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Co-Director of Spine Fellowship  
Boston Medical Center

*Work Related Injuries Workshop  
May 2 & 3, 2016*

# Neck Session

SURGICAL OPTIONS

**10 min**

# Disclosure

- No COI

# NECK SESSION

- Neck Injuries: Whiplash, Minor Fx (Dr. Mostoufi)
- Disc HNP: Non-Op Rx (Dr. Feliz)
- Pain Generator: C spine vs Shoulder (Dr. T Tannoury)
- *Surgical Options*

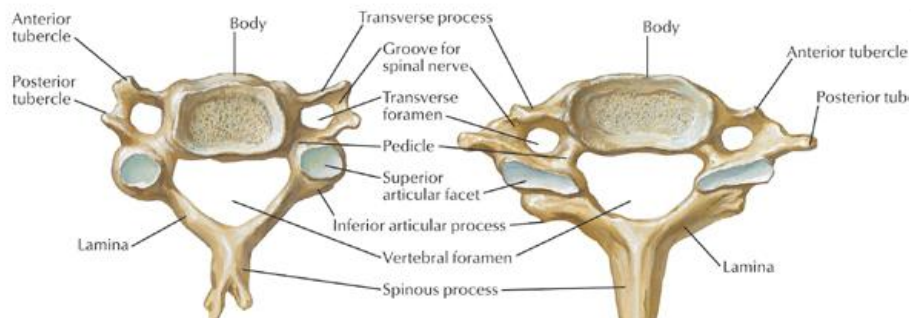


# Neck Injury Presentations

- NECK PAIN
- SHOULDER PAIN
- ARM PAIN
- N/T/Weakness: UE/LE
- Loss Dexterity/  
Imbalance

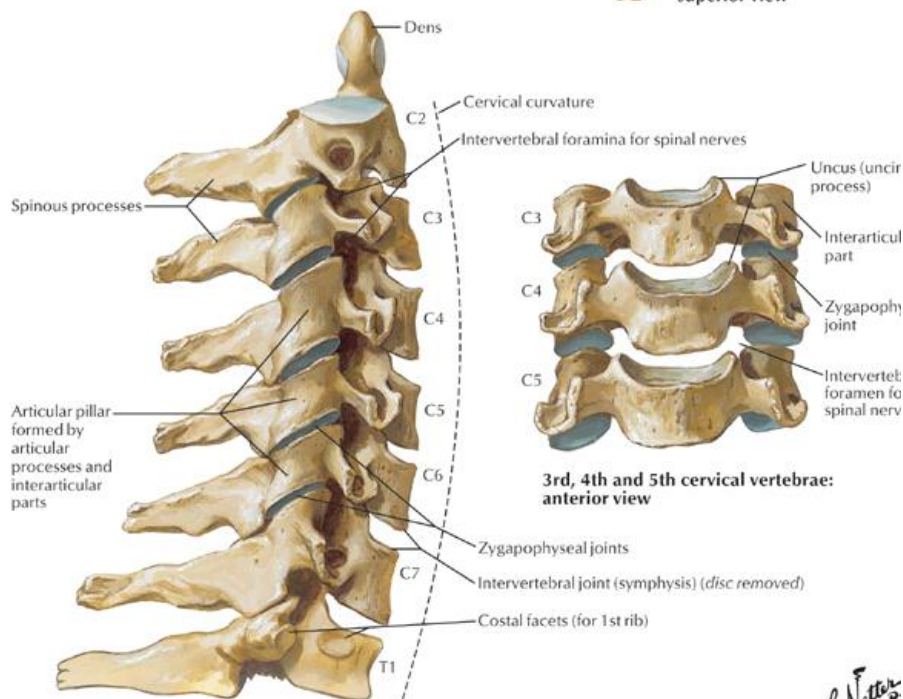


# Anatomy



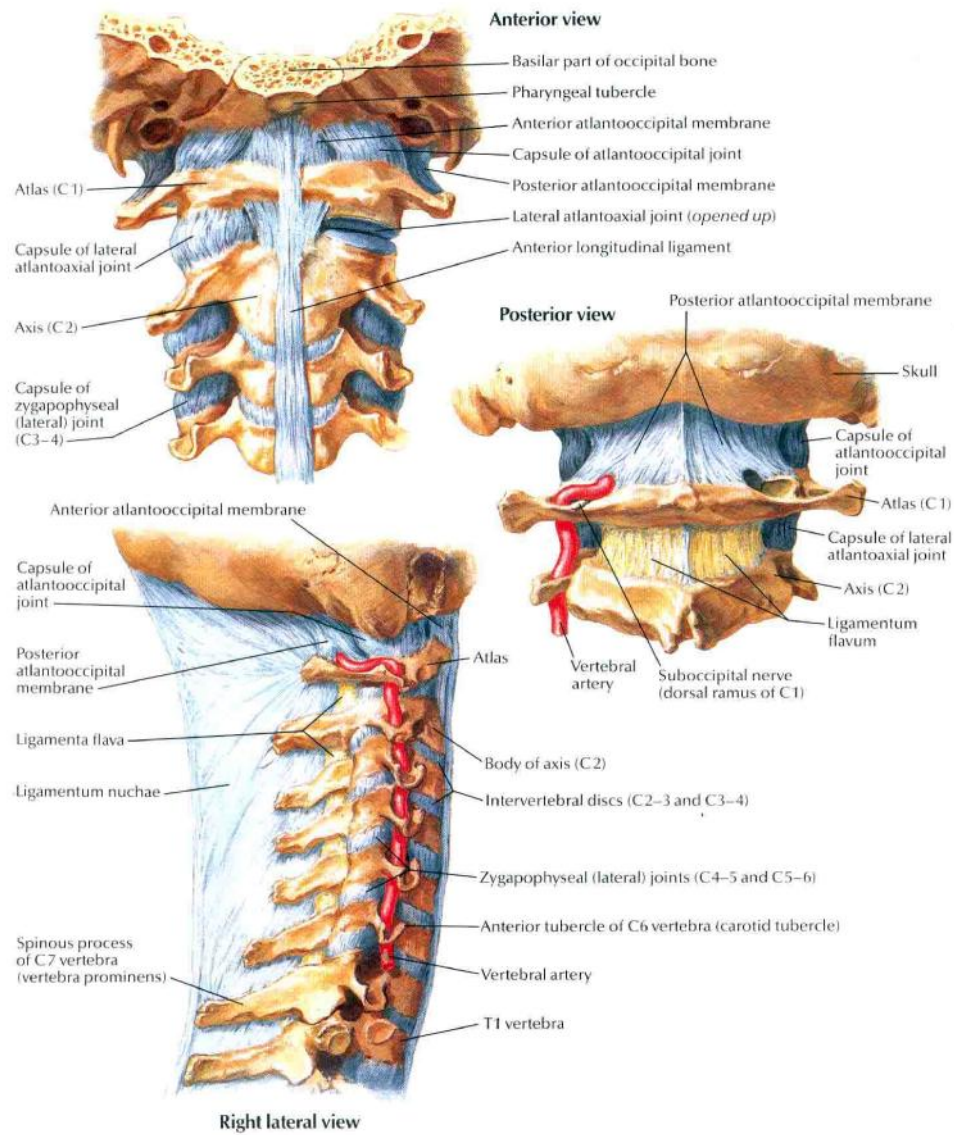
**4th cervical vertebra: superior view**

**7th cervical vertebra: superior view**



**2nd cervical to 1st thoracic vertebrae: right lateral view**

**3rd, 4th and 5th cervical vertebrae: anterior view**



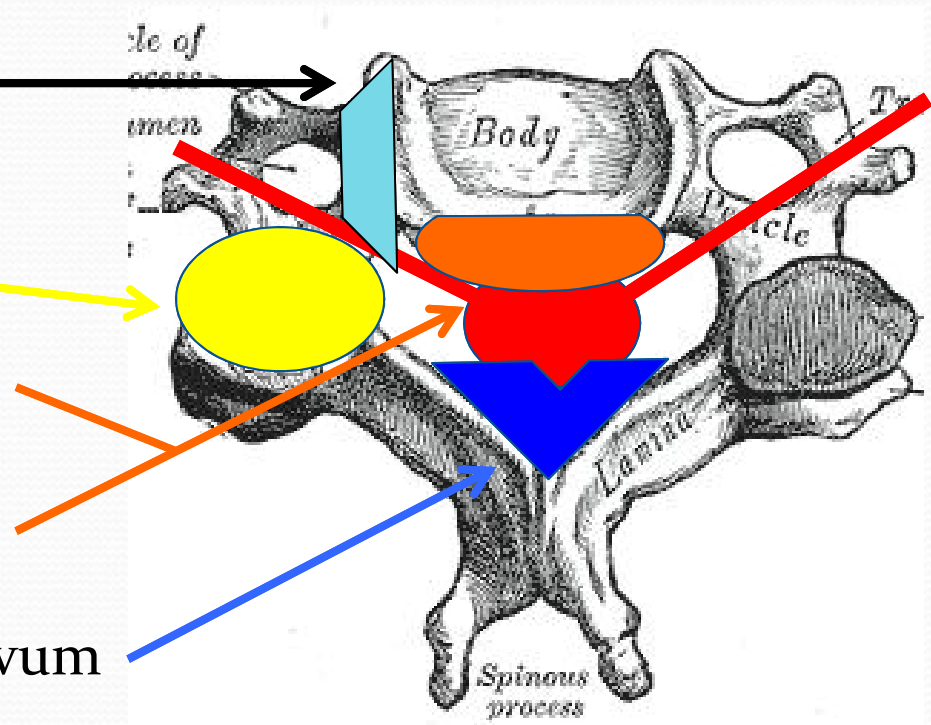
**Right lateral view**



# Radiculopathy/ Myelopathy - Pathophysiology:

- Direct Mechanical compression NRoot/Cord:

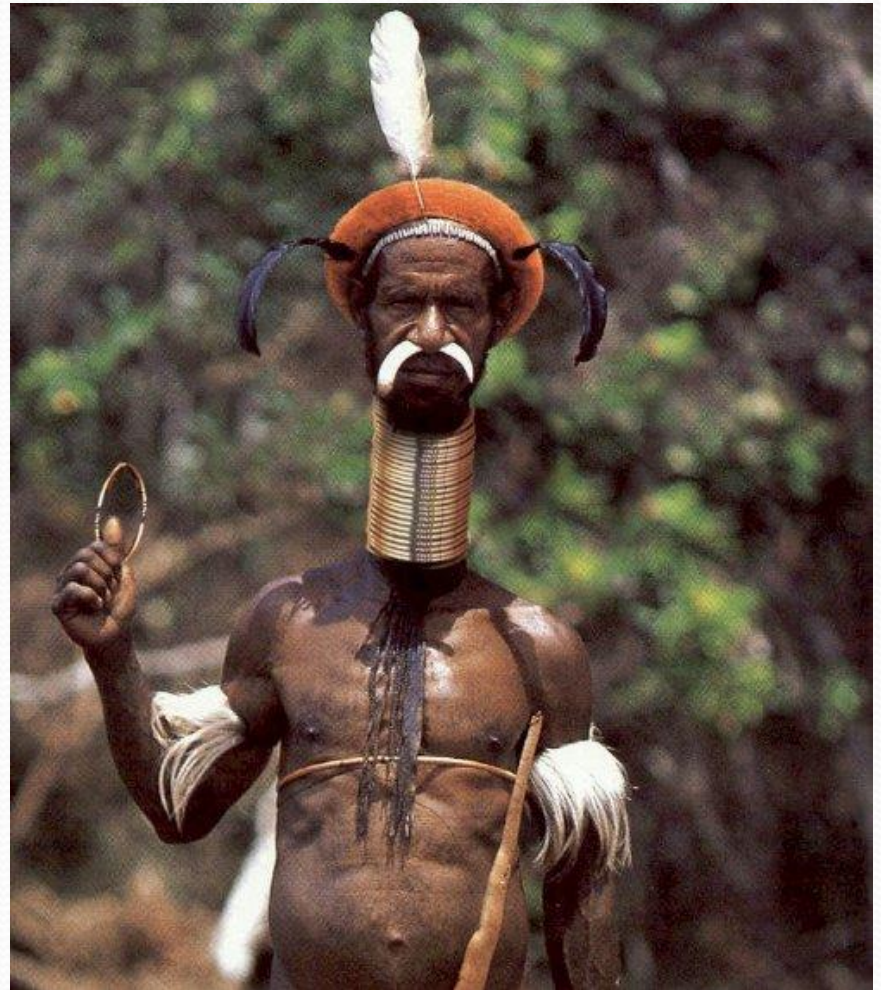
- Uncus joint
- Facet joint
- Disk Osteophyte Complx
- Disc Herniation - OPLL
- Infolding Ligamentum flavum



# Most Common Causes Neck Pain

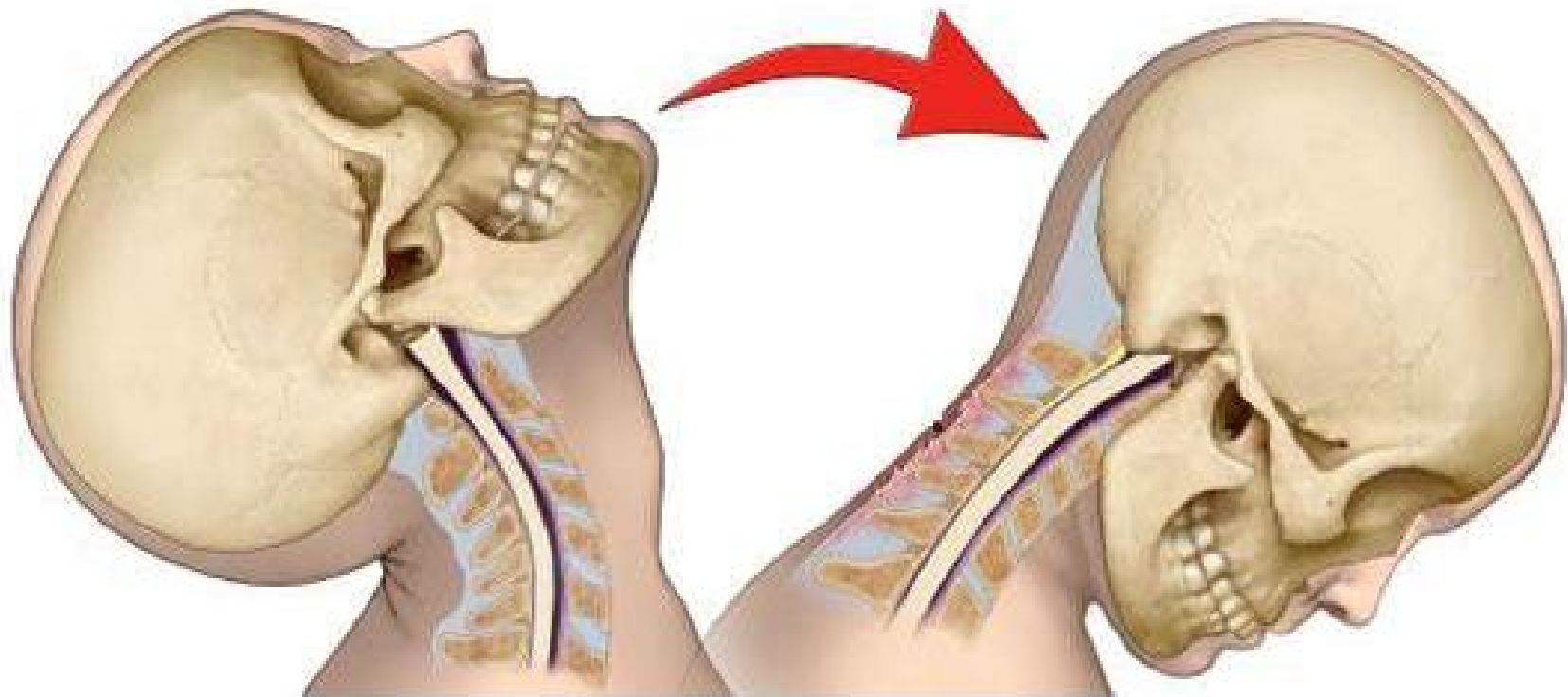
- Cervical Sprain
- Cervical Spondylosis
- Cervical radiculopathy
- Cervical myelopathy
- Fracture

Dwyer Et al, Bogduk et al

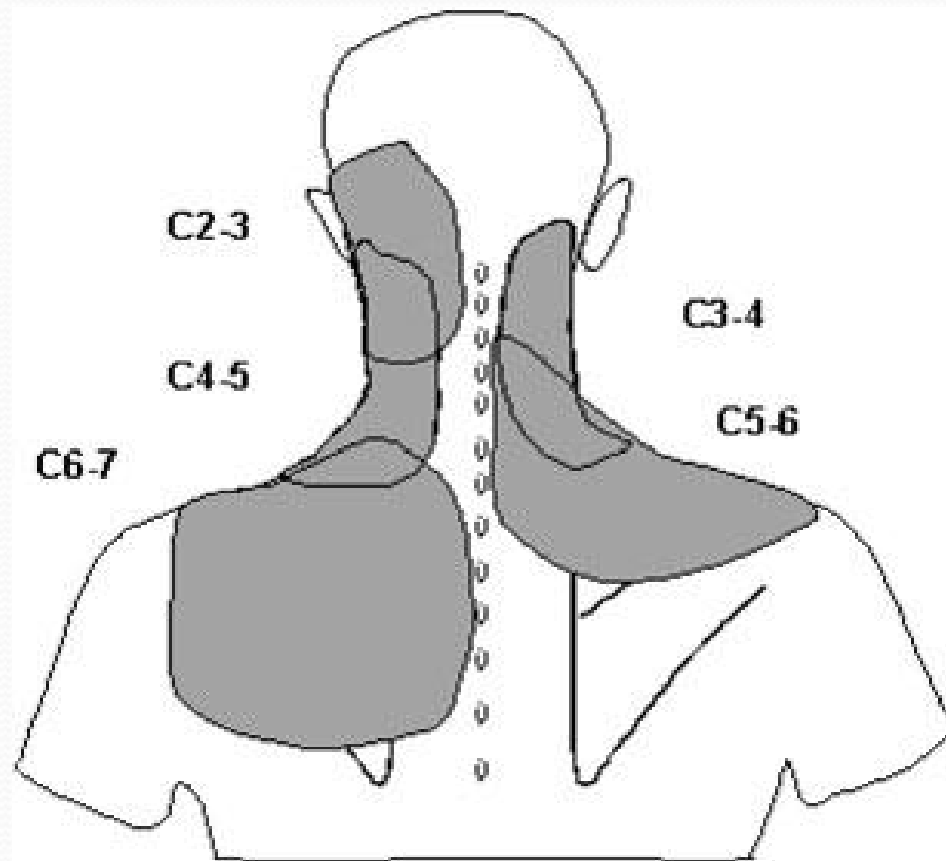




# Cervical Sprain / Whiplash

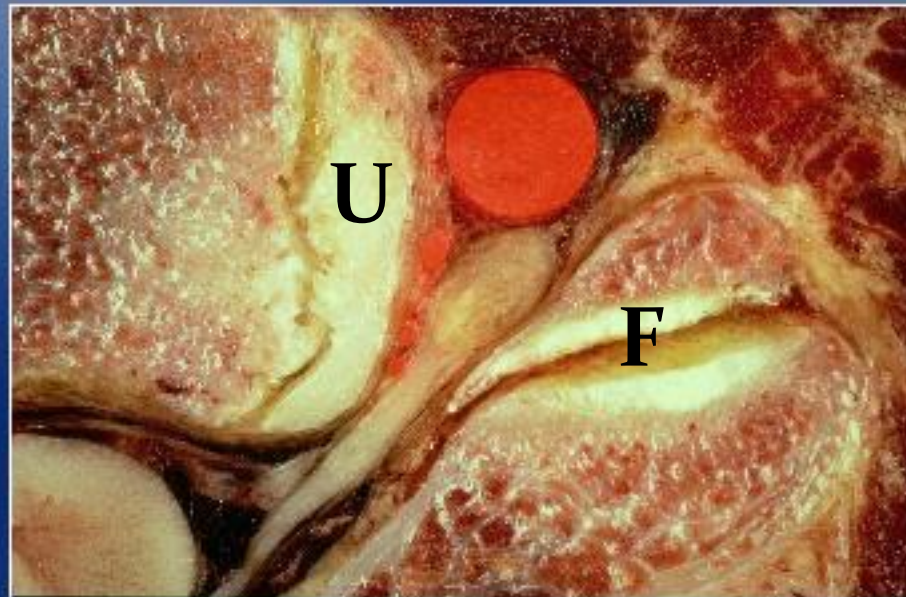


# Discogenic Pain (Spondylosis)



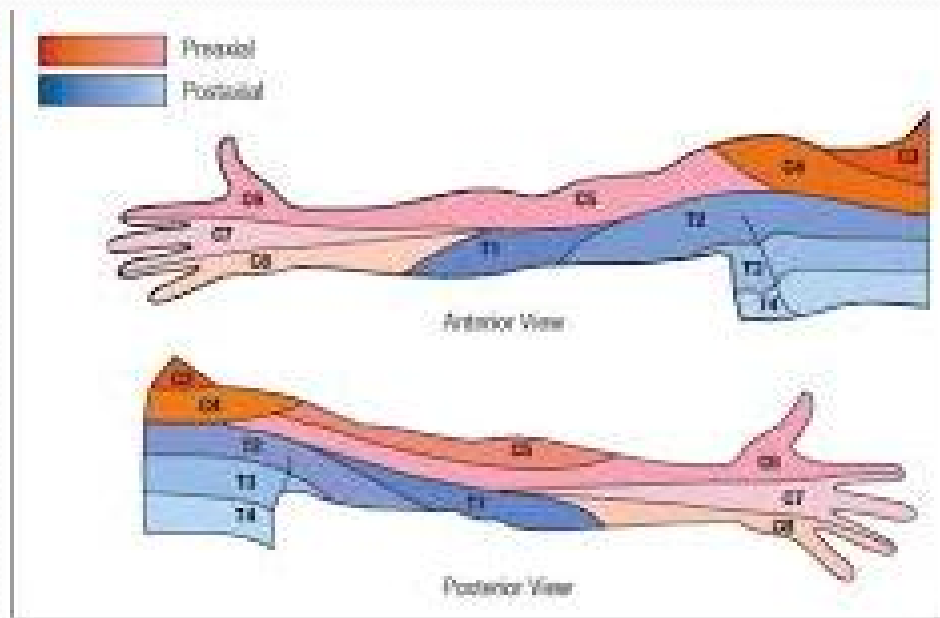


# Cervical Spondylosis With Sclerosis of the Uncus and Root Compression



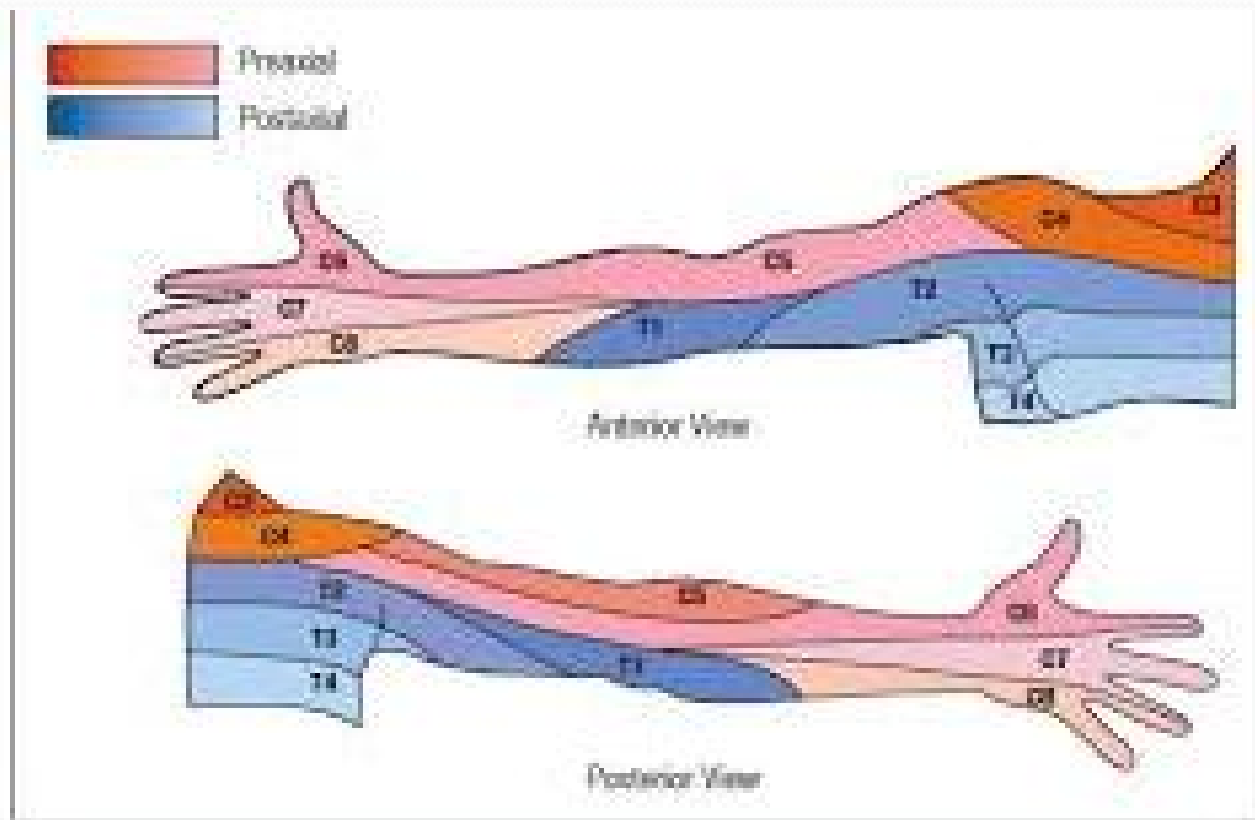
# Cervical Radiculopathy

- PINCH'ed NERVE
- Pain is often accentuated by maneuvers that stretch the involved nerve root. Some examples include:
  - Coughing
  - Sneezing
  - Reaching



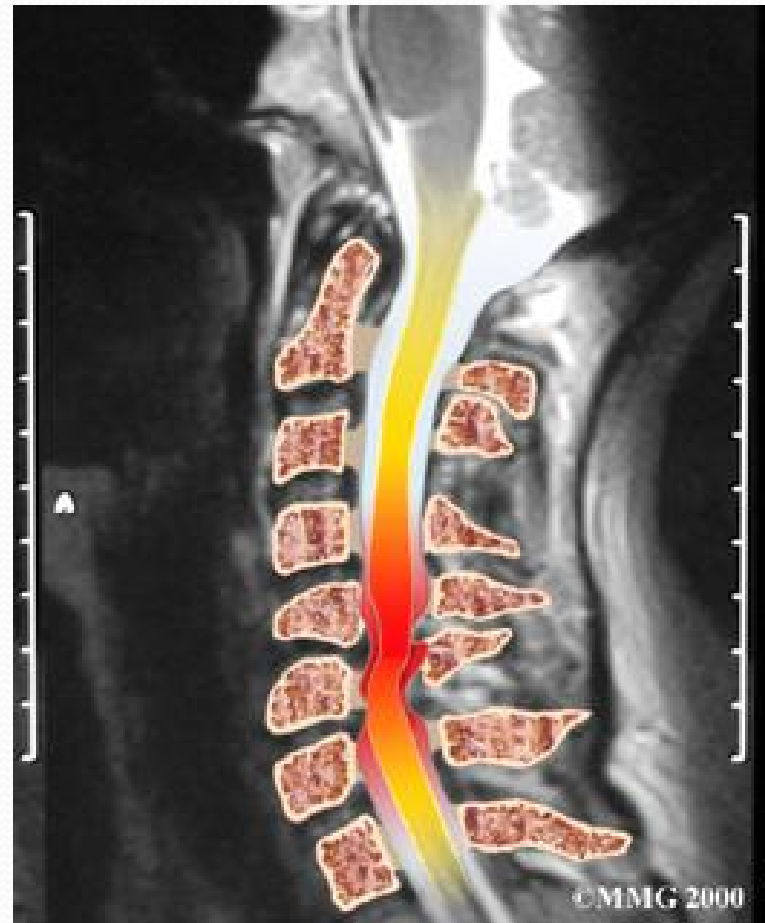


# Radicular Pain



# Spinal Cord Compression: Myelopathy

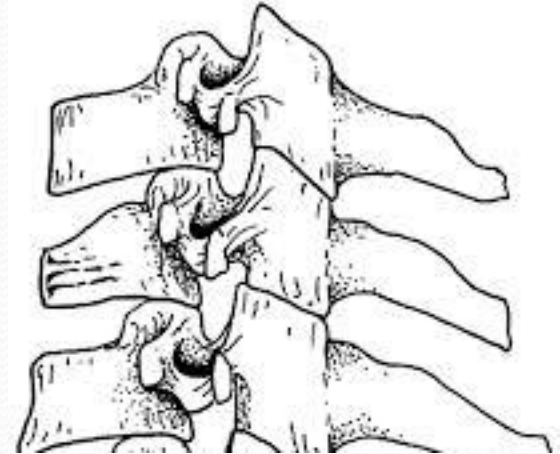
- Neck Pain
- UE:
  - Radiculopathy
  - Weakness/N/T
  - Clumsiness
- LE:
  - Loss of Balance
  - Frequent Falls
  - Gait disturbances





# Cervical Fractures

- Vertebral Body:
  - Compression fractures
  - Burst fractures
- Facet fractures
  - Subluxation
  - Dislocation



# Facet Fractures / Dislocation





# MANAGEMENT - Terminology

- Axial Neck Pain (without neurologic deficits):
  - Typically conservative mgmt (PT)
  - Facet block? RFA?
- Arm Pain: Radiculopathy
  - PT/ Traction / Injections
  - Surgery: if conservative management fails
- Surgery: Weakness, Myelopathy, Instability (Fracture, Stenosis, HNP, Infection, Tumor, etc)

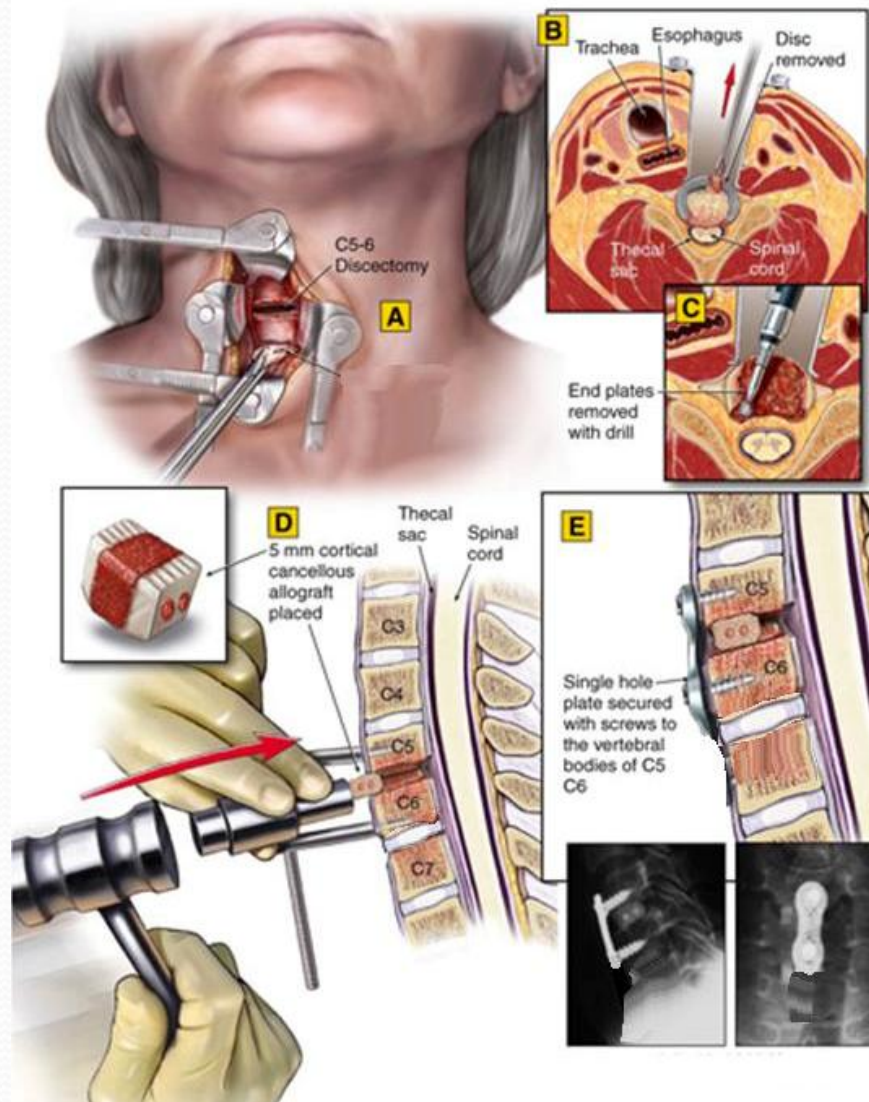




# Surgical Options - Terminology

- Anterior cervical diskectomy and fusion (ACDF)
- Anterior cervical corpectomy and fusion (ACCF)
- Cervical disk arthropasty – replacement (cTDR)
  
- Posterior cervical laminotomy - Foraminotomy
- Posterior cervical laminectomy & Fusion
- Posterior cervical laminoplasty

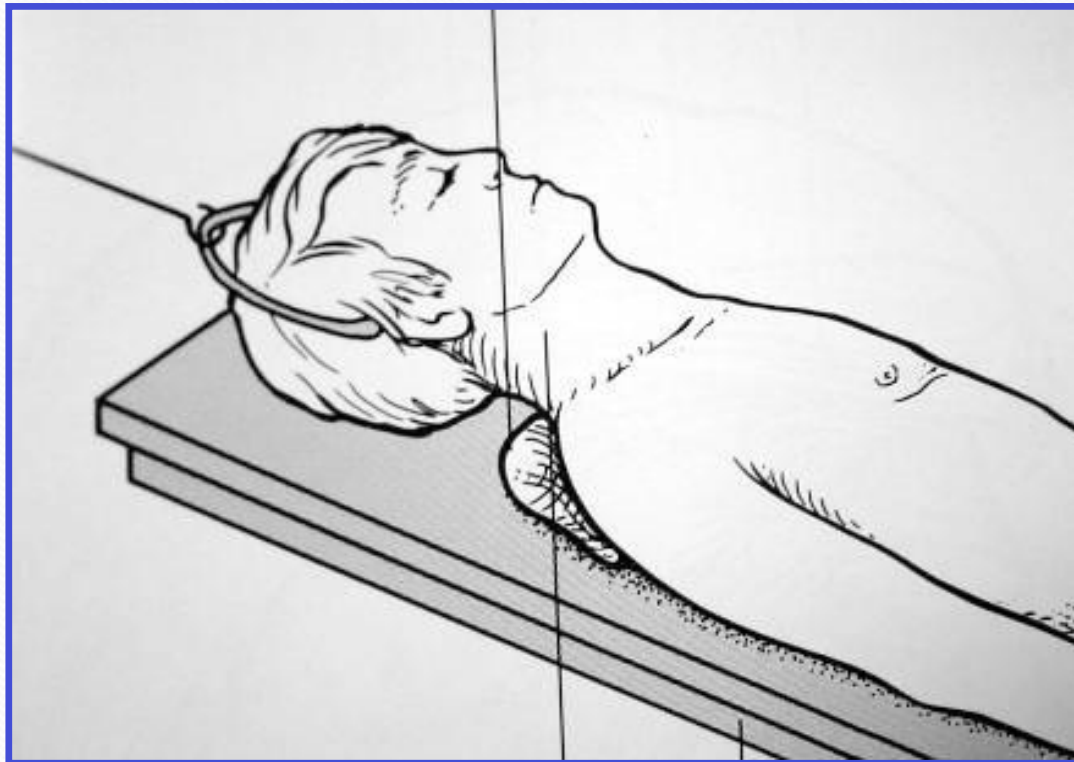
# ACDF





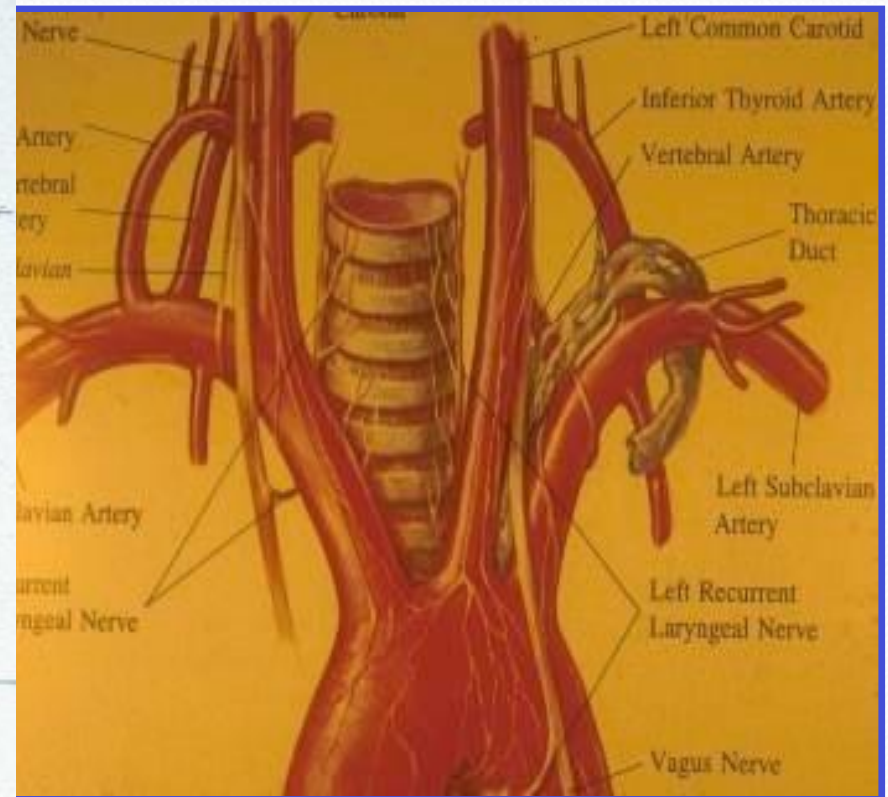
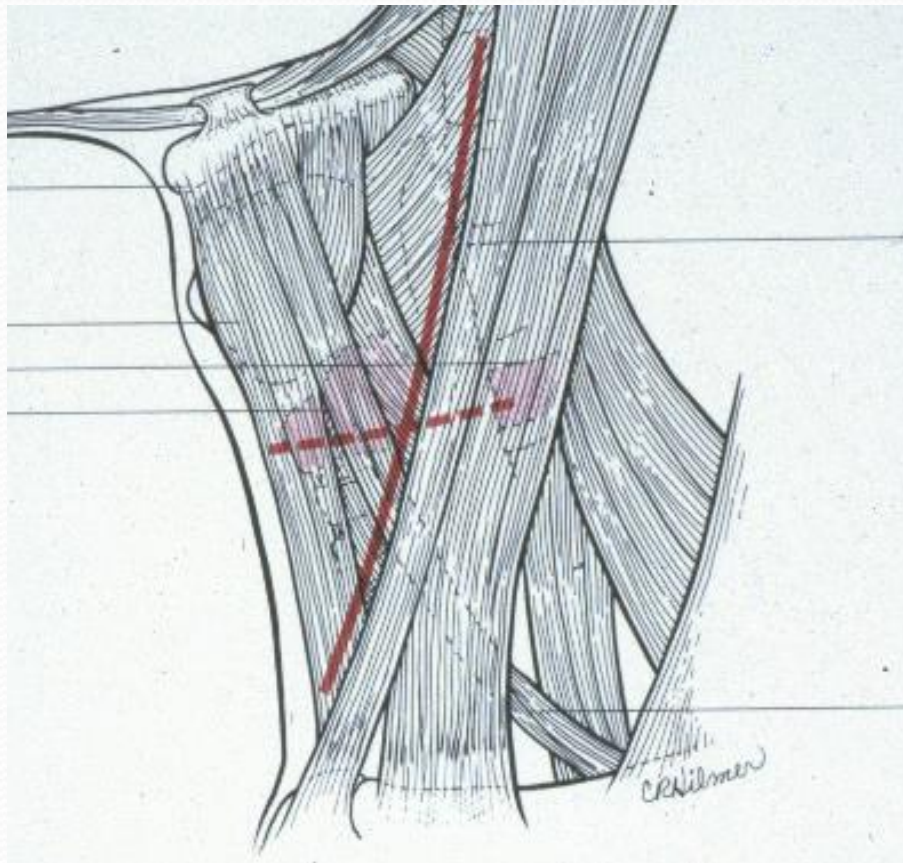
# Positioning and Anatomy

- Mild Neck extension

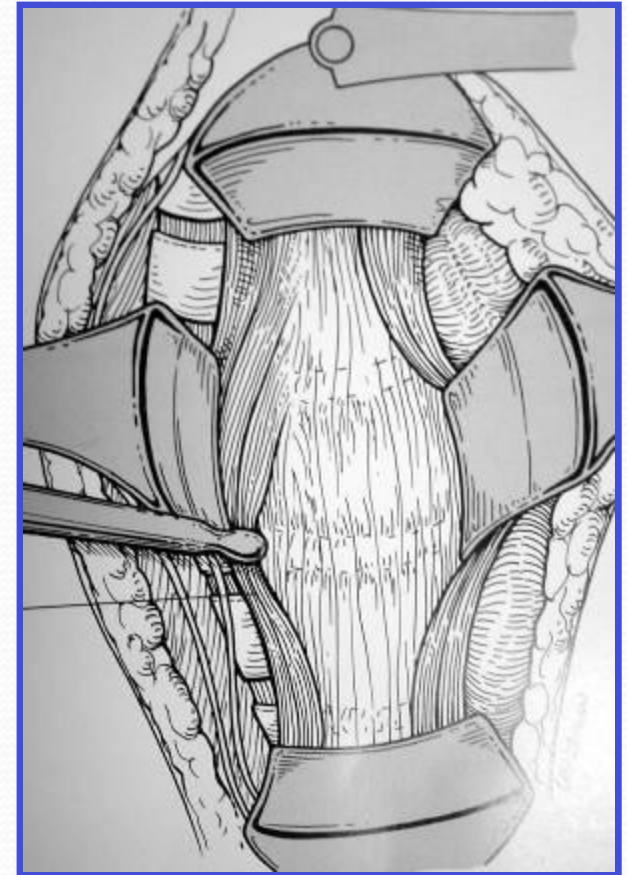
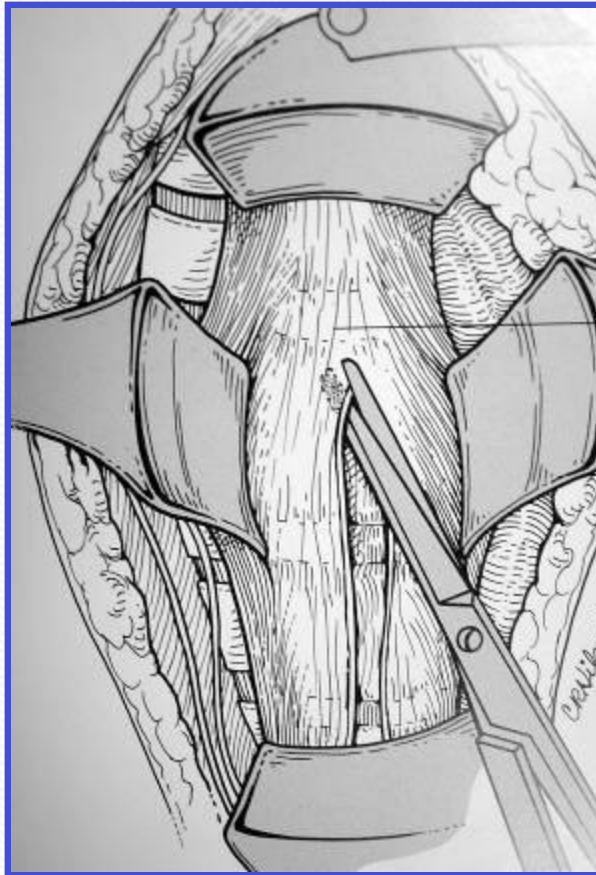
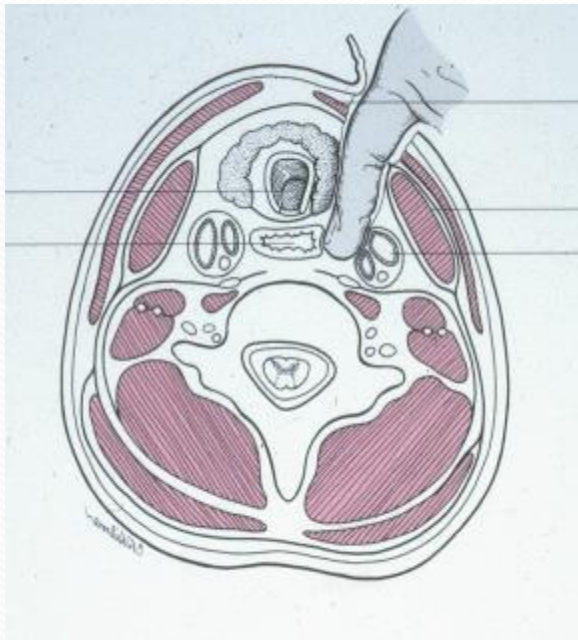




# Anatomy

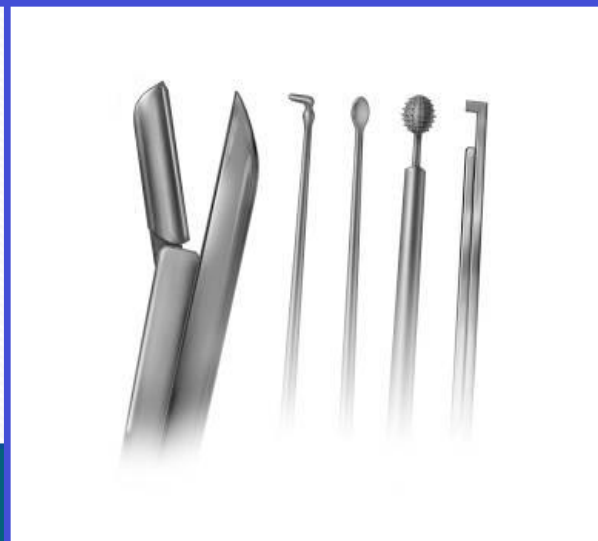
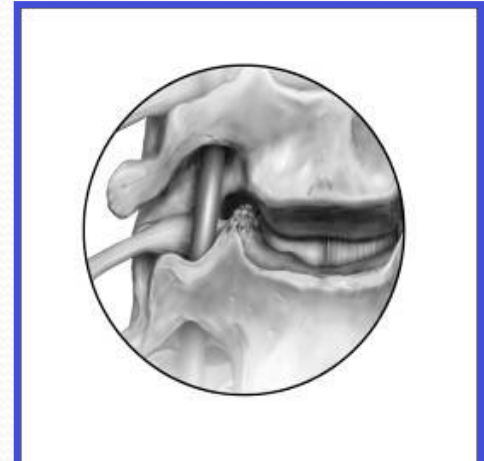
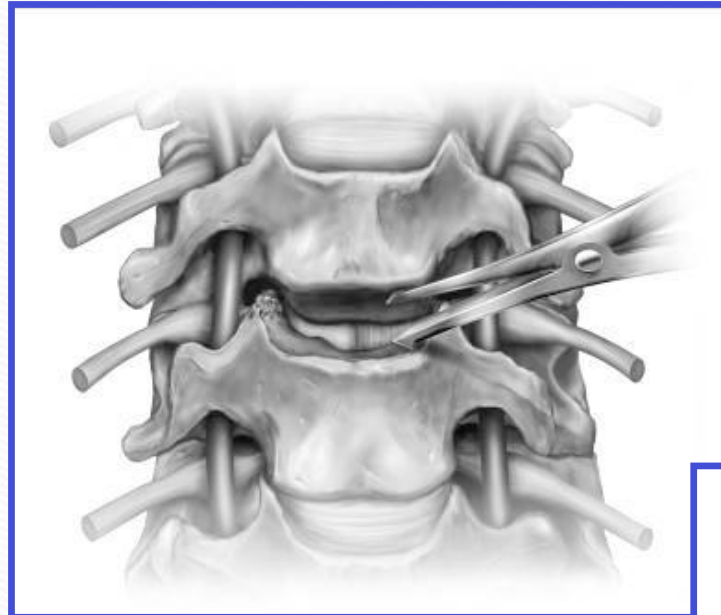






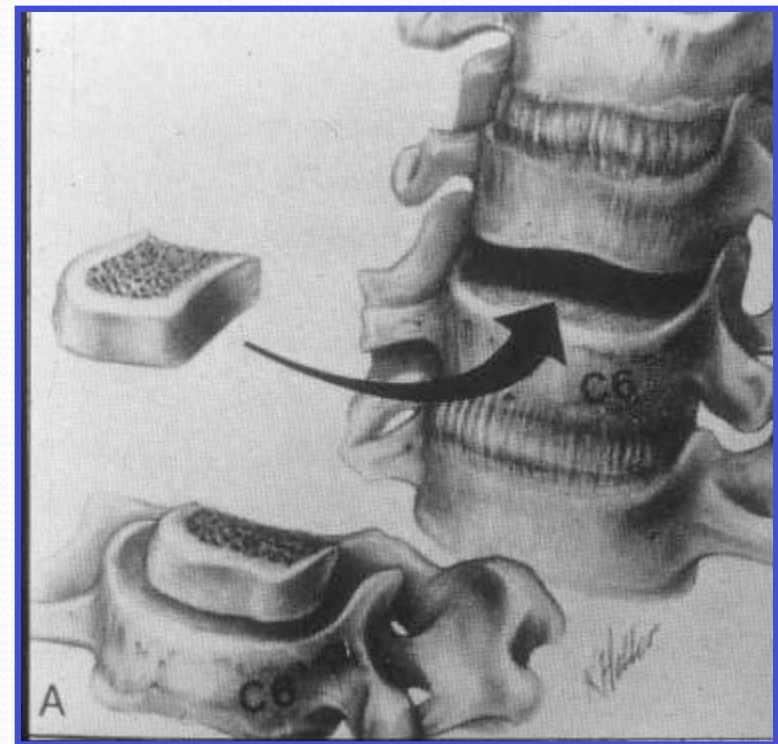
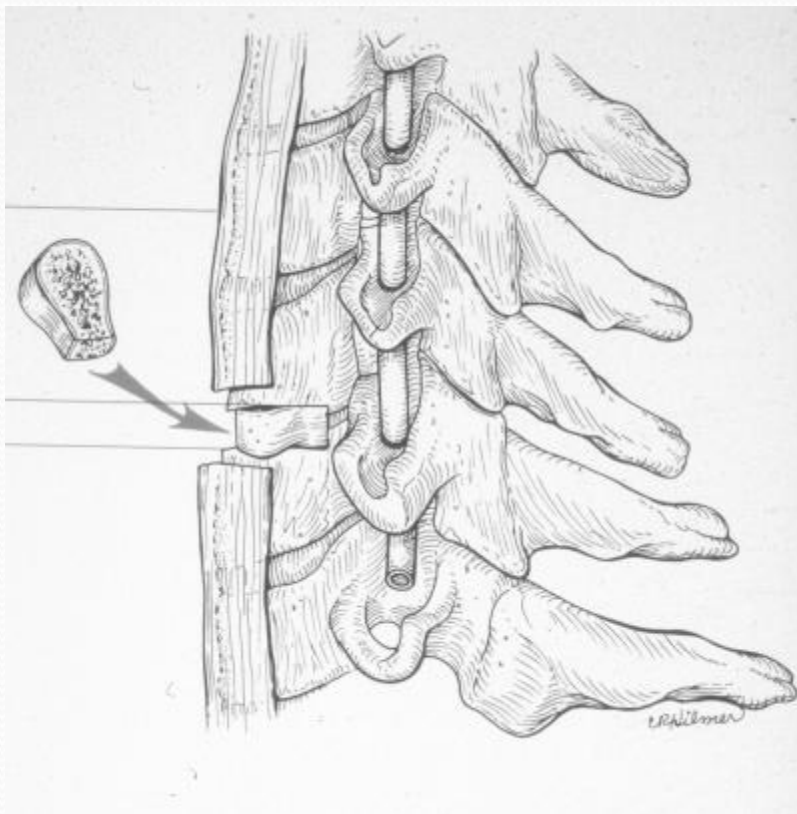
# Discectomy and Decompression

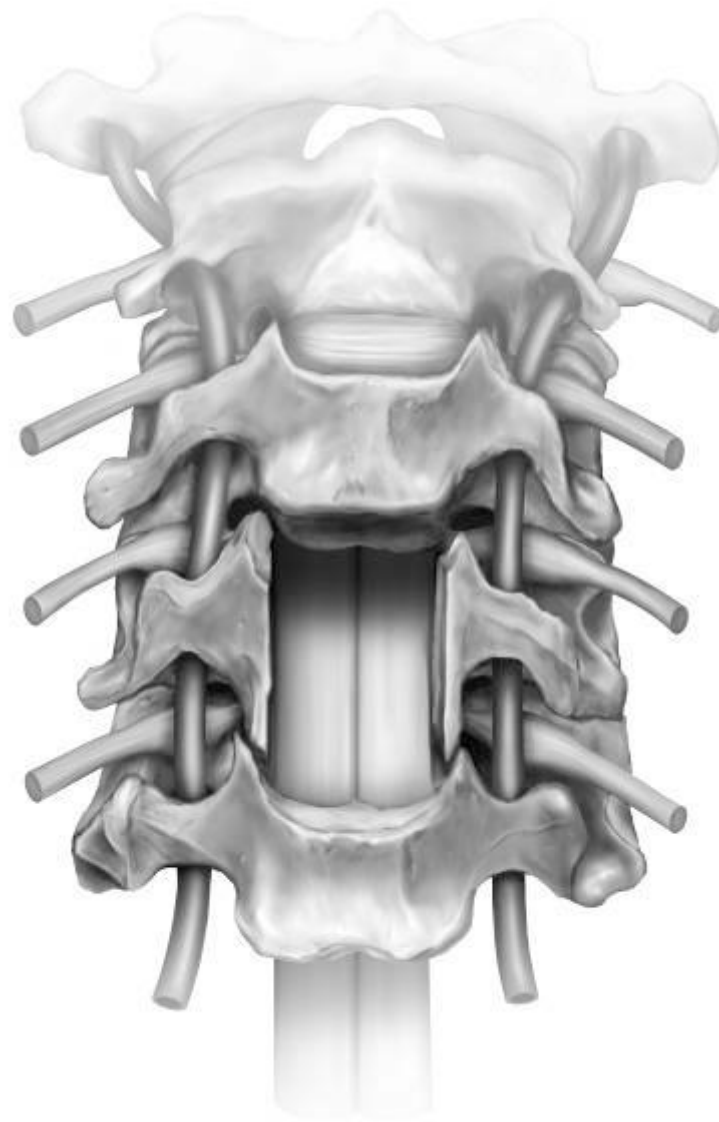
- HT: 5-10mm
- W: 10-15mm
- Depth: 12-17mm





# Bone Graft Placement







corpectomy



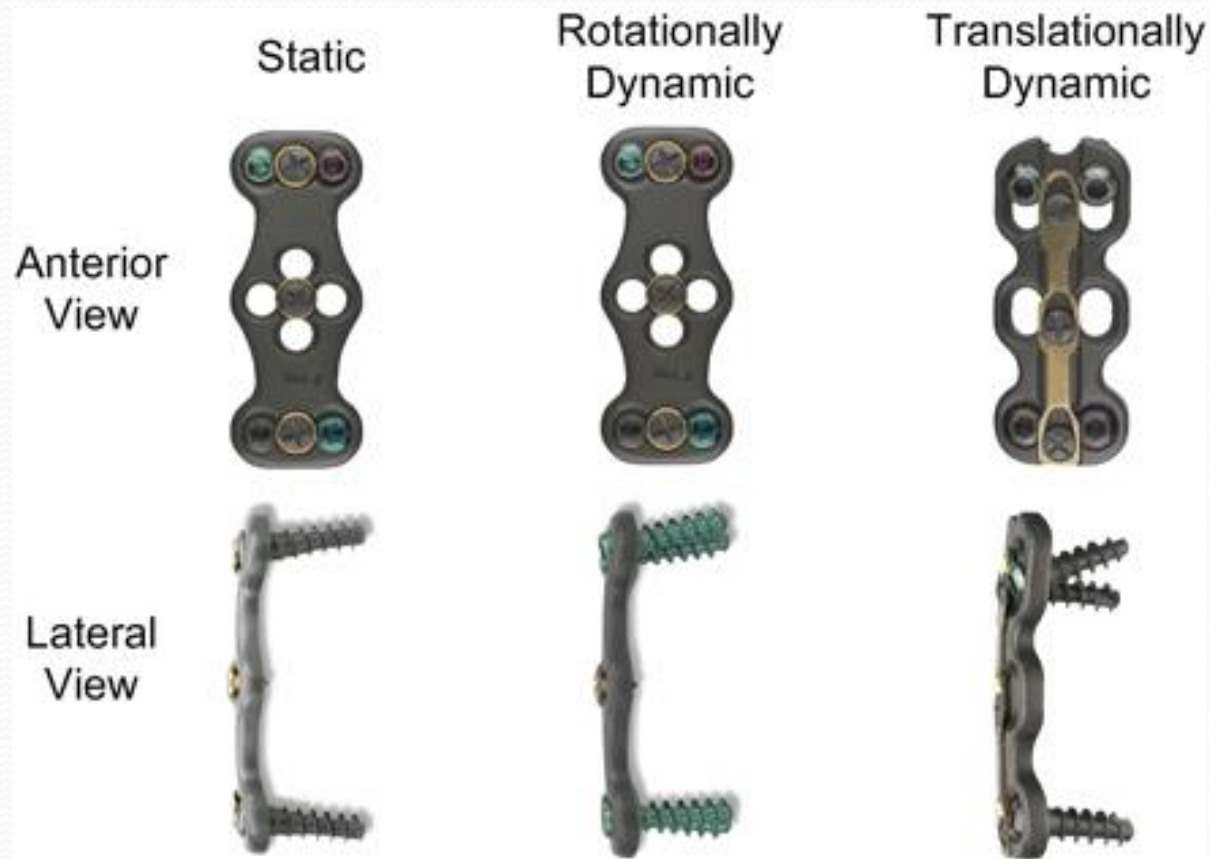
fusion and plating

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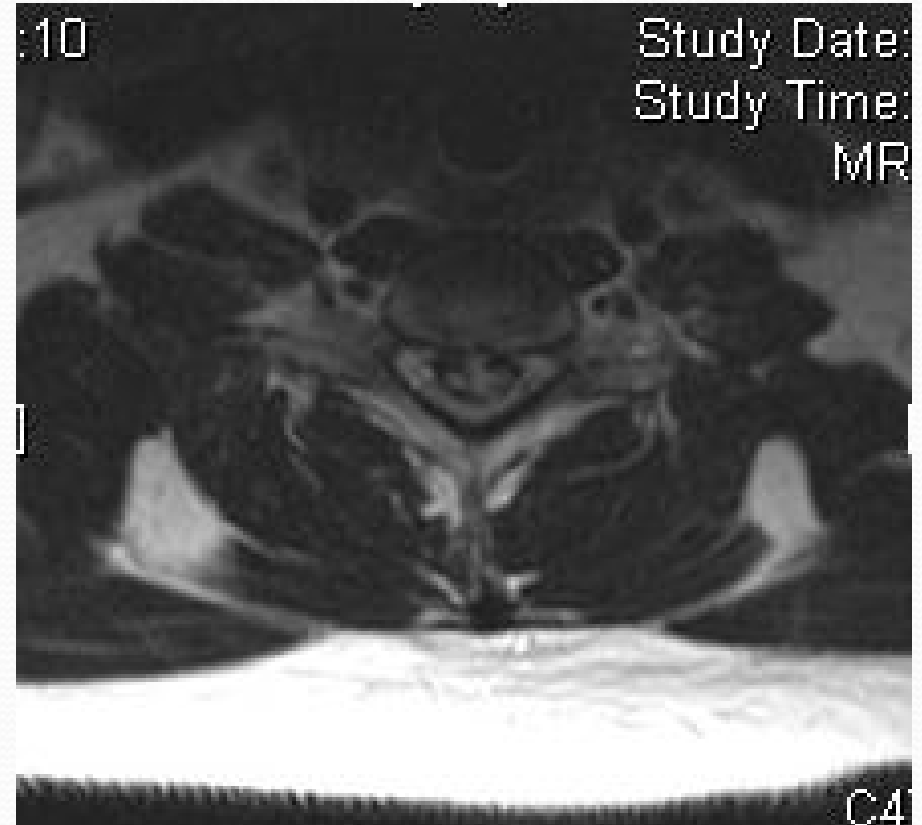
# Anterior Plating



# ACDF Cases



# 32 F s/p chiropractic manip – U&LE weakness



# ACDF





# 42y F with C6 & C7 radic



# 45 y F – Roll over MVA: C5-6-7

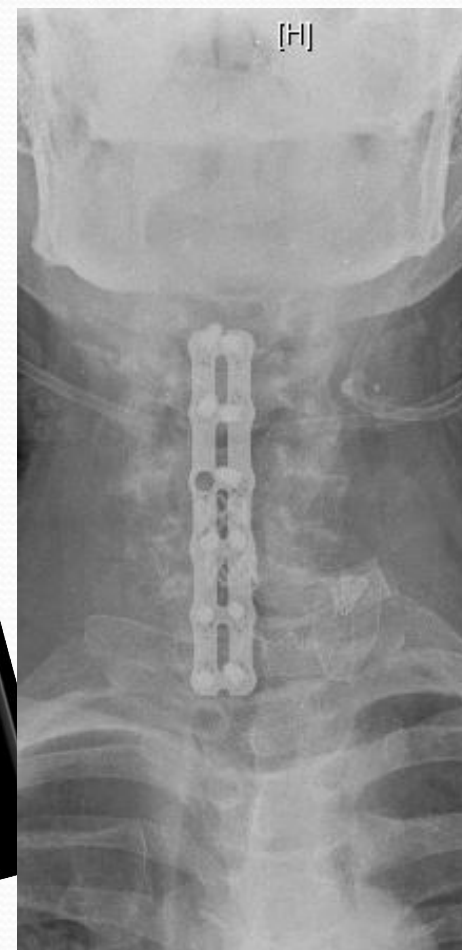




# Adjacent segment disease



# Adjacent segment disease





# Multilevel: C3-C7



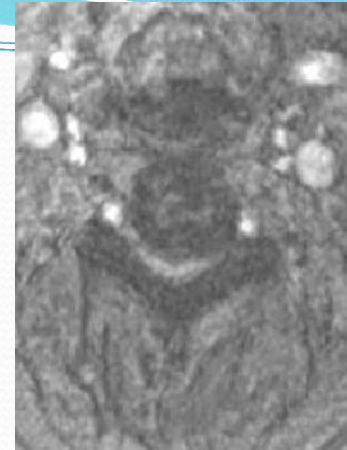
# Multilevel: C3-T1





# ACCF Cases

# 50 M with chronic progressive difficulty ambulating



C<sub>3-4</sub>



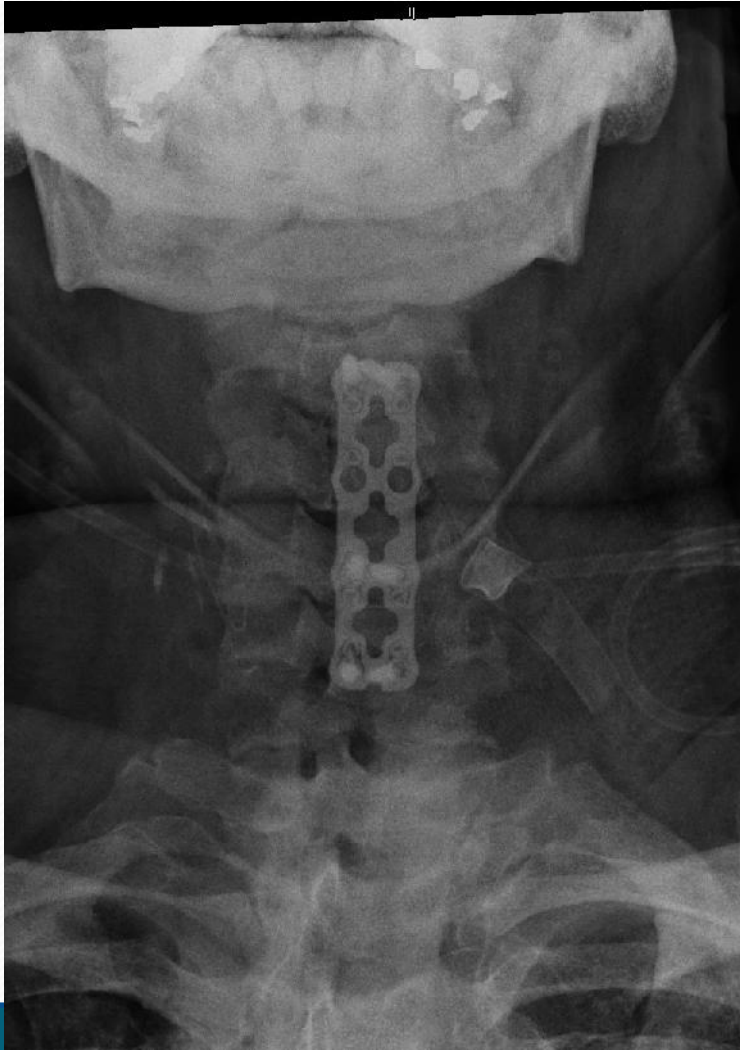
C<sub>4-5</sub>



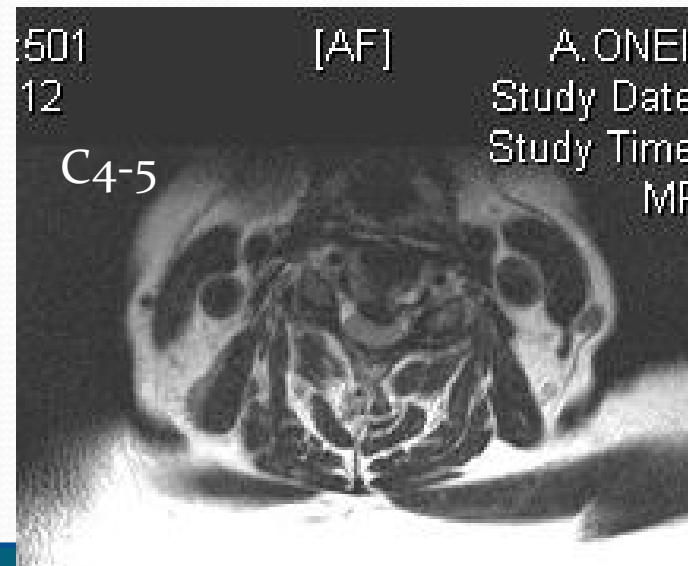
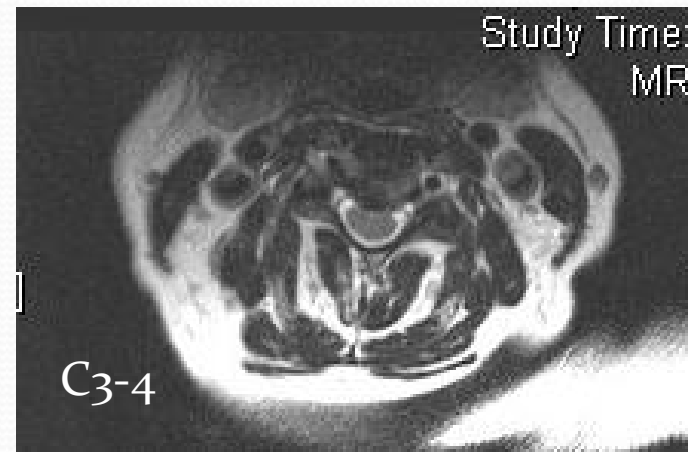
C<sub>5-6</sub>



# Corpectomy & fusion

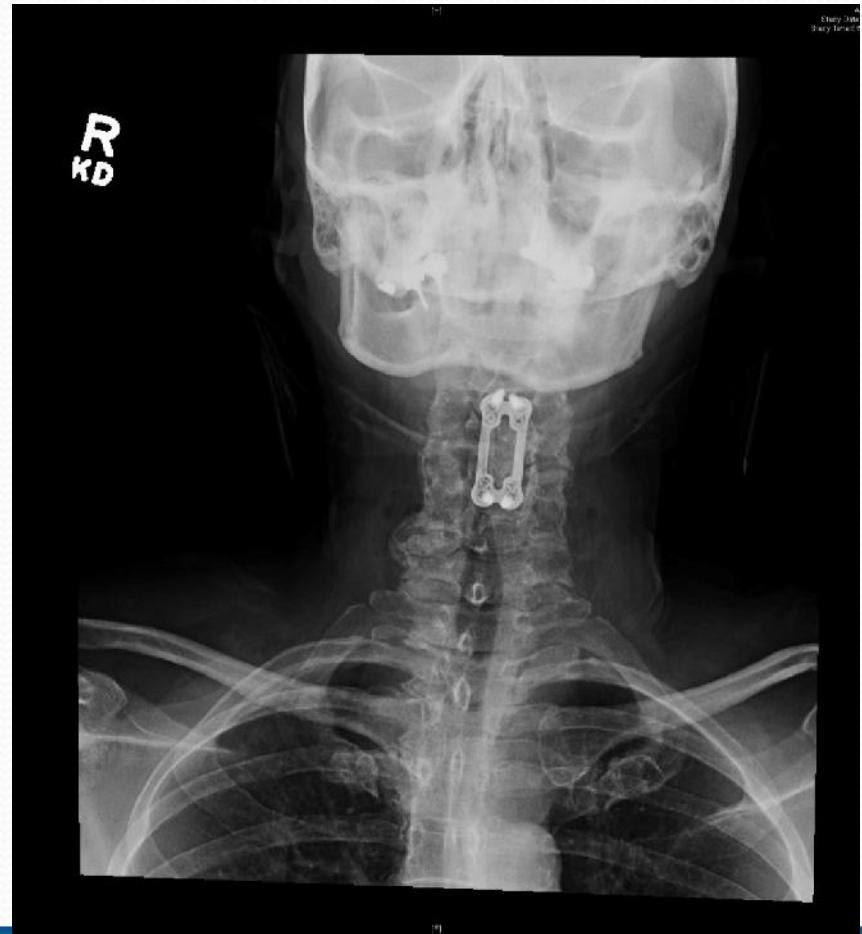
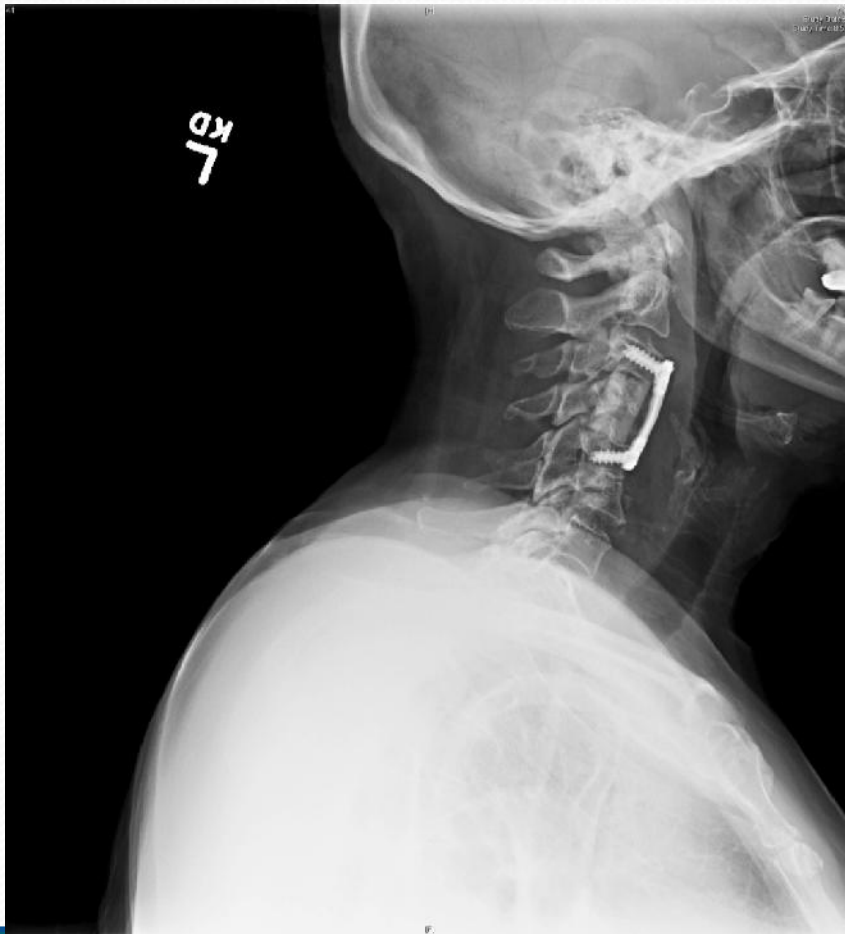


# 55 F w L Neck/shoulder Pain, L biceps weak



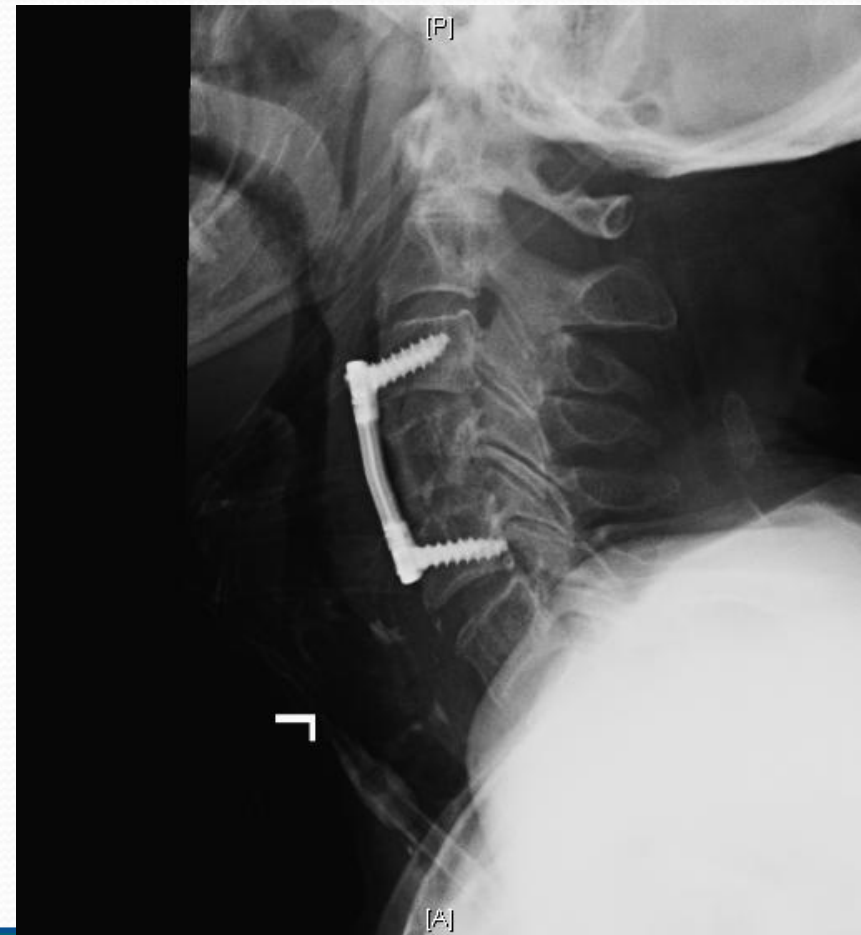


# C4 corpectomy – ACF C3-5



# 70 y F with Myelopathy

## C4 Corpectomy – ACF C3-5





# Cervical Disc Arthroplasty

- Artificial disc replacement
- Preserves ROM
- Decrease risk of adjacent DD
  - ***Decrease Reoperation rate***
    - 1 level: ACDF 17.3% vs cTDR 4.5%
    - 2 level: ACDF 21% vs. cTDR 7.3%



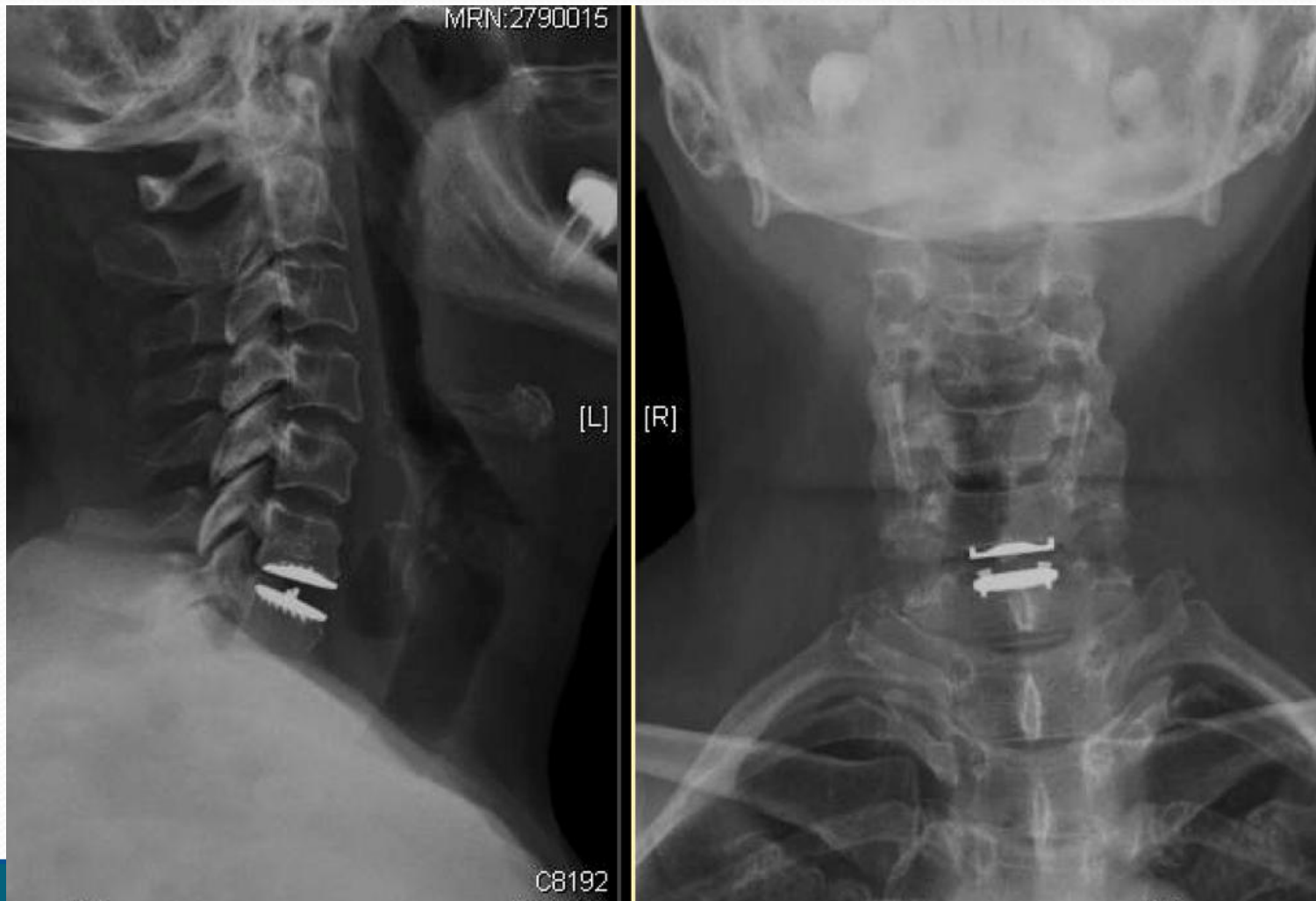
***Jackson JNS 2016 (5 yr f-up)***

# 39 y M w C7 Radiculopathy





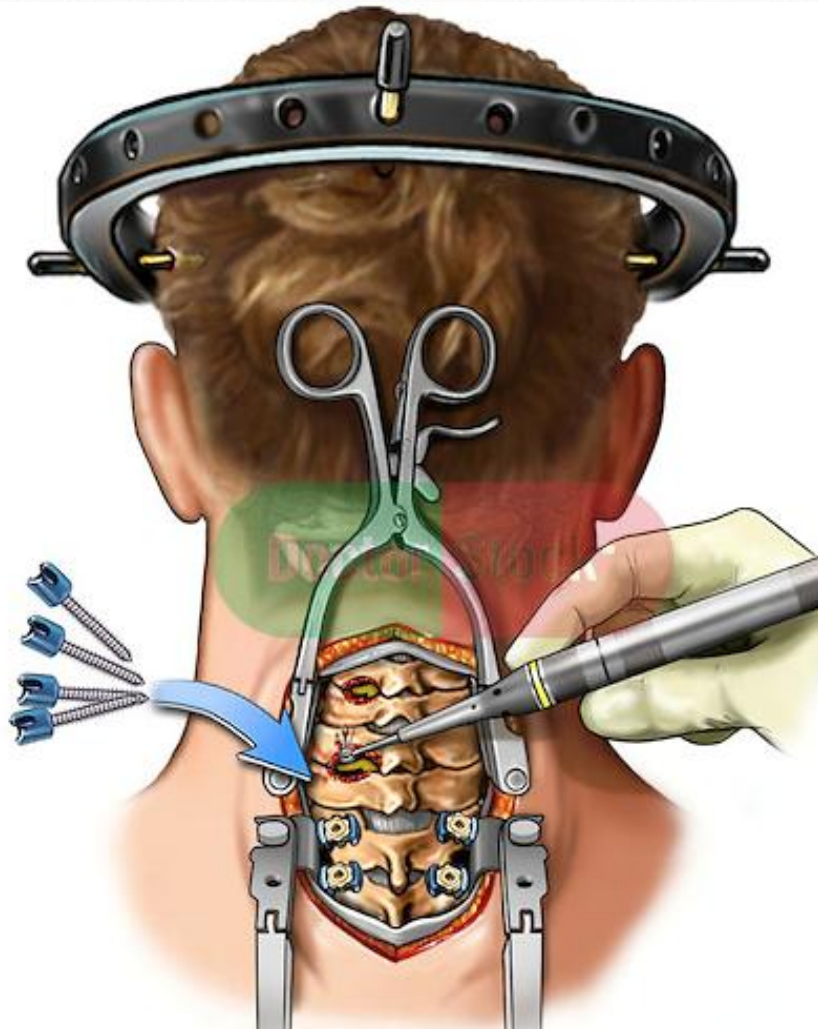
# 45 y F with C7 radiculopathy



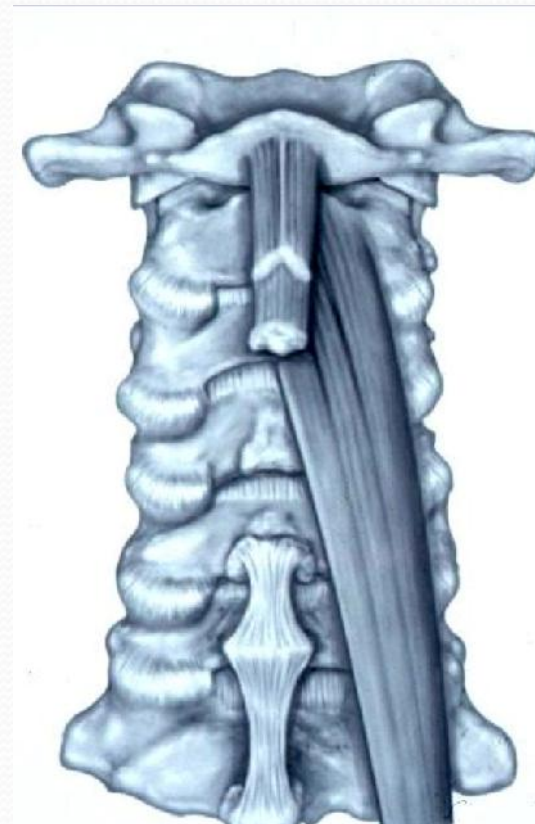
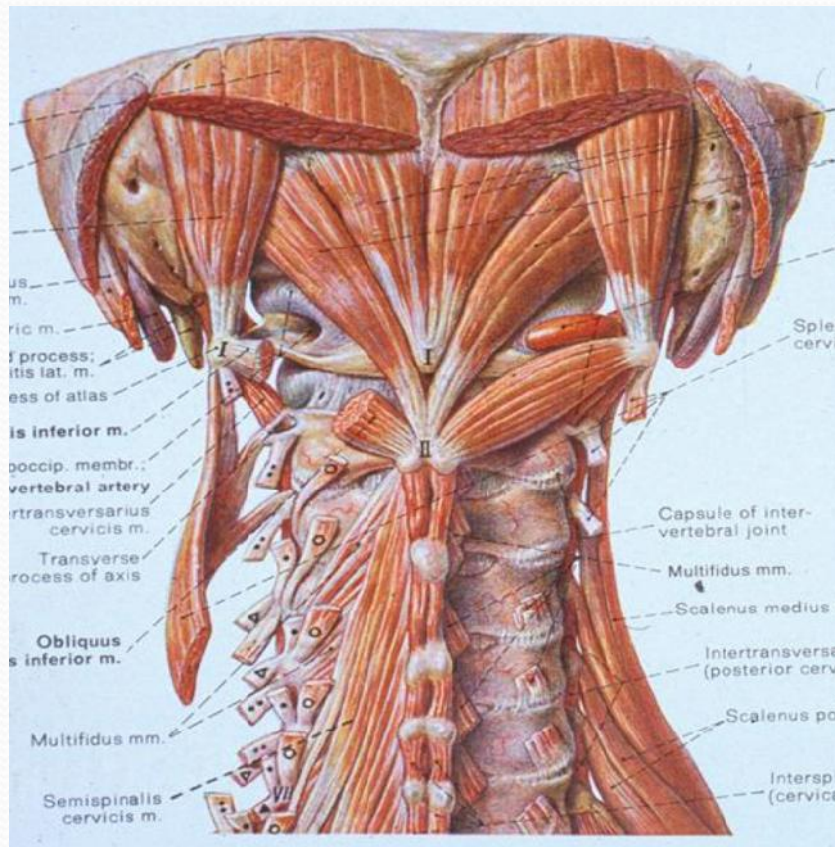
# Posterior Cervical Options



# Cervical Foraminotomy



# Not tissue preserving!

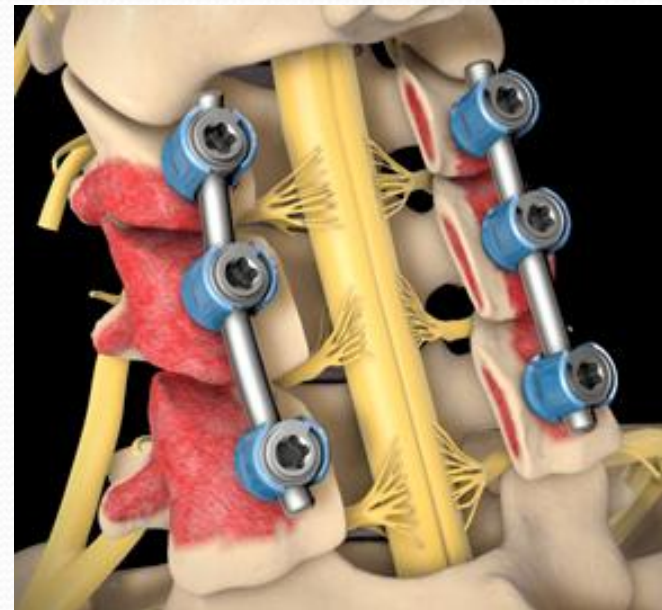
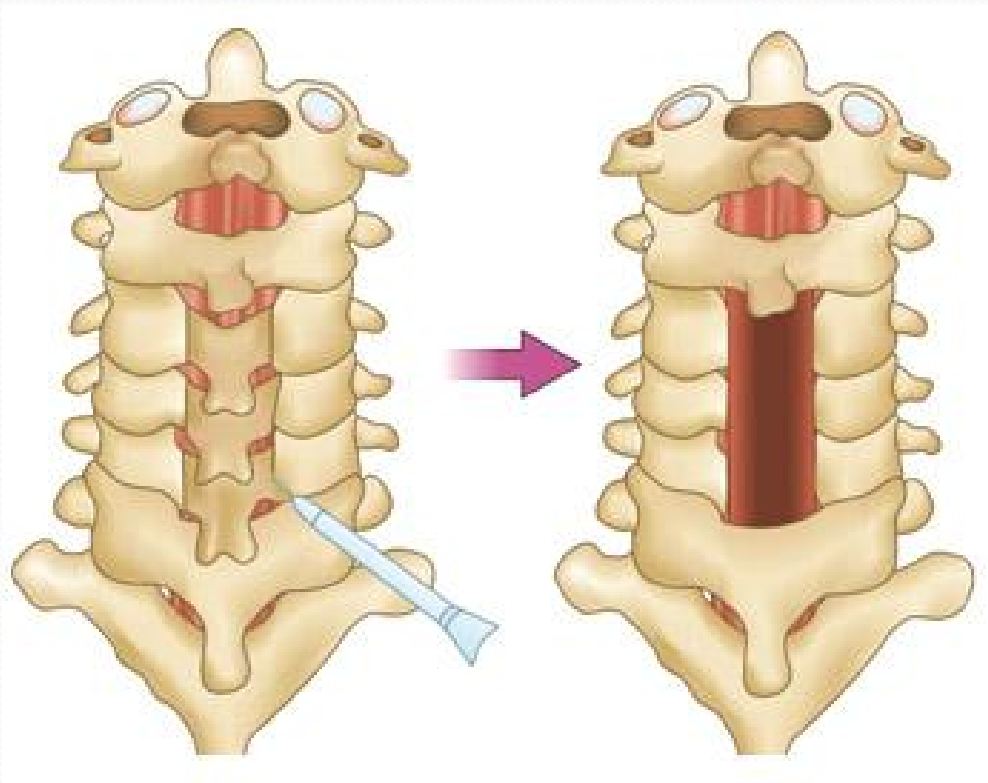


Multifidus is destroyed !!

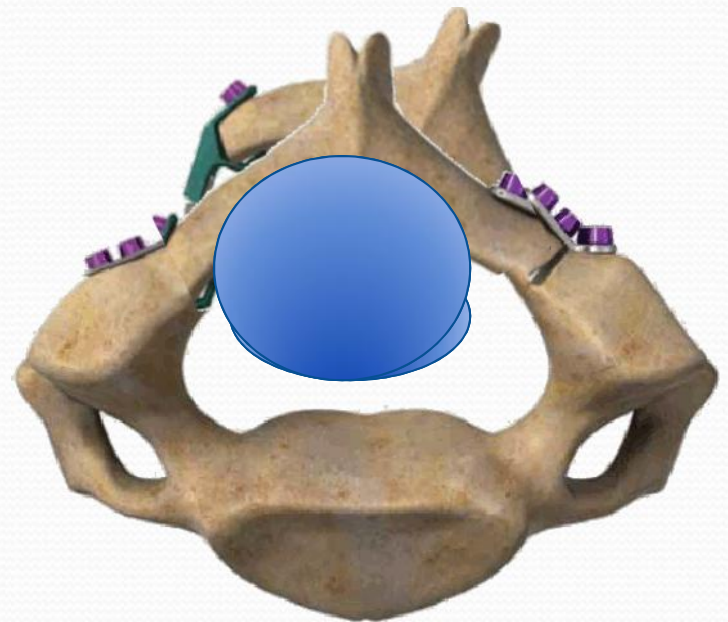
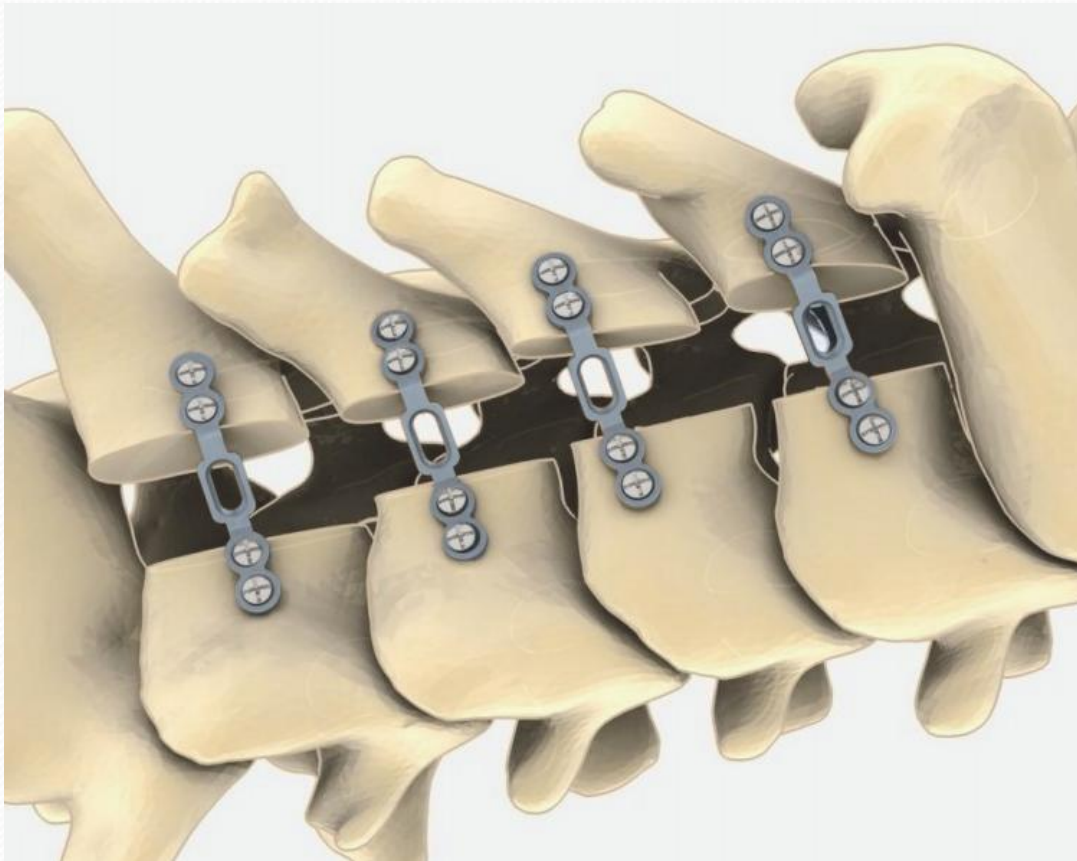
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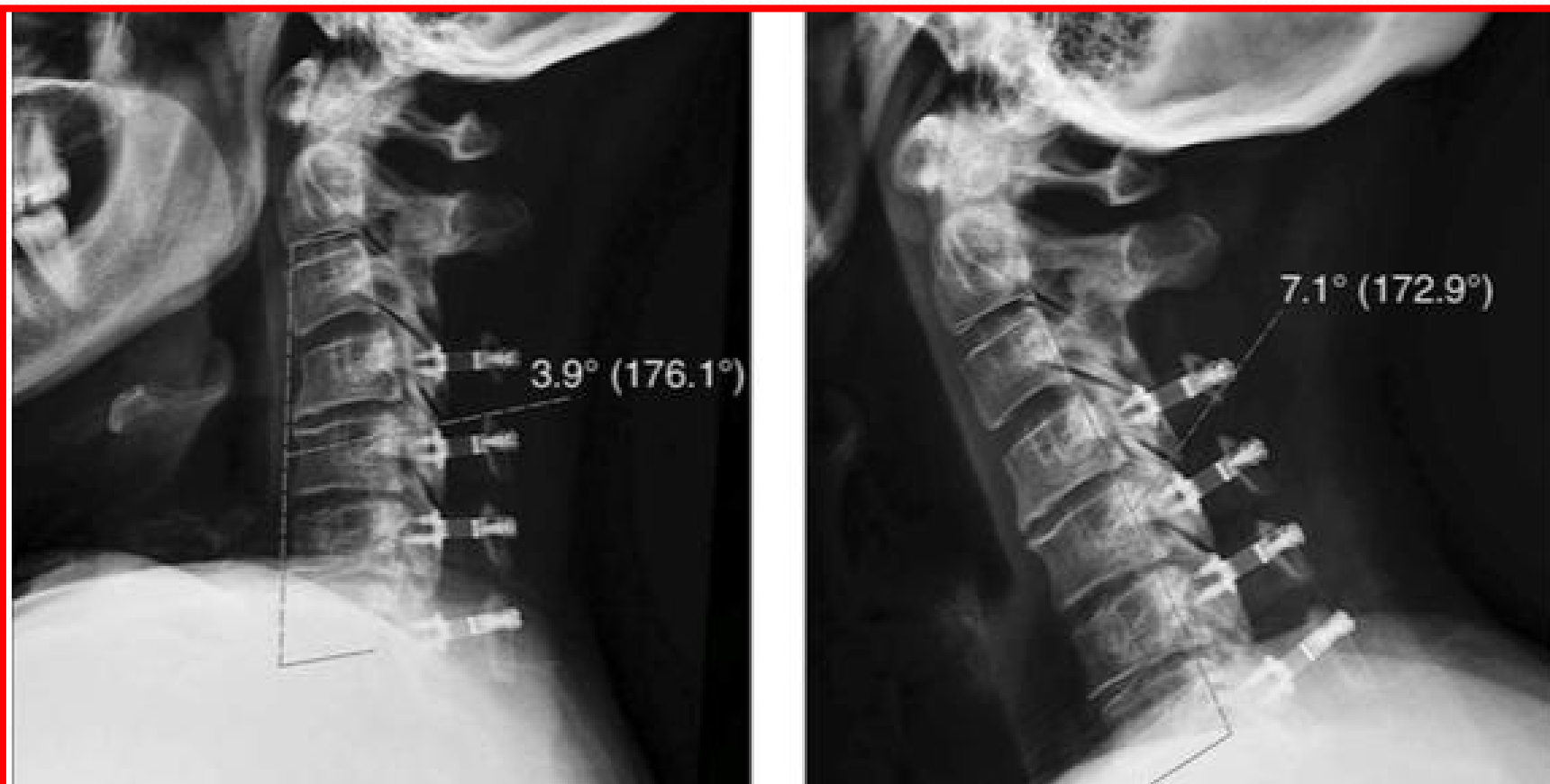
# Cervical laminectomy and fusion



# Cervical Laminoplasty







# Posterior Cases

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*May 2 & 3, 2016*



# 55 M – U/L ext weak, clumsiness



# Cervical Laminectomy & fusion





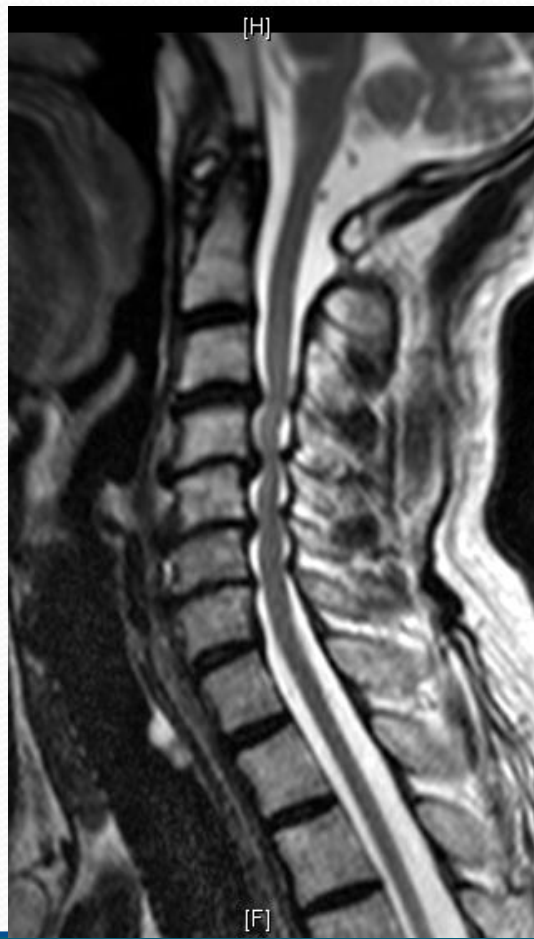
# 64 y F w hand N/T & diff Dexterity



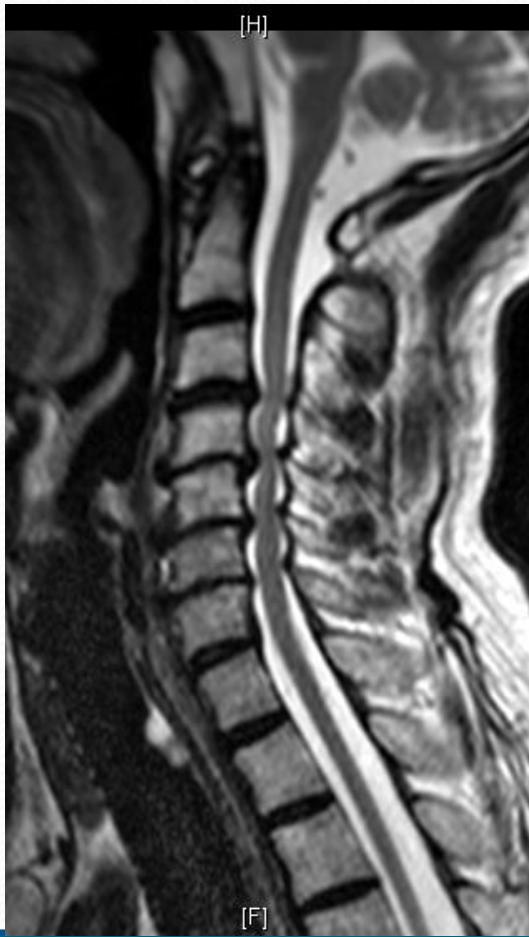




# 56 y M w Myelopathy



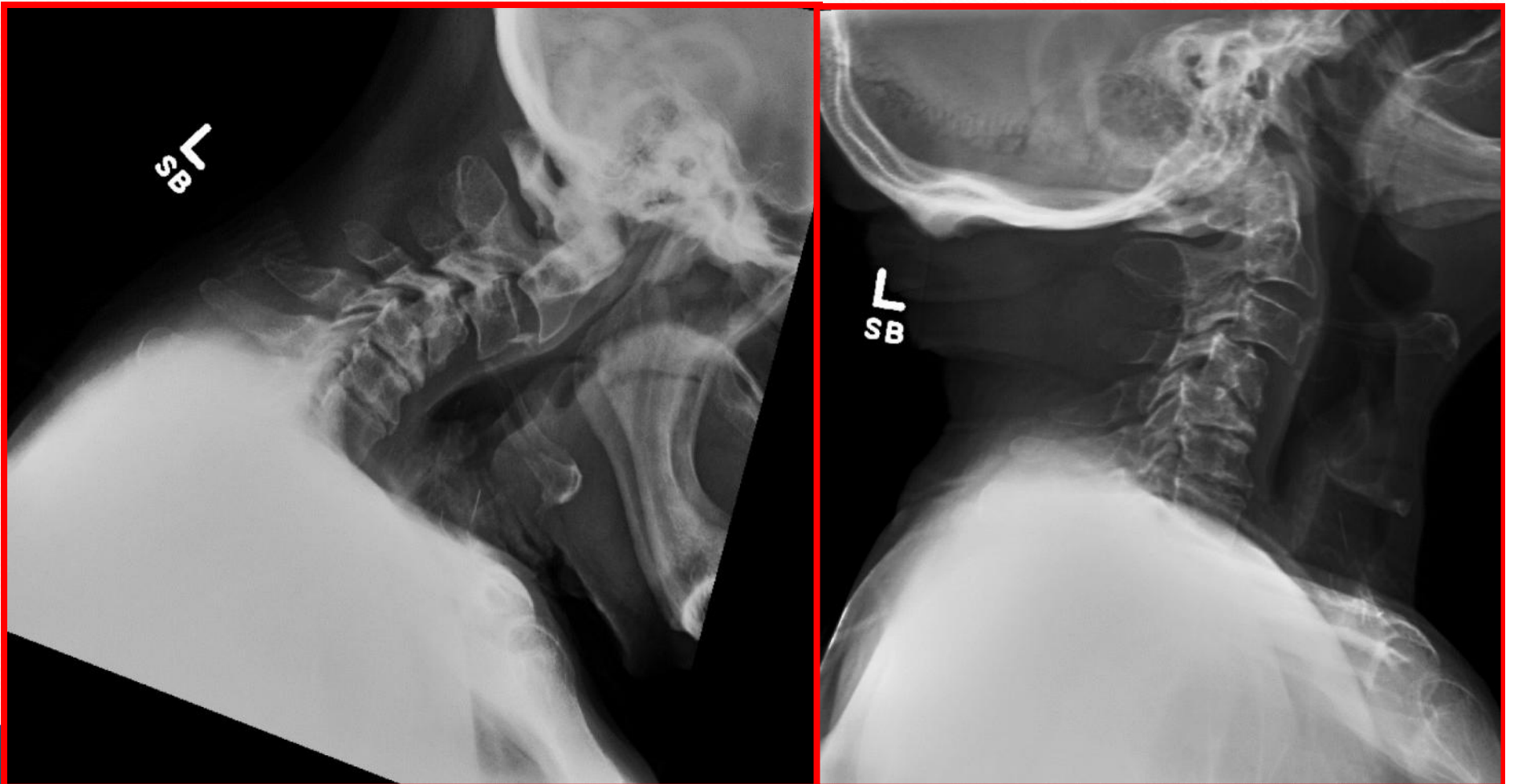
# 56 y M w Myelopathy





# Combined Ant-Post CF

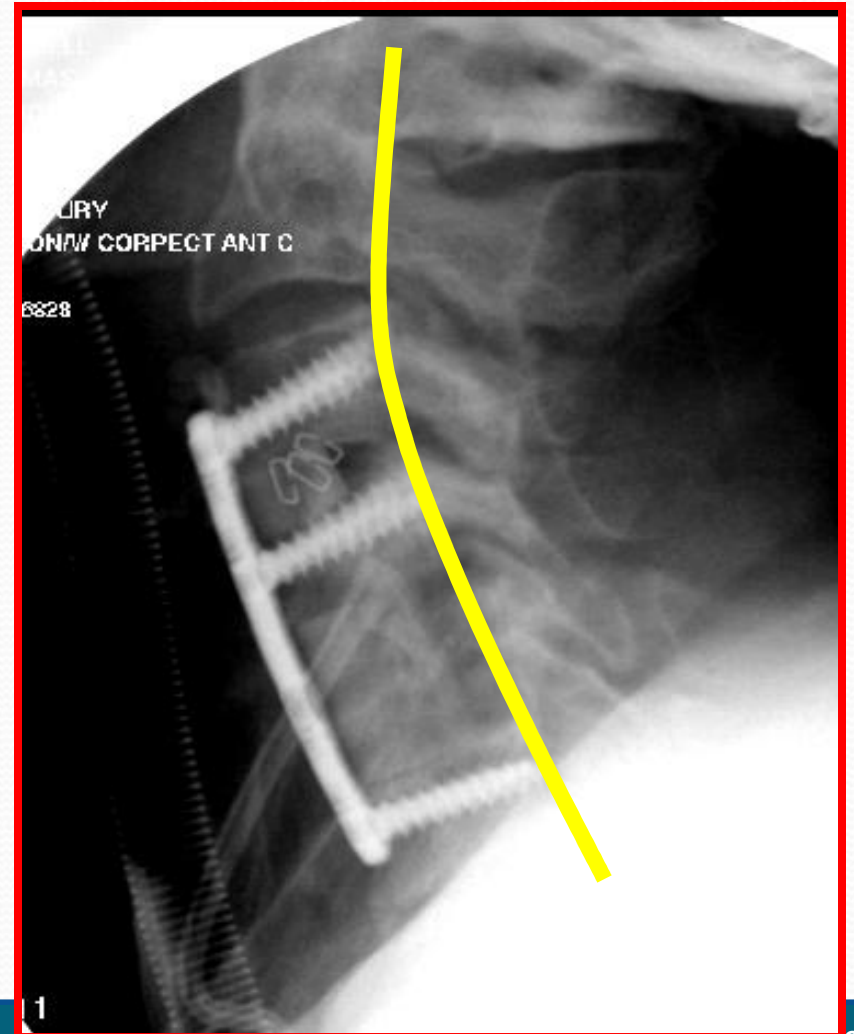
# 60 y M w severe myelopathy





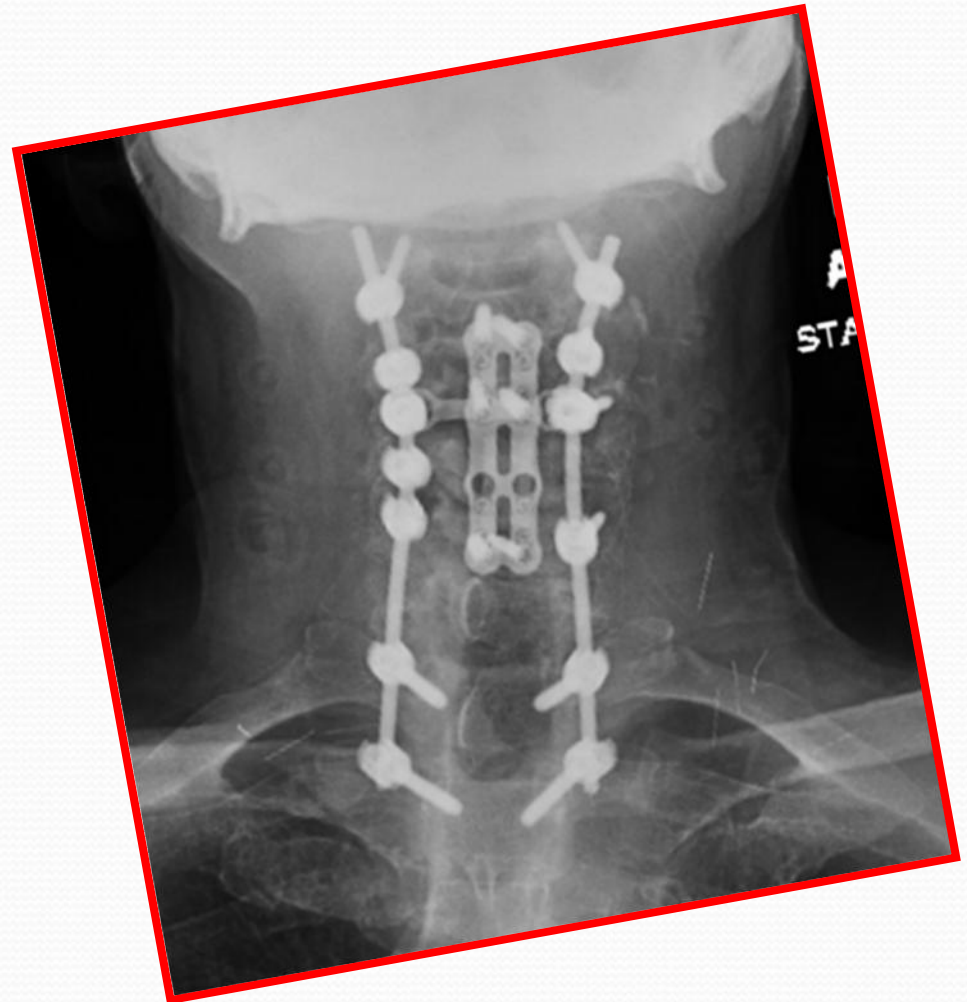


# Stage I: Corpec C5-ACCF C3-6






# Stage II – Post Lami Fusion



# CONCLUSION



- 
- Anterior:
    - ACDF/ACCF
    - cTDR
  - Posterior:
    - Laminectomy/foraminotomy +/- Fusion
    - Laminoplasty
  - Combined

# 60 y F, fall face down, neck pain









# Thank You!