



**Marcus Neuroscience Institute**  
BAPTIST HEALTH SOUTH FLORIDA

## Surgical options for Cervical Spine Conditions: Lessons from 25 years of complex spine surgery

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### Disclosures

**Frank D. Vronis, M.D., Ph.D.**, faculty for this educational activity, has no relevant financial relationships with ineligible companies to disclose, and has indicated that the presentation or discussion will not include off-label or unapproved product usage.

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## Objectives

At the end of this lecture, participants will be able to:

- Present alternatives to traditional thinking for cervical spine surgery, identify pitfalls and minimally invasive options and discuss complication avoidance.

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## Neck Pain

- 2/3 of western population with a prolonged episode of neck pain
- 2<sup>nd</sup> only to back pain as reason for primary care visit



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## Neck Pain

- Most present as “non-specific neck pain”
- Multi-factorial etiology
  - Poor posture
  - Anxiety
  - Depression
  - Strain
  - Sports
  - Occupation
  - Whiplash and high energy trauma



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EVIDENCE-BASED STRATEGIES

## Treatment Options – Cervical DDD

- Exercise Regimens
- Analgesics
- NSAIDS
- Muscle Relaxants
- Stress Management
- Accupuncture
- Psychotherapy
- Tricyclics



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EVIDENCE-BASED STRATEGIES

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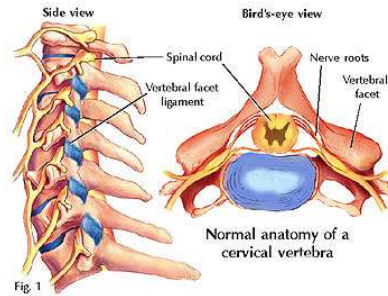
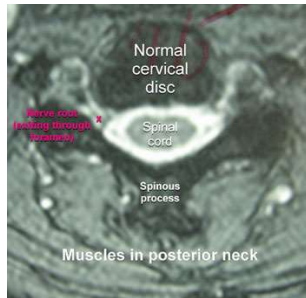
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## Cervical Axial Neck Pain

- Where is the pain coming from?????



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## Cervical Degenerative Disc Disease

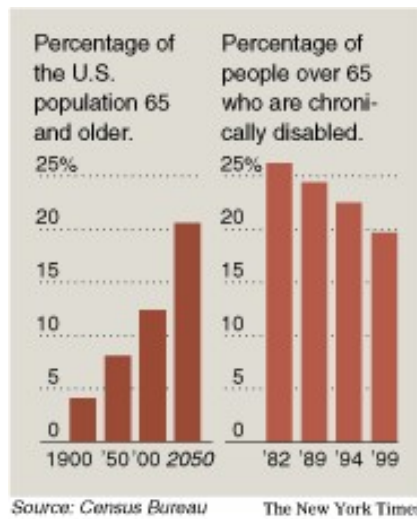
- Axial pain
- Radiculopathy (C5, C6, C7)
- Myelopathy
- Deformity

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## Myelopathy

- Mechanical deformation of the cord
- Dynamic factors
- Ischemia
- Gait difficulty, spasticity, loss of manual dexterity, powerthesias, weakness, B/B problems

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Activity Level  
Of Older Americans  
Is Increasing

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## GENERAL PRINCIPLES

- Avoid Surgery if Possible
- Avoid Fusion if Possible

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## Psychosocial assessment (wrong or high-risk patient)

- Personal injury litigation
- Worker's compensation
- Depression
- Smoking
- Morbid obesity
- Chronic pain syndromes



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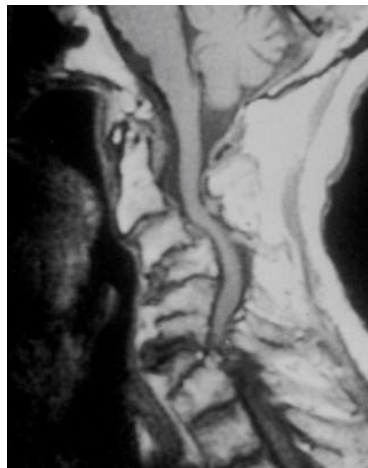
## ADJACENT – SEGMENT DEGENERATION

- 16.5% at five years and
- 36.1% at ten years.

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## Anterior Approach

- Kyphosis
- Deformity
- Younger patients

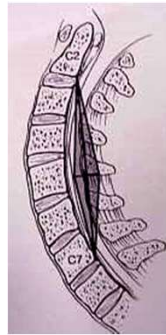


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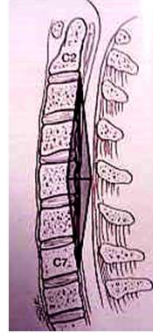


## Posterior Approach

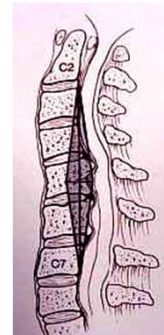
- Needs a lordotic / neutral alignment
- Is contraindicated in **fixed** kyphotic deformity



Lordotic



Straightening

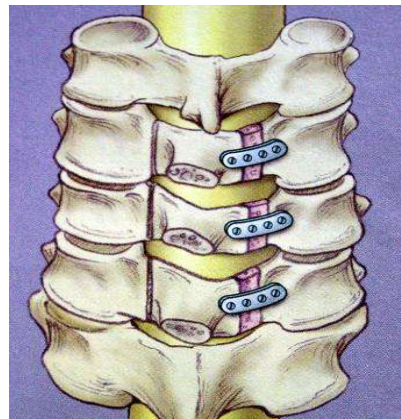


Kyphotic

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## Laminoplasty

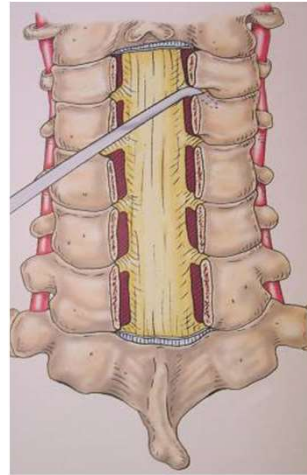
- 40% loss of subaxial motion
- 8% incidence of C5 palsy
- Less risk of post laminectomy kyphosis



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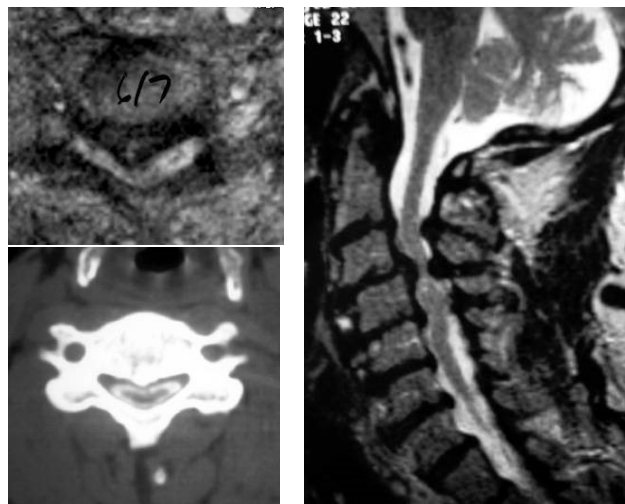
## Simple Laminectomy

- Older patients, medically unstable
- Problems:
  - post-laminectomy kyphosis (25% incidence)
  - post-laminectomy scarring, ? tethering
  - cannot be combined with foraminotomies



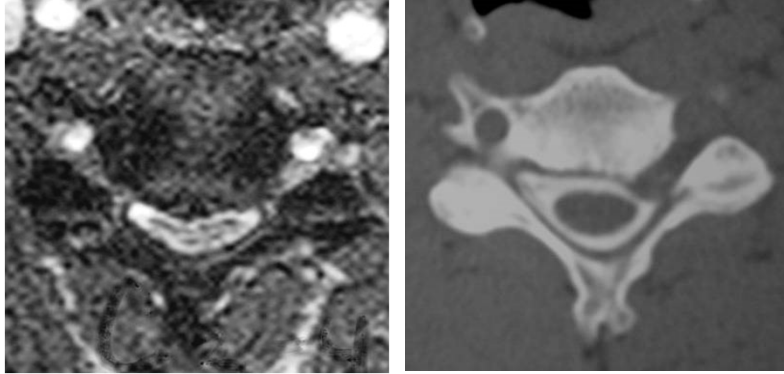
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## Anterior vs Posterior vs. Concentric



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## Central vs. Lateral



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## Intervertebral vs. Vertebral



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## Single Level vs. Multilevel

Does the anatomic region influence the decision for surgery?

Does the anatomic region influence the surgical technique?

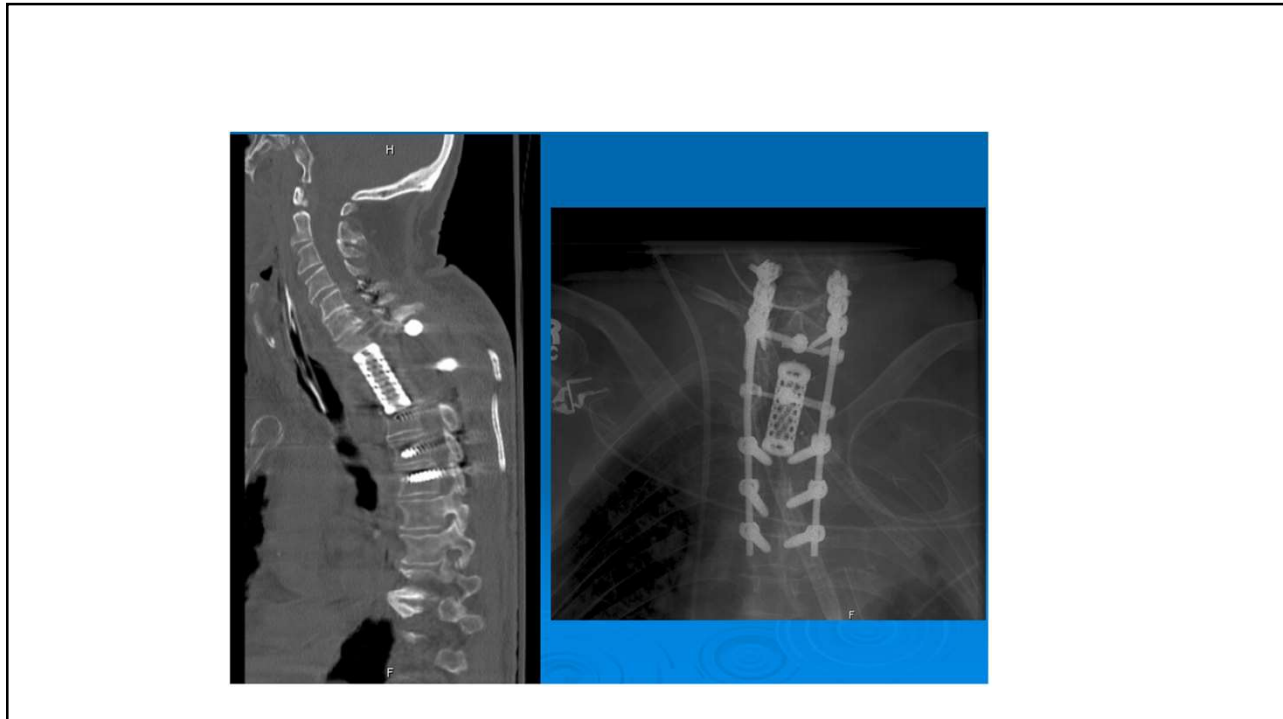


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Pancoast Tumor




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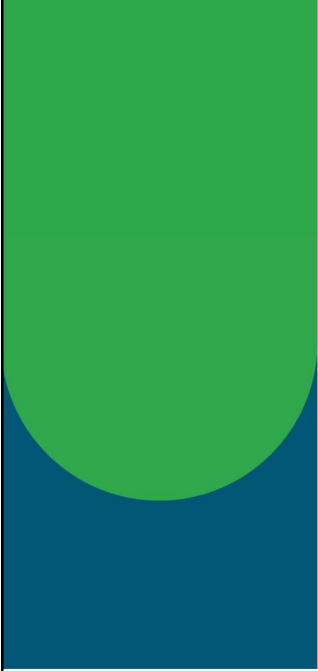
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## Cervical Arthroplasty

- Cervical arthroplasty offers the promise of restoring normal spinal movement and reduces a kinematic strain on adjacent segments

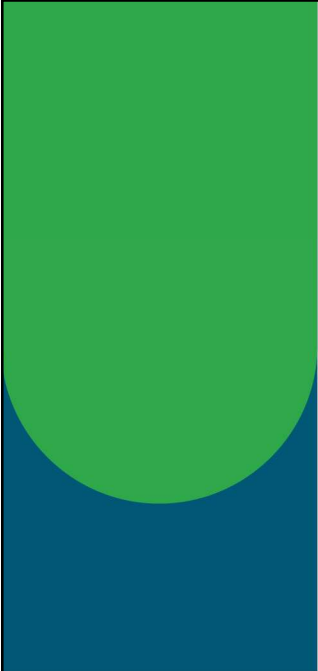


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- After ACDF, intradiscal pressure ↑  
ROM above + below ↑
- Is all ASD from ACDF?
  - **Some from natural history**
  - **200 asymptomatic Pts > 50 yr.**
  - **Developed Six's in 15% over a 10 year**
  - **Spine 26: 2463-2466, 2001**

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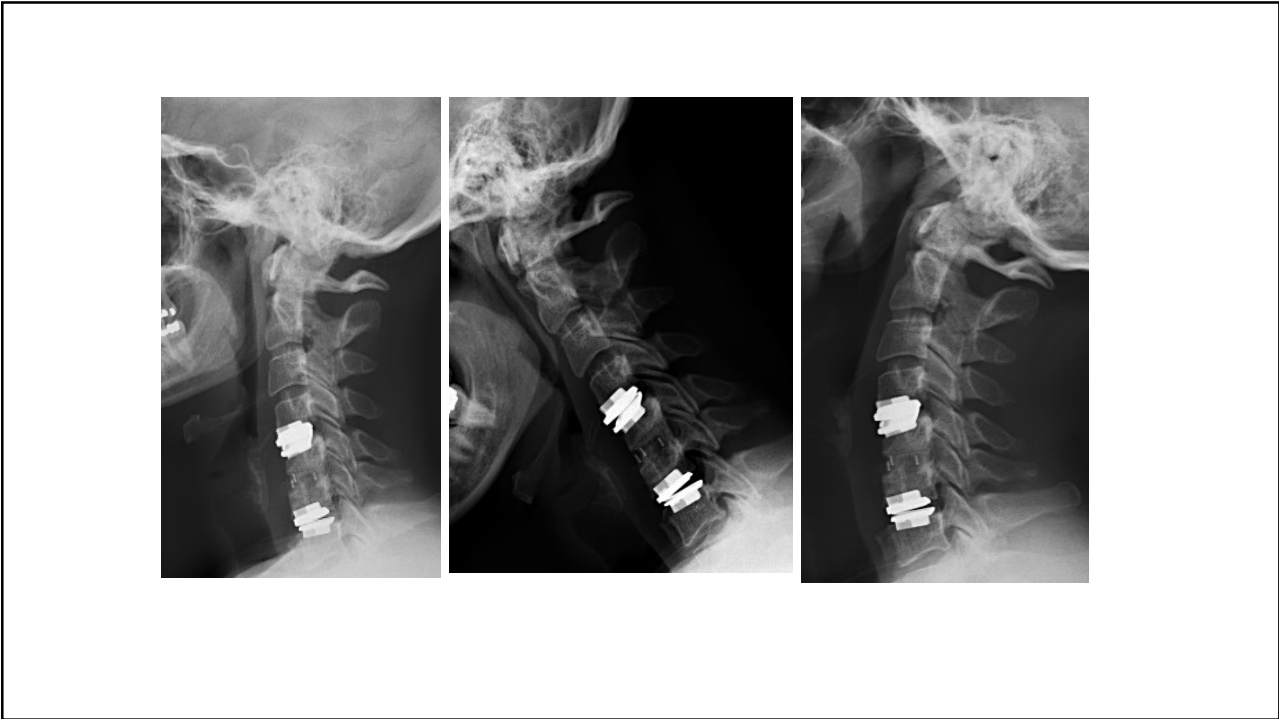


- ASD
  - **Seen naturally when segments auto-fuse**
  - **Klippel-Feil Syndrome**
  - **SX's depend on spinal canal dimensions, pain perception and unknown factors**
- After ACDF, what we see is a combination of surgically induced ASD and natural history (1.5%+1%=2.5%/yr.)

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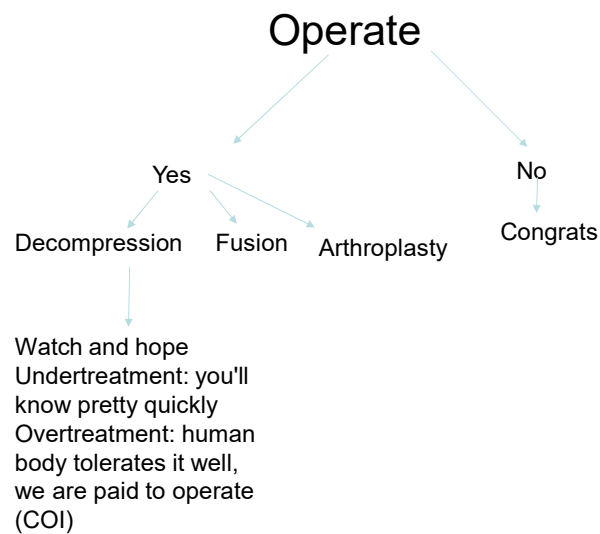
## Arthroplasty

- Best option for: smokers
- Best option for early degeneration (soft disc vs osteophyte)
- Dynamic components of spondylosis not addressed by TDR
- Not age but appearance of motion segment



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## Decisions



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## When NOT to operate

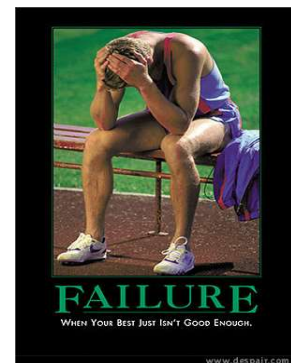
- When the patient is getting better on his/her own
  - When the patient is asymptomatic (no role for prophylactic surgery)
  - When the patient has not tried conservative measures
  - When there is lack of correlation between imaging studies and symptoms
  - When the patient's general medical condition is poor
  - Don't play the fear game
  - When there are significant psychological issues (*alcoholism, drug dependence, litigation, etc.*)
- \*Keep in mind that surgery itself causes tissue injury



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## Failed Surgery

- If they didn't get better from the first operation why would they benefit from a second (or third) operation?
- Incorrect diagnosis
- Improper patient selection
- Incomplete decompression
- Inadequate fusion/fixation
- pseudoarthrosis
- Surgical complication
- Recurrent pathology
- New pathology



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## Lessons Learned

- Every level of the spine is worthy of saving
- What is the smallest operation I can get away with
- Scrutinize your good AND bad results
- This is a humbling field, complications will happen!



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## References

- Tong, Y., Kaplan, D. J., Spivak, J. M., & Bendo, J. A. (2020). Three-dimensional printing in spine surgery: a review of current applications. *The Spine Journal*, 20(6), 833-846.
- Yee, T. J., Swong, K., & Park, P. (2020). Complications of anterior cervical spine surgery: a systematic review of the literature. *Journal of spine surgery*, 6(1), 302.

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**Thank You.**



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