



DISORDERS OF THE CERVICAL SPINE

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CONFLICT OF INTEREST

I hereby certify that, to the best of my knowledge, no aspect of my current personal or professional situation might reasonably be expected to affect significantly my views on the subject on which I am presenting.

OBJECTIVES

- ❖ Identify anatomical structures of cervical spine
- ❖ Describe components of conservative care
- ❖ List mechanical contributors to cervical spine disorders
- ❖ Discuss differential diagnoses for non-radiating neck pain
- ❖ Identify appropriate referral for inter-disciplinary care

DISORDERS OF THE CERVICAL SPINE

- ❖ Anatomy
- ❖ Mechanical contributors
- ❖ Physical assessment
- ❖ Diagnosis & treatment
- ❖ Inter-disciplinary care
- ❖ Case studies/Q&A

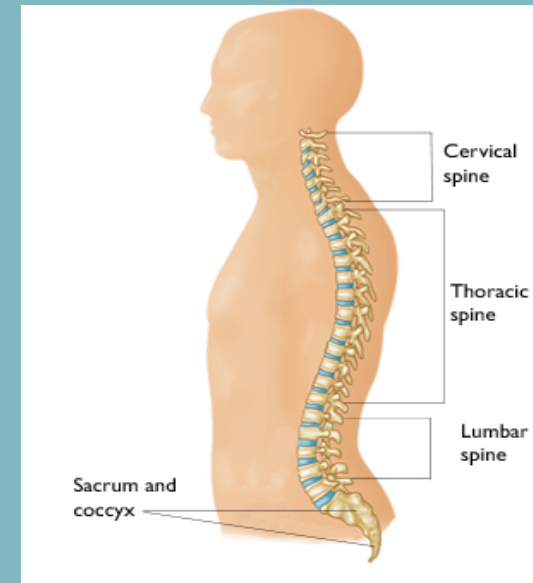
Cervical Spine: Anatomic Review

Cervical Spine Anatomy Videos

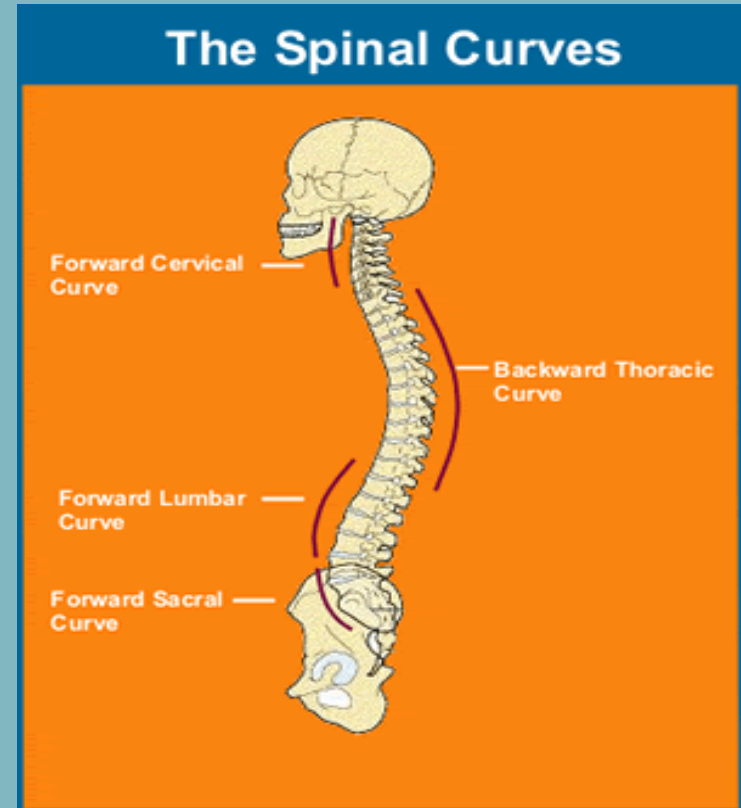
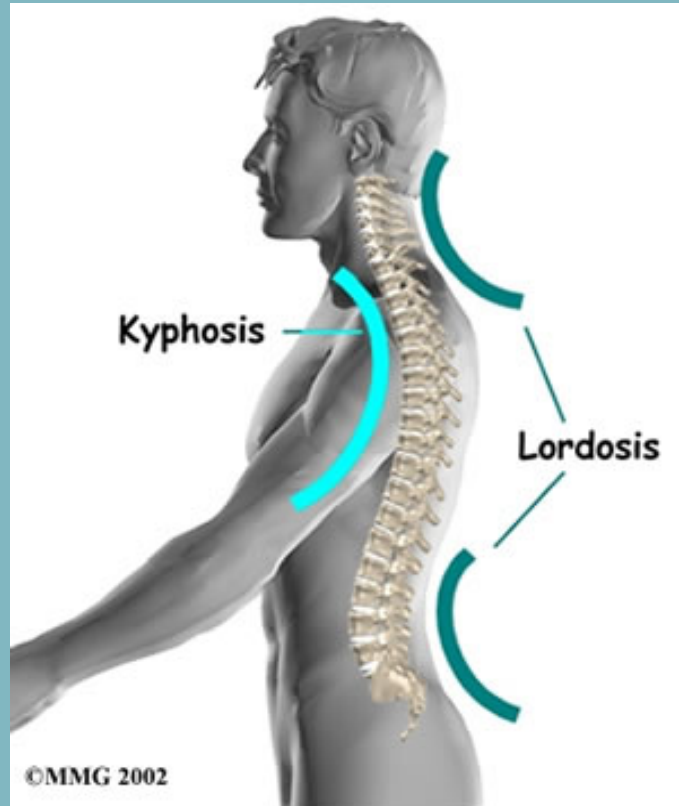
http://www.youtube.com/watch?v=mwfuXcee_GY 3:10

<http://www.youtube.com/watch?v=aDvbAvBIQuM> 1:54

https://www.youtube.com/watch?v=RNUpMNd_u1U 7:12



Cervical Spine: Anatomic Review

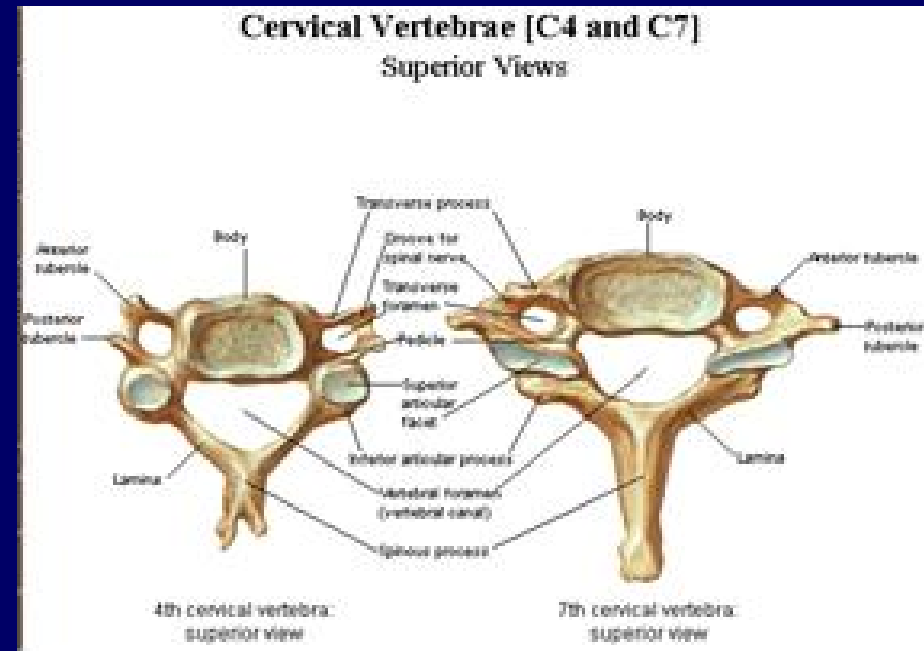
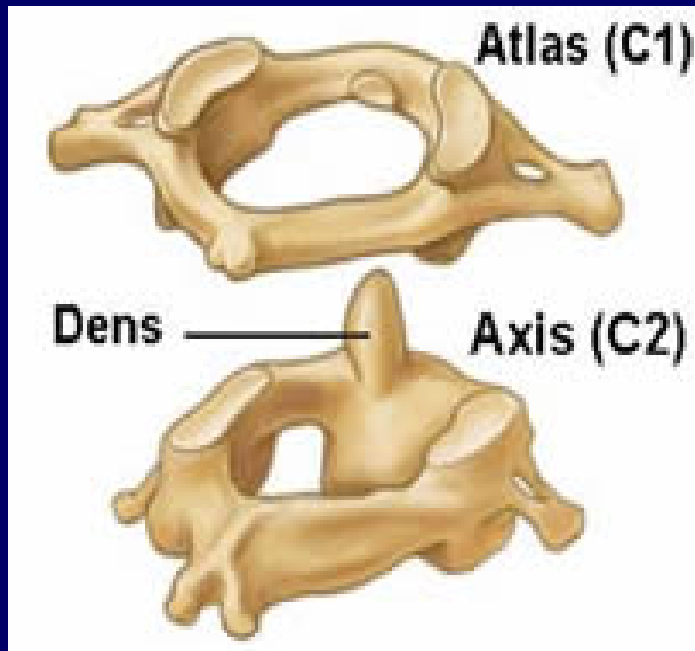


Cervical Spine: Anatomic Review

Functions of the Cervical Spine

- ❖ **Protect the brain stem & spinal cord**
- ❖ **Support the skull**
- ❖ **Allow for wide range of head movement**

Cervical Spine: Anatomic Review



Cervical Spine: Anatomic Review

7 CERVICAL VERTEBRAE

C1 body (atlas)

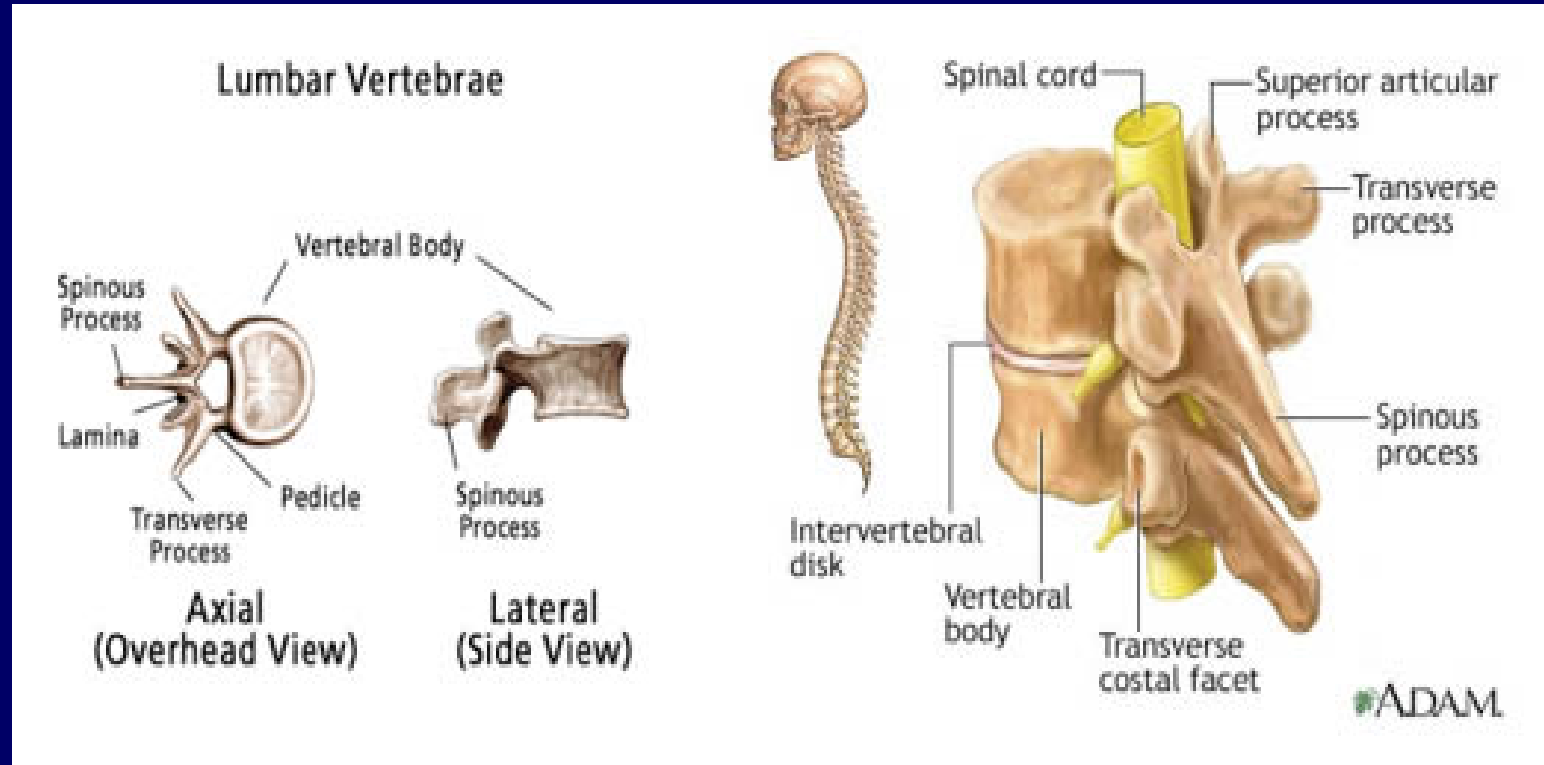
C2 body (axis)

Spinous process of C7

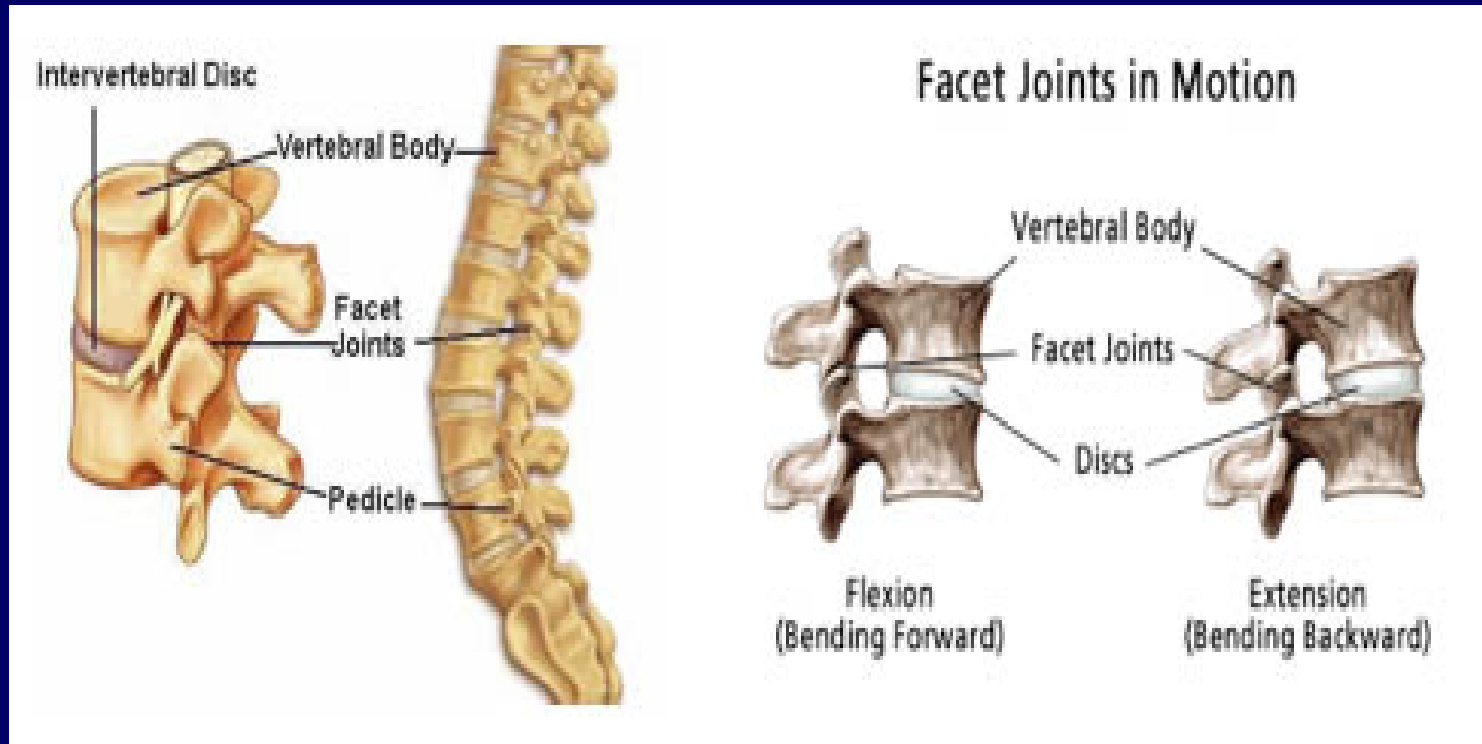
Body of C7



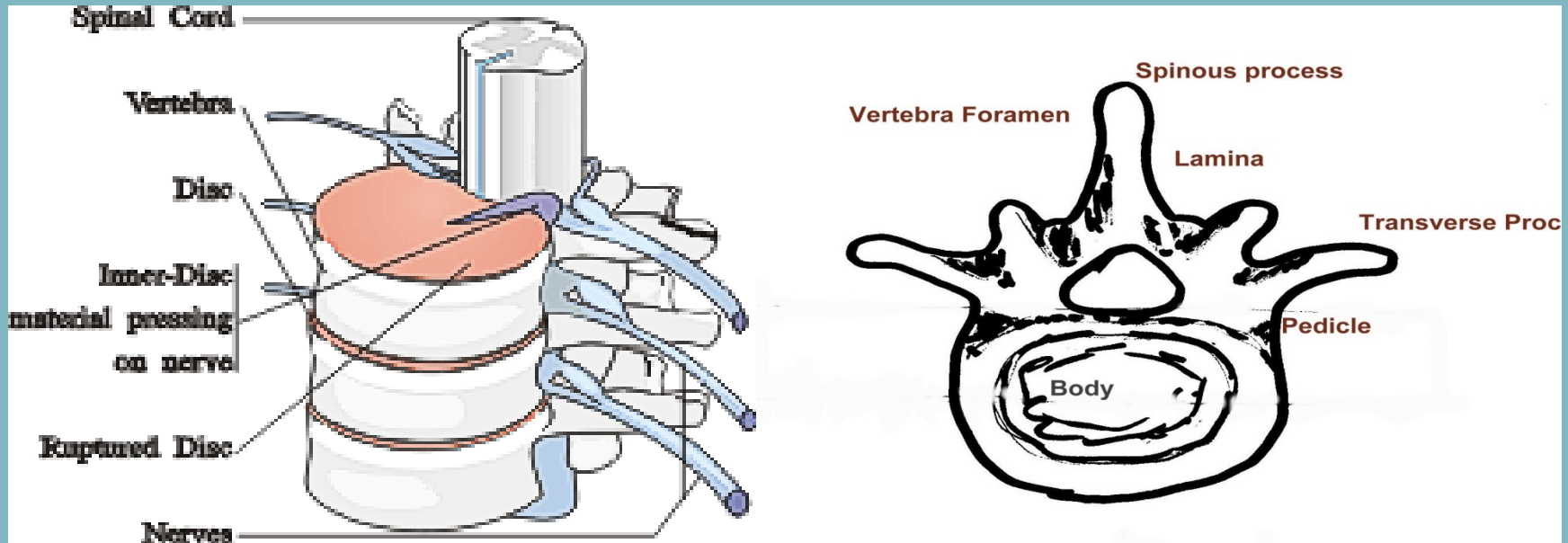
Cervical Spine: Anatomic Review



Cervical Spine: Anatomic Review

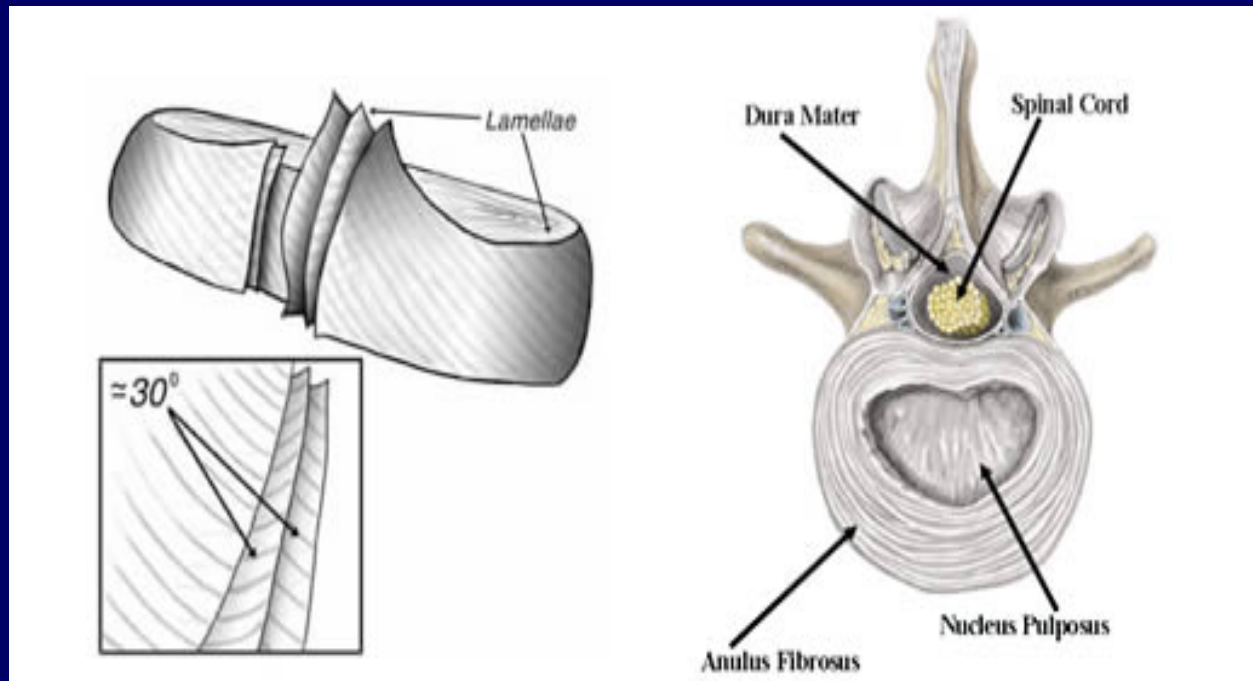


Cervical Spine: Anatomic Review



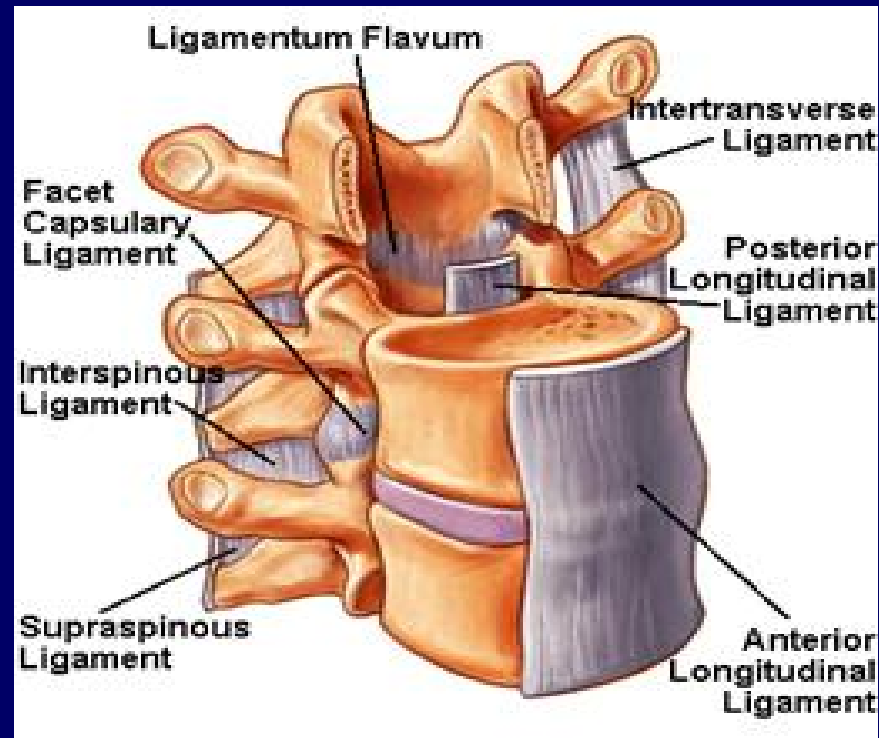
BONE, SOFT TISSUE,
NERVES

Cervical Spine: Anatomic Review

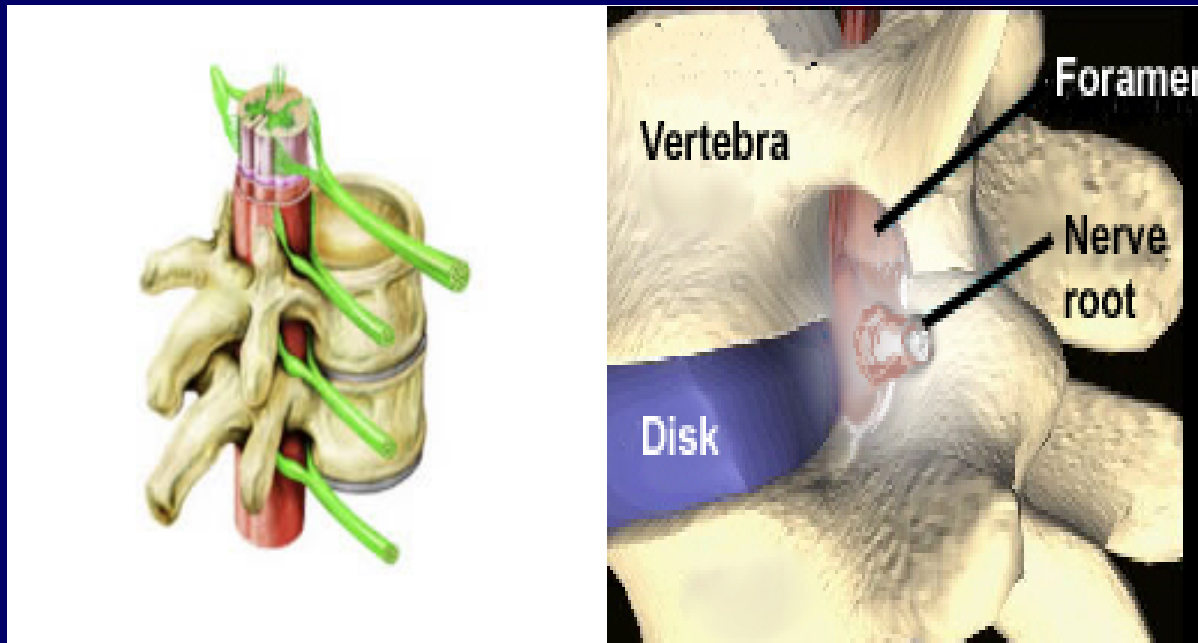


Intervertebral Discs

Cervical Spine: Anatomic Review



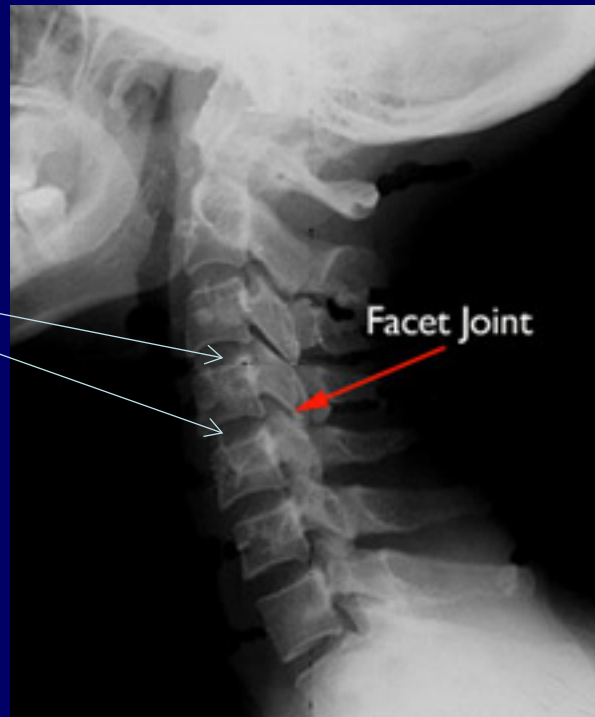
Cervical Spine: Anatomic Review



Nerves

Cervical Spine: Anatomic Review

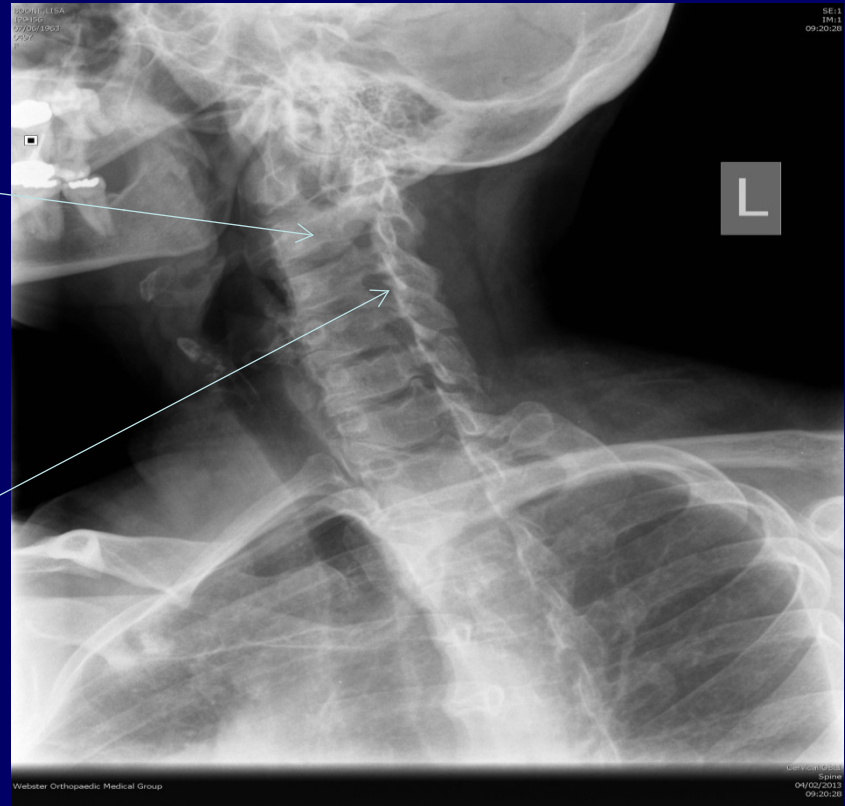
Discs



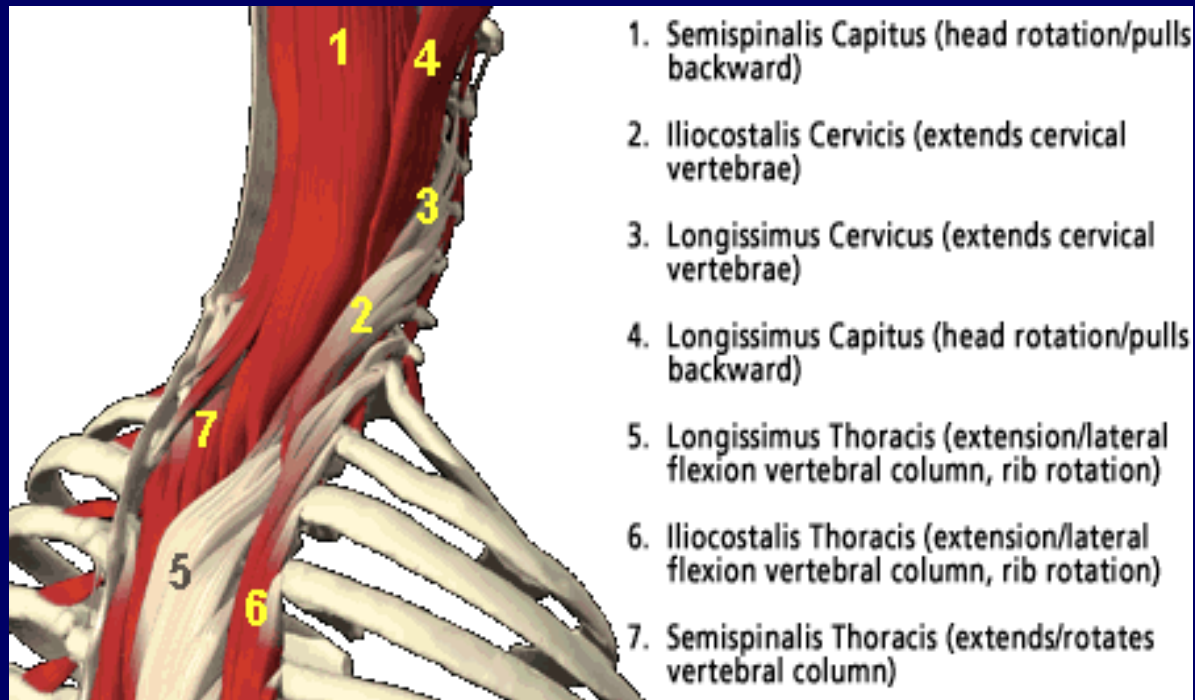
Cervical Spine: Anatomic Review

Vertebral body

Neural Foramen



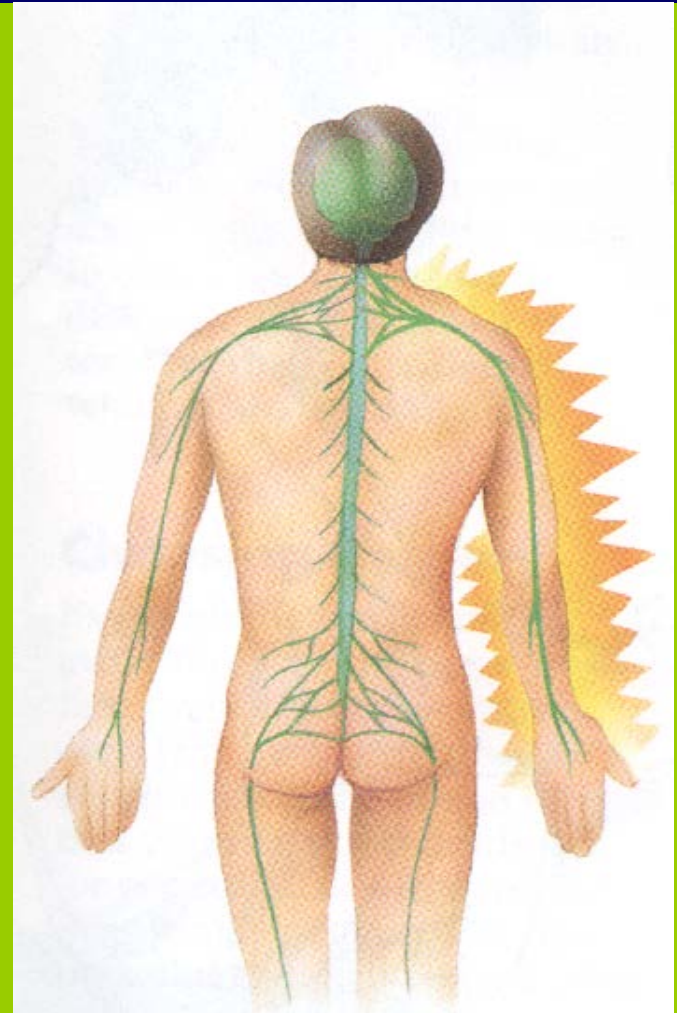
Cervical Spine: Anatomic Review



Muscles and Tendons

Neck & Arm Pain

- * May be due to cervical disk
- * Sometimes hard to separate causes:
 - shoulder
 - arm
 - carpal tunnel



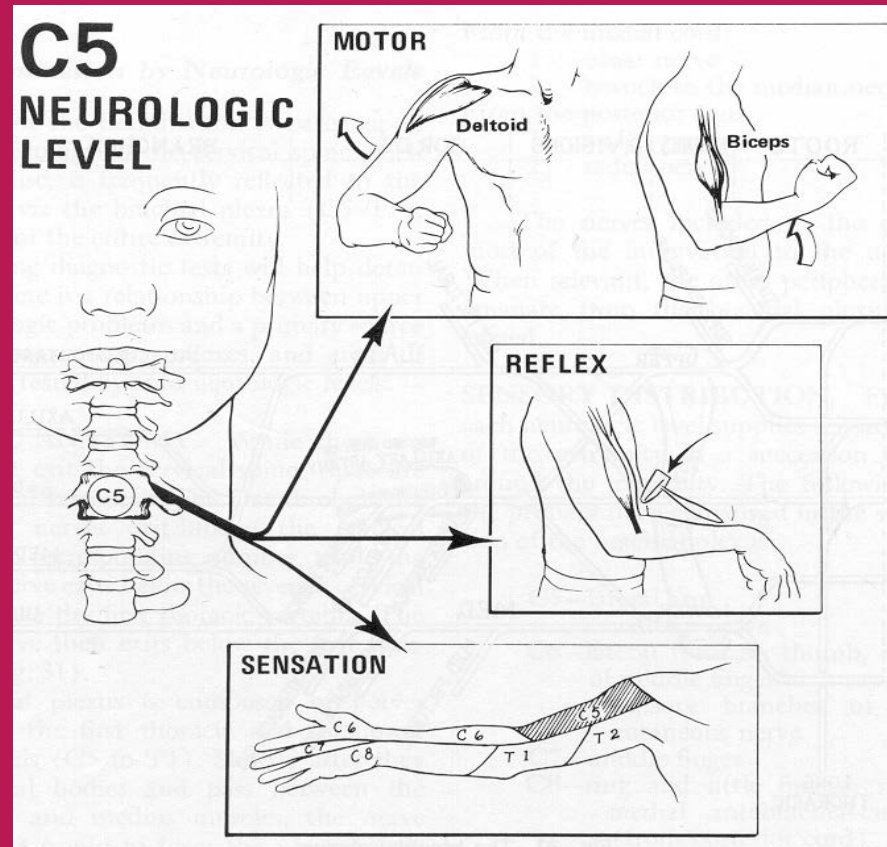
Mechanical Contributors to Cervical Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- Herniated Nucleus Pulposus (HNP)

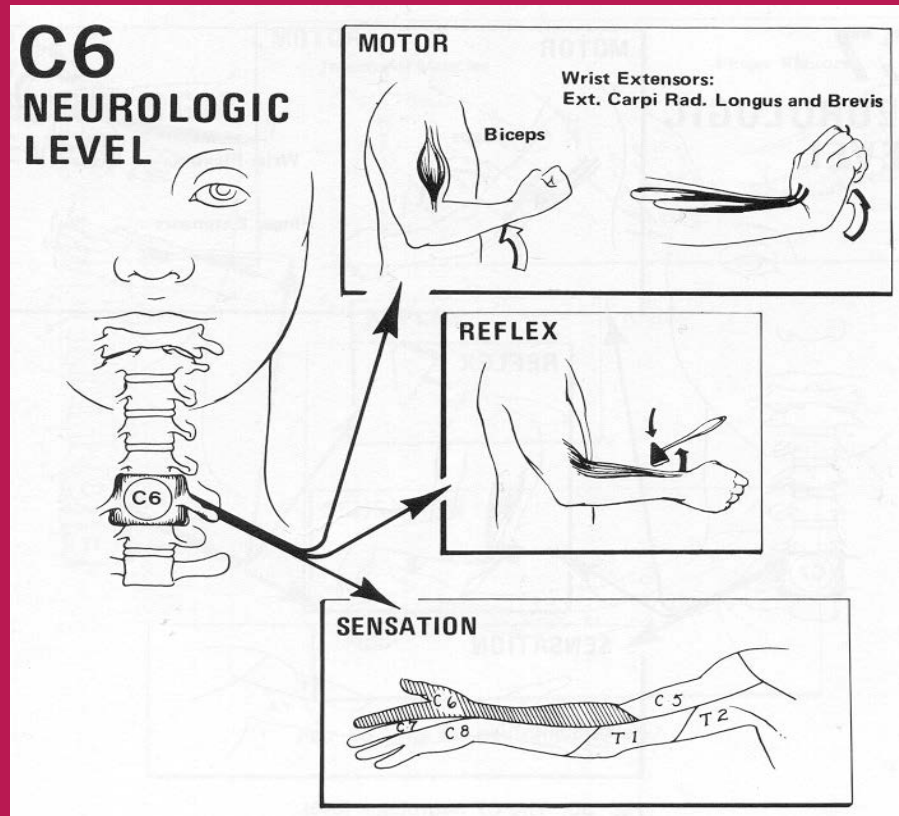
Cervical Nerve Compression

- ❖ Acute onset of pain starting in the medial shoulder blade area, upper arm culminating in numbness and tingling in fingers
- ❖ Causes: woke up funny, MVA, "benching heavy at the gym"
- ❖ Easily confused with intrinsic shoulder pain and peripheral nerve lesions.

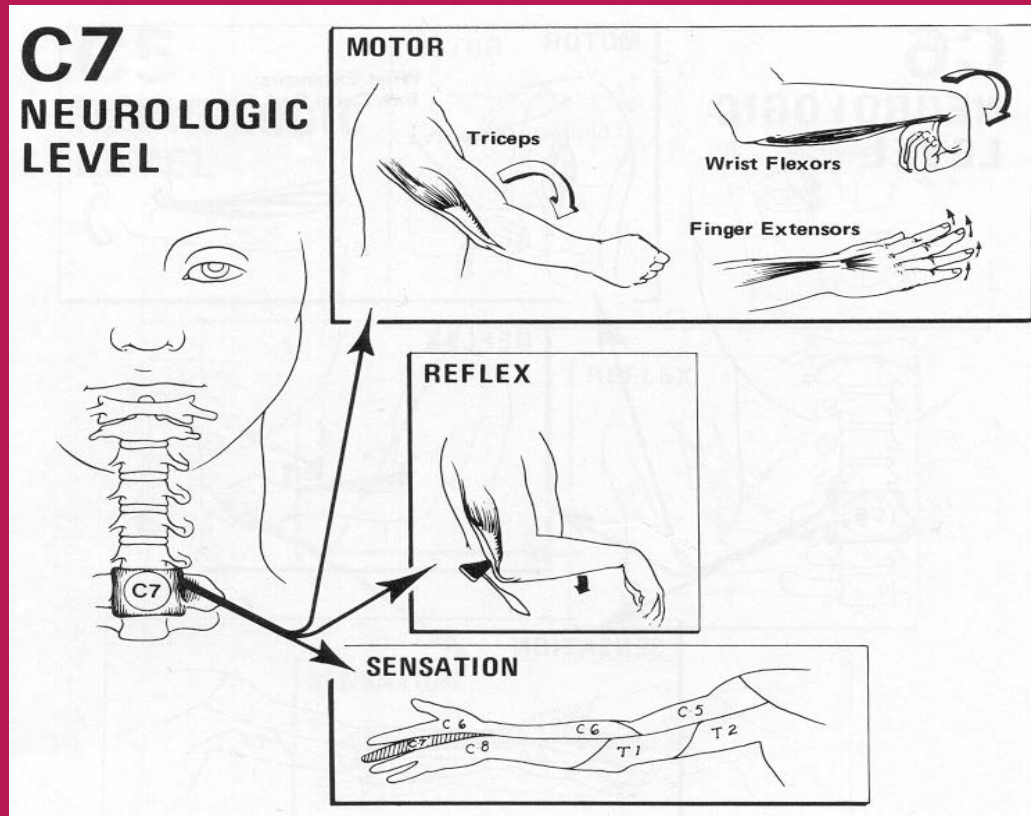
C5 Neurology



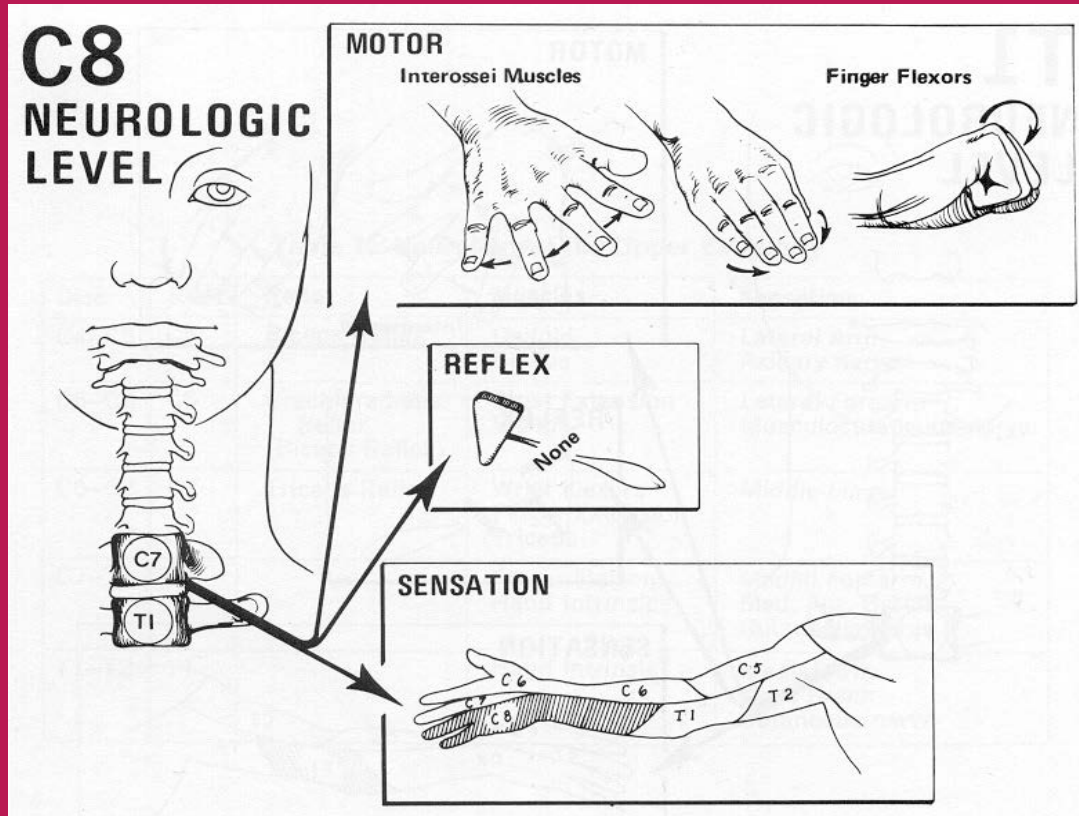
C6 Neurology



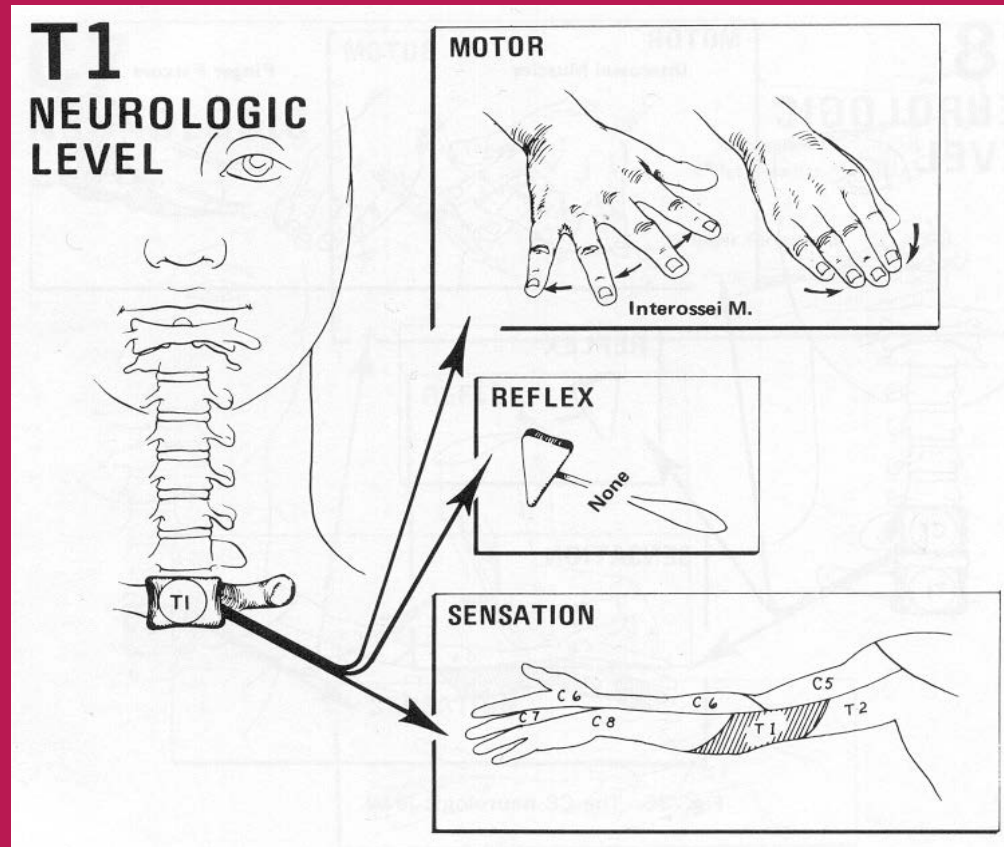
C7 Neurology



C8 Neurology



T1 Neurology



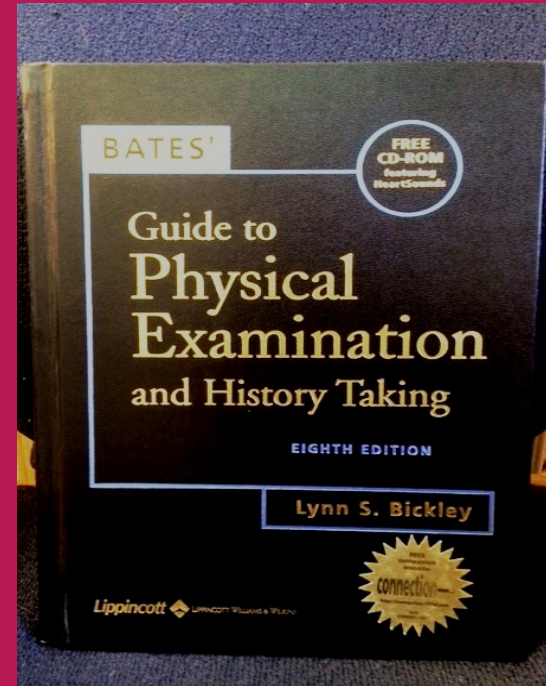
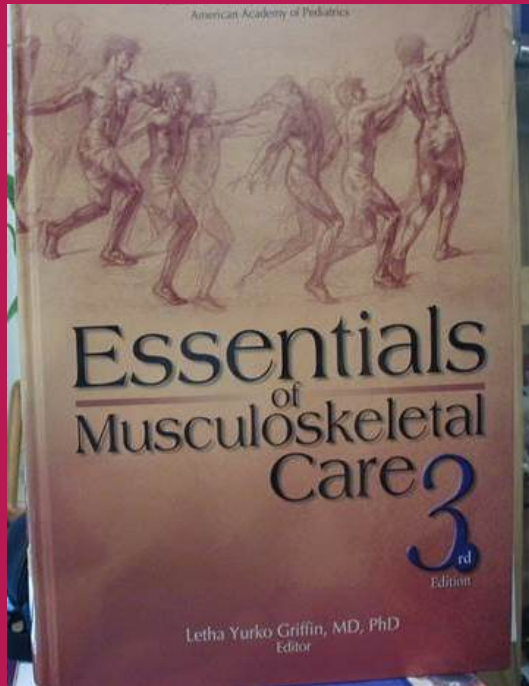
Case Study #1

- 61 y/o male orthopedic surgeon
- Healthy appearing; slender
- Chronic cervical spine pain; bilateral shoulder pain; daily headaches X 1 mo.
- No history of previous trauma/injuries
- Well-controlled HTN/HLD; on beta blocker, statin, and 81 mg ASA daily.

The Cervical Spine

**Interview and examine
the patient before
any diagnostics are
performed!**

History & Physical Exam



O.L.D. C.A.R.T.S.

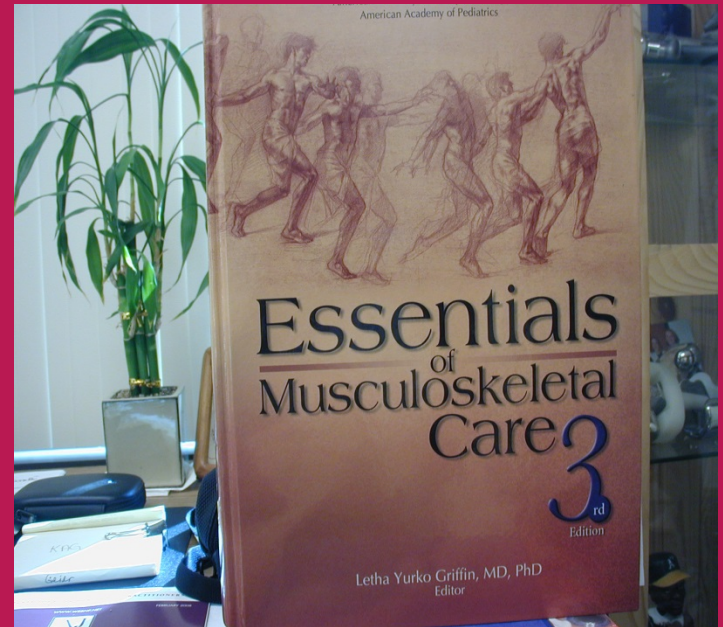
- Onset
 - Location
 - Duration
 - Character
 - Aggravates/Alleviates
 - Radiation
 - Timing
 - Severity
- When did it start?
 - Where is it?
 - How long does it last?
 - What does it feel like?
 - ? makes worse/better
 - Where does it go?
 - When does it happen?
 - Scale of 1-10

HPI: Case Study #1

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Onset• Location• Duration• Character• Aggravates/Alleviates• Radiation• Timing• Severity | <ul style="list-style-type: none">• "H/As began 1 mo ago; neck pain for sev. yrs. "• "neck & shoulders"• "intermittent"• "aching; grinding; stiff "• "performing surgery/ ibuprofen"• "B trapezius; shoulders"• "H/As after work daily"• "8/10" |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Physical Examination

- ❖ Inspection
- ❖ Palpation
- ❖ Percussion
- ❖ Range of Motion (ROM)
- ❖ Sensation
- ❖ Circulation
- ❖ Muscle Testing
- ❖ Special Tests



Physical Examination: Cervical Spine

Inspection

skin: rashes, abrasions, scars, color, swelling, masses

Posture, alignment, curves: kyphosis; lordosis; scoliosis;
torticollis; “military” spine

Palpation

skin: temperature, swelling, tenderness

paraspinal muscles: tenderness, spasm

spinous processes: tenderness, step off

muscle strength: graded 0 - 5

Physical Examination

Percussion

**Reflexes - Biceps (C5,C6); Triceps (C6,C7);
Brachioradialis (C5,C6)**

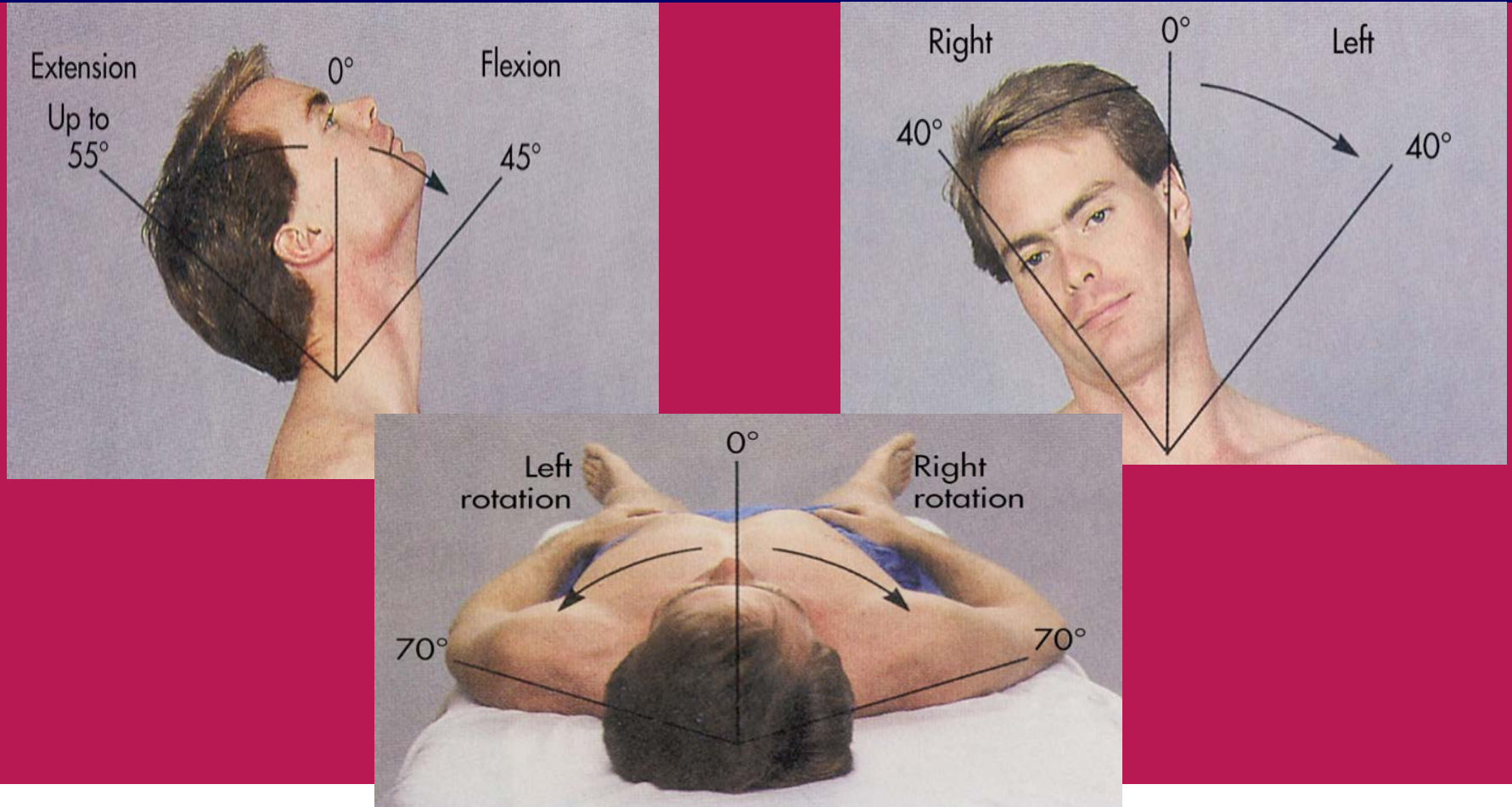
***Graded 0 – 4+ (2+ = Normal/Average)**

*** Use reinforcement or distraction if reflexes absent or diminished; i.e., clench teeth**

Range of Motion (ROM)

- **Flexion/Hyperextension**
- **Lateral bend**
- **Rotation**

Range of Motion (ROM)



P.E.: Case Study #1

- Inspection
- Palpation
- Reflexes
- Range of Motion
- Strength
- Sensation
- Circulation

- Skin w/o scars; cervical spine curve nl lordotic
- TTP bilateral trapezius
- 2+ (average; normal)
- Full, but stiff & painful
- WNL
- WNL
- WNL

Diagnosis: Case Study #1

- Probable
- Possible
- Rule Out
- Unlikely

Mechanical Contributors to Cervical Spine Disorders

- Spondylosis
- Spinal stenosis
- Degenerative disc disease
- Spondylolisthesis
- HNP

DISORDERS OF THE CERVICAL SPINE

Cervical spondylosis =
Arthritis of the neck

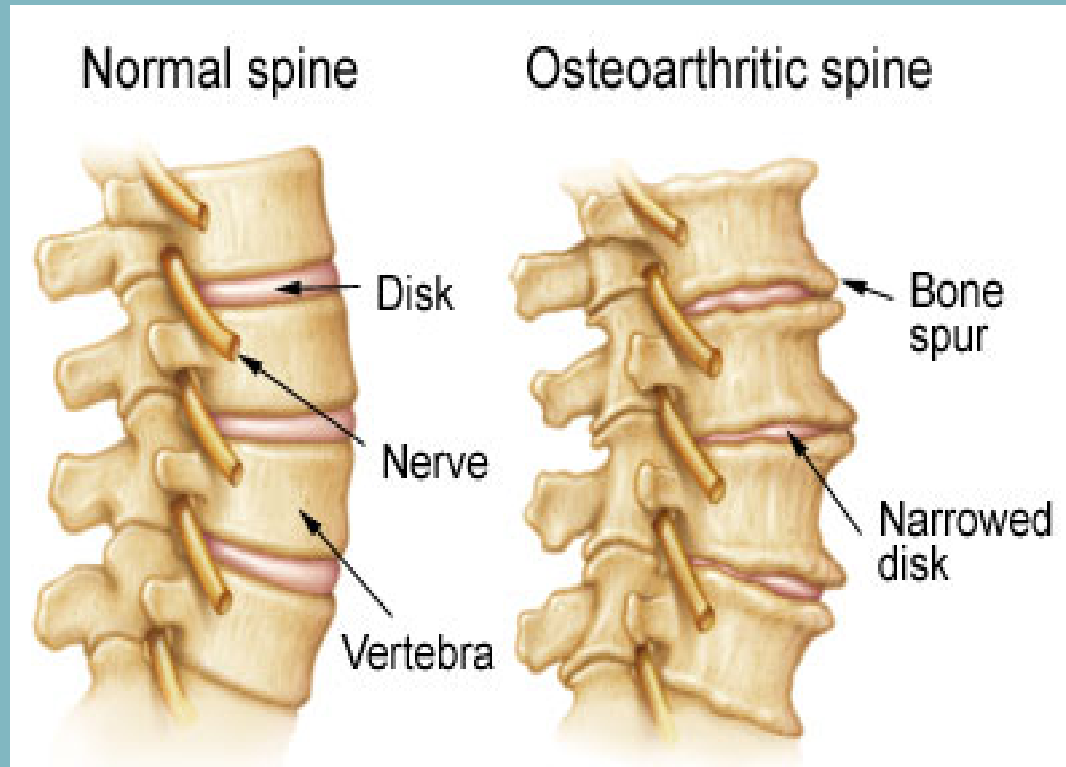
More than 85% of people >60 are
affected

Cervical Spondylosis

Definition: arthritis of the neck caused by slow degeneration.

Degeneration of the spinal column, especially that resulting in abnormal fusion and immobilization of the vertebral bones.

Cervical Spondylosis



Cervical Spondylosis

Risk factors

- Age
- Occupation
- Neck injuries
- Genetic factors

Cervical Spondylosis

Symptoms

- Neck pain & stiffness
- Numbness & weakness in arms, hands, & fingers
- Trouble walking, loss of balance, or weakness in hands or legs

Cervical Spondylosis

Symptoms (cont.)

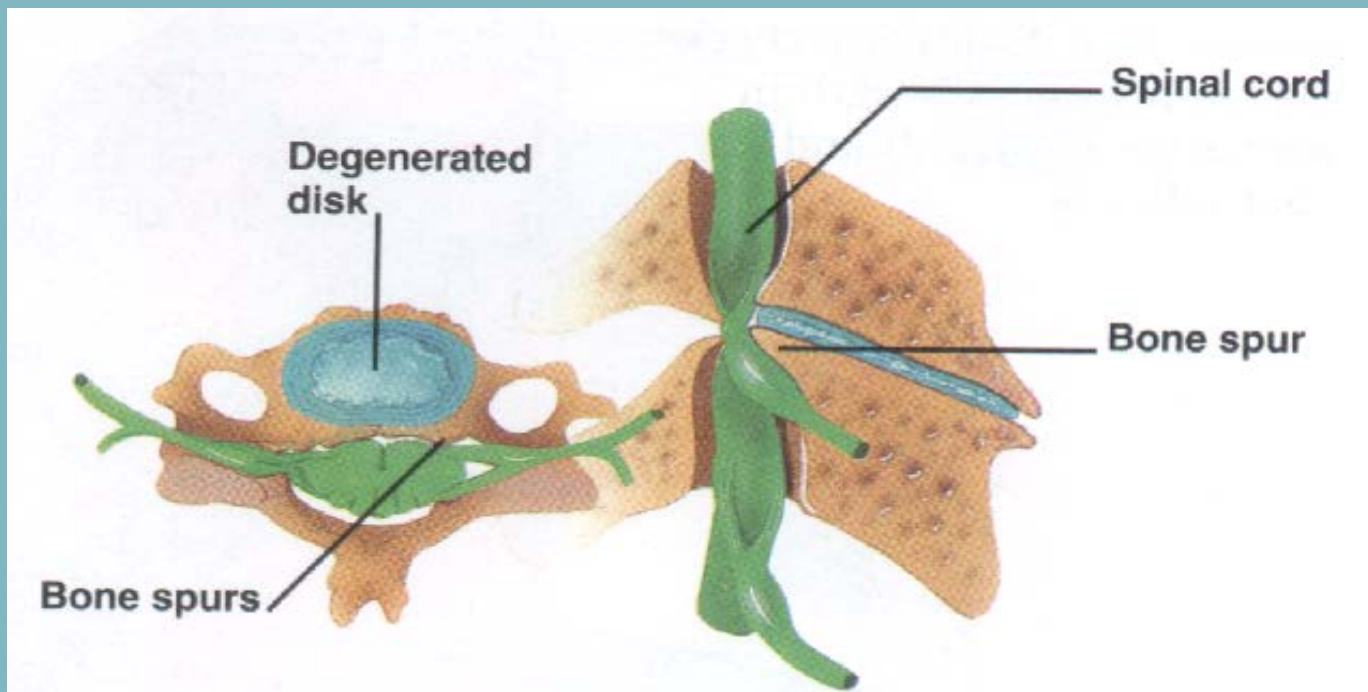
- Muscle spasms in neck and shoulders
- Headaches
- Grinding & popping sound/feeling in neck w/ movement

Mechanical Contributors to Cervical Spine Disorders

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Spinal Stenosis

Definition: narrowing of the spine



Spinal Stenosis

- * Etiology: congenital vs. acquired (degenerative)
- * Lumbar region most common
- * Also called neurogenic claudication

Spinal Stenosis

SYMPTOMS

- Stiffness, pain, numbness, or weakness in the neck, shoulders, arms, hands, or legs.
- Balance/coordination problems; shuffling or tripping while walking
- Loss of bowel or bladder control

Imaging/Diagnostics

- ❖ X-Rays - show the bones
- ❖ CT (CAT) scans - 3D X-rays
- ❖ MRI - 3D scans of the soft tissue
- ❖ EMG's - test for nerve or muscle damage

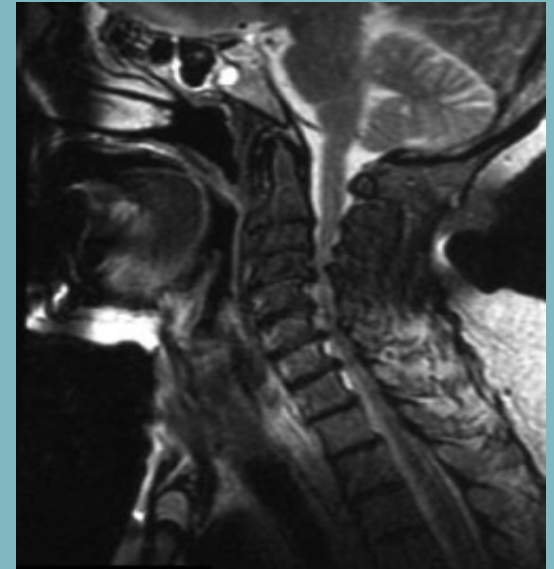
Cervical Spondylosis



Normal x-ray



Spondylosis on x-ray



Spondylosis on MRI

Treatment: Case Study #1

- ❖ Rest, ice
- ❖ Meds: NSAIDs, steroid burst, narcotic and
Non-narcotic analgesics, gabapentin, muscle relaxers
- ❖ Physical therapy
- ❖ Chiropractic
- ❖ Manual traction
- ❖ Epidural injection

Treatment: Case Study #1

- Physical Modalities
- DME
- PT
- Pharmacological
- Activity Modification
- Referrals

Case Study #2

- 40 y/o female yoga instructor
- Healthy appearing; fit
- Sudden onset acute cervical spine and left shoulder pain after “heavy exercising” with left arm weakness.
- History of previous MVA 20 yrs ago
- No significant co-morbidities; takes OCP

HPI: Case Study #2

- Onset
 - Location
 - Duration
 - Character
 - Aggravates/Alleviates
 - Radiation
 - Timing
 - Severity
- "yesterday after yoga"
 - "neck & left shoulder"
 - "constant"
 - "burning; stabbing"
 - "Arm use/rest"
 - "down left arm"
 - "worse in evening"
 - "9/10"

P.E.: Case Study #2

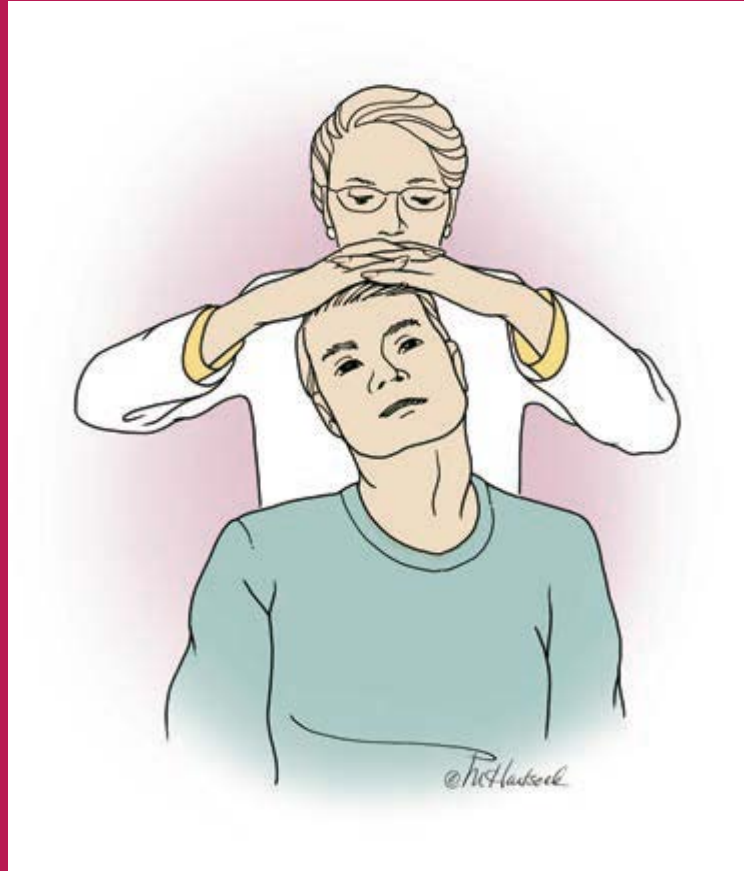
- Inspection
 - Palpation
 - Reflexes
 - Range of Motion
 - Strength
 - Sensation
 - Circulation
- Skin w/o scars; cervical spine military (no curve)
 - TTP & spasms, bilateral trapezius; L > R
 - L Brachioradialis 1+
 - limited; **painful**
 - Weak L wrist extension
 - Numb left thumb
 - WNL

Special Tests: Case Study #2

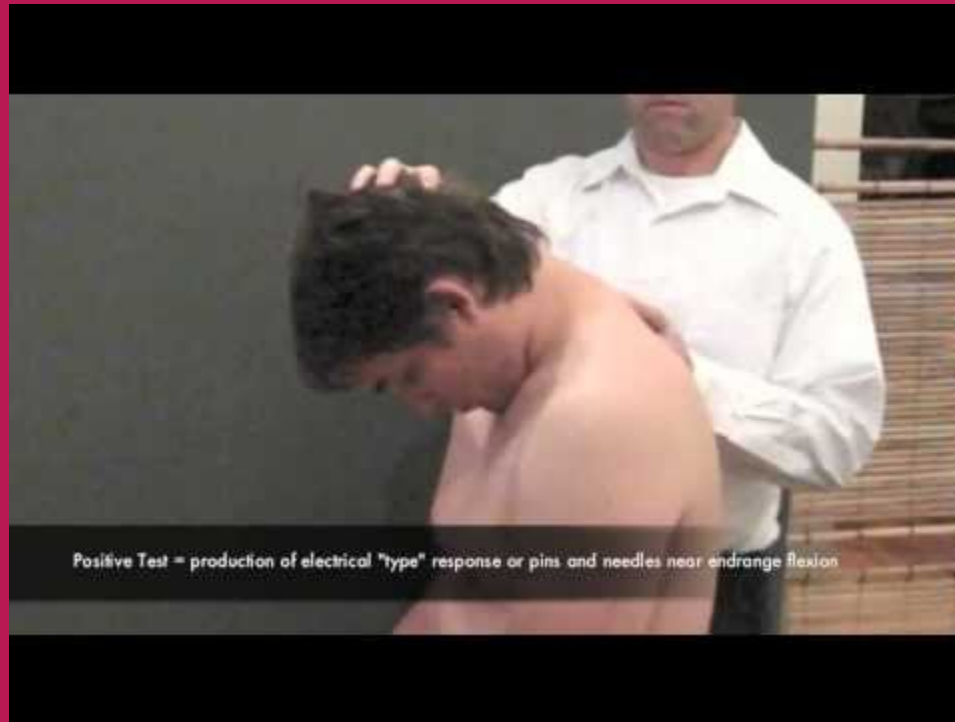
- ❖ Spurling's maneuver
- ❖ Lhermitte's sign
- ❖ Hoffman's reflex

- ❖ Positive left
- ❖ Negative
- ❖ Negative

Spurling's Maneuver



Lhermitte's Sign



Hoffmann's reflex



Diagnosis: Case Study #2

- Probable
- Possible
- Rule Out
- Unlikely

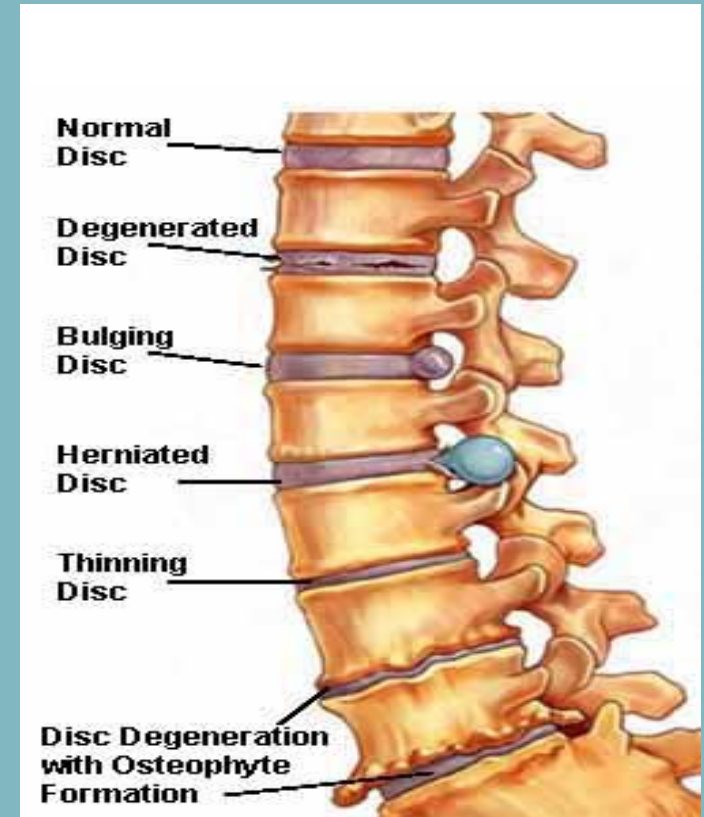
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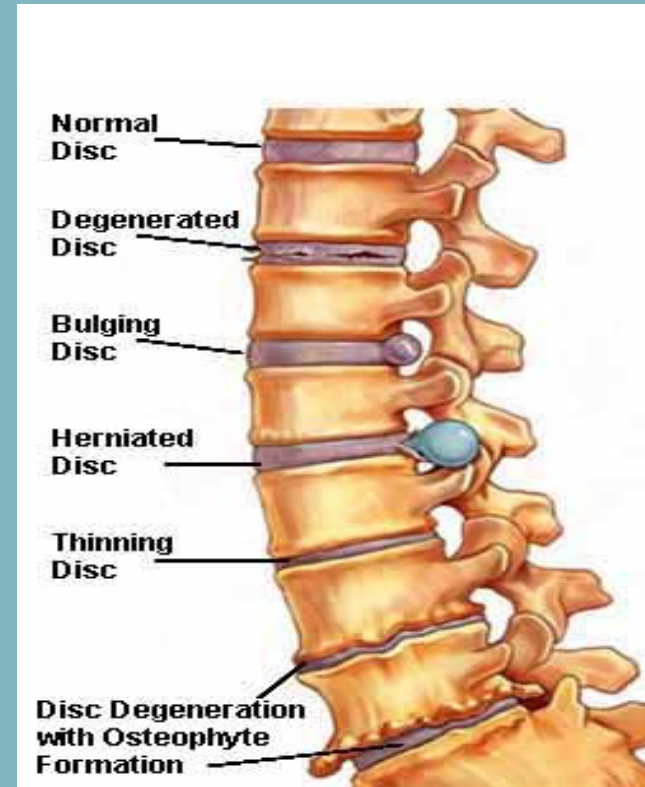
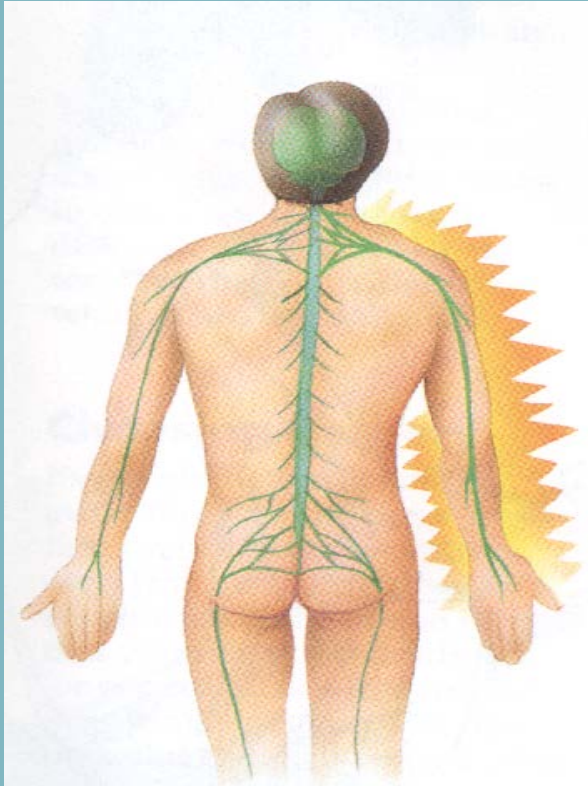
Degenerative Disc Disease

Symptoms

- Pain
- Stiffness
- Numbness/weakness in shoulder, arm, or hand



Degenerative Disc Disease



Imaging/Diagnostics: Case Study #2

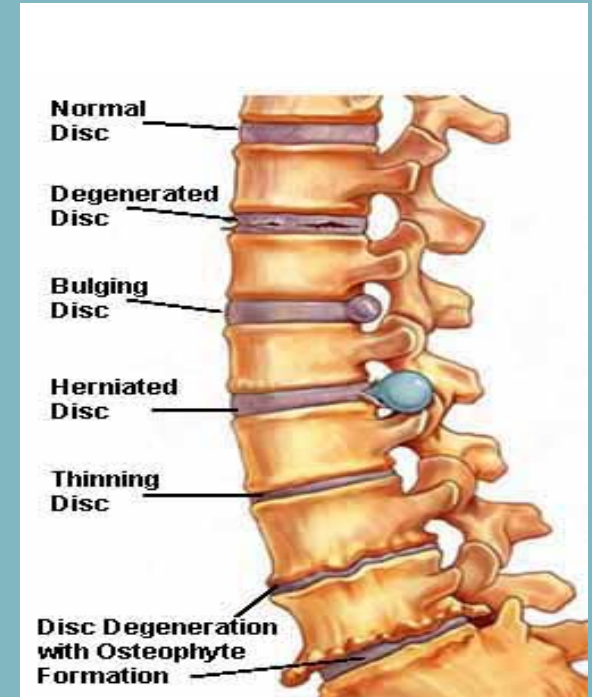
❖ X-ray

❖ MRI

❖ C5-6 disc space narrowing

❖ L C5-6 disc herniation

Cervical Degenerative Disc Disease/HNP



Treatment: Case Study #2

- Physical Modalities
- DME
- Pharmacologic
- Referral
- Activity Modification
- Other

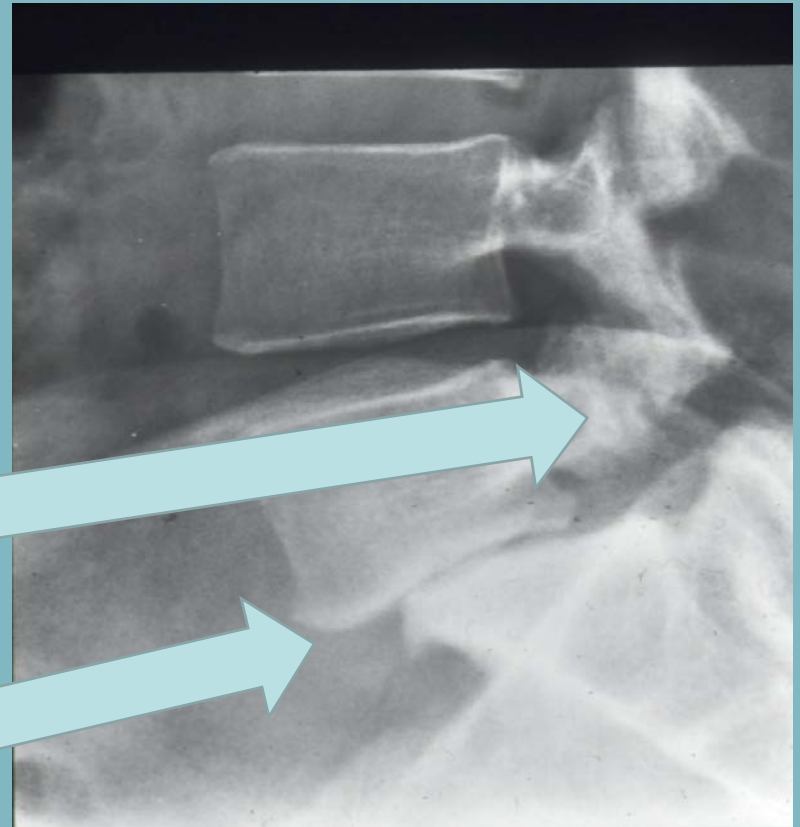
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Spondylolysis/Spondylolisthesis

Definitions:

- spondylo = vertebrae
- lysis = broken
- listhesis = slipped forward

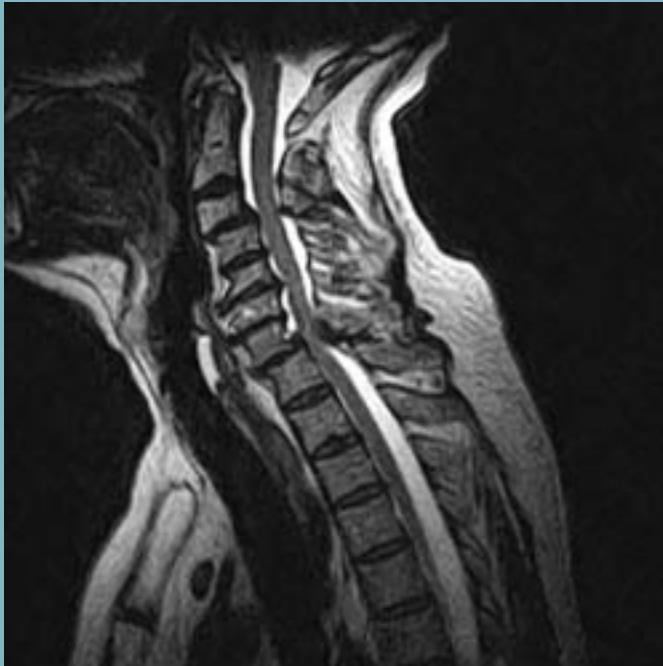


Cervical Spondylolisthesis

Symptoms

- ❖ Neck pain that extends toward the shoulder
- ❖ Pain between the shoulder blades
- ❖ Pain in the back of the head
- ❖ Radicular symptoms w/ pain, numbness, or weakness extending into the arms or legs
- ❖ Loss of coordination
- ❖ Bowel or bladder incontinence

Cervical Spondylolisthesis



Recumbent



Upright Seated

References

American Academy of Orthopaedic Surgeons (2013). OrthoInfo.org. Cervical Spondylosis (Arthritis of the Neck). Retrieved from AAOS.org. 2/12/15

Daffner, R.H. Radiologic Evaluation of Chronic Neck Pain. (2010). *American Family Physician*. 82(8), 959-963.

Eubanks, J.D. Cervical Radiculopathy: Nonoperative Management of Neck Pain and Radicular Symptoms. *American Family Physician*. 81(1), 33-40.

O'Leary, S., Falla, D., Elliott, J.M., & Jull, G. Muscle Dysfunction in Cervical Spine Pain: Implications for Assessment and Management. *Journal of Orthopaedic & Sports Physical Therapy*. 39(5), 324-333.

About JOF

- Our Mission: To improve the lives of people with musculoskeletal conditions through education, research & service.
- Our Goal: To raise the profile and priority of non-surgical musculoskeletal health with local hospitals, schools and the general public, while encouraging a collaborative, multi-disciplinary care model in ortho community.
- We call this approach Orthopedic Primary Care.

About JOF

- We strive to remove barriers to innovation and improvement of care by embarking on efforts that build community among schools, hospitals, providers, & the industry.
- JOF's vision is to be the Bay Area's pre-eminent resource for information, collaboration and innovation affecting musculoskeletal health and common orthopedic conditions.



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