

Best Practices in Cervical Spine Treatment

Chairpersons: Dr. Tony Tannoury & Alice Hathaway

Monday, April 30th

8:50 – 9:50 am

*Work Related Injuries Workshop
April 30th & May 1st, 2018*



Chadi Tannoury, MD.

Medical Director, Orthopedics – BMC
Assistant Professor -Orthopaedic Spine
Co-Director of Spine Fellowship
Boston Medical Center

Neck Session

What Really Hurts – Rx ?

10 min

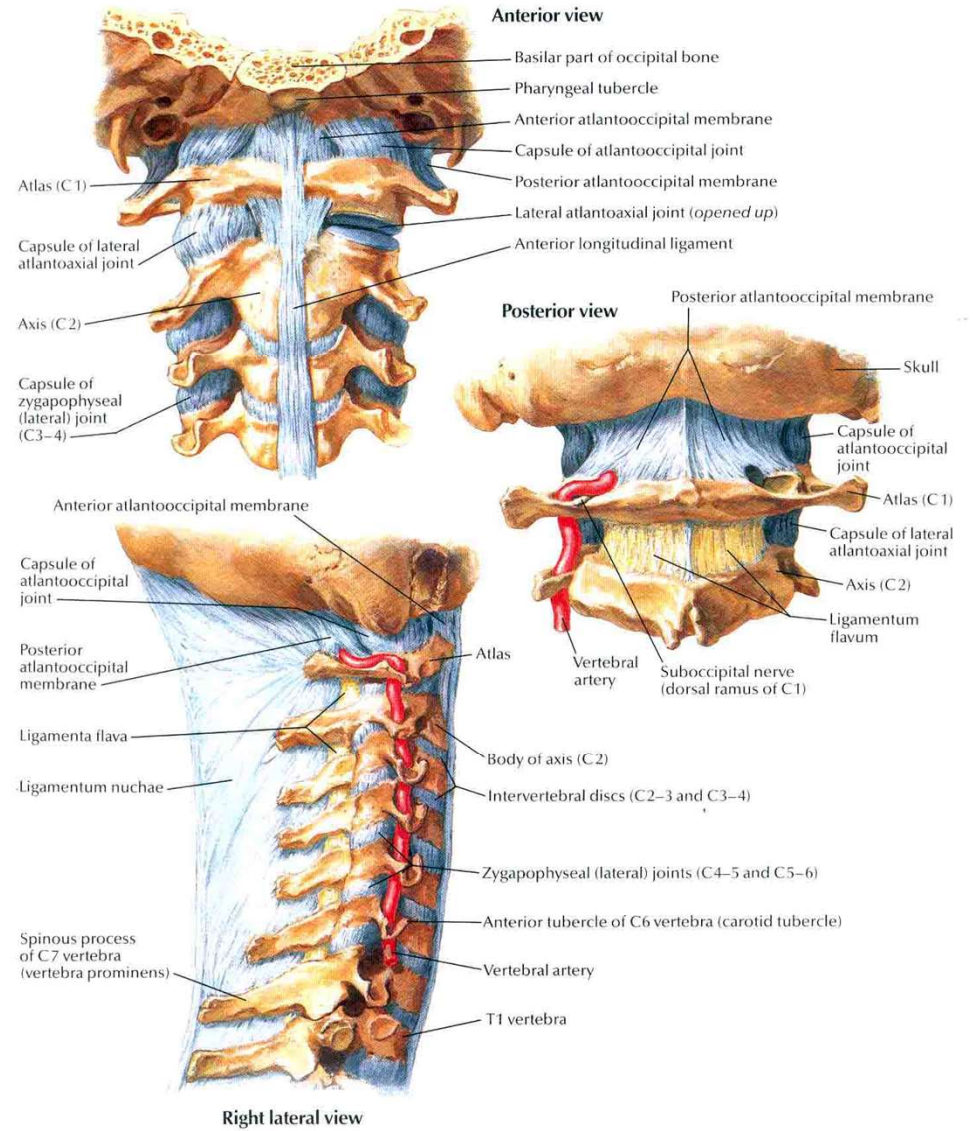
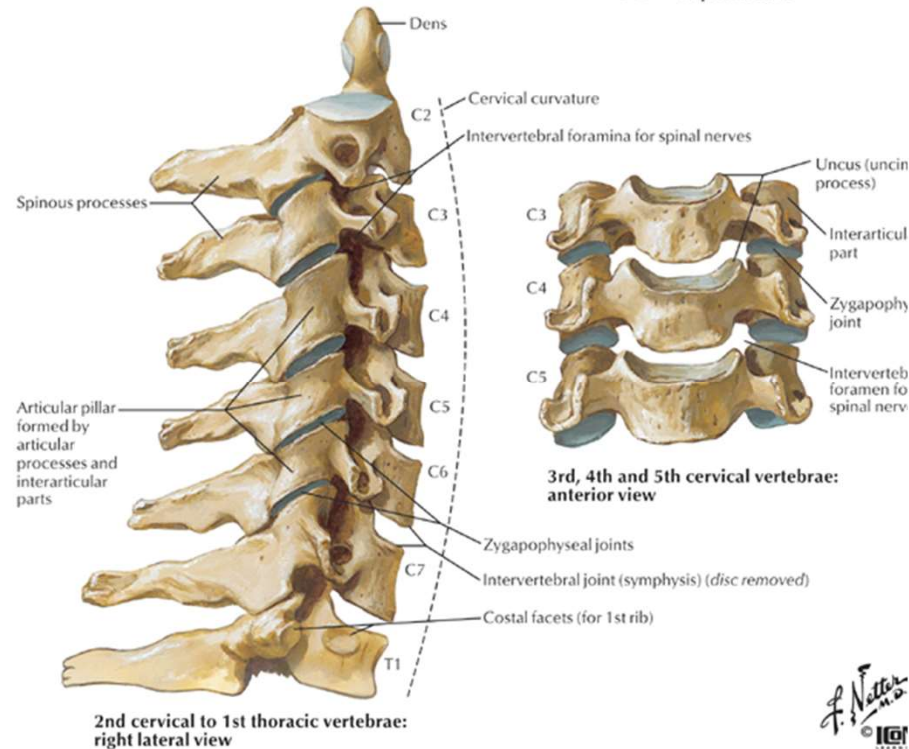
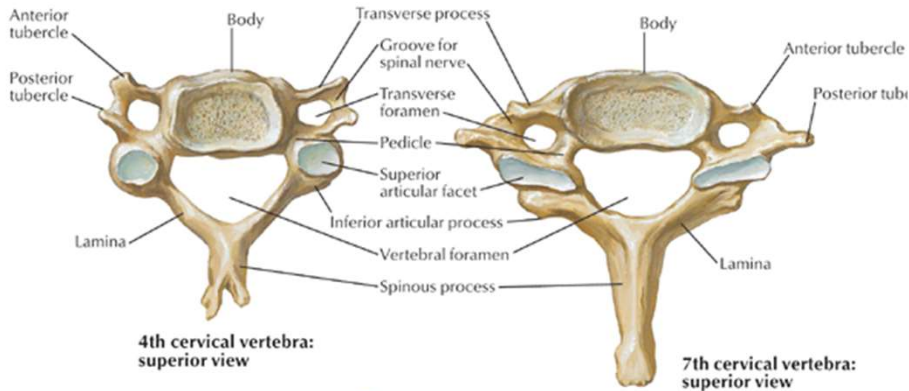
Disclosure

- No COI

NECK SESSION

- Pain Generator: C spine vs Shoulder (Dr. Vaynberg)
- Neck Injuries: RTW plan (Dr. James Sami)
- Case Discussion
- *Surgical Options*

Anatomy

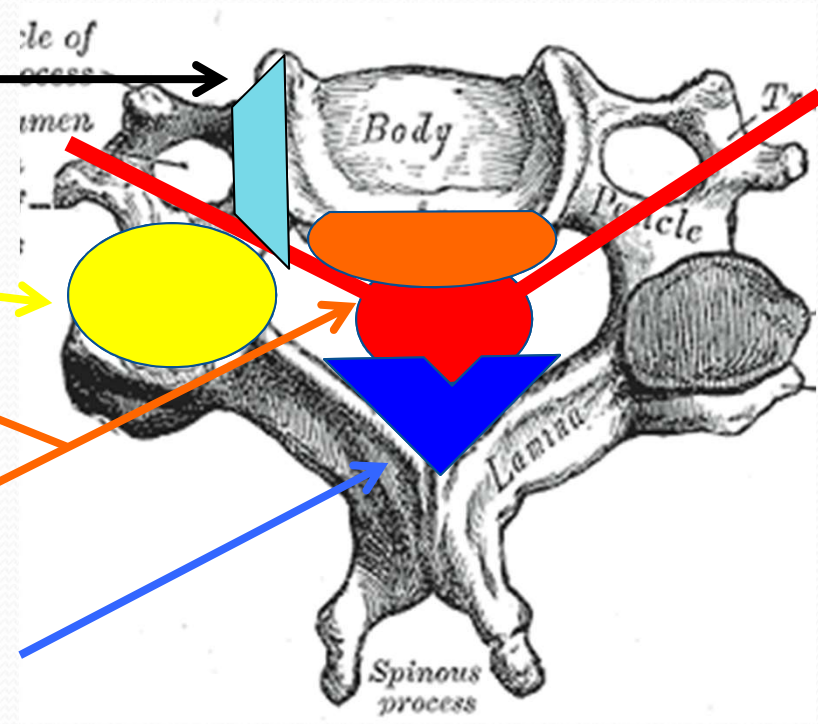


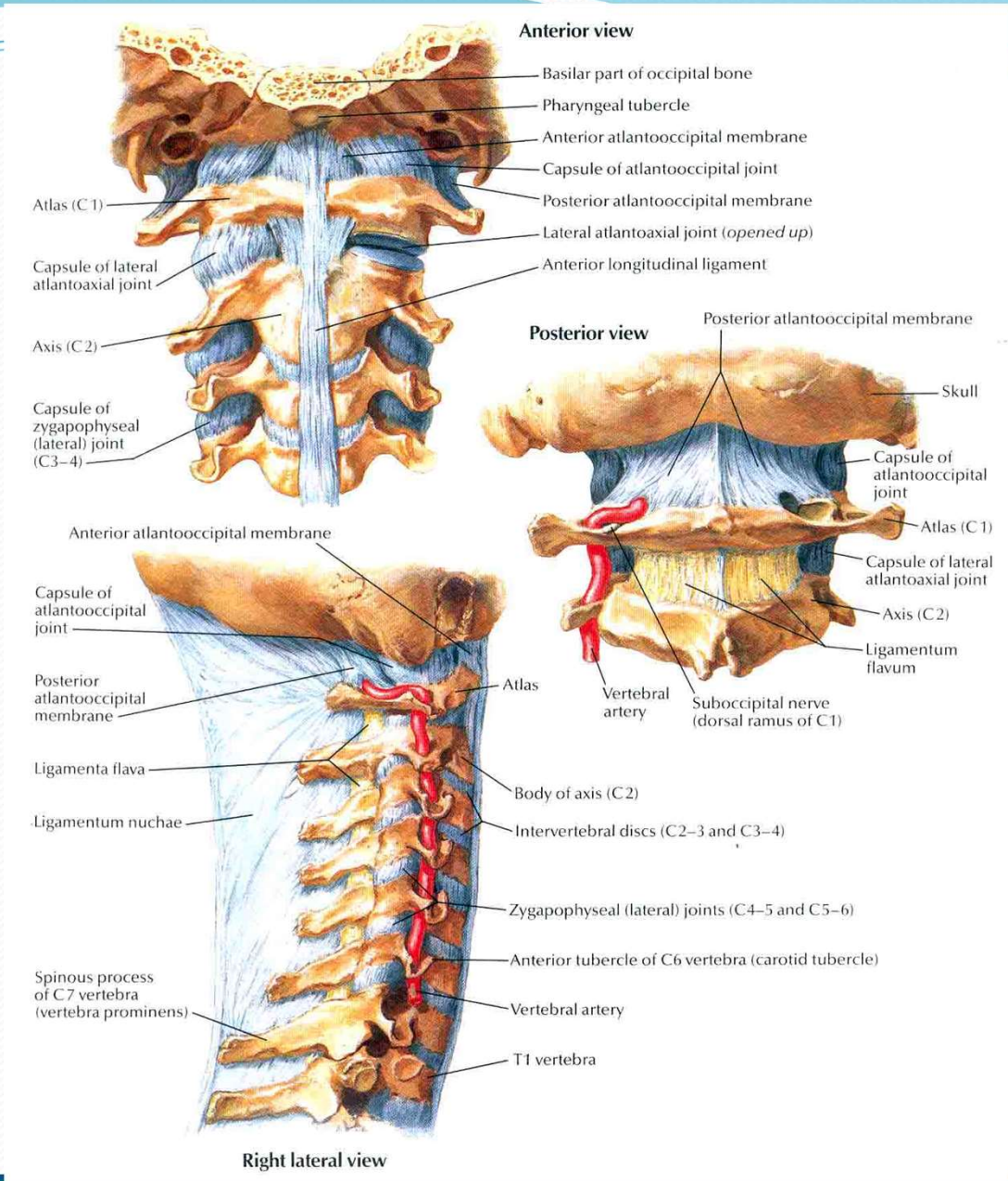
F. Netter M.D.
© 1989

Radiculopathy/ Myelopathy - Pathophysiology:

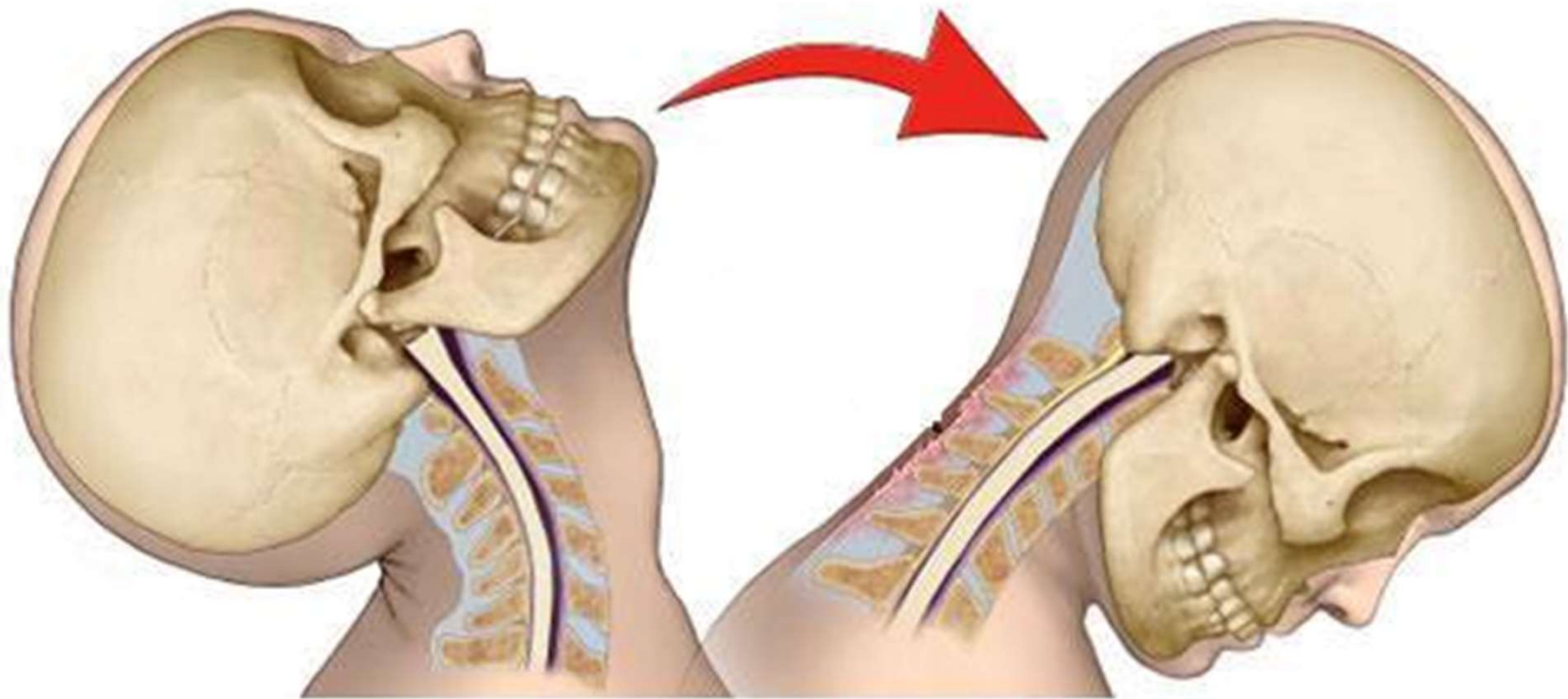
- Direct Mechanical compression NRoot/Cord:

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

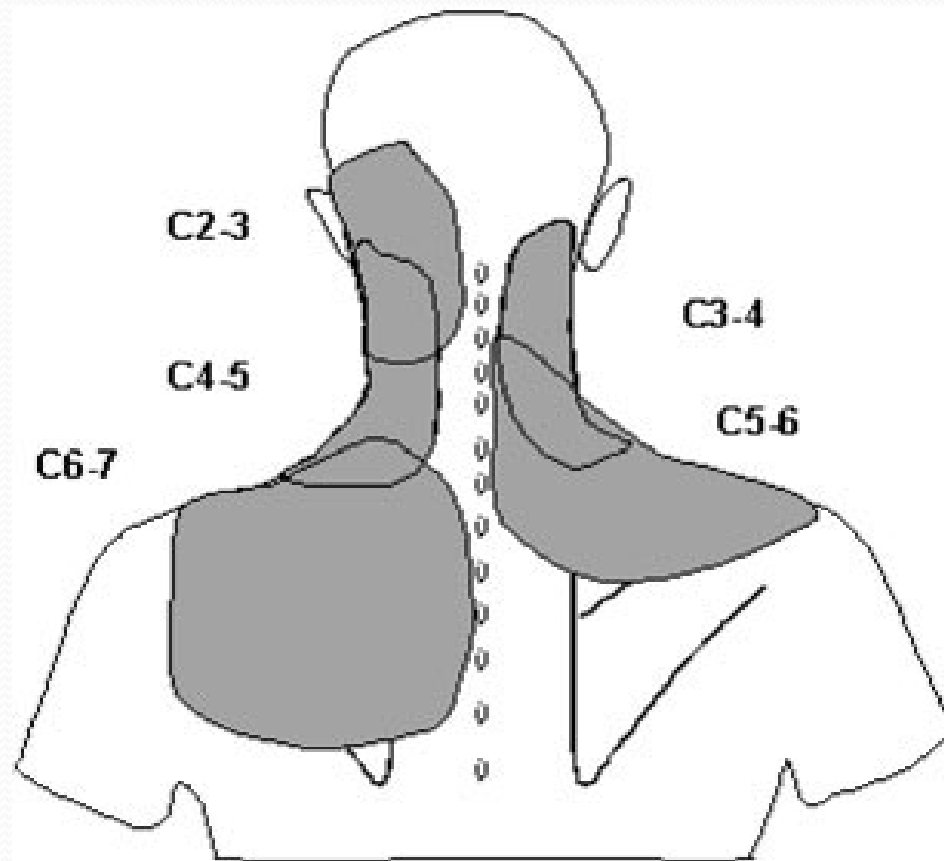




Cervical Sprain / Whiplash

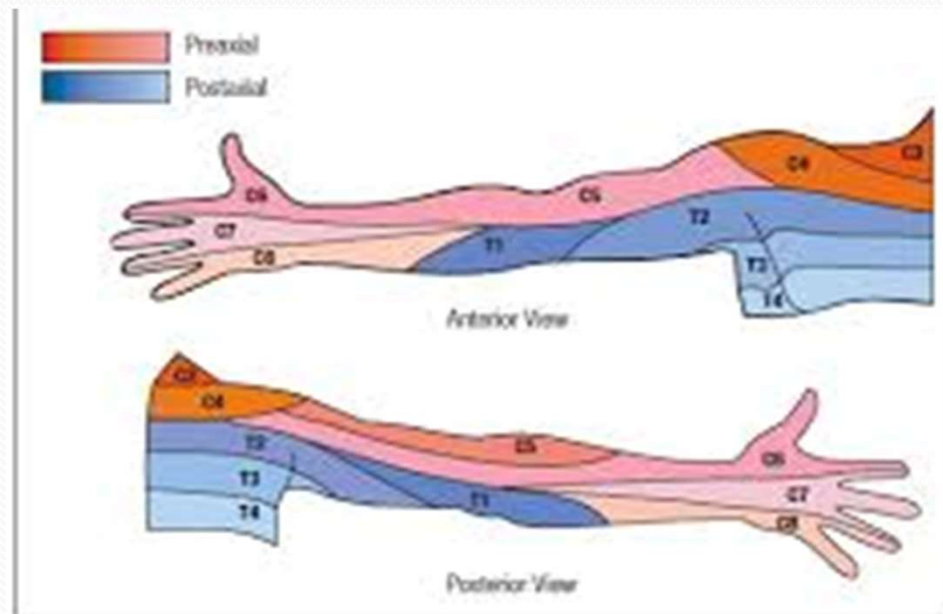


Discogenic Pain (Spondylosis)



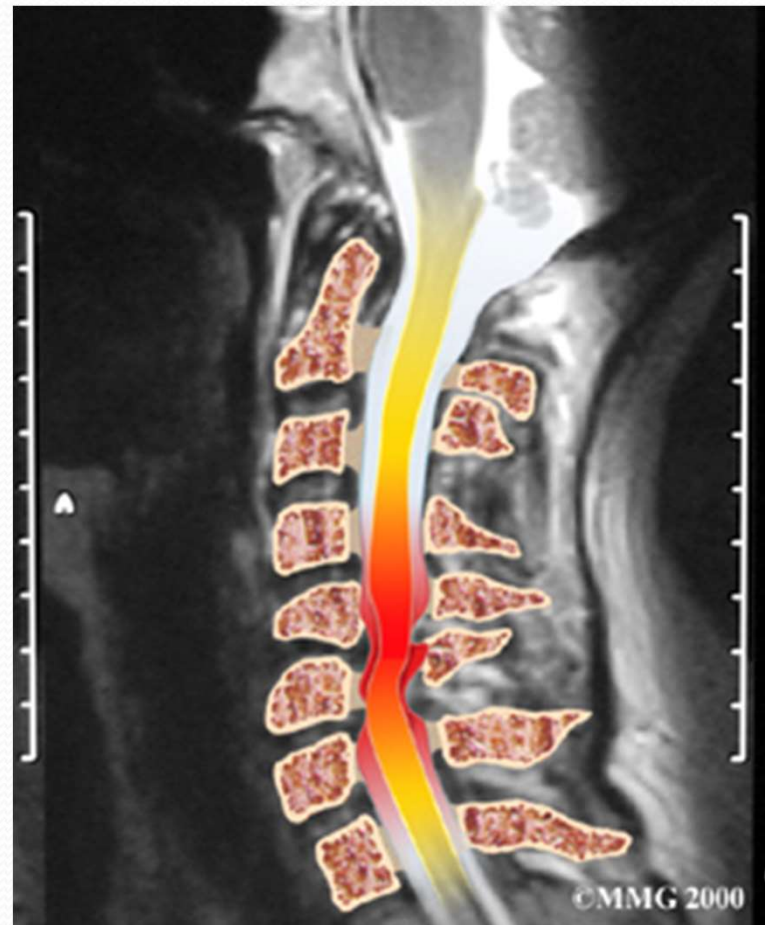
Cervical Radiculopathy

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



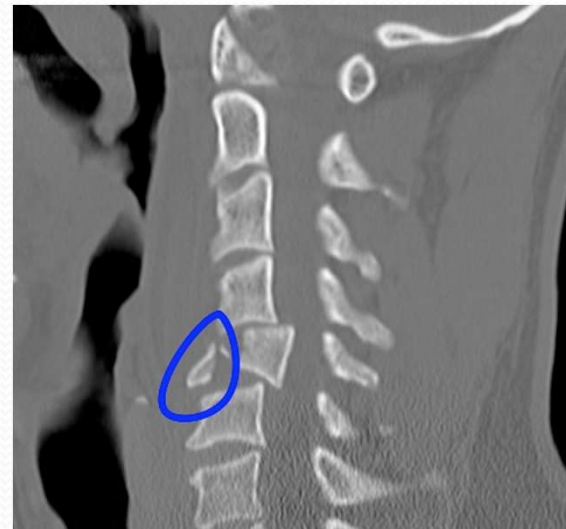
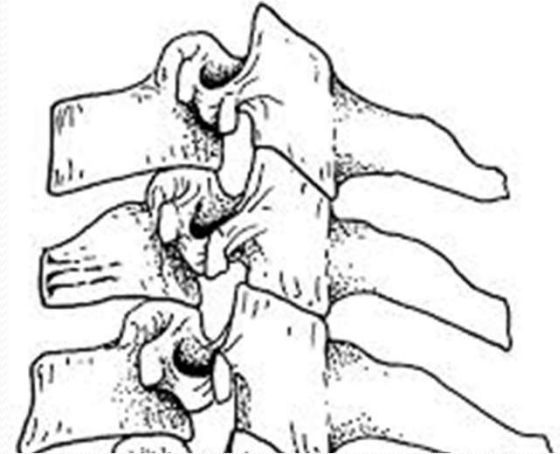
Spinal Cord Compression: Myelopathy

- 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)

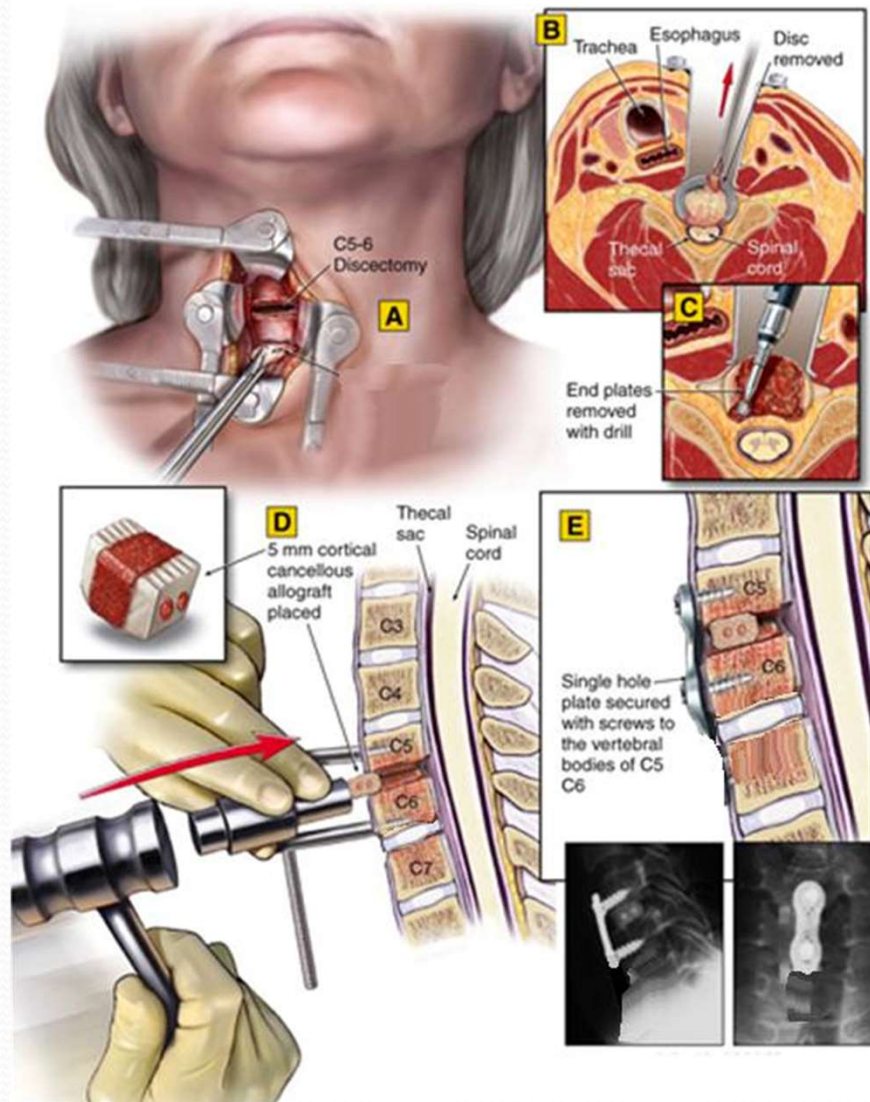


Surgical Options - Terminology

- Anterior cervical diskectomy and fusion (ACDF)
- Anterior cervical corpectomy and fusion (ACCF)
- Cervical disk arthropasty – replacement (cTDR)

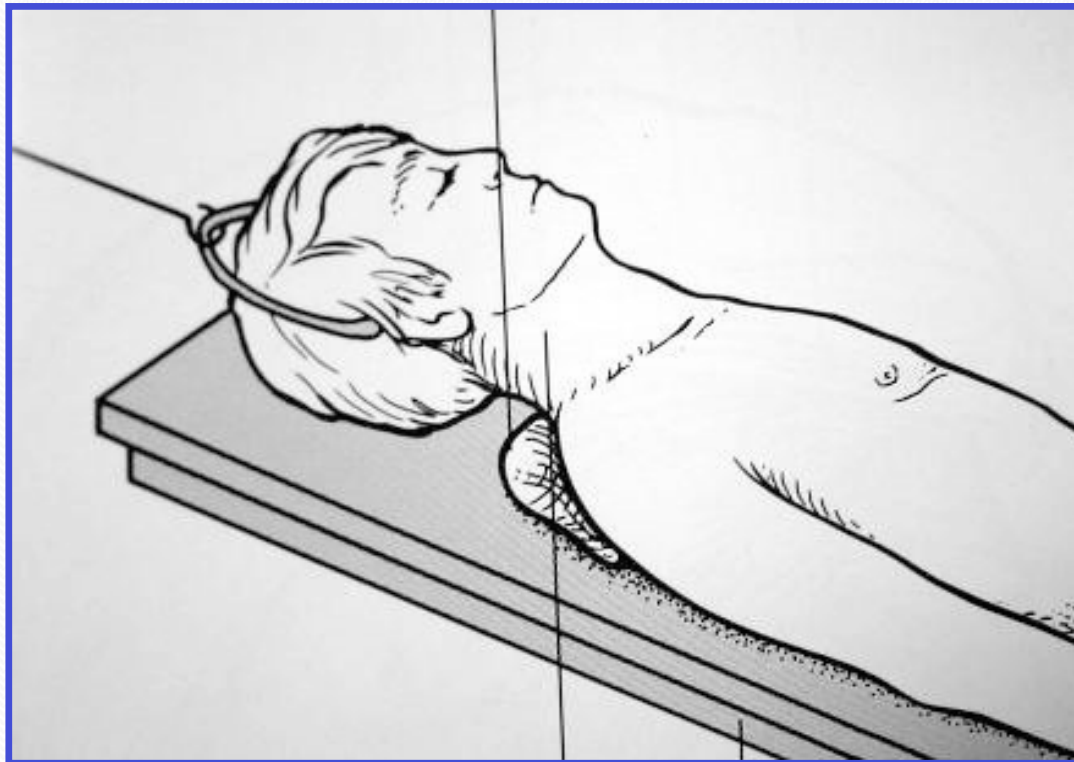
- Posterior cervical laminotomy - Foraminotomy
- Posterior cervical laminectomy & Fusion
- Posterior cervical laminoplasty

ACDF

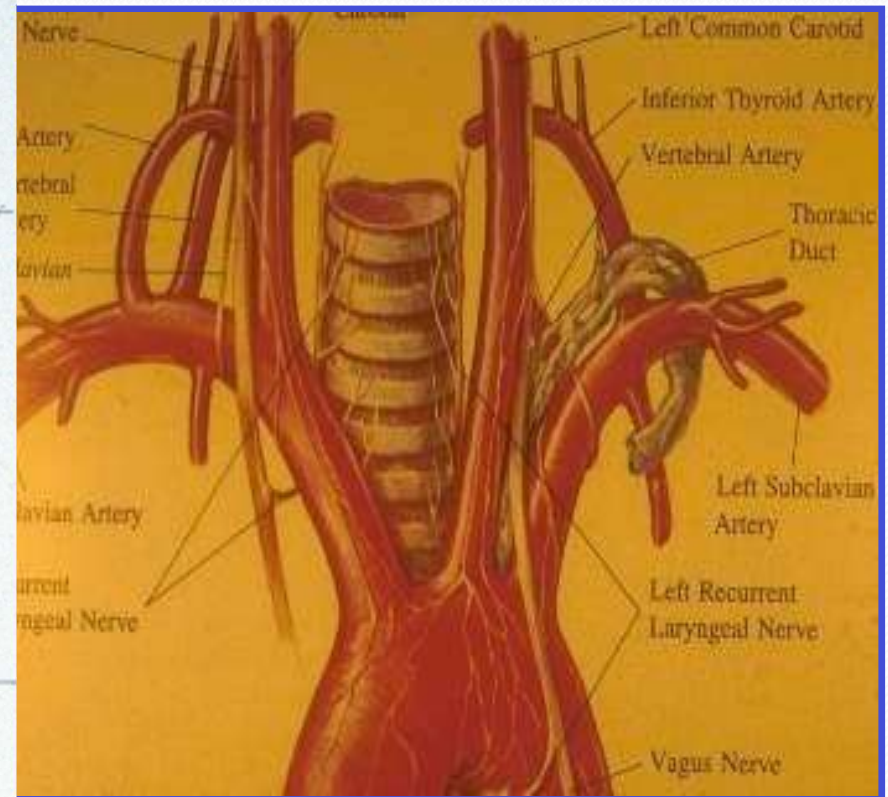
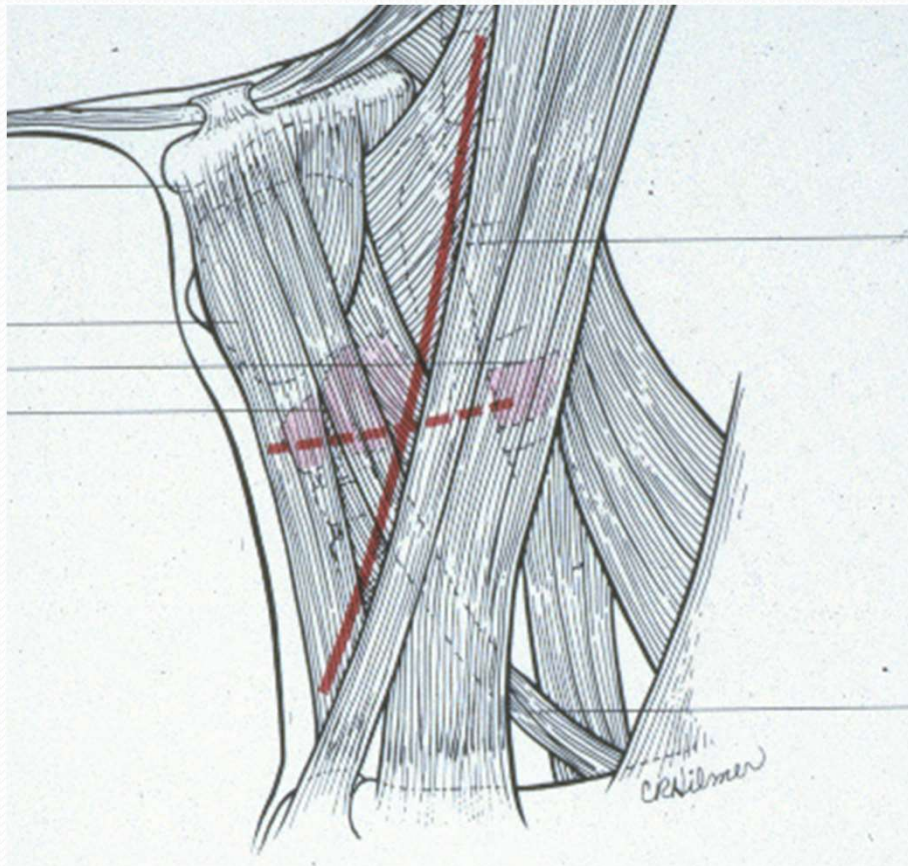


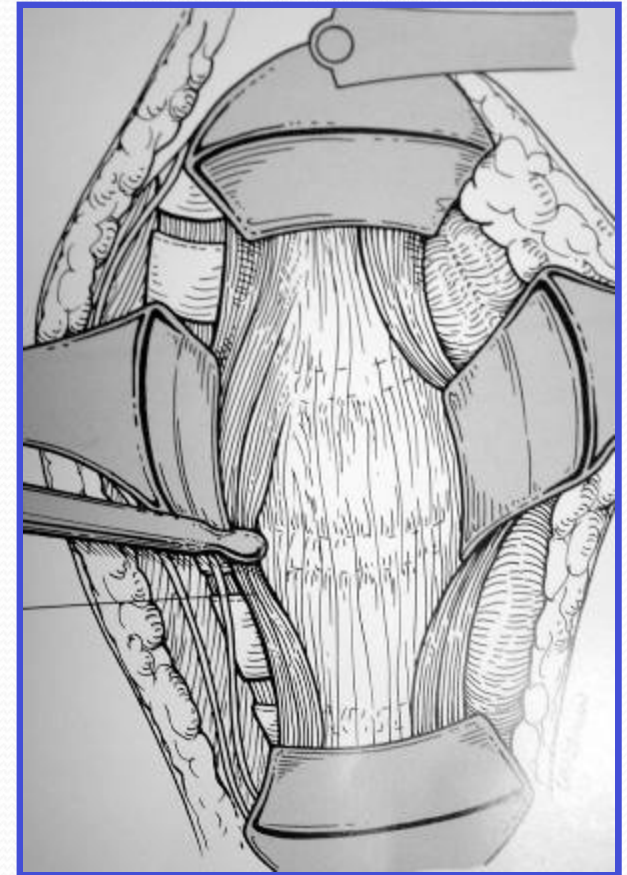
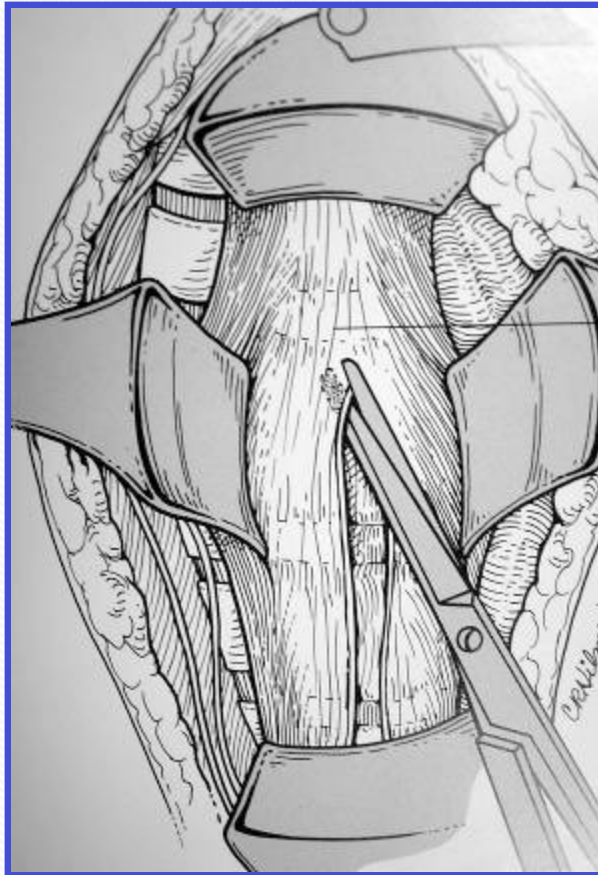
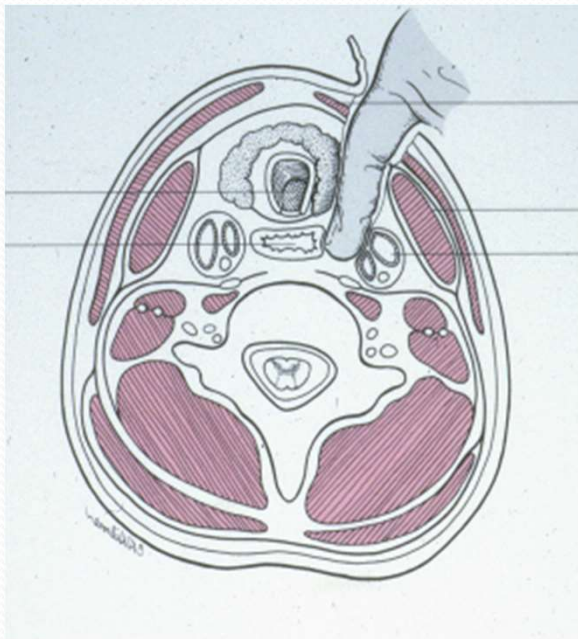
Positioning and Anatomy

- Mild Neck extension



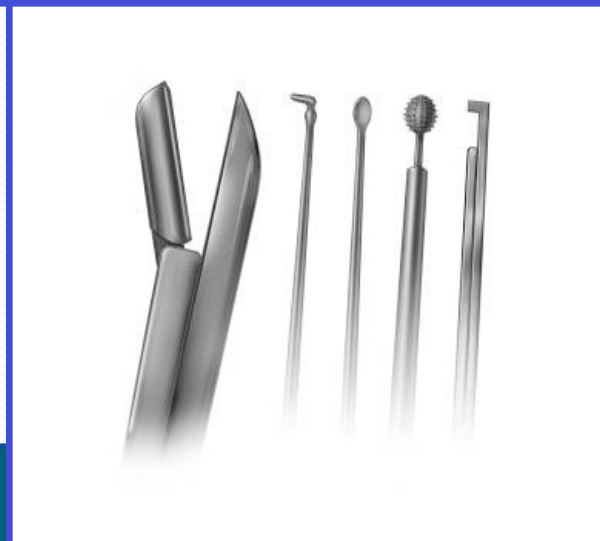
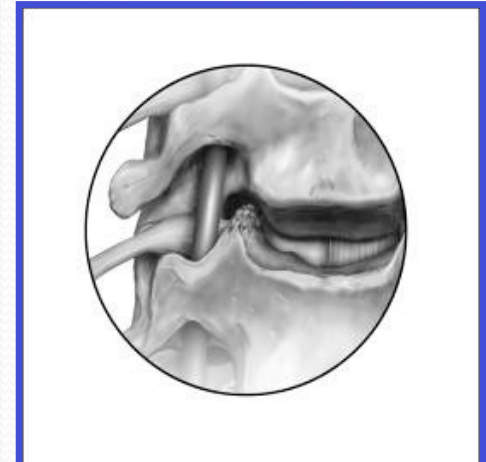
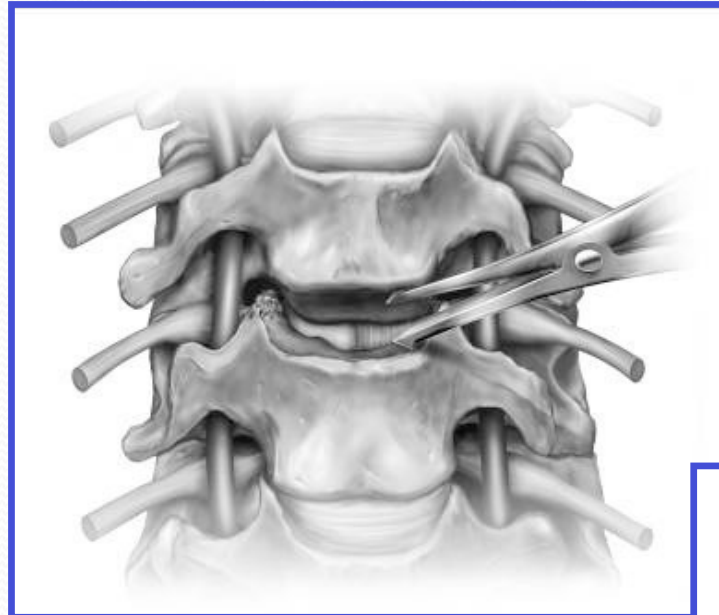
Anatomy



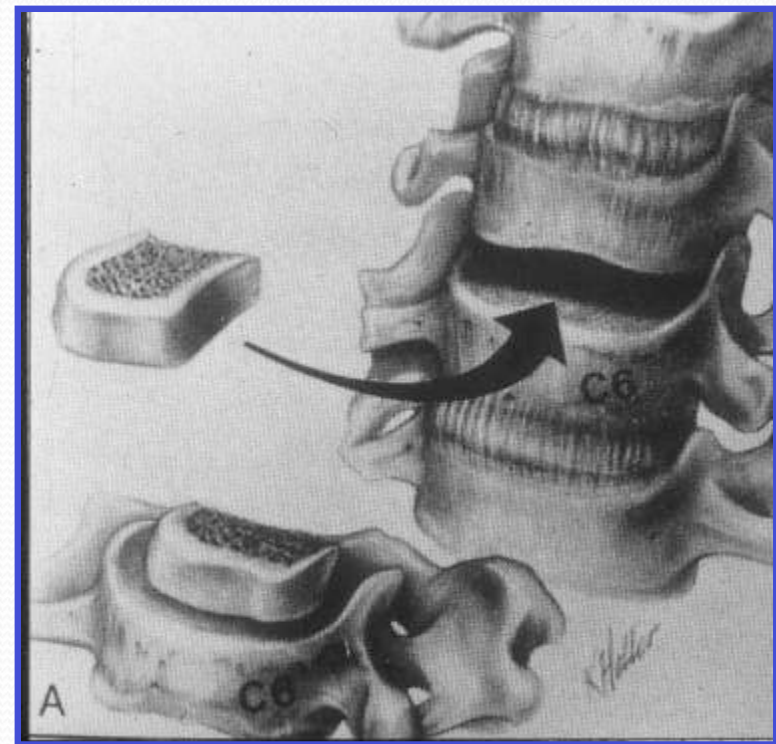
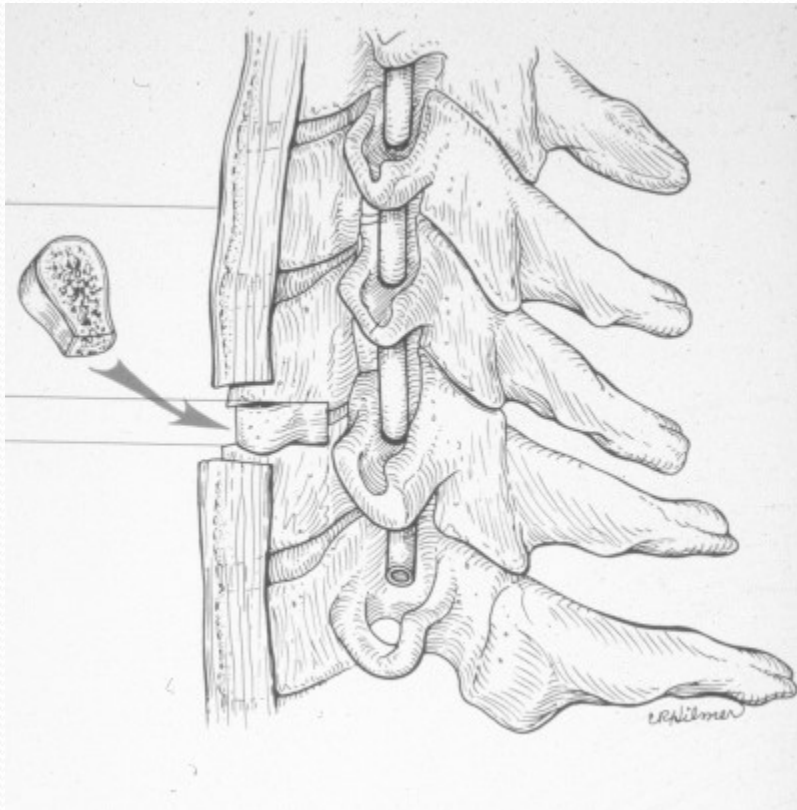


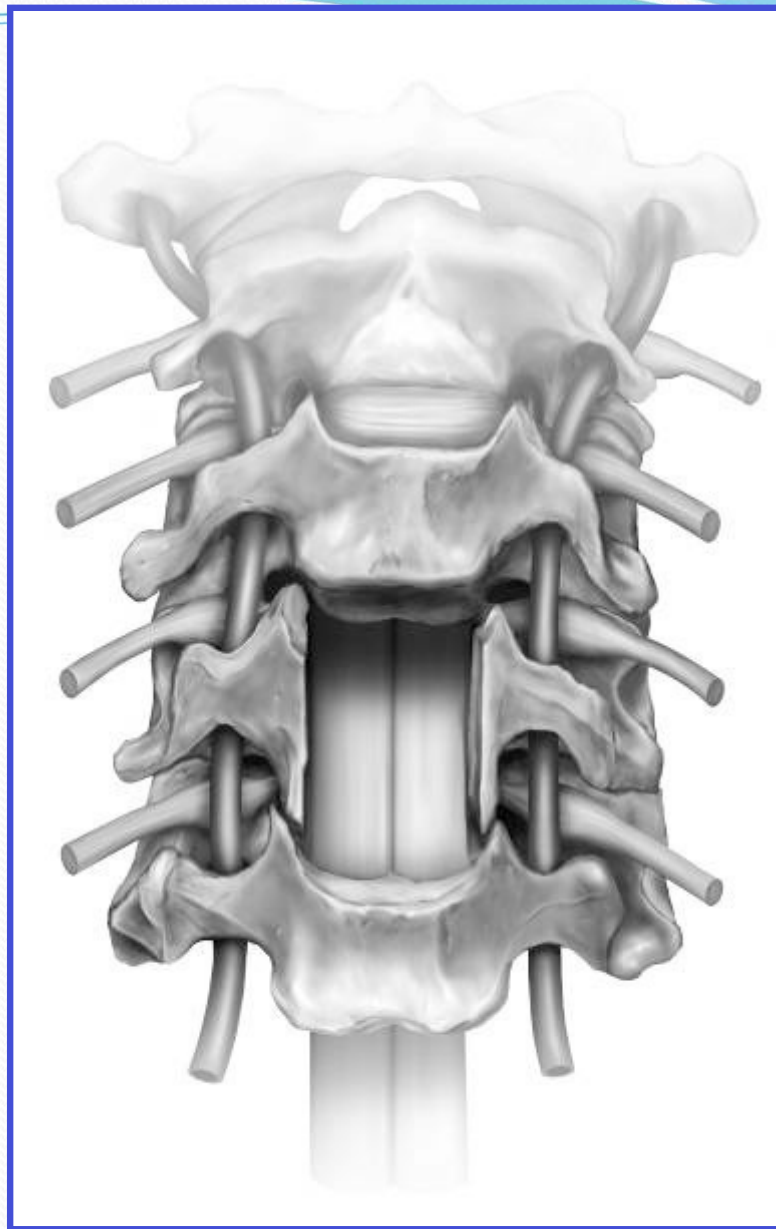
Discectomy and Decompression

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

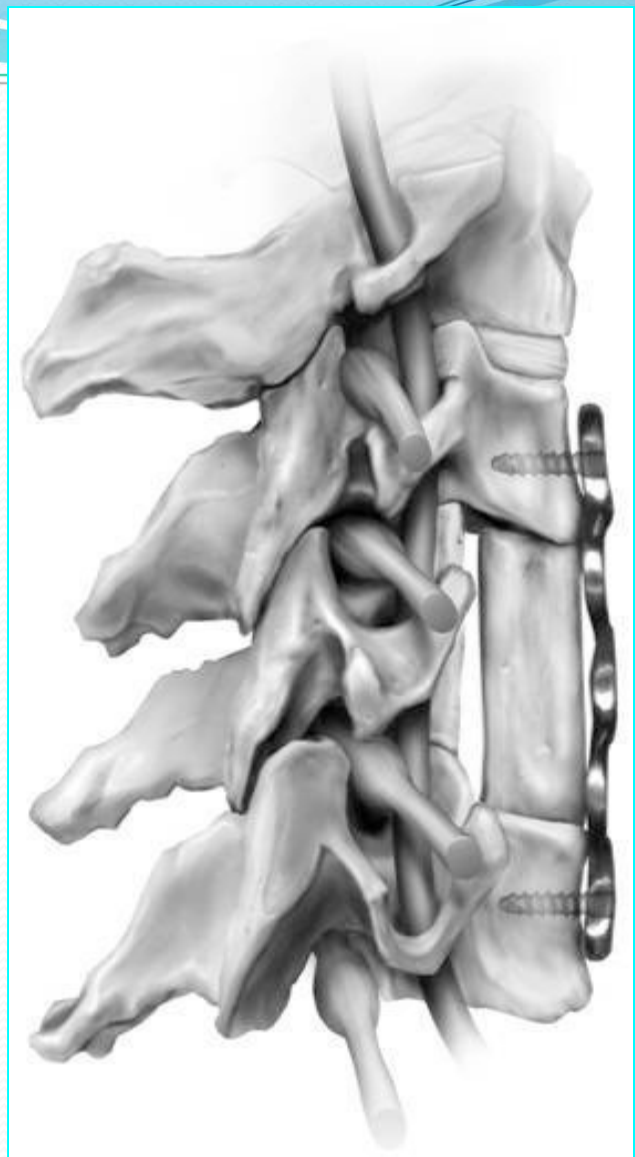


Bone Graft Placement





corpectomy



fusion and plating



Anterior Plating

Anterior
View



Lateral
View



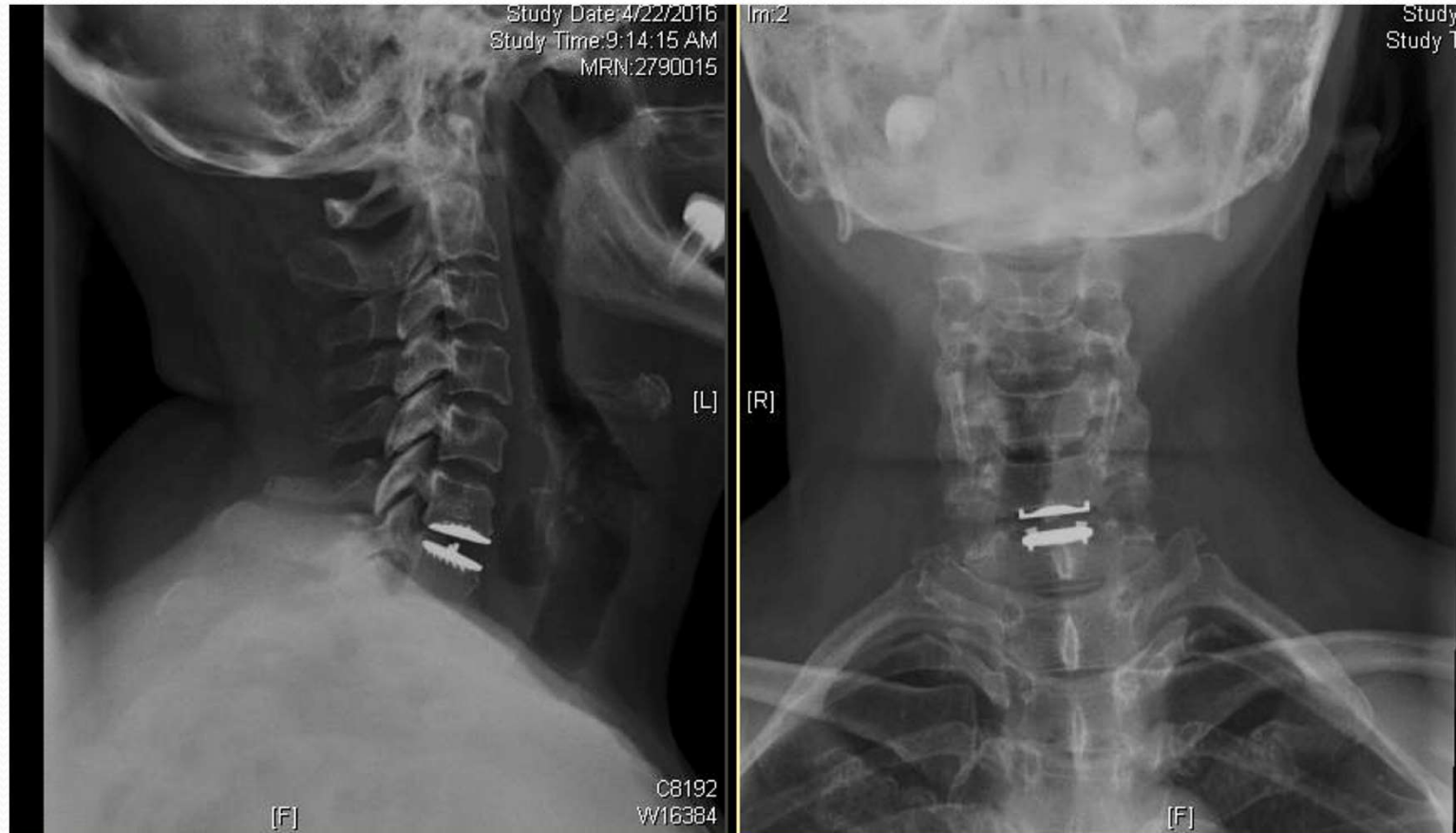
Cervical Disc Arthroplasty

- 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)

45 y F with C7 radiculopathy

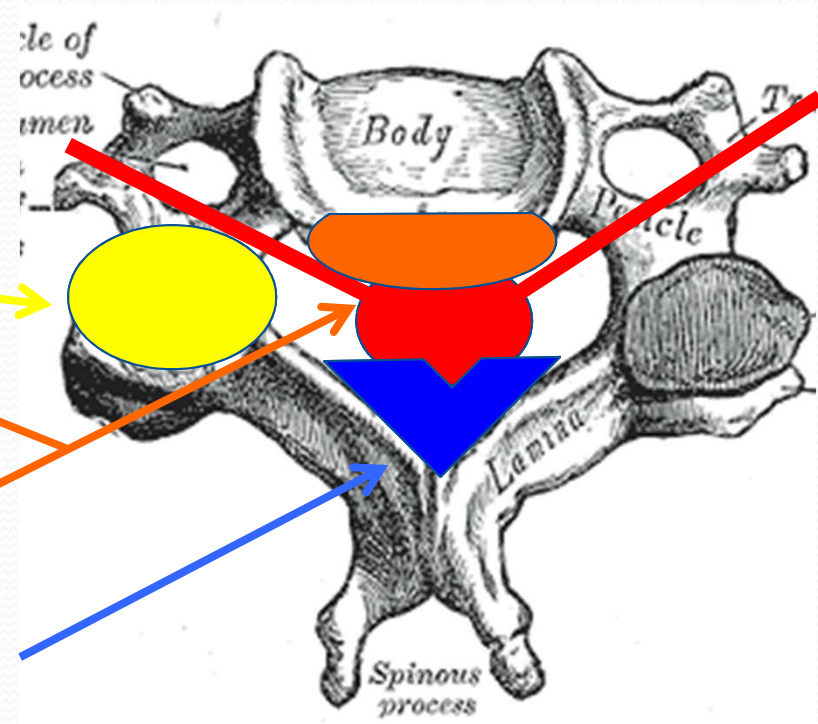


Posterior Cervical Options

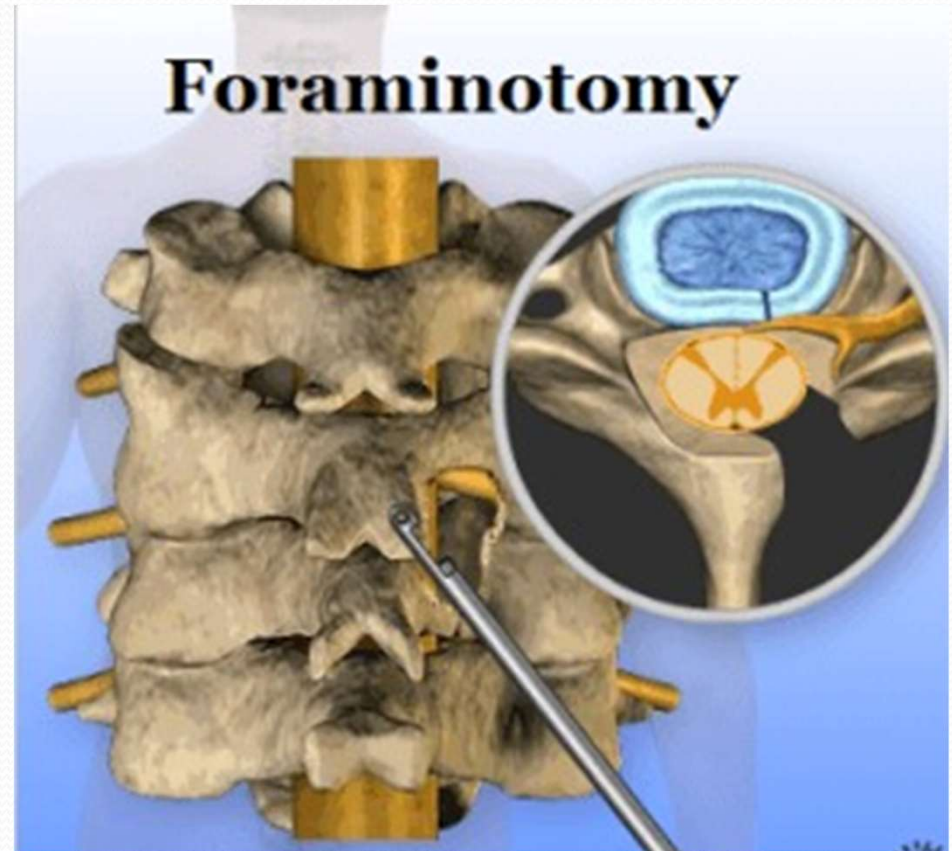
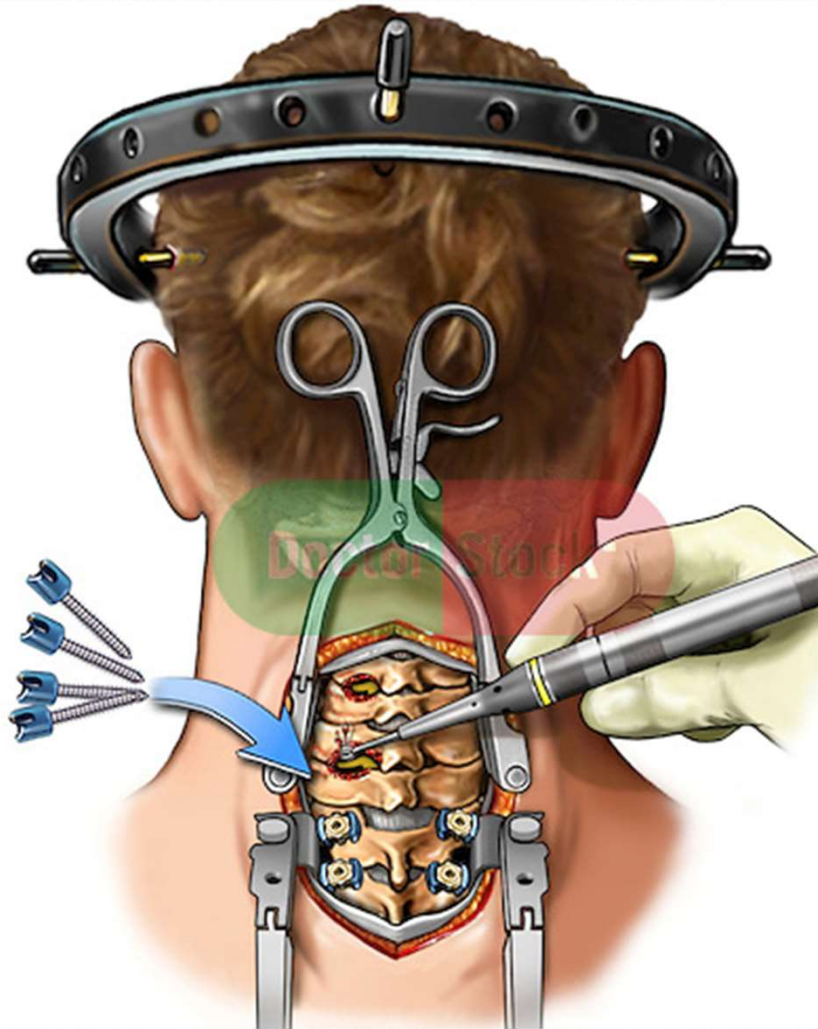
Radiculopathy/ Myelopathy - Pathophysiology:

- Direct Mechanical compression NRoot/Cord:

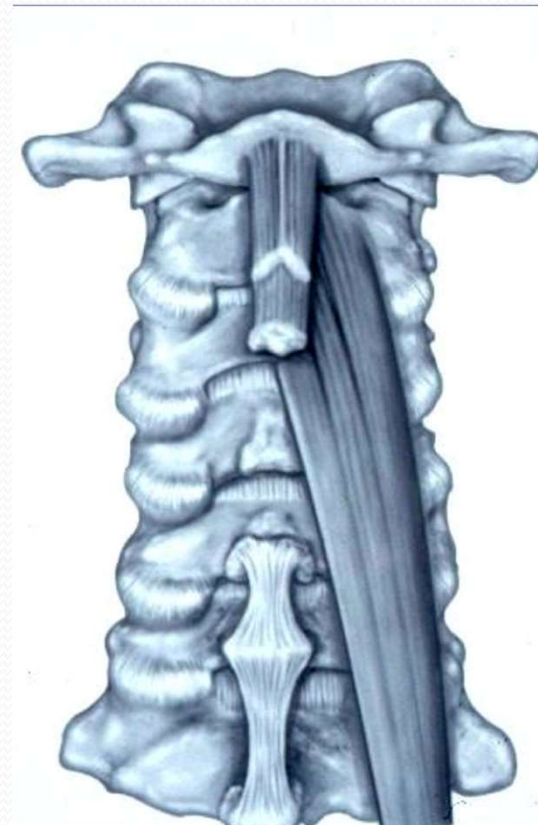
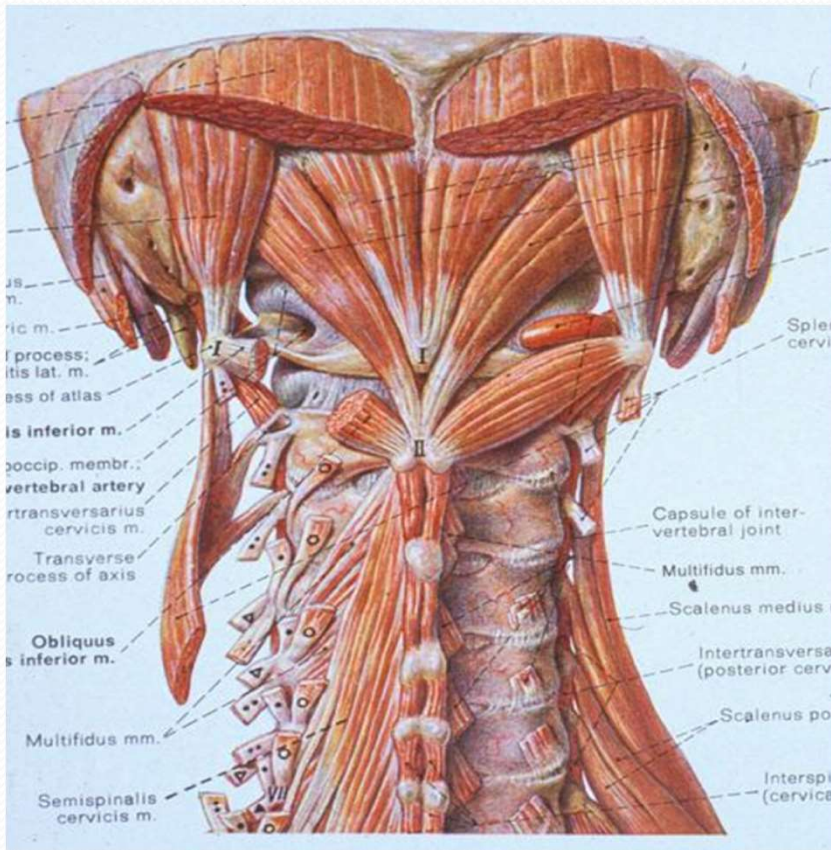
- Facet joint
- Disk Osteophyte Complx
- OPLL
- Infolding Ligamentum flavum



Cervical Foraminotomy



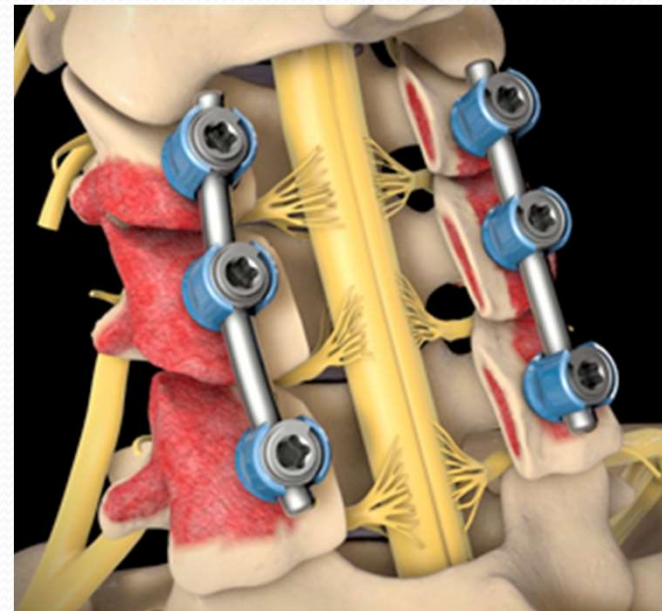
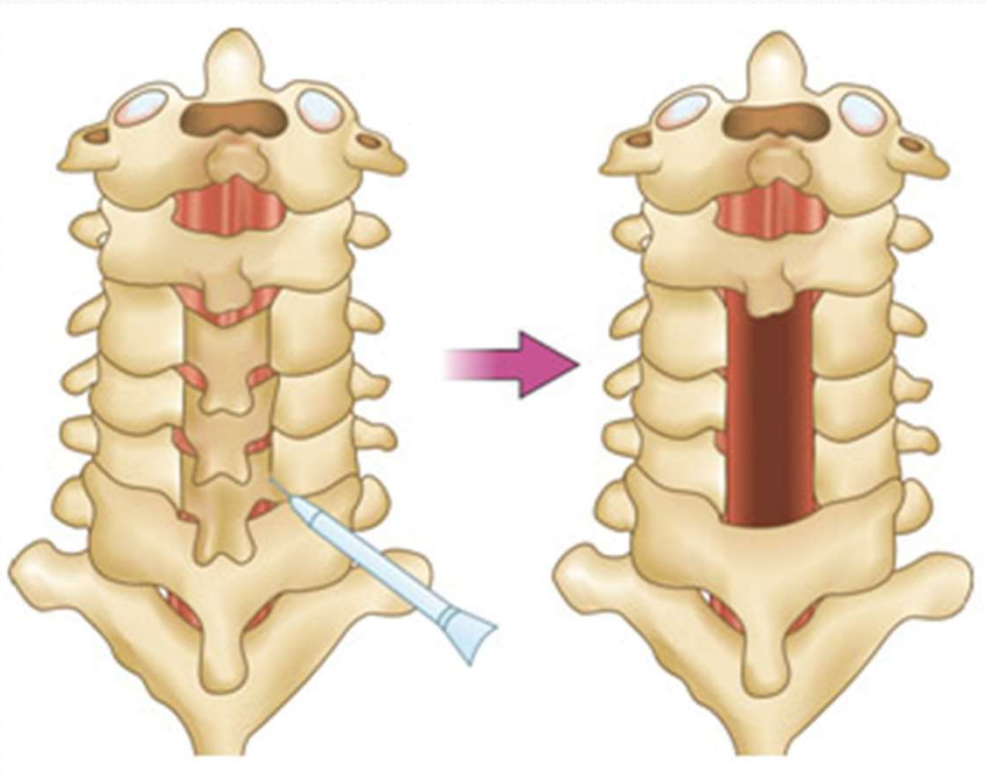
Not tissue preserving!



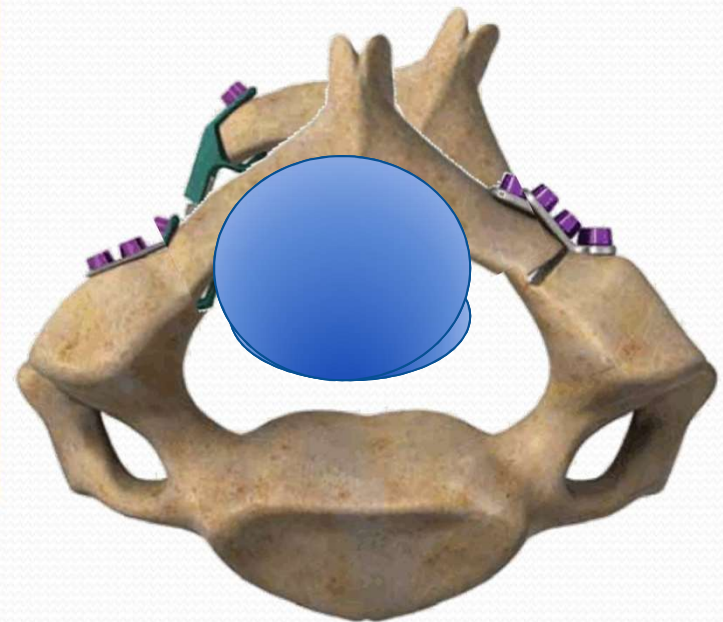
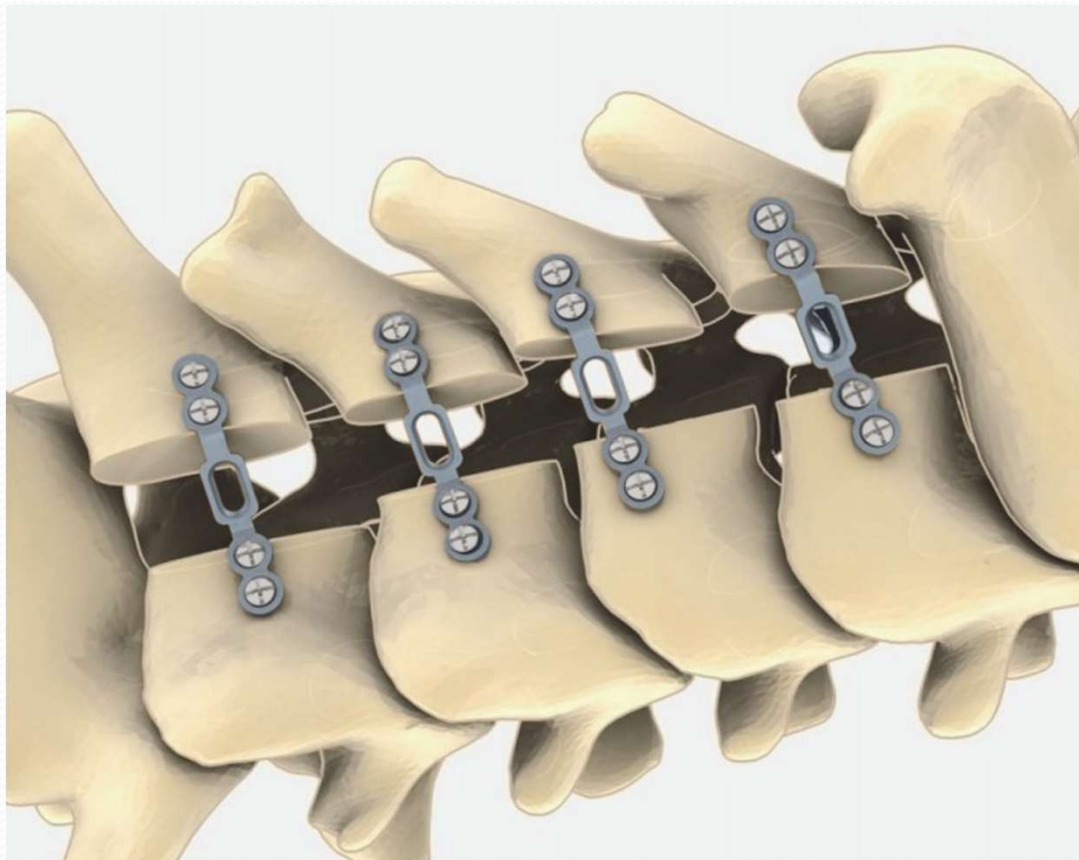
Multifidus is destroyed !!

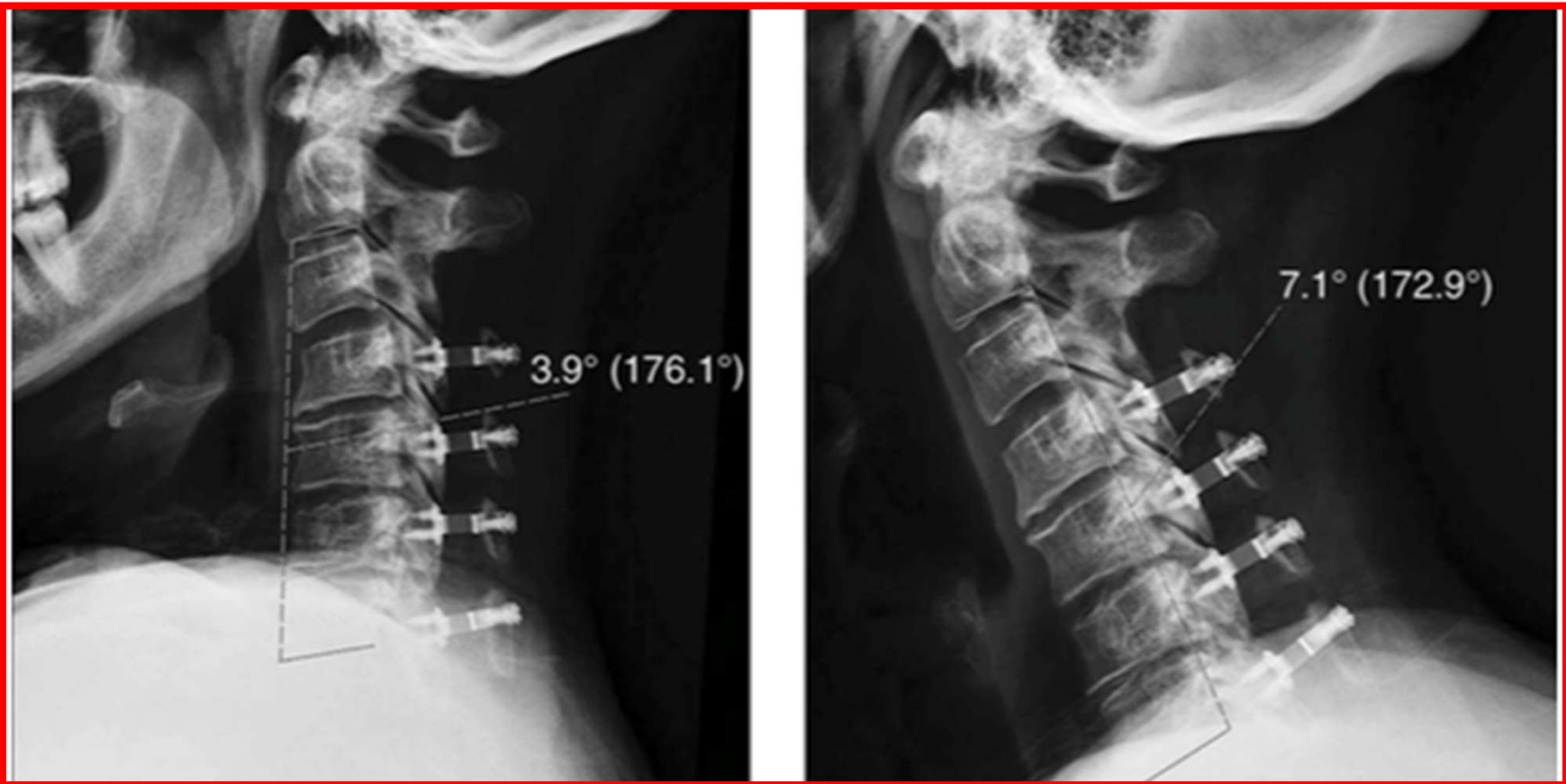
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Cervical laminectomy and fusion

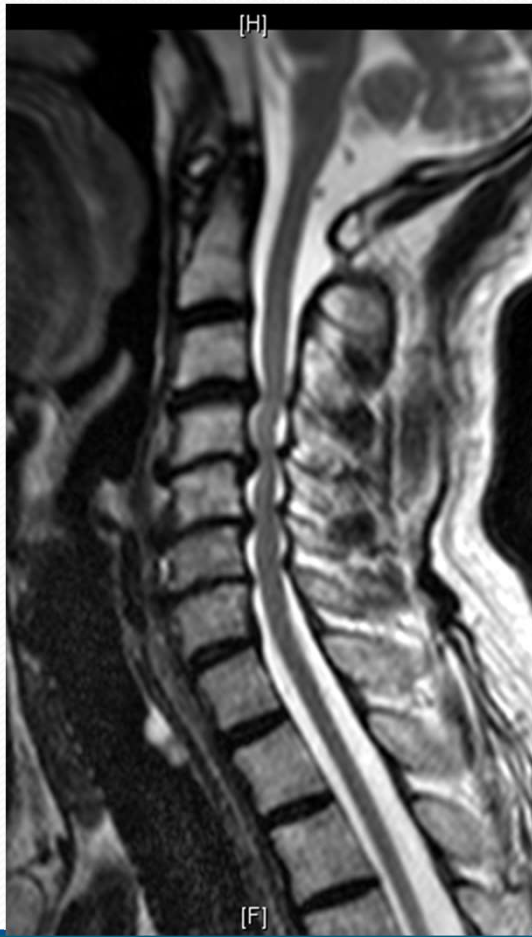


Cervical Laminoplasty





56 y M w Myelopathy

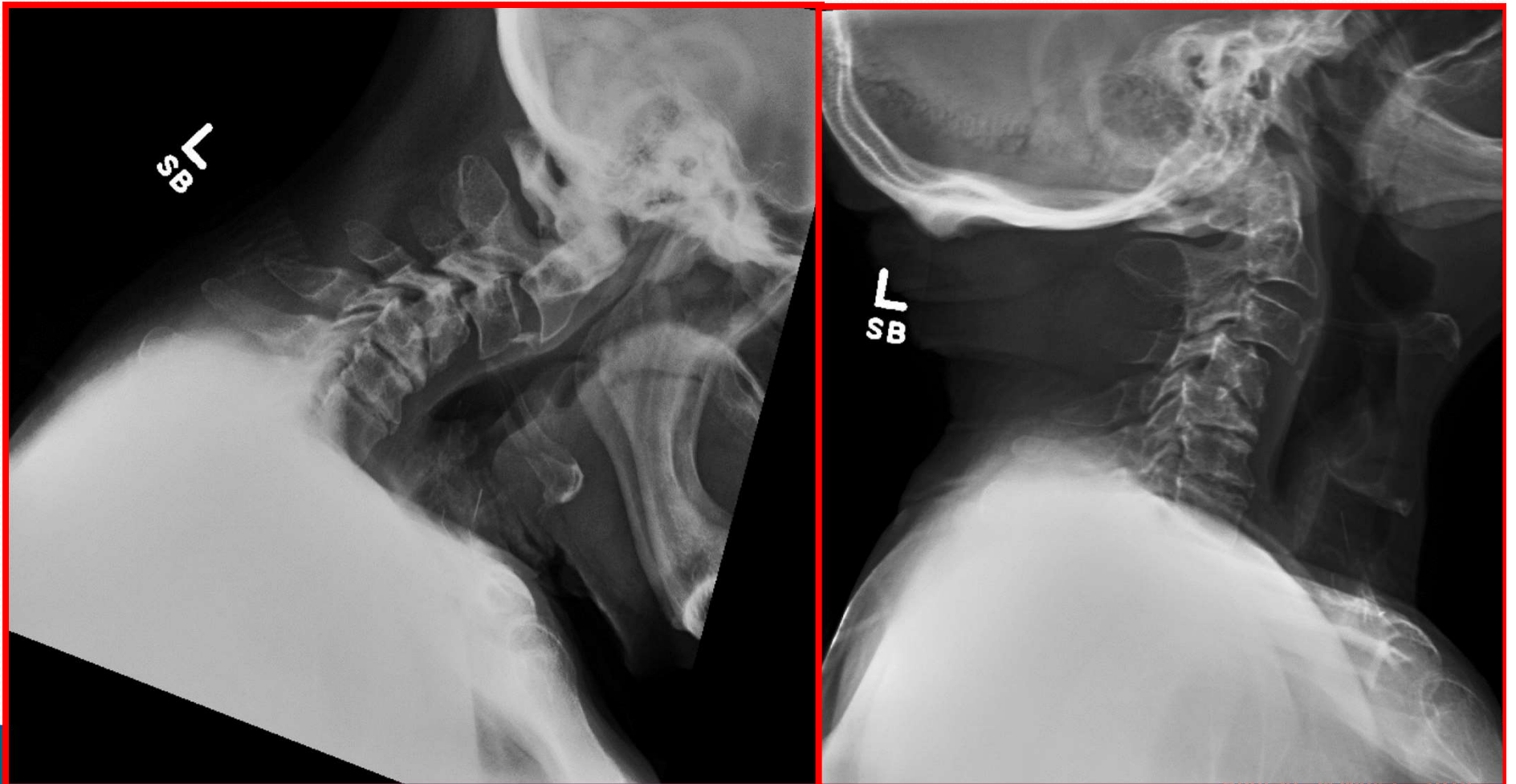


56 y M w Myelopathy



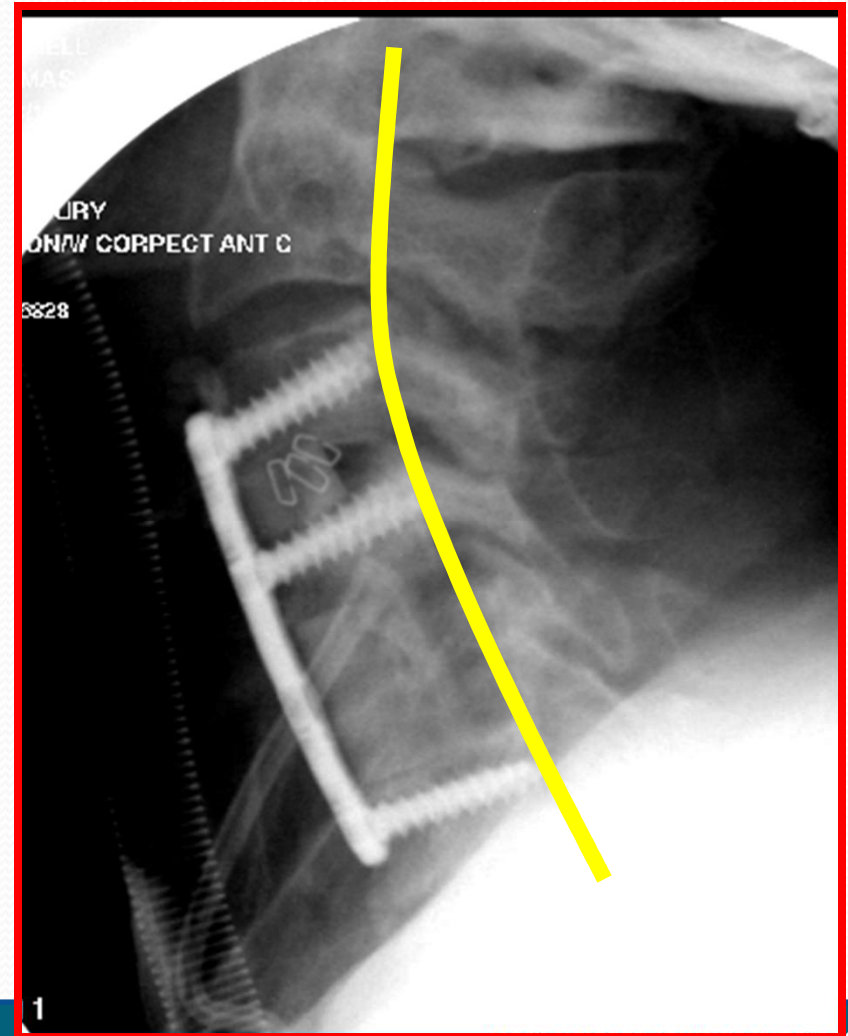
Combined Ant-Post CF

60 y M w severe myelopathy

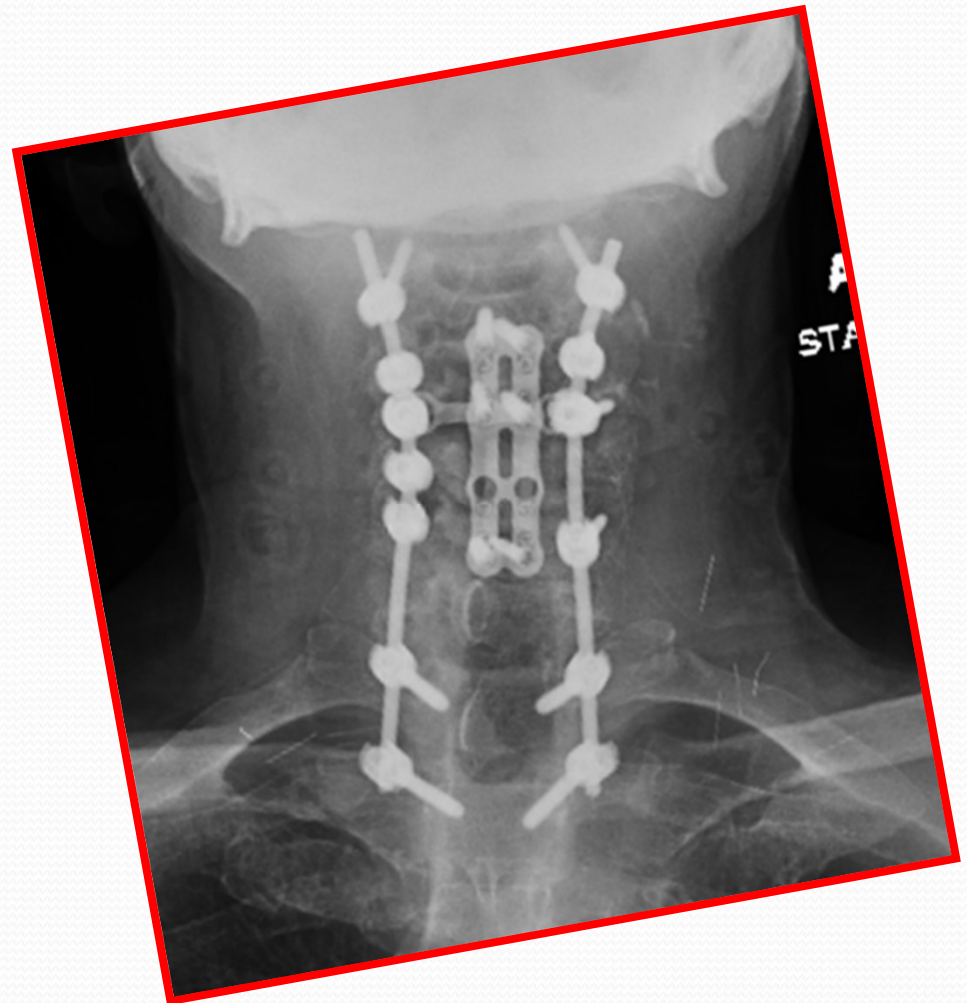




Stage I: Corpec C5-ACCF C3-6



Stage II – Post Lami Fusion



CONCLUSION

UNDERSTANDING Anatomy & Pathology

- Anterior:
 - ACDF/ACCF
 - cTDR
 - Anterior fixation
- Posterior:
 - Laminectomy/foraminotomy +/- Fusion
 - Laminoplasty
 - Instrumentation – fusion (Fracture stabilization)
- Combined

Thank You



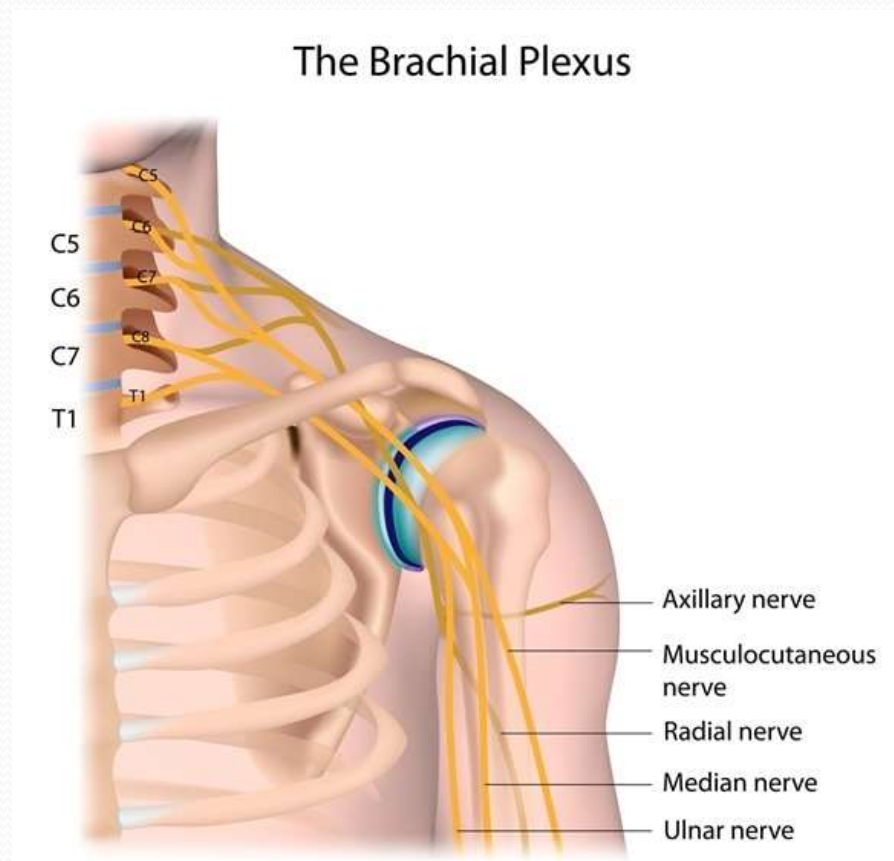
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Neck vs Shoulder: where is the pain?

Eduard Vaynberg MD
Assistant Professor Boston University School of Medicine
New England Pain Management Consultants at:
Boston Medical Center
Boston Outpatient Surgical Suites
New England Baptist Hospital

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Anatomical Map



Pain Generators

- Cervical muscles
- Cervical discs
- Cervical facet joints
- Shoulder structures
- Zebras (tumors, thoracic outlet syndrome)



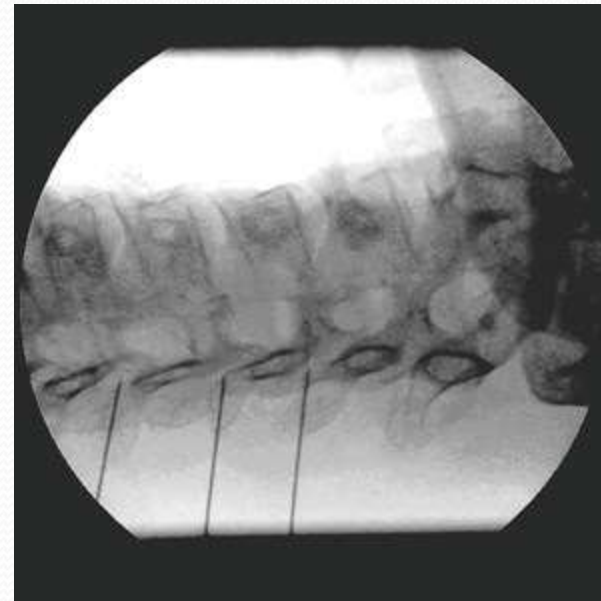
Narrowing down the possibilities

- History and Physical
- Imaging
- Selective blockade

Shoulder injection



Cervical epidural and facet injections



How To Set Up A Return To Work Plan For Cervical Spine Injuries

James L. Sarni, M.D.
St. Elizabeth's Hospital
Orthopedic Medicine Of Boston

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James L. Sarni M.D.

- Einstein-Montefiore PM&R Residency
- Hospital for Joint Diseases Sports Medicine Fellowship
- Board Certification PM&R
- Tuft NEMC Department of Orthopedics Spine/Sports
- MGH Founded Physiiatric Spine Clinic – Dept. of Orthopedics 16 years
- St. Elizabeth’s Ortho/Regenerative Medicine
 - Fluoroscopic Spine Interventions
 - Ultrasound Guided MSK Injections

Strategy Derived From 10 Years As A Consultant Reviewer to DMS/Sun Life

- Purpose:
 - Review The Documentation To Determine if it Supports The Physical Limitations Ordered

Lesson Learned

- Write Every Note As If You Are Trying To Convince Your Most Respected Peer The Injured Worker Is Unable To Work
 - And How Do Doctors Justify Their Decisions To One Another?
 - Document The Pathology
 - Document The Pathology
 - Document The Pathology

“I Open At The Close”

- Composing The Closing Return To Work Note Starts At The Opening Visit When Physician Documents The Pathology

Return To Work Note Is Based Upon One Simple Principle

- *Do The Present Limitations Of The Biomechanics Imposed By The Pathology Allow The Worker To Perform The Physics Of The Task Involved, And to Do So Without **INCREASED** to Themselves and Others?*

Examples

- C8 Radiculopathy Affects Intrinsic Muscles of The Hand - poor coordination – affects fine motor skills
- Cervical Facet Injury
 - Limits Cervical Extension
 - Limits Side To Side Movement
 - Police or Firefighter Who Can't Look Over Their Shoulder?
 - Electrician or Painter Who Can't Work Above Their Shoulders?

“Limitations Of The Biomechanics Imposed By The Pathology”

- Without A Clear Articulation Of The Pathology – Any Discussion About Return To Work Is Useless



How To Determine Pathology

- Correlate:
 - Reported Mechanism Of Injury
 - Physical Exam
 - Radiographic and Electro diagnostic Studies

History 90% of Diagnosis

- History Helps Distinguish Pathology That Occurred As a Result of The Incident from Pathology That Pre Existed The Incident
 - Patient Complains of LBP after Picking Up a 10 lb. box and MRI shows 4 Degenerative Discs.
 - Patient Complains of Increase Shoulder Pain After Routine Lifting of 5 lb. Case and MRI shows severe labral tears and partial tears in supraspinatus, infraspinatus, subscapularis and hypertrophy of AC joint



Once Pathology Is Identified:

- Everything Falls Into Place
 - Treatment program
 - Progress Schedule
 - Estimated Return To Work Date
 - Long Term Prognosis

Pathology

- Gives A Scientific Basis of Expectations
- Eliminates The Argument of All Secondary Interests
 - Patient's Motivation? Irrelevant
 - Employer Not Want Him Back? Irrelevant
 - Legal Gain? Irrelevant



Pathology

- Reduces The Equation of Back To Work To A Matter of Physiology and Physics: Nothing Else



What About Pain

- Degree of Pain Is Directly Related Pathology
- Are The Complaints of Pain Consistent With Pathology?

Do People Deal With Pain Differently?

- Of Course They Do – But Should That Matter?
- Or Should Only Facts Matter?
- No Fault Divorce? Only Facts and Numbers Matter
- No Fault Auto? Who Caused Accident? Only Facts
- Worker's Comp? What is Pathology, Physics of Job

Pathology Approach Cuts Both Ways:

- Impairment Greater Than Pain Would Indicate
 - C6 Radiculopathy
 - Cervical Sprain/Strain

C6 Radiculopathy: C5-C6 HNP

- Muscles Innervated By C6
 - Serratus Anterior
 - Rotator Cuff
 - Brachioradialis
 - Pronator Teres

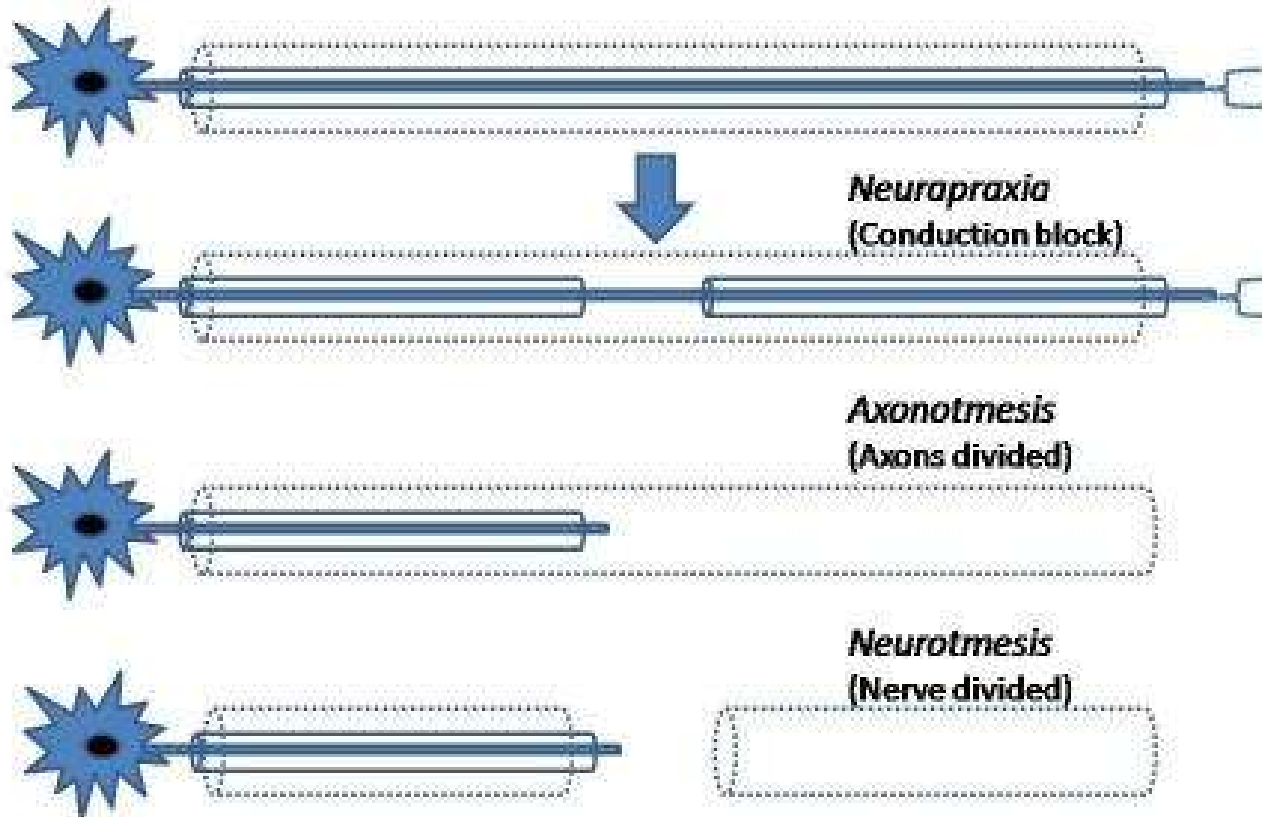
3 Months After Injury:C6 Weakness But No Pain

- Able To Play Golf For Few Hours
- Able To Go Gym 1 Hour per Day
- But NOT Able to Lift Greater Than 20 lbs. for hours per day, 5 Days per Week, 45 Weeks per year
- *Impairment Supported By Pathology*

C6 Pathology From HNP

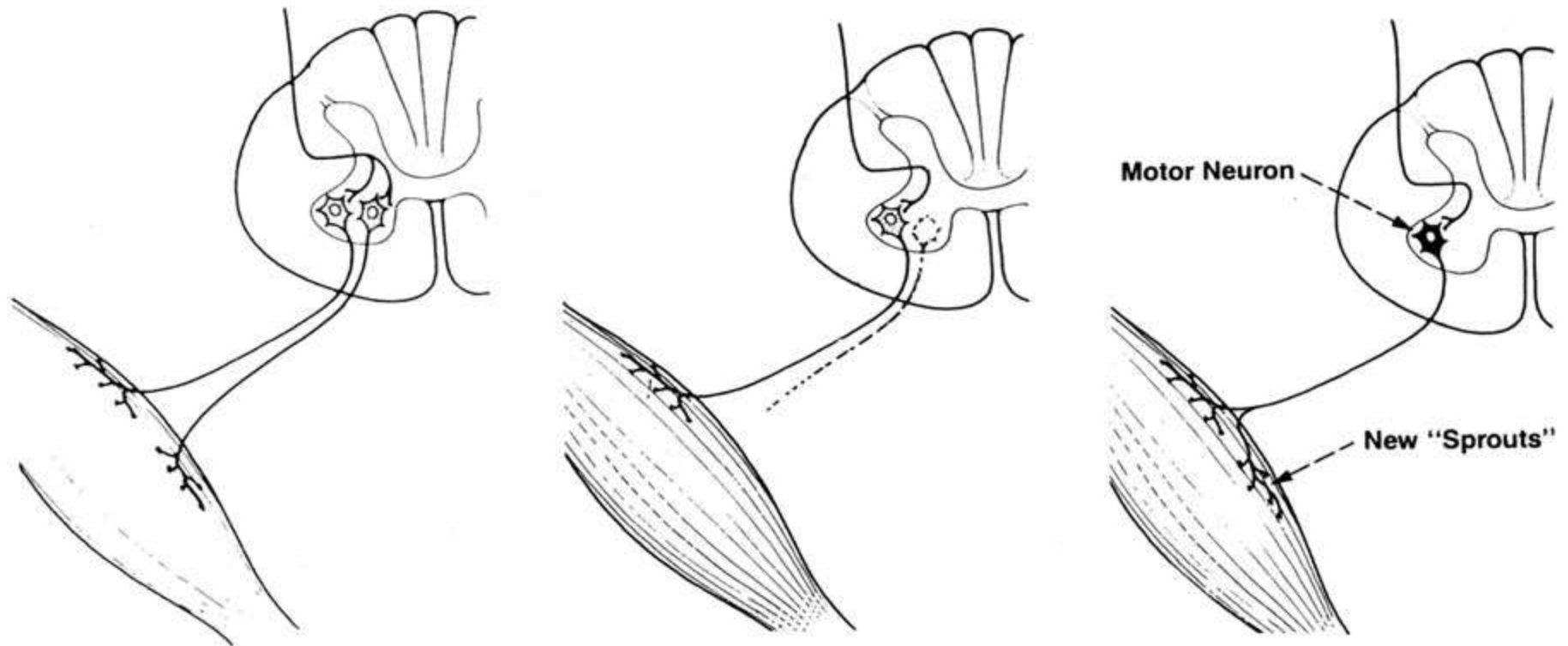
- Chemical Toxicity From Disc
- Axonotmesis to Nerve Axon
- Collateral Sprouting From Non Affected Nerves
- CMUAP on EMG
- Post Polio Type Syndrome
 - Muscle strength returns, but not repetition
 - Muscle fatigues over time, generates less force risks injury to muscle and tendon

Grades of Nerve Injury (Seddon 1942)



NERVE INJURY

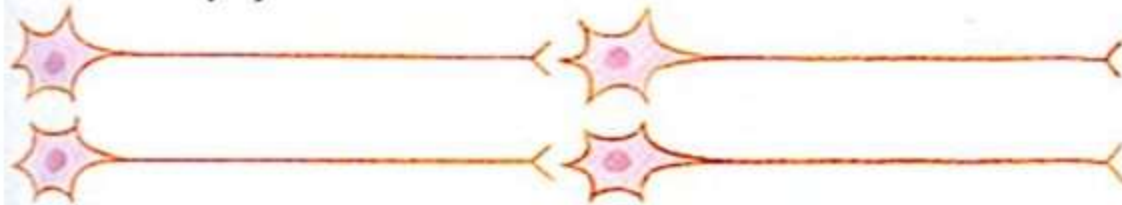
Collateral Sprouting



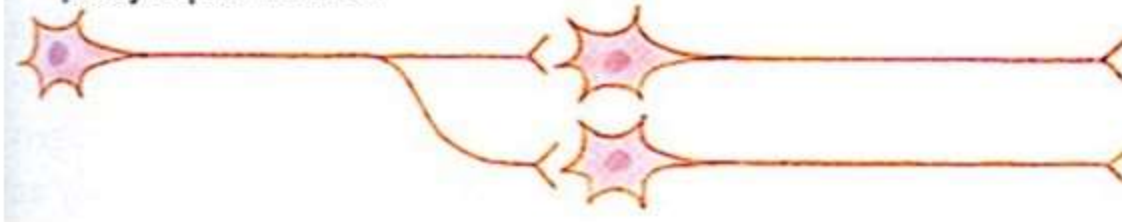
PNS and CNS Recovery: Collateral Sprouting

- Axon of remaining neuron forms a collateral sprout to **reinnervate denervated target**

A Before injury



Collateral sprouting following the death of one presynaptic neuron



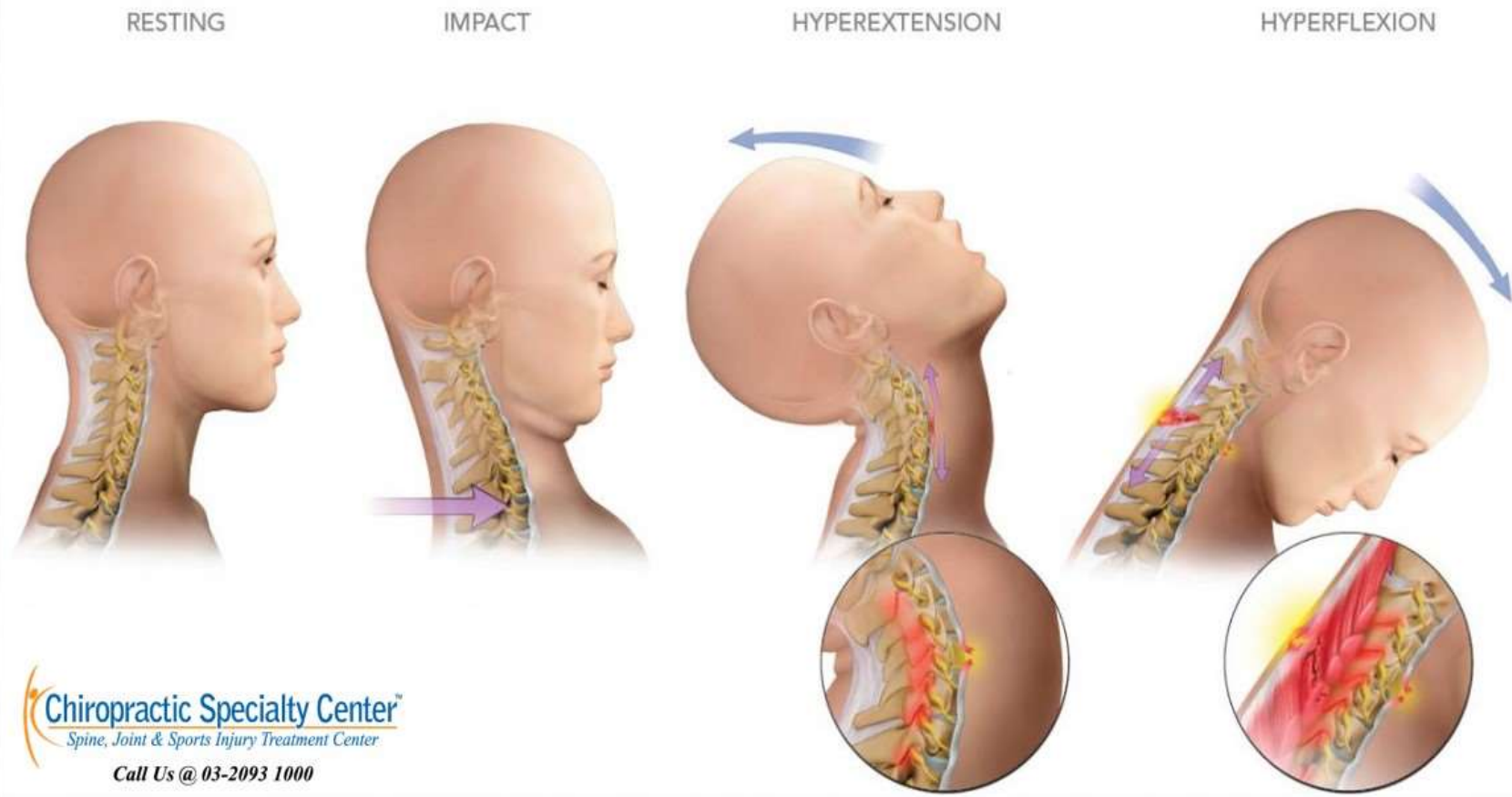
With injury, **younger** rats develop more collateral sprouts than older rats

MVA At Work: Whiplash

- Cervical Facet Injury
 - Limited Cervical Extension
 - Limited, Hard Stop To Cervical Rotation
 - Improves With Cervical Facet Injection
 - Improves with Mechanical Traction
 - Facet Arthritic Changes C5-C6

- *So Why Can't They Work?*

WHIPLASH MECHANISM OF INJURY



The pathology of whiplash: Neck sprain - Figure

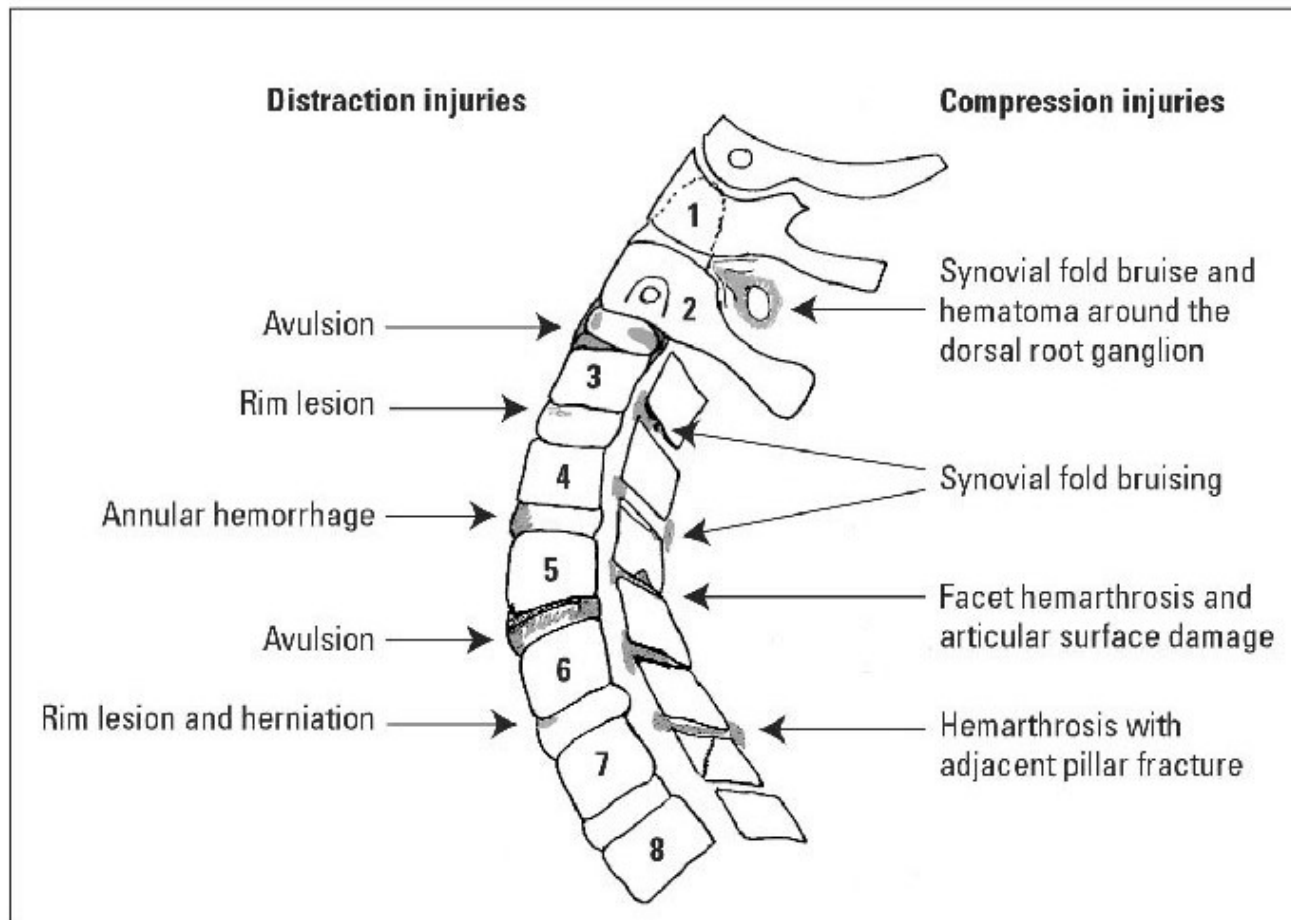
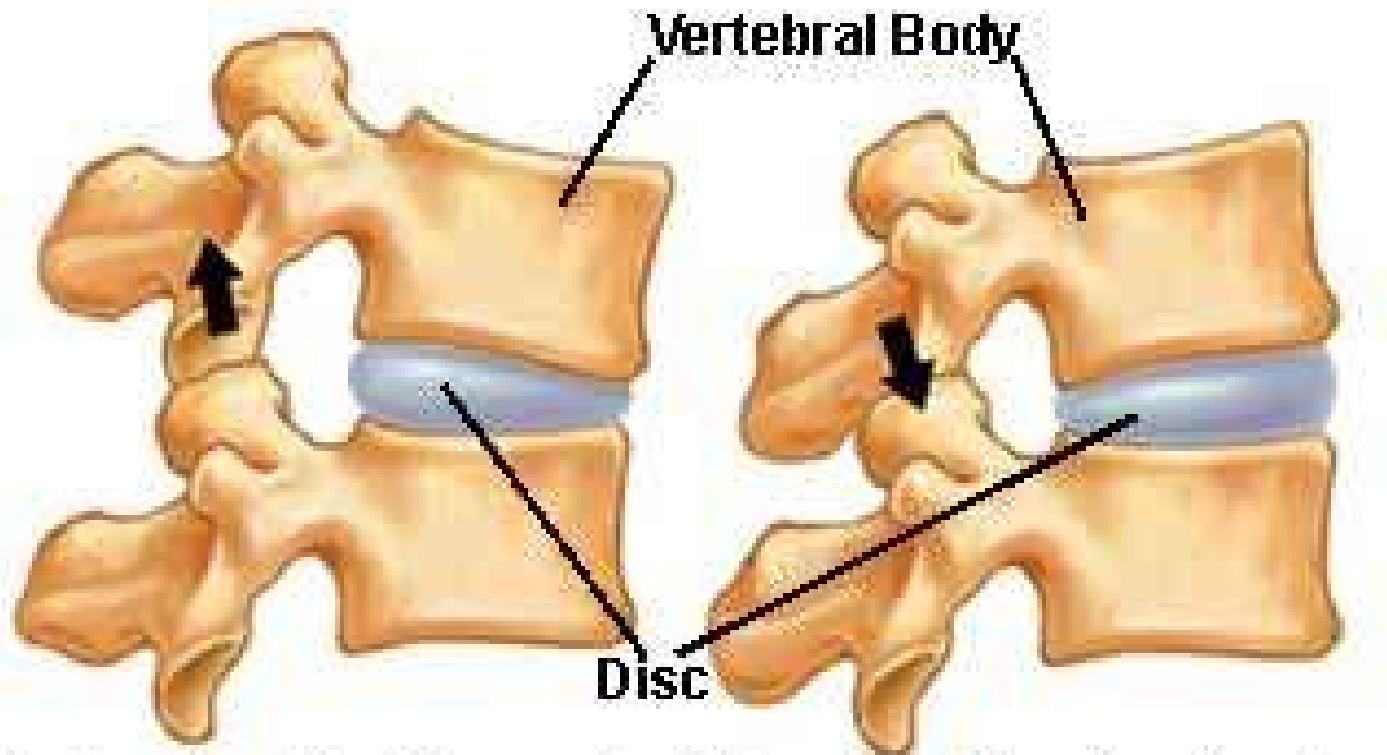


Figure. Composite injury diagram demonstrating typical locations for injuries in individuals who showed neck sprain in association with fatal car accidents. Similar injuries may be seen in patients with severe whiplash.

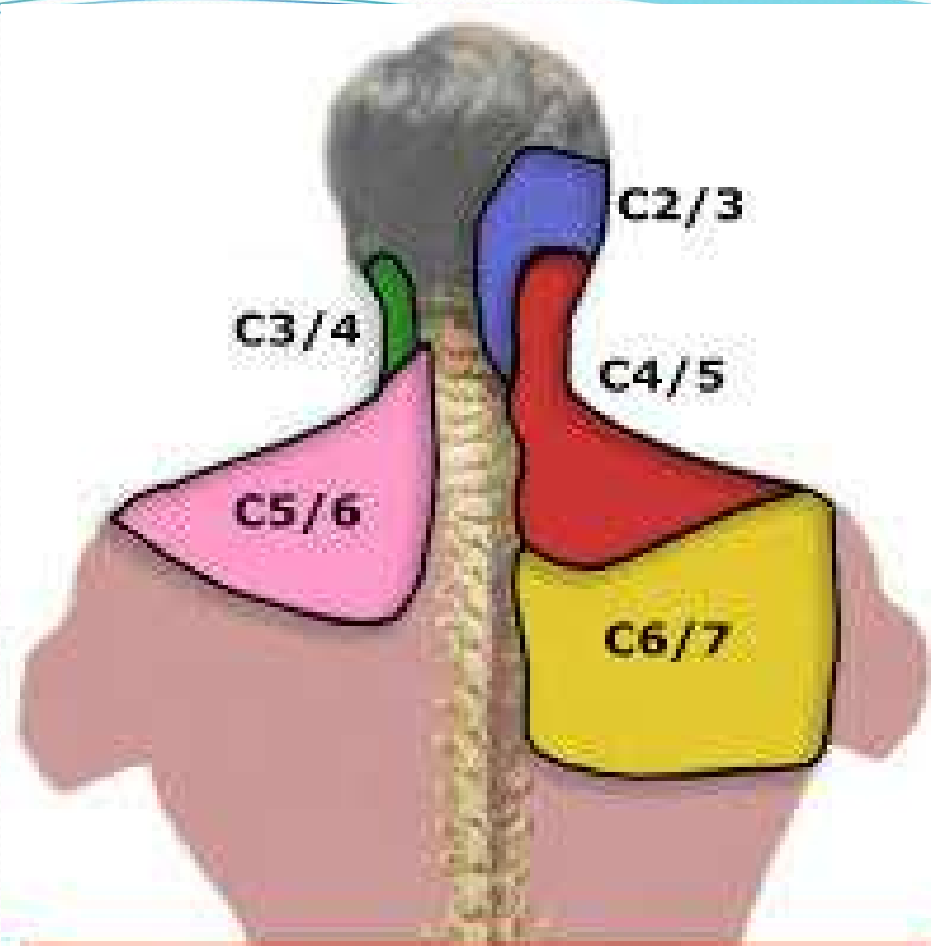
Note: Examples of extension-type injuries include both anterior distraction injuries to the discs and posterior compression injuries to the facets. Dorsal root ganglion hemorrhage could not be shown on this diagram. The anterior and posterior longitudinal ligaments and the muscles are not shown. The anterior longitudinal ligament is not damaged in rim lesions, and the longus cervicis is not usually torn in disc avulsions.

Facet Joints in Motion

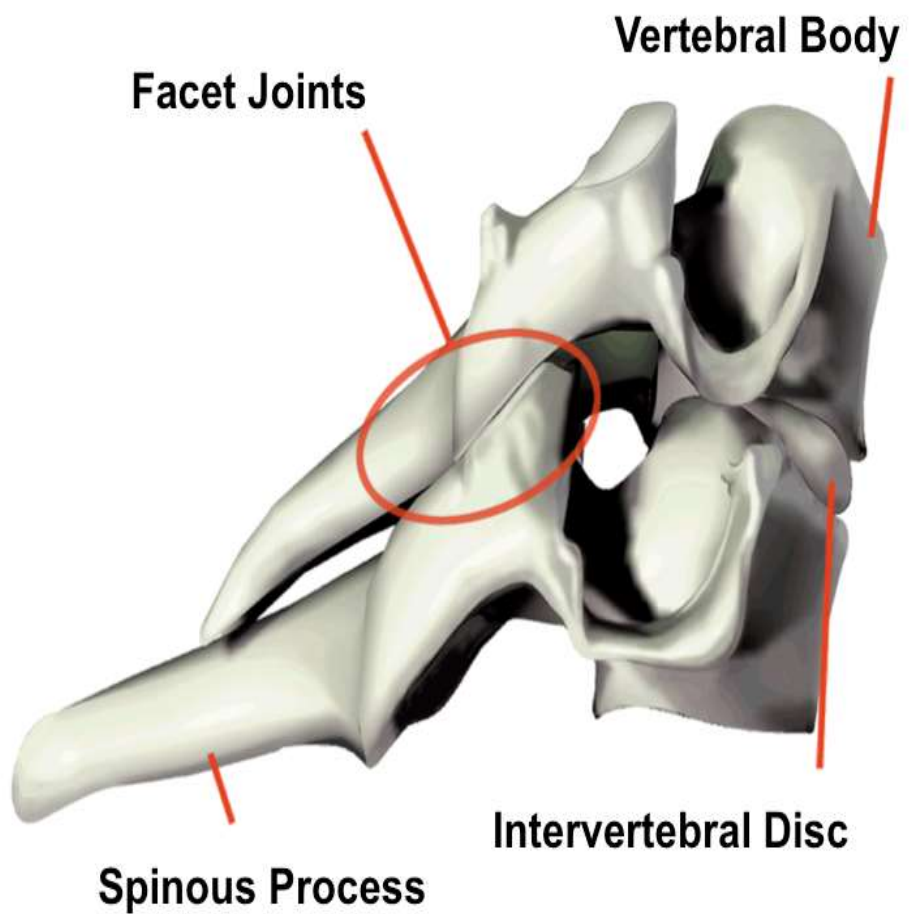


Flexion (Bending Forward)

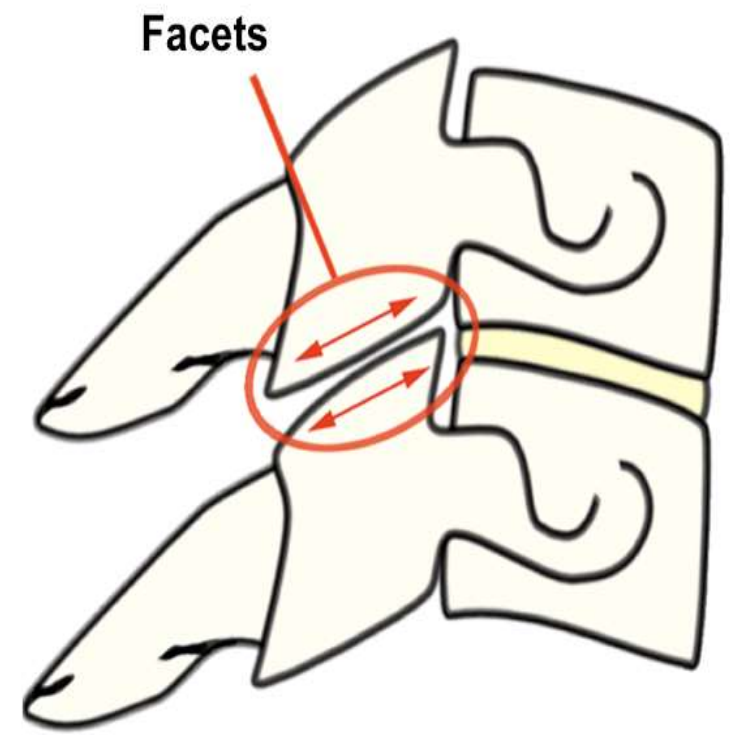
Extension (Bending Backward)



**Cervical Facet Joint
- Pain Referral Patterns -**



Normal Gliding Motion





MRI, X-Rays, EMG, In Whiplash

- All Normal



Epidural In Whiplash

- Not Helpful

Impairment in Whiplash/Facet

- Able To Cut The Lawn
- Able To Go To Gym
- Able To Seem Unimpaired In ADL's
- *But Can Not Repeatedly Or Prolonged Go Into Cervical Extension*



Back To Work Strategy - Summary

- Pathological Diagnosis Is Reliable And Reproducible
- The Physical Impairment From That Pathology Is Reliable and Reproducible
- ***This Strategy Removes Any Medical Ambiguity From The Situation And Allows The Patient and Their Employer To Go Forward To Resolve The Issue***

Case Discussion

Tony Tannoury, M.D.
Boston University
Boston Medical Center

BOSTON
UNIVERSITY



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H & P

- 43 YO lady, housekeeper.
- Witnessed Slip on ice leaving her work.
- Next day, had to leave mid-day due to severe right shoulder and parascapular pain.
- Severe burning sensation Lateral and Postero-lateral aspect of the Rt Shoulder.
- Diffuse hand and forearm tingling
- Minimal Back and right buttock pain.

2 weeks Post Injury

- Neck pain same= 7-8
- Tingling/hyperesthesia in the Rt forearm & hand
- Rt Shoulder pain: Lateral and Postero-lateral aspect
- Motor:
 - Right
 - Weakness of grip strenght 3+/5
 - WE:4/5
 - Biceps:4/5
 - Shoulder Abduction:3+
 - Left: Normal 5/5

ED X-rays

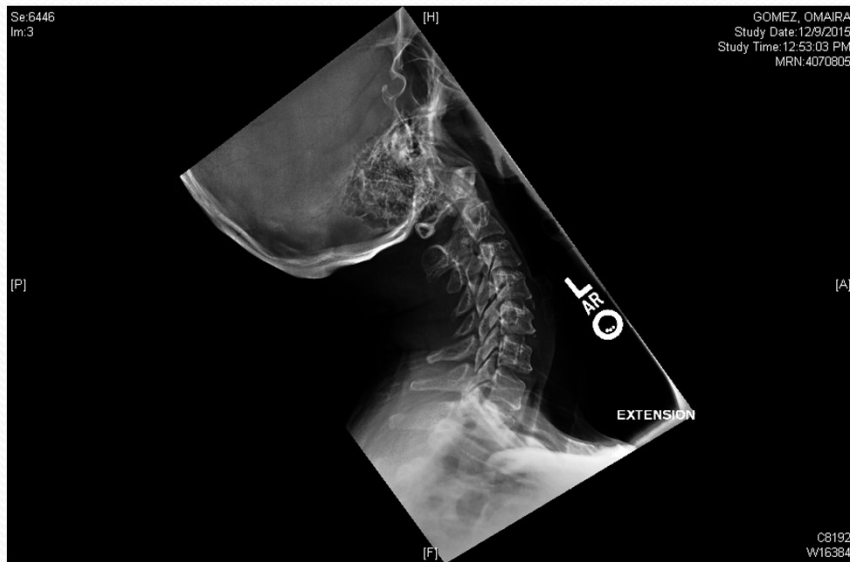


2 weeks post injury.

Next Steps:

- Any further work up?
- Rx options:
 - PT
 - Meds
 - C-collar immobilization
 - Injections
 - Chiro Medicine

Dynamic X-rays



2 weeks post injury.

Next Steps:

- Any further work up?
- Rx options:
 - PT
 - Meds
 - C-collar immobilization
 - Injections
 - Chiro Medicine
- Any concerns about Shoulder pain?
 - Work up?
 - Differential Diagnosis?

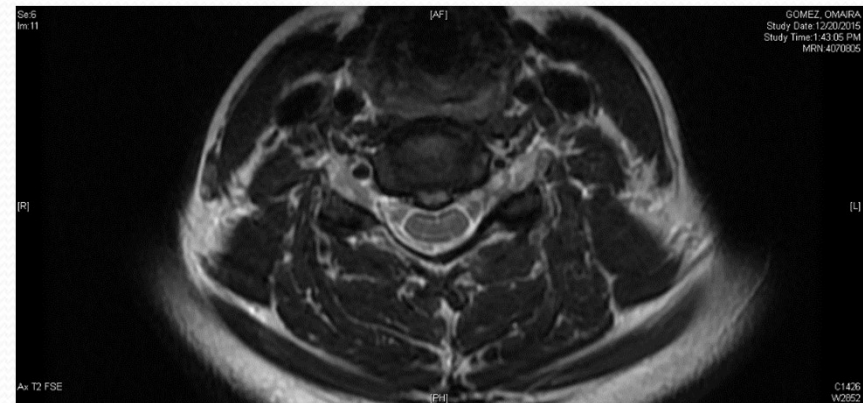
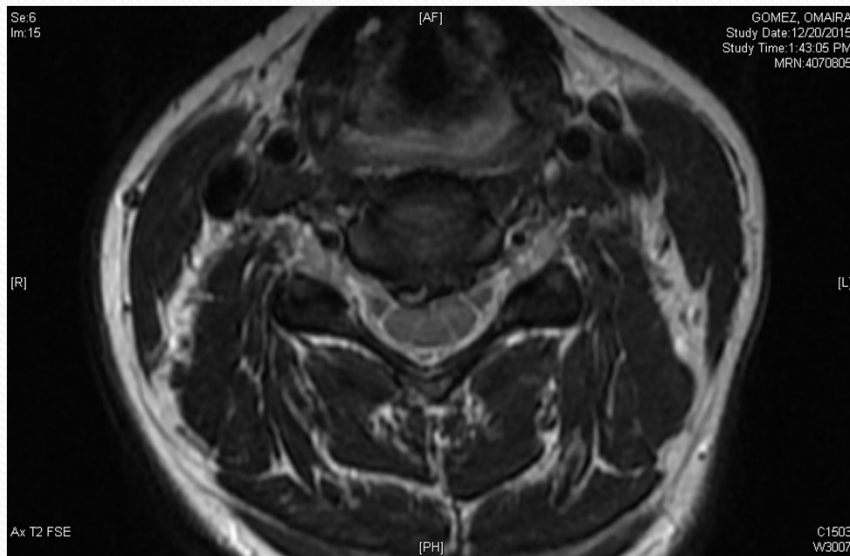
8 weeks Post Injury

- Neck pain same= 7-8
- Tingling in the hand improved
- Shoulder pain same.
- Motor:
 - Right
 - Weakness of grip strength 3+/5
 - WE:4/5
 - Biceps:4/5
 - Shoulder Abduction:3+
 - Left: Normal 5/5

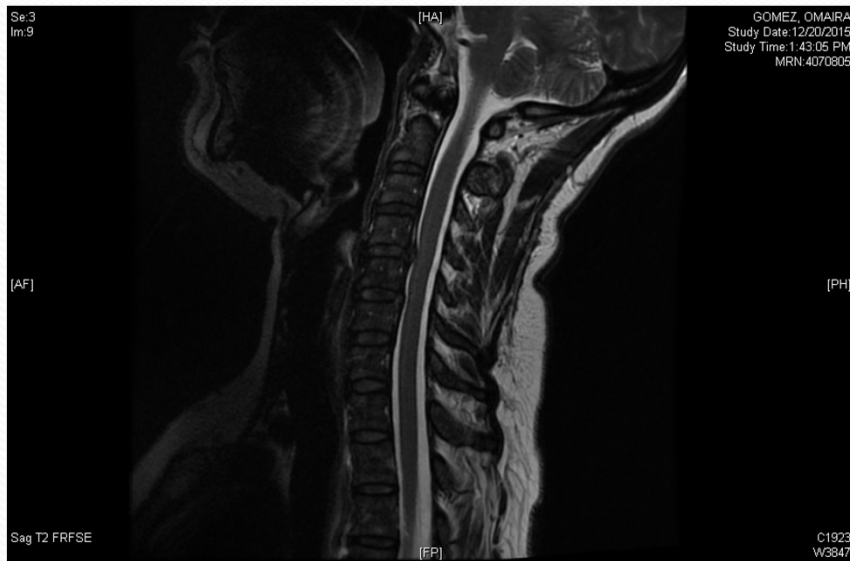
MRI

C4-5

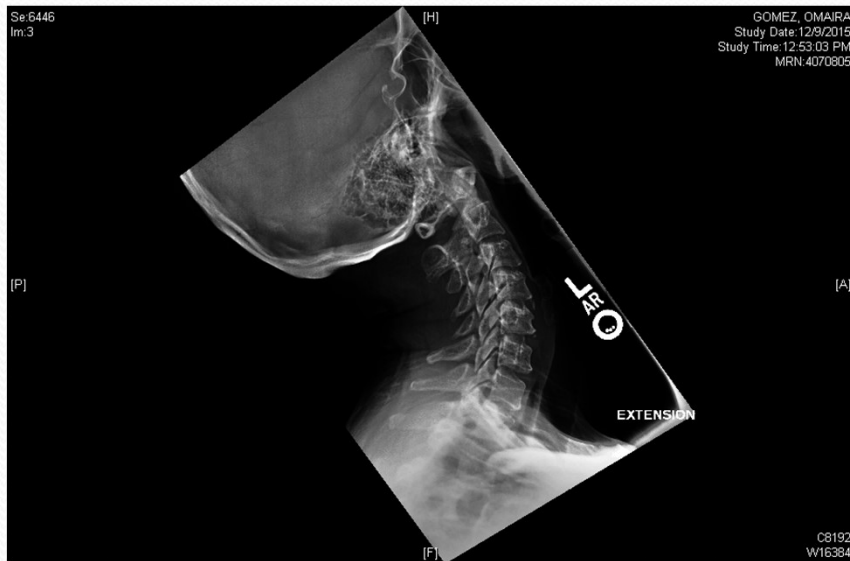
C5-6



MRI Sagittal Cuts



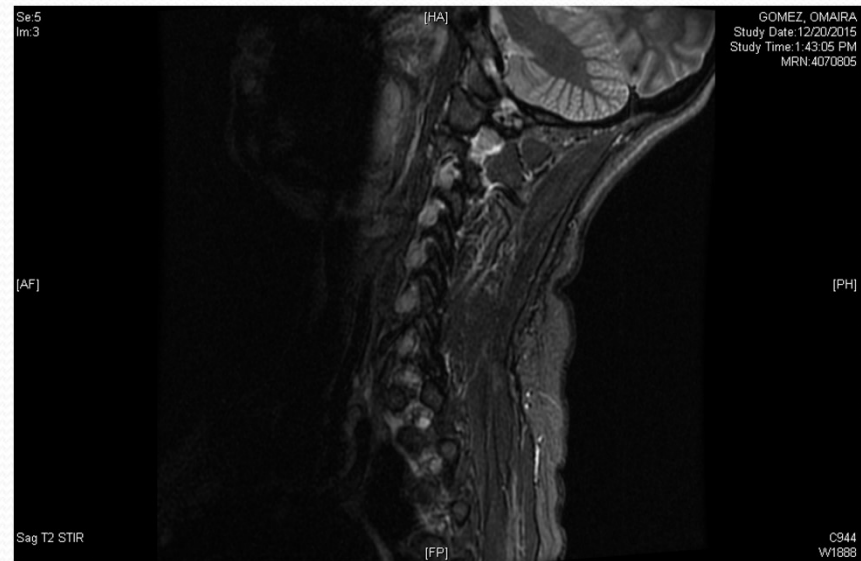
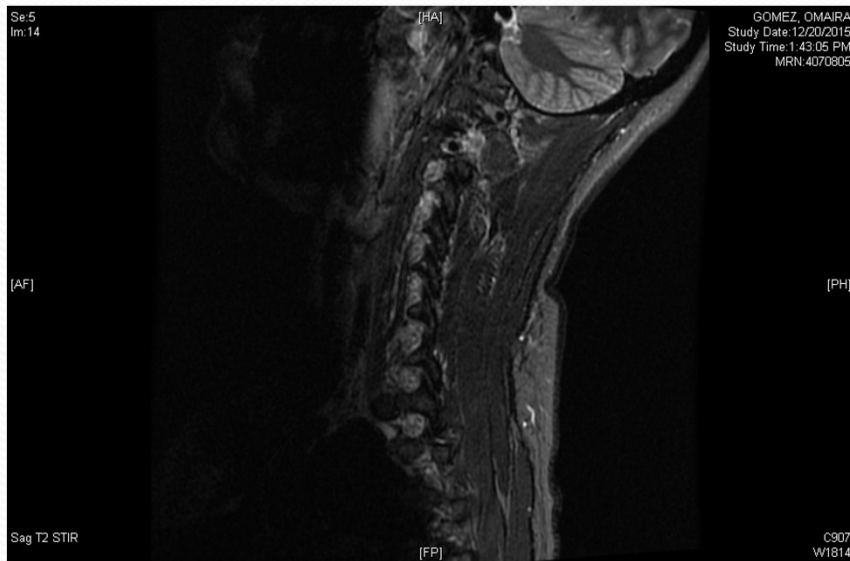
Dynamic X-rays



MRI STIR images

Right

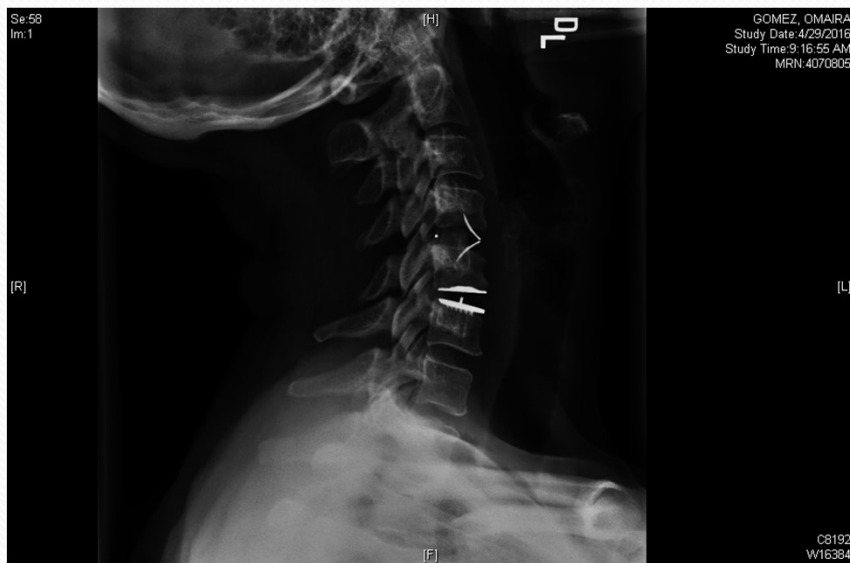
Left



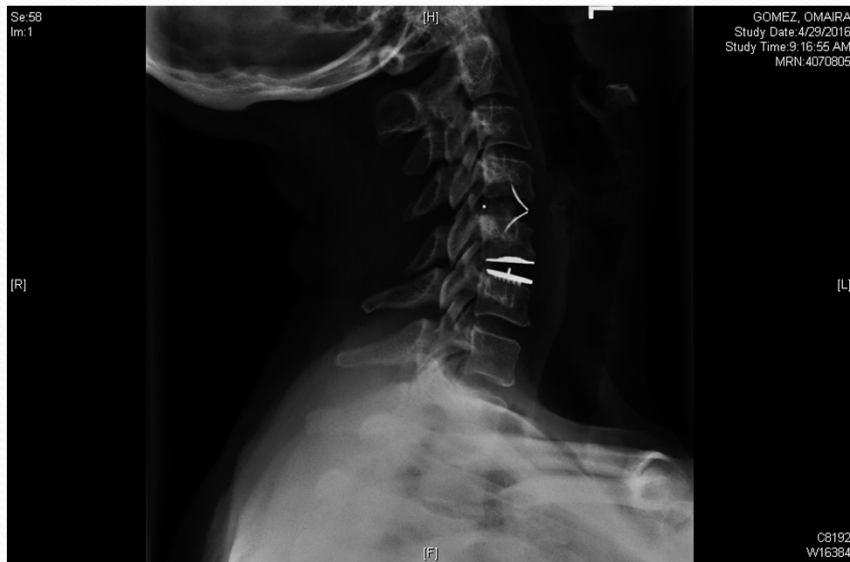
Post Op.



Post Op X-rays



2 months post op.



F/U

2 months post op

- Minimal parascapular burning.
- Back to work:
 - 2 weeks light duty:
 - No repetitive bending
 - Lifting <25 lbs
 - Then Unrestricted

4 months post op

- Parascapular burning much improved
- Tolerating unrestricted work