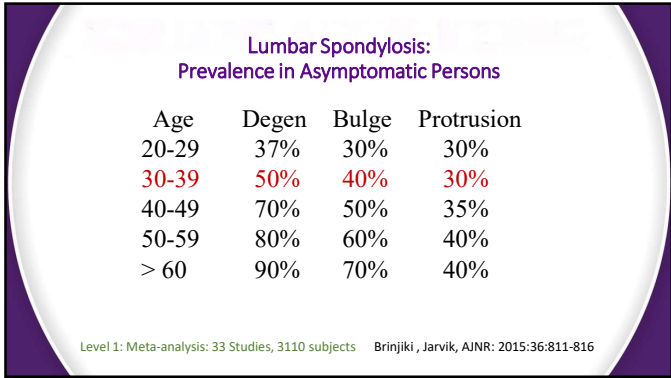
Protrusion **Extrusion**



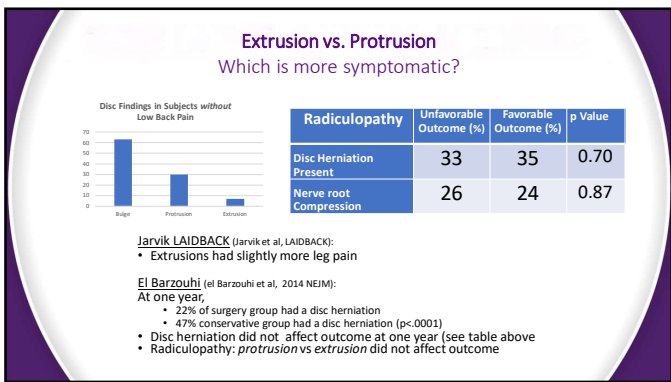
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Fardon, TSI, 2014

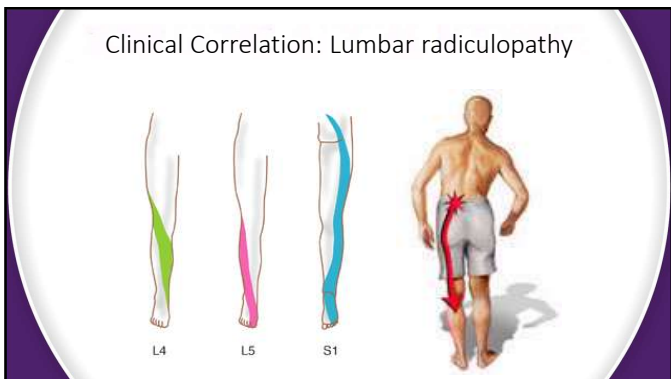
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Do prior imaging findings predict new findings?

Would this preexisting disc bulge make a protrusion more likely to occur after minor trauma?

Carragee: Does Minor Trauma Cause Serious Low Back Illness?
200 patients x 5 yrs=1000 patient yrs
53 subjects, 69 MRIs
Prior degenerative or disc findings did not lead to more new findings.

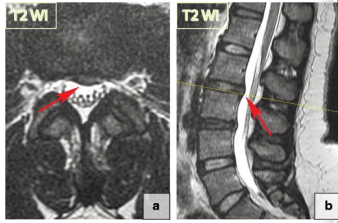


Photo: Kushchayev SV, 2018

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RTW

L5-S1: Left paracentral disc protrusion contacts the S1 nerve root in the subarticular zone and displaces it posteriorly.

After discectomy only (without curetting the disc space):

- When can he go back to work?
- Can he go back to heavy work?



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RTW after Discectomy

Two Answers

1st study: Carragee: 1999: RTW after lumbar discectomy:

- Average RTW 1.2 weeks, NO restrictions 148/149 in 8 weeks
 - Those with more strenuous work took longer to RTW
 - 98% to same occupation: at 5 years only 6% had changed occupation
 - Workers comp litigation predicted slower RTW
 - Women took longer to RTW than men
- 11% reherniation at 5 years (similar to historical data)

2nd Study: Carragee: 2006: Prospective Controlled study of limited vs subtotal discectomy with large anular defect (big hole in the anulus)

At one year:

- Limited discectomy 18% v subtotal discectomy 9% (p=0.1)
- Back pain worse (in subtotal than limited discectomy)
- Pain medication use was higher (in subtotal than limited discectomy)
- RTW was longer (in subtotal than limited discectomy)
- Patient satisfaction lower at 2 yrs (in subtotal than limited discectomy)

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Central Disc Protrusion

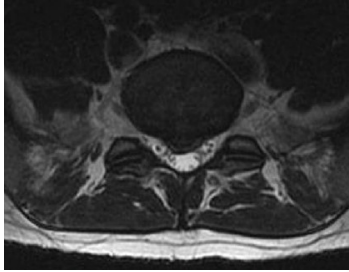
L5-S1 central disc herniation in an 18-year-old female rower with right L5 radicular pain. During rowing she feels a "pop"

Causation: Related?

What does that "pop" mean?

Pain starts 2 days later

Pain starts 2 months later

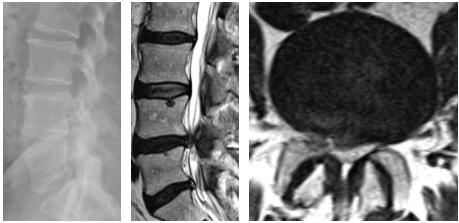


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Degenerative Spinal Stenosis with Neurogenic Claudication


No spondylolisthesis...
Is Fusion Indicated?



NASS Clinical Practice Guidelines: **No**

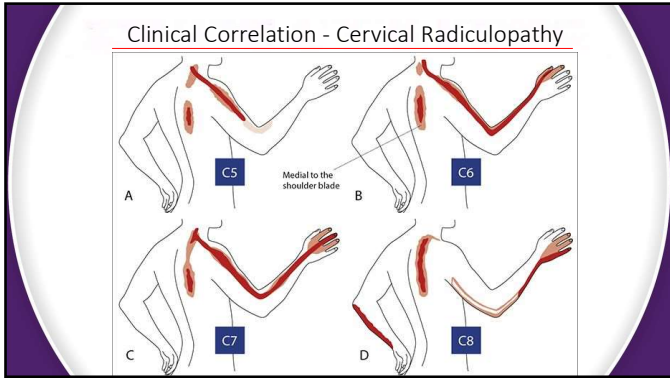
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Cervical Spine



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What would you recommend?

Cervical disc herniation

- 40 yo male
- MRI: C5-6 disc extrusion
- increased signal in the cord
- Asymptomatic
- Exam is normal

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Cervical Spondylosis- WAD

55 yo female in a rear-end MVA, moderate damage

- Degenerative disease at C5-6 with kyphosis
- Neck pain and severe headache, episodic "flares"

ID-migraine

During the last 3 months:

1. Has a headache limited your activities for a day or more?
2. Are you nauseated or sick to your stomach when you have a headache?
3. Does light bother you when you have a headache?

93% positive predictive value for migraine

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Case Example

30 yo male:

Assaulted at work:

CC: neck & shoulder pain,
Rt arm pain, numbness and
temperature changes.

MRI: left foraminal stenosis

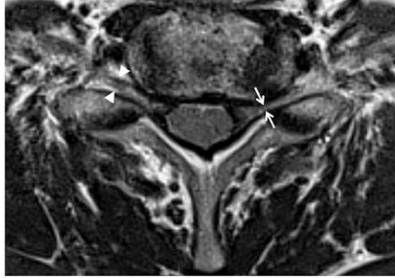
Exam:

No cervical
radiculopathy.

No Right radial pulse.
TOS maneuvers negative.

What is your diagnosis:?

What is your opinion
regarding causation?



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Adjacent Segment Disease vs Degeneration

55-year-old male

Surgeon performs a disc
arthroplasty rather than a
fusion to prevent ASD.

What is the evidence for ASD

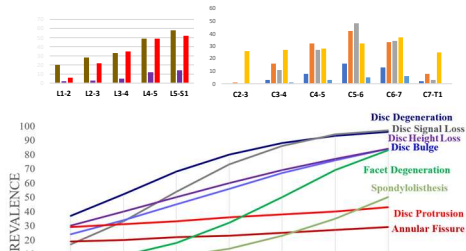
- Degeneration?
- Disease?



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ASD vs ASP vs ASA (Adjacent Segment) :

Degeneration, Disease, Pathology, or Aging?



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Heterotopic Ossification after Cervical Disc Replacement

- 2/3rd have Progressive Bony Formation at 10 years.
- 25% with limited motion 10 years after surgery.
- More postop change with most preop bony change.

14% 3%
13% 12%

Zhou, Spine 2018 Level 3

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Fusion vs. disc arthroplasty 10-year Outcome

Randomized Prospective Study of Fusion vs Disc Replacement

- No differences in patient reported outcomes ($p = 0.61$)
- Rate of reoperation for Adjacent Segment Pathology was the same ($p = 0.21$)
- Rate of MRI degenerative changes was similar

Kontakis

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How do you put the examinee at ease?

This is my introduction to the exam:

- This is a medical examination. Some people would say this is not an independent examination because someone is paying me, but my reputation is more important to me. I am here to give my medical opinion, not to take sides.
- I am not your doctor, but if I see something urgent, I will tell you.
- We will talk, then I will dictate into this Dictaphone. This is your time to tell your story. If I make a mistake, please correct me.
- Do not do anything that will make you uncomfortable. I am pretty good at work arounds, but if not, then I will say you declined rather than say you refused.
- This is not a deposition. I want to hear what you remember.

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Do you allow videotaping? Audiotaping?

- Yes, I do.
- I do a backup audiotape. (by me) If there is a stipulation, then I put it in the stipulation: if they record, I record.
- Unless there is an independent videographer, both sides get the recording.
- I still dictate in the room.

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What do you do when a chaperone interrupts?

- I tell them to stop it.
- I dictate in the room, so it is easy to dictate what the attorney/nurse case manager said.
- I am going to get the exam, even though I want to walk out.
- I call retaining counsel at the end of the examination.

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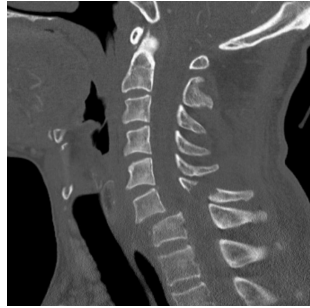
What you do if you find something emergent?

- AMA Code of ethics:
1. Disclose the nature of the relationship with the employer or third party and that the physician is acting as an agent of the employer or third party before gathering health information from the patient.
 2. Explain that the physician's role in this context is to assess the patient's health or disability independently and objectively. The physician should further explain the differences between this practice and the traditional fiduciary role of a physician.
 3. Protect patients' personal health information in keeping with professional standards of confidentiality.
 4. Inform the patient about important incidental findings the physician discovers during the examination. When appropriate, the physician should suggest the patient seek care from a qualified physician and, if requested, provide reasonable assistance in securing follow-up care.

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Case Example: SCI
Bilateral Jumped Facets

- Impressive Injuries
- Severe SCI
- Use ASIA Exam
- expect late complications
traumatic tethered cord
syringomyelia

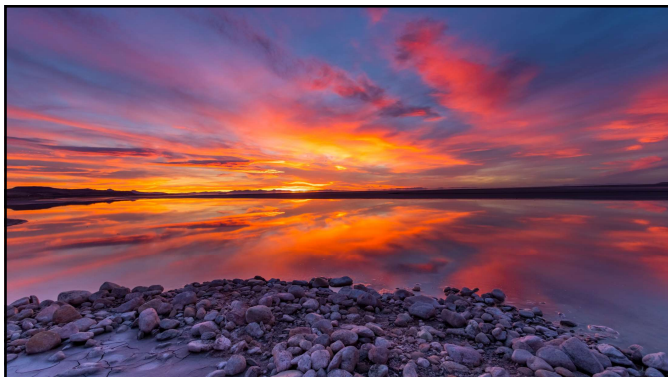


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ASIA Exam

- International Standard
- Instructions on Back
- Find a Mentor
- Same for Plaintiff or Defense
- Of use to Life Care Planner

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References

- Allen ME, et al. *Acceleration Perturbations of Daily Living: A Comparison to Whiplash*. Spine 1994;19:11:1285-1290
- Anderson JT, Ahn UM, Ahn NU, et al. *Depression Is a Strong Predictor of Poor Lumbar Fusion Outcomes Among Workers' Compensation Subjects*. Spine.2015;40;10:748-756.
- Battie MC, et al. *Lumbar Disc Degeneration: Epidemiology and Genetic Influences*. Spine: 2004;29:2679-2690.
- Battie MC, et al. *The Twin Spine Study; Contributions to a Changing View of Disc Degeneration*. The Spine J. 9;(2009):47-59
- Battié M, et al. *Lumbar Spinal stenosis is a highly genetic condition partly mediated by disc degeneration*. Arthritis Rheumatol. 2014;66(12): 3505-3510. doi:10.1002/art.38823
- Behrend C, et al. *Smoking Cessation Related to Improved Patient-Reported Pain Scores Following Spinal Care*. J Bone Joint Surg Am. 2012;94:1-6
- Benzel E. *ASD Perspective: Oschner J*. 2014:78-83
- Binjiki, Jarvik. *Systematic Literature Review of Imaging Features of Spinal Degeneration in Asymptomatic Populations*. AJNR 2015 April ; 36(4): 811-816.
- Carragee EJ. *Does Discography Cause Accelerated Progression of Degeneration Changes in the Lumbar Disc? A Ten-Year Matched Cohort Study*. SPINE 2009;34:2338-2345
- Carragee E, et al. *Does minor trauma cause serious low back illness? Spine(2006);31:2942-2949*

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References

- Carragee E et al. *Are first-time episode of serious LBP associated with new MRI findings? The Spine Journal 6 (2006) 624-635*
- Carragee E, et al. *A prospective controlled study of limited versus subtotal posterior discectomy: short-term outcomes in patients with herniated lumbar intervertebral discs and large posterior anular defect*. Spine 2006;31:653-657doi:10.1016/j.spinee.2006.03.005
- Carragee E, et al. *Are first-time episodes of serious LBP associated with new MRI findings? doi:10.1016/j.spinee.2006.03.005*
- Carragee E, et al. *Activity restrictions after posterior lumbar discectomy: A prospective study of outcomes in 152 cases with no postoperative restrictions*. SPINE 31;6:653-657
- Carroll LJ et al. *Course and Prognostic Factors for Neck pain in Whiplash-Associated Disorders (WAD)*. Spine(2008);33:45:581-592
- Carreon LY, Glassman SD et al. *Can the anxiety domain of EQ-5D and mental health items from SF-36 help predict outcomes after surgery for lumbar degenerative disorders? J Neurosurg Spine 2016;25:352-356*
- Cassidy JD, Carroll L, Cote P, Berglund A, Mygren A. *Low back pain after traffic collisions: a population-based cohort study*. SPINE 2003;28:1002-9
- Castro WHM, et al. *No stress - no whiplash? Prevalence of "whiplash" symptoms following exposure to a placebo rear-end collision*. Int J Legal Med 2001; 114:316-322

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References

- Chaichana KL, Mukherjee D, Adogwa O et al. *Correlation of preoperative depression and somatic perception scales with postoperative disability and quality of life after lumbar discectomy*. J Neurosurg Spine 2011;14:261-7.
- Cormier J et al. *A comprehensive review of low-speed rear impact volunteer studies and a comparison to real-world outcomes*. Spine 2016;43(18):1250-1258 doi: 10.1097/BRS.0000000000002622
- Daimon K, Matsumoto M, Watanabe K, et al. *A 20-year prospective longitudinal study of degeneration of the cervical spine in a volunteer cohort assessed using MRI. Follow-up of a cross-sectional study*. JBJS(Am) 2016;100:842-49. doi:10.2106/JBJS.17.01347
- Daimon K, Fujiwara H, Nishiwaki Y, et al. *A 20-year prospective longitudinal MRI study on cervical spine after whiplash injury: Follow-up of a cross-sectional study*. J or Orth Science 2019;24:579-583.
- Don AS and Carragee E. *Is the self-reported history accurate n patients with persistent axial pain after a motor vehicle accident? The Spine Journal 9 (2009) 4-12 doi:10.1016/j.spinee.2008.11.002*
- el Barzouhi et al, *Magnetic Resonance Imaging in Followup Assessment of Sciatica*, NEJM, 2013;368:11:999-1007
- Fardon DF et al, *Lumbar disc nomenclature: v 2.0: Recommendations of the combined task forces of the NASS, ASSR and ASNR*. The Spine J, 2014;14:2525-2545

30

References

- Hashem LE, et al. *Exploration of the Inter-relationships between Obesity, Physical Inactivity, Inflammation and LBP.* Spine 2018;43:1218-1224
- Holm LW et al. *The Burden and Determinants of Neck Pain in Whiplash-Associated Disorders (WAD) after Traffic Collisions.* Spine 2006;33:45:562-59
- Kalichman L, et al. *Computed tomography-evaluated features of spinal degeneration: prevalence, intercorrelation, and association with self-reported low back pain.* The Spine Journal 2010;10:200-208
- Kim S et al. Korean J Radiol. <https://doi.org/10.3348/kjr.2015.16.6.1294>
- Kontakis M et al. *Artificial disc replacement and adjacent-segment pathology: 10-year prospective outcome of a randomized trial.* J Neurosurg Spine 36:949-953, 2022 DOI: 10.3171/2021.9.SPINEZ1904
- Kushchayev S V, Guchko T, Jerraya M, et al. *ABCs of the degenerative spine.* Insights Imaging 9, 253-274 (2018). <https://doi.org/10.1007/s13244-017-0584-z>
- Lees-Haley PR et al. *Response bias in self-reported history of plaintiffs compared with nonlitigating patients.* Psychological Reports, 1996;79:811-818.
- Matsumoto M et al. *Prospective Ten-Year Follow-up Study Comparing Patients With Whiplash-Associated Disorders and Asymptomatic Subjects Using Magnetic Resonance Imaging.* SPINE 2010;35:1684-1690
- Matsumoto M et al. *Age-related Changes of thoracic and Cervical Intervertebral Discs in Asymptomatic Subjects.* Spine 2010;35:1359-1364
- Matsumoto M et al. *MRI of cervical intervertebral discs in asymptomatic subjects.* JBJS (J Bone Jt Surgery) 1998;80-B:19-24
- Matsumoto M, et al. *Tandem age-related lumbar and cervical intervertebral disc changes in asymptomatic subjects.* Eur Spine J (2013) 22:708-713, DOI 10.1007/s00596-012-2500-z
- McIlhorm, JM: *AMA guides to the Evaluation of Disease and Injury Causation*, 2nd Edition, AMA Press, 2013
- Merrill RK, Zabala LP, Peters C, Qureshi SA, McNany SJ. *The impact of Depression on Patient Reported Outcome Measures after Lumbar Spine Decompression.* 2017. Spine. doi: 10.1097/BRS.0000000000002329

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References

- Nakashima H, et al. *Abnormal Findings on Magnetic Resonance Images of the Cervical Spines in 1211 Asymptomatic Subjects.* SPINE 2015;40(6):92-98
- Okada E, et al. *Ageing of the Cervical Spine in Healthy Volunteers A 10-Year Longitudinal Magnetic Resonance Imaging Study.* SPINE 2009;34:706-712
- Päävi K, Kolu et al. *Evaluation of the Effects of Physical Activity, Cardiorespiratory Condition, and Neuromuscular Fitness on Direct Healthcare Costs and Sickness-Related Absence Among Nurses With Recurrent Nonspecific Low Back Pain.* SPINE 2017;42:854-862
- Parvizi S, Day S. *Magnetic Resonance Imaging in Low Back Pain: A Review of Current Recommendations and Its Usefulness in Low Back Pain Evaluation.* J Recent Adv Pain 2017;7(3):133-135
- Pfirrmann CWA: *Magnetic Resonance Classification of Lumbar Intervertebral Disc Degeneration.* Spine 2001;26:1873-1878.
- Plian K, Moran D, Kostowski T, Risheng X, Goodwin R, Elder B, Ramhendran S, Bydon A. *Relationship between depression and clinical outcome following anterior cervical discectomy and fusion.* J of Spine Surgery 2017;3:133-40.
- Ravindra VM, et al. *Vitamin D Levels and 1-Year Fusion Outcomes in Elective Spine Surgery: A Prospective Observational Study.* Spine 2015;40:1536-1541
- Shi Y, et al. *Smoking and pain: pathophysiology and clinical implications.* Anesthesiology. 2010;113(4):977-92.
- Su CA, Kusin DJ et al. *The association between body mass index and the prevalence, severity and frequency of low back pain.* Spine 2018;43:848-852
- Wan MJ, et al. *Conversion to Symptomatic Chiari I Malformation after minor head or neck trauma.* Neurosurgery 63:748-753, 2008.
- Zhou F, et al. *Progressive Bone Formation After Cervical Disc Replacement.* Spine, 2018;43:E163-E170

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