

Workup and Treatment of Non-Traumatic Neck Pain

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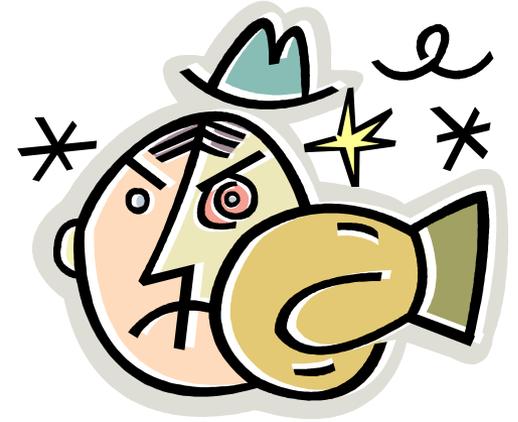
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Background

- ▶ 1 Year Prevalence of neck pain approximately 20% ,and lifetime prevalence at 67%
- ▶ 75% have recurrent neck pain in 1–5 years
- ▶ 50% of those with whiplash associated neck pain report symptoms at 1 year +
- ▶ Most episodes resolve spontaneously in first 2 weeks, minority take 6–12 weeks; <1% require surgical intervention



Common Causes of Mechanical Neck Pain

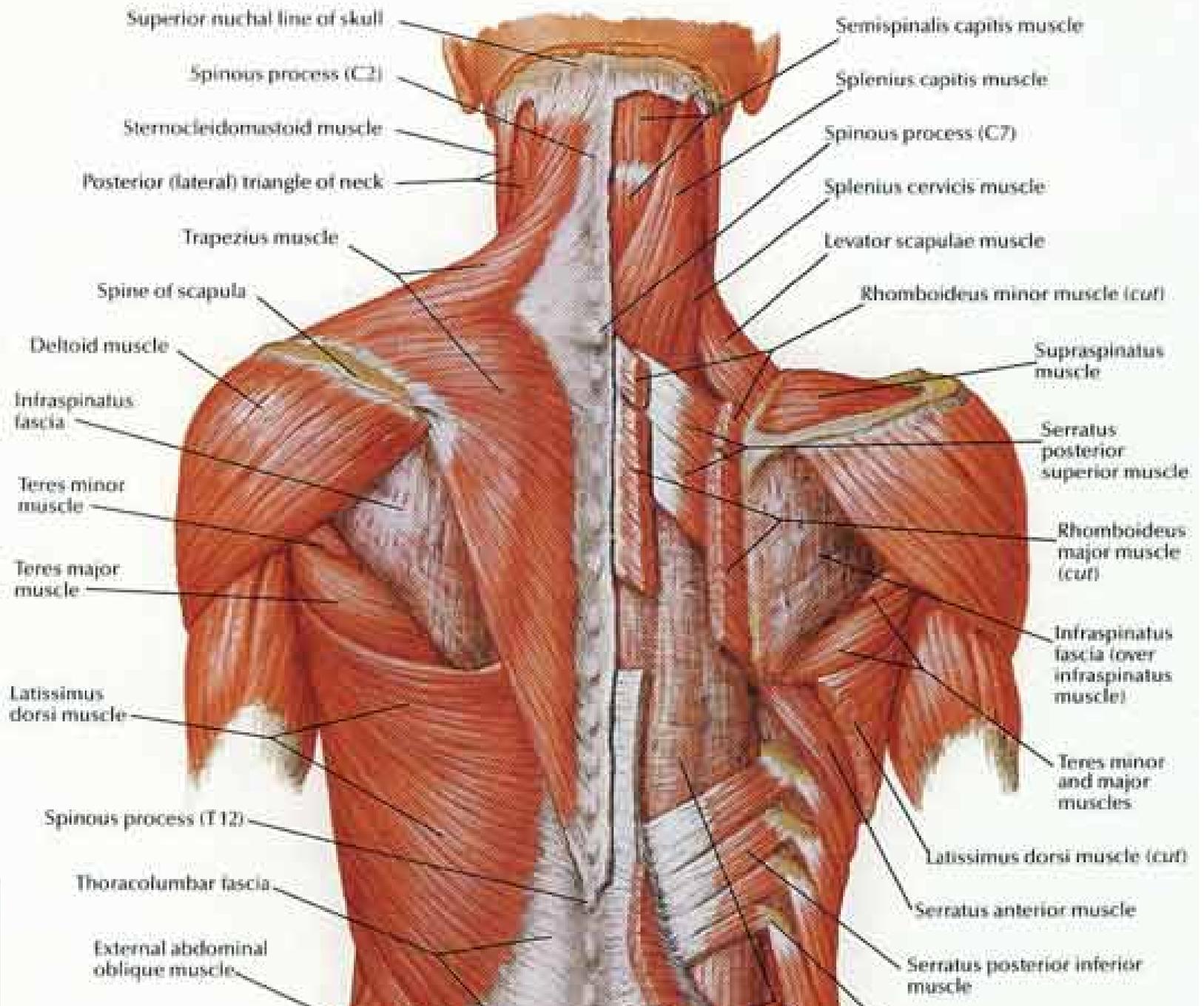


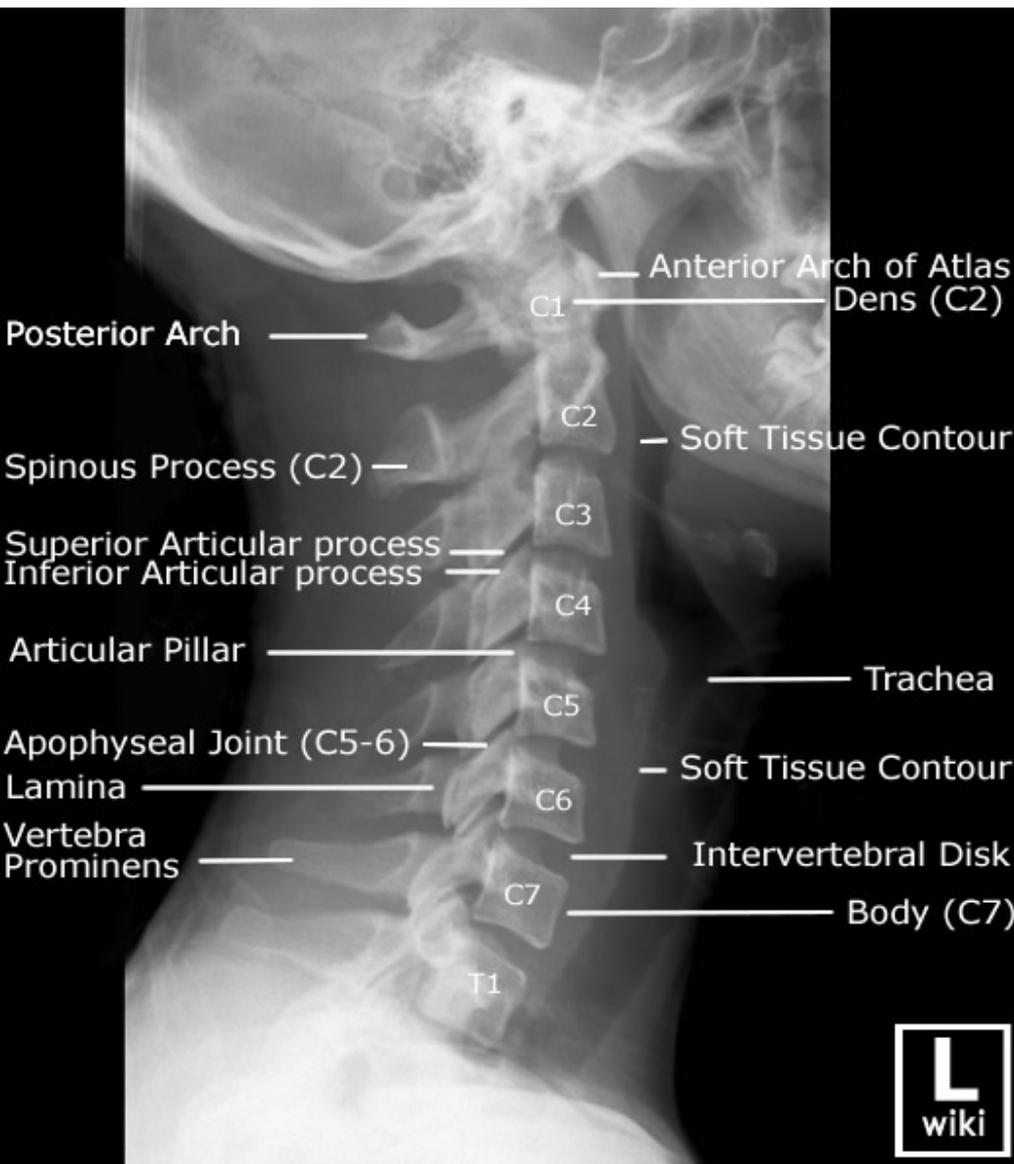
Neck pain only: axial neck pain

- Facet joint arthropathy
- Whiplash–Associated Disorder (may include facet joints, myofascial, ligamentous, discogenic)
- Discogenic neck pain (internal disc disruption)
- Strain/Myofascial pain

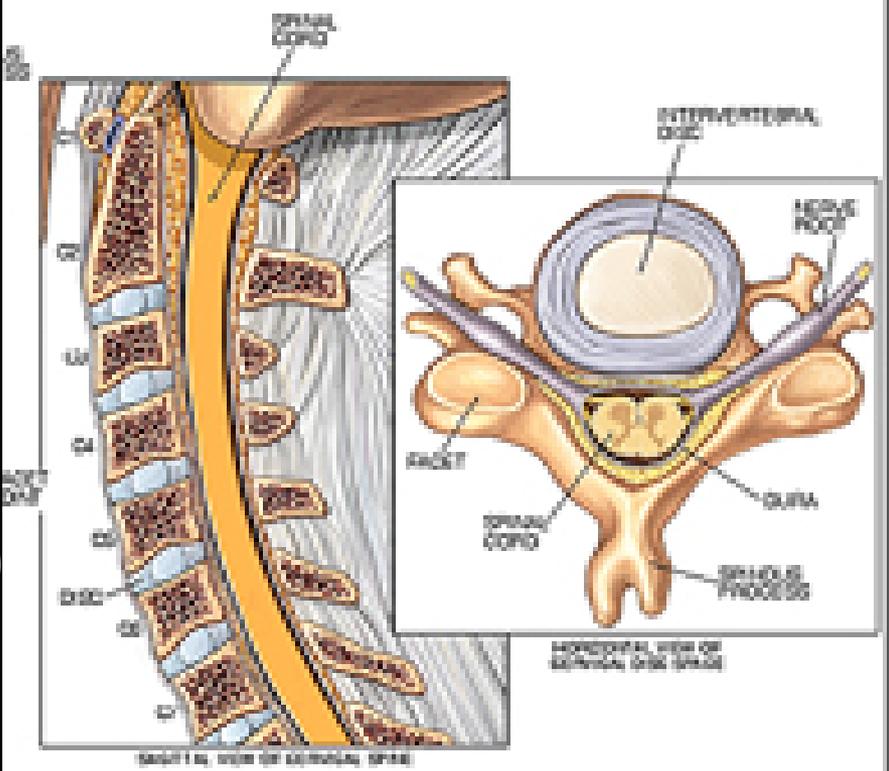
Neck pain with radiation to the arm

- Spinal stenosis
- Herniated disc
- Myelopathy (may include leg and gait change)





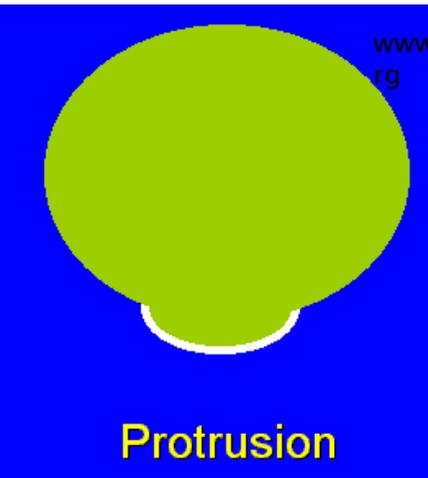
ANATOMY OF THE CERVICAL SPINE



Herniation

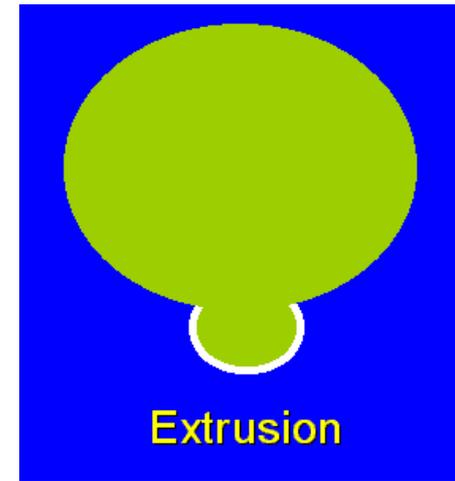
NEW NOMENCLATURE

disc material is smaller peripherally than at base



disc material is wider peripherally than at base

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~~Focal~~

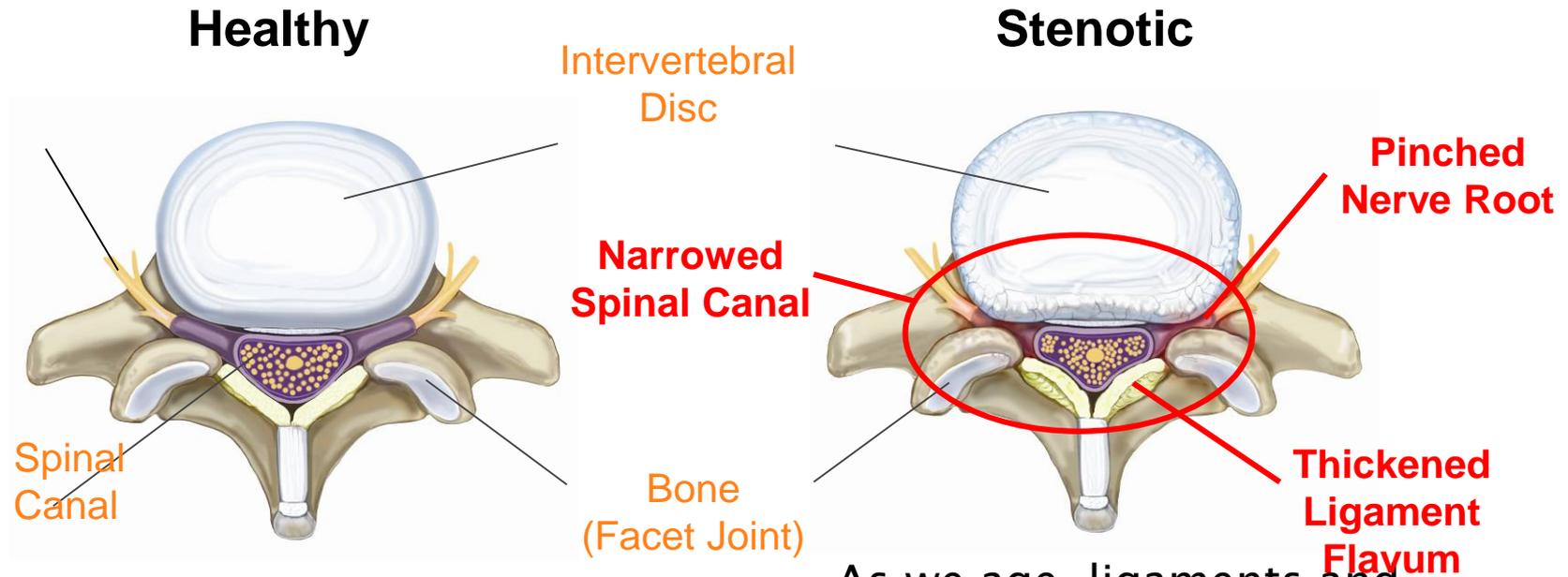
~~Broad-Based~~

~~Focal~~

~~Broad-Based~~

Sequestration - extrusion that loses all continuity with parent disc (a.k.a. "free")

Spinal Stenosis



- ▶ Vertebrae provide support for your head and body
- ▶ Discs act as “shock absorbers”
- ▶ Vertebra protects spinal cord
- ▶ Nerves have space and are not pinched

- As we age, ligaments and bone can thicken
- Narrowing is called “stenosis”
- Narrowing impinges on nerves in spinal canal and nerve roots exiting
- Result – pain & numbness in neck and arms (legs—myel)

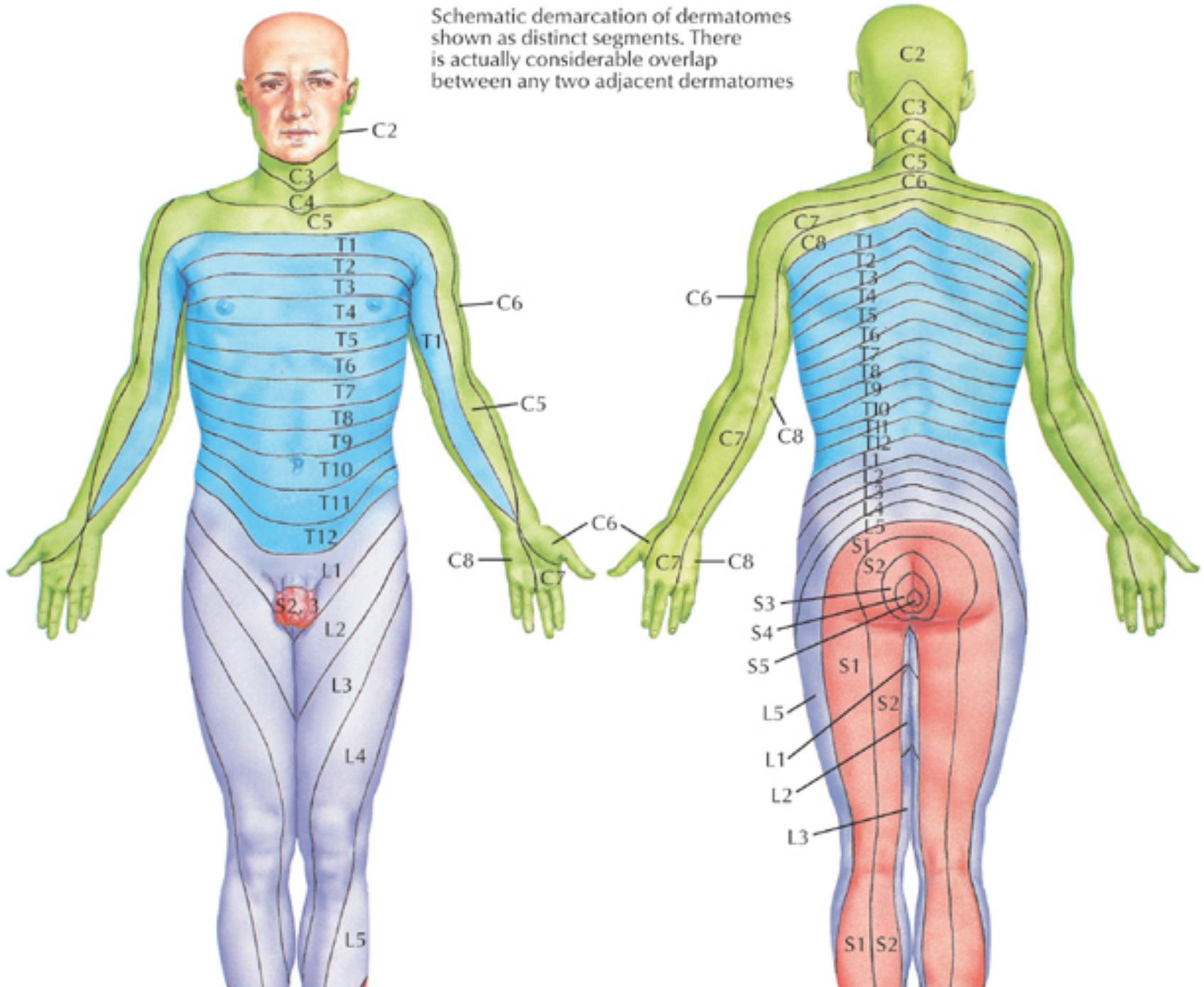
Radicular vs Somatic Referred Pain

	SOMATIC PAIN	RADICULAR PAIN
CAUSES	FACET JOINT, MYOFASCIAL, DISCOGENIC	DISC HERNIATION, ANNULAR TEAR, SPINAL STENOSIS
SYMPTOMS	DEEP, ACHING, POORLY LOCALIZED, NECK MORE THAN ARM, NO PARESTHESIA, COVERS WIDE AREA, NO RADICULAR PAIN	SHARP, SHOOTING, WELL LOCALIZED, ARMS MORE THAN NECK, PARESTHESIA, WELL DEFINED AREA, RADICULAR DISTRIBUTION
MODIFICATION	WORSE WITH EXTENSION, BETTER WITH FLEXION	WORSE WITH FLEXION, BETTER WITH EXTENSION
RADIATION	NECK TO HEAD, SHOULDER BLADES, UPPER BACK, ABOVE ELBOW	FOLLOWS NERVE ROOT DISTRIBUTION, BELOW ELBOW COMMON
SIGNS: SENSORY/MOTOR/REFLEX	NO	POSSIBLE

NERVE ROOT COMPRESSION

ROOT INVOLVED	LOCATION OF LESION	REFERRED PAIN	MOTOR	SENSORY	REFLEX
C5	C4-5	SHOULDER/ UPPER ARM	SHOULDER MUSCLES	SHOULDER	BICEPS
C6	C5-6	BICEPS AND RADIAL ASPECT OF FOREARM	BICEPS	RADIAL ASPECT OF FOREARM	BICEPS
C7	C6-7	TRICEPS AND DORSAL ASPECT OF FOREARM	TRICEPS	INDEX AND MIDDLE FINGERS	TRICEPS
C8	C7-T1	ULNAR ASPECT FOREARM	INTRINSICS OF HAND	RING AND LITTLE FINGERS	none

Schematic demarcation of dermatomes shown as distinct segments. There is actually considerable overlap between any two adjacent dermatomes



History



- ▶ Don't forget family history, past history, review of systems, social history
- ▶ Emergency or not
- ▶ Red Flags: cancer history, fever/recent infection, IV drug use, immunocompromised, steroid use, weight loss, severe/progressive MOTOR deficit, bowel/bladder incontinence/retention

Step 1: Rule out Cervical Spondylitic Myelopathy

- ▶ Secondary to compression of neural elements (spinal cord and nerve roots)
- ▶ Progressive neurologic deficits including weakness, spasticity, gait
- ▶ Usually due to spondylosis causing decrease in volume of spinal canal
- ▶ Venterolateral lesions lateral aspect of cord and nerve roots: combination of arm and leg dysfn
- ▶ Midline lesions/central aspect of cord: usually no nerve root compression upper, but have leg and gait issues, +/- bowel/bladder
- ▶ MRI or CT myelogram to diagnose
- ▶ Surgical decompression ASAP for best results



Step 2: Rule out systemic illness

▶ Acute severe symptoms in those w/o cervical myelopathy may suggest systemic illness

▶ 5 questions to ask:

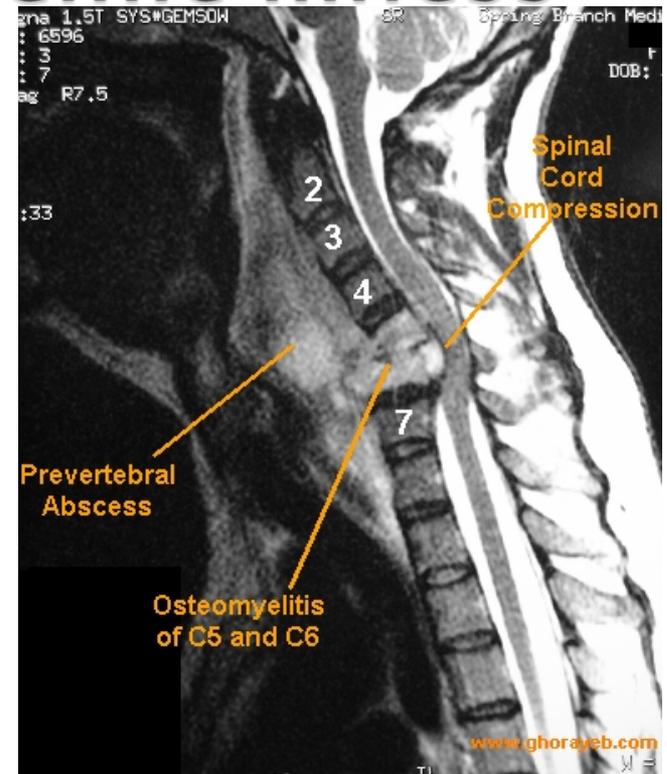
1. Constitutional symptoms of fever, weight loss suggestive of infection (osteomyelitis, meningitis, discitis) or tumor

2. Pain that is increased with recumbency at night may have spinal cord tumor, MS

3. Prolonged morning stiffness may have spondyloarthropathy (RA, PMR, Ankylosing spondylitis)

4. Localized cervical bone pain may be due to Paget's disease, sarcoidosis or local tumor (osteoblastoma)

5. Viscerogenic pain (angina, carotid artery dissection, thoracic aortic dissection, thoracic outlet syndrome, cholecystitis, esophageal)



Presentation and Diagnosis

- ▶ **Neck pain predominant:** May be cervical spondylosis, i.e. degenerative disc disease, facet joint disease, esp at C56/C67 levels
- ▶ **Neck pain Interscapular Predominant:** may have trapezius muscle tension or instability of cervical spine, esp C3–7 levels (flex/extension films)
- ▶ **Arm Pain Predominant—Compression syndromes of vascular structures or peripheral nerves, shoulder:** Adson's test for thoracic outlet, shoulder eval, Tinel's at ulnar and carpal tunnels, EMG/NCS, Brachial plexus injury
- ▶ **Arm pain Predominant—Herniated discs:** Also consider double-crush—axons compressed on one region may be more susceptible to impairment at distant site (patterns of arm pain that exceed expected regional involvement of peripheral nerve)
- ▶ **Proximal muscle/Tender point pain:** myofascial syndrome, PMR, Fibromyalgia



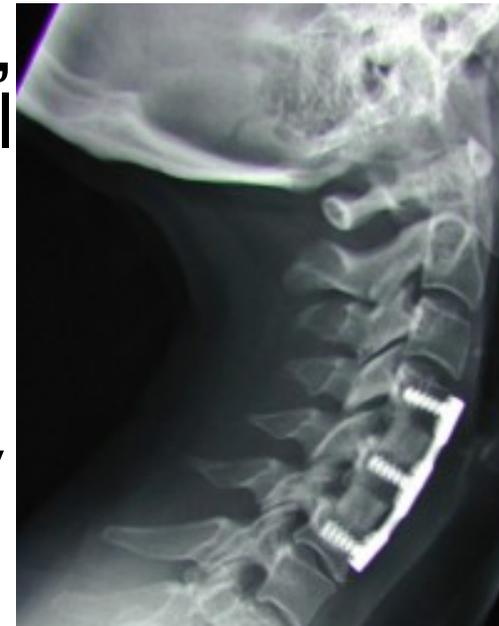
Lab Tests

- ▶ Typically not necessary
- ▶ Acute phase reactants: ESR and CRP: increase with cancer and infection, PMR
- ▶ ESR & CRP are non-specific: also elevated in SLE, RA, surgery, MI, gastric ulcer, pregnancy
- ▶ CBC: elevated WBC and left shift in infection



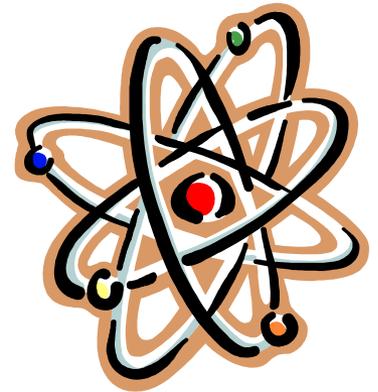
Radiographic Evaluation: X-ray

- ▶ X-ray: cheap, fast, available, low radiation
- ▶ Typically not useful in acute setting
- ▶ Does not show discs, neural components
- ▶ Lateral view most important to evaluate degenerative conditions (disc space, facet joints, spondylosis/osteoarthritis, alignment, spondylolisthesis, foraminal stenosis, fracture)
- ▶ Flexion/extension view for instability
- ▶ Typically AP and lateral views
- ▶ Assess instrumentation if prior surgery

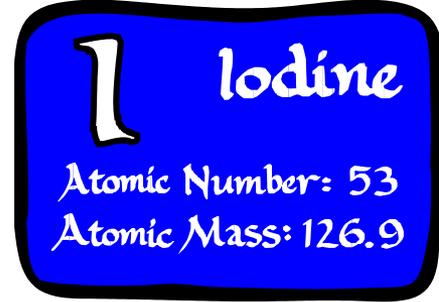


Radiographic Evaluation: Nuclear Bone Scan

- ▶ Typically for detecting metastatic disease
- ▶ 80% of metastatic lesions are in axial skeleton
- ▶ Up to 40% with metastatic disease found on bone scan had normal X-rays
- ▶ Better detects osteomyelitis (first day) than x-rays which may take 14 days to appear
- ▶ May also help detect discitis



Radiographic Evaluation: CT and CT Myelogram

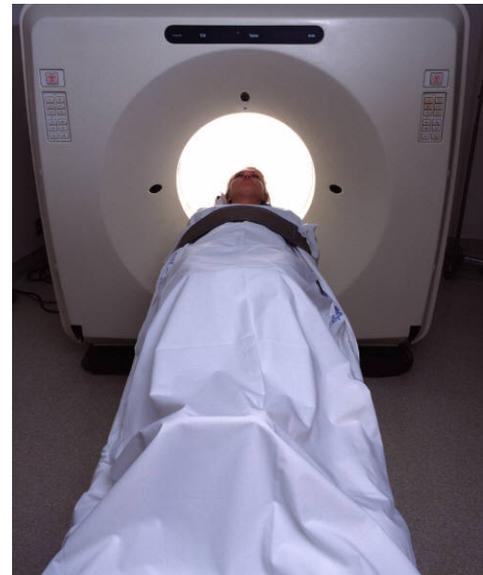


- ▶ CT better than x-ray/MRI to visualize bony anatomy, foramina, trauma
- ▶ CT Visualizes neural components, discs, but not as well as MRI
- ▶ CT superior to MRI to detect facet joint changes, unstable surgical fusions, & severe deg changes

- ▶ CT Myelogram is Gold Standard to detect neural compression in spinal canal
- ▶ CT Myelogram especially helpful in patients with **multilevel** disc degeneration, radiculopathies, disc fragment and canal or lateral recess stenosis, or symptoms not correlating to MRI

Radiographic Evaluation: MRI

- ▶ Overall best screening test for the spine
- ▶ Shows discs, neural components very well to assess stenosis, disc herniation, malignancy, infection
- ▶ Caution: 50% of asymptomatic patients have disc bulges, and 25% have disc herniations
- ▶ Contraindicated with pacemaker or ferromagnetic material
- ▶ ZERO radiation



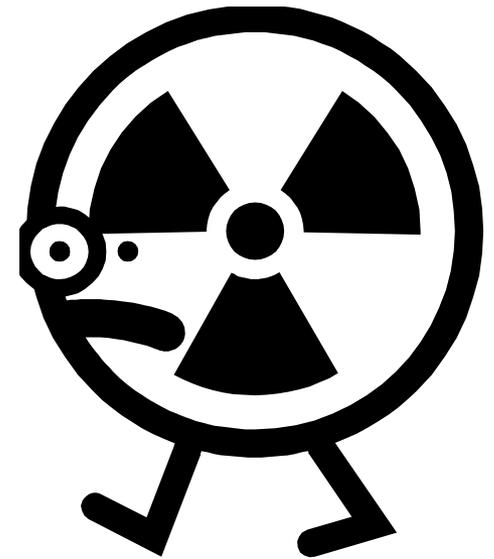
Radiographic Evaluation: IV Contrast or NO Contrast

- ▶ Iodine contrast for CT and gadolinium for MRI
- ▶ Typically MRI and CT done WITHOUT contrast
- ▶ Typically add to better visualize structures when suspect tumor, infection/abscess
- ▶ Typically add if prior spine surgery to better differentiate scar tissue from inflammation and soft tissue

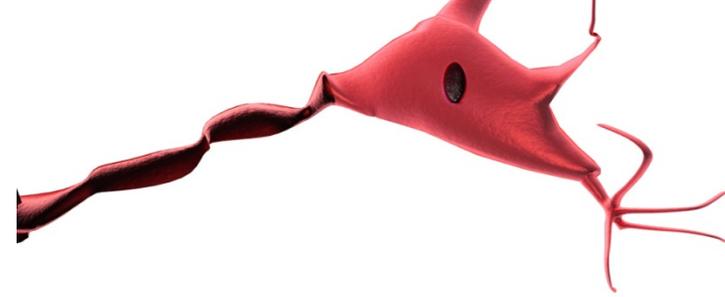


Radiation Exposure

- ▶ Background: 0.6 rads/year
- ▶ X-ray: 0.2 rads
- ▶ CT: 3–5 rads
- ▶ MRI: 0 rads
- ▶ CT myelogram: 6–10 rads
- ▶ Bone scan: 0.15 rads
- ▶ Discography: 0.2 rads



EMG/NCS



- ▶ Evaluates fictitious arm weakness
- ▶ Radiculopathy vs. Neuropathy
- ▶ Extent of nerve injury not accurately determined
- ▶ Acute or Chronic nerve injury, & reinnervation
- ▶ Normal may not be normal (sensory vs. motor radiculopathy and mild vs. severe)
- ▶ Timing of EMG/NCS: day 3 up to day 42
- ▶ Which of multiple abnormal levels on MRI/CT is symptomatic

Differential Diagnosis: Spinal Pain

<u>Evaluation</u>	<u>Strain</u>	<u>Herniated Disc</u>	<u>Spondylo-arthropathy</u>	<u>Visceral</u>	<u>Instability</u>	<u>Degenerative disc disease</u>	<u>Myelopathy</u>	<u>Infection</u>	<u>Tumor</u>
Predominant pain	neck	arm	neck	neck/ throat	neck	neck	neck	neck	neck
Constitutional Symptoms			+	+/-				+	+
Tension/ Compression test		+			+/-				
Neuro exam		+			+/-		+		
x-ray AP/Lat			+		+	+	+	+/-	+/-
Flex/extend x-ray					+				
CT/MR		+	+	+	+/-	+	+	+	+
Myelogram		+/-					+/-		
Bone Scan								+	+
ESR/CRP								+	+
CBC								+	
EMG/NCS		+/-			+/-				

Conservative Therapy

- ▶ After cervical myelopathy and acute systemic medical disorders ruled out
- ▶ Initially, specific diagnosis such as herniated disc, cervical spondylosis or neck strain may not matter—as entire group may be treated in similar way
- ▶ Soft cervical collar in small group, short-term
- ▶ Nsaids, muscle relaxants, opioids, neuropathic meds, oral steroid
- ▶ Activity, increase as tolerated, program of exercises with strengthening of paravertebral muscles, and later point to increase ROM, formal PT
- ▶ Cervical traction: for cervical disc herniation/radiculopathy
- ▶ Most improve within 10 days to 6–8 weeks



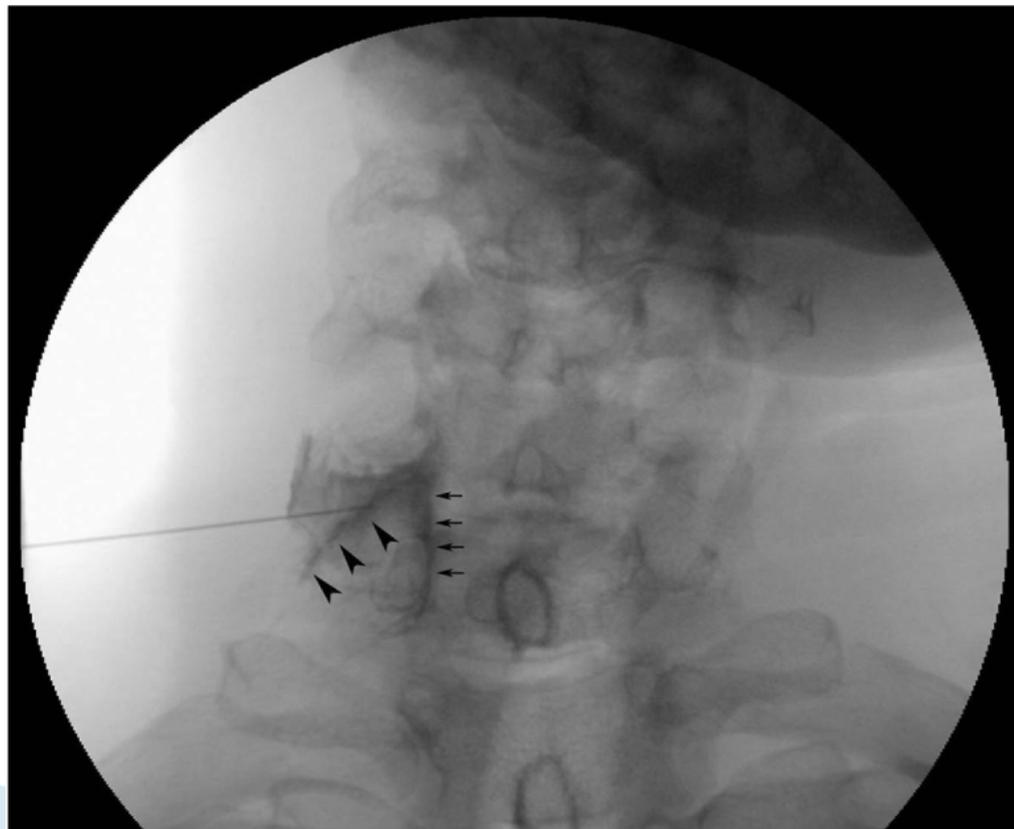
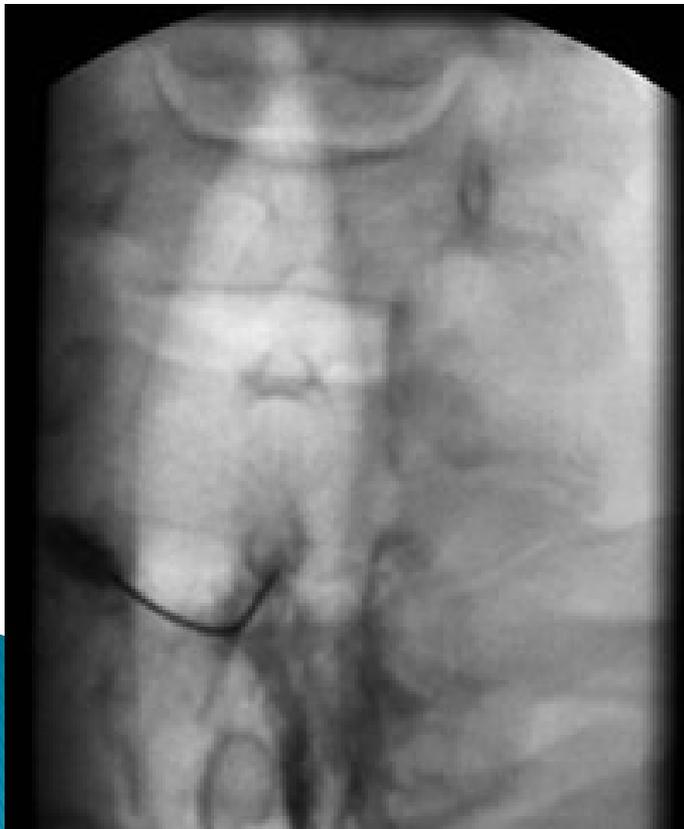
Spinal Nerve Blocks

- ▶ Nerve blocks may have diagnostic and therapeutic roles.
- ▶ Diagnostic blocks aid in identifying the site of pain.
- ▶ Therapeutic blocks relieve acute pain and may provide longer lasting relief.
- ▶ Complications are rare: spinal headache, allergic reaction, infection (epidural abscess, discitis), bleeding (epidural hematoma), spinal cord or nerve injury (direct or indirect), vascular injury or embolism/spinal cord infarction



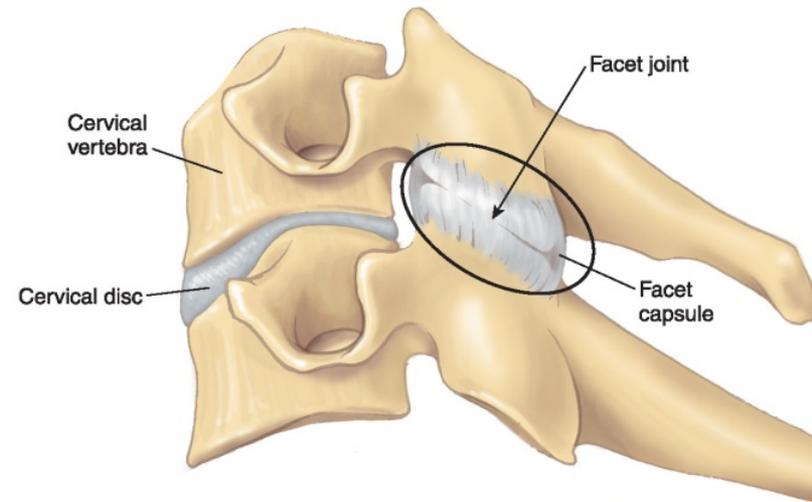
Epidural Steroid Injection

- ▶ Transforaminal vs Interlaminar
- ▶ Series of 3 & Time interval of injections
- ▶ +/- Radicular: Stenosis, Herniation, DDD



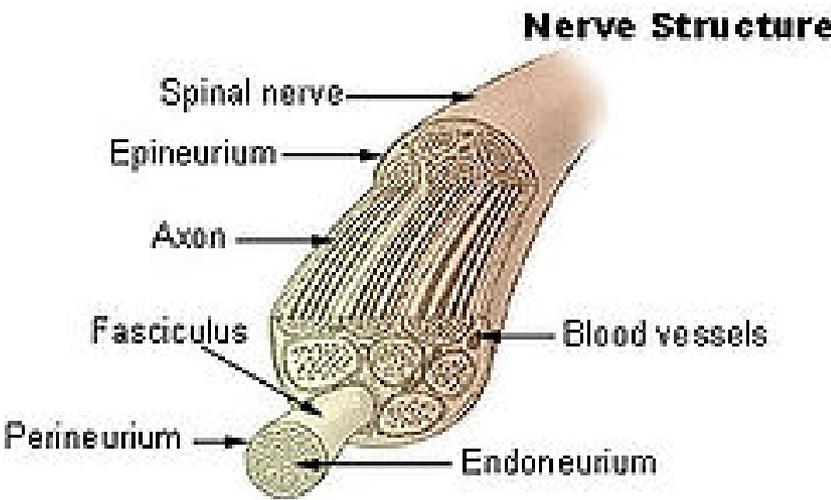
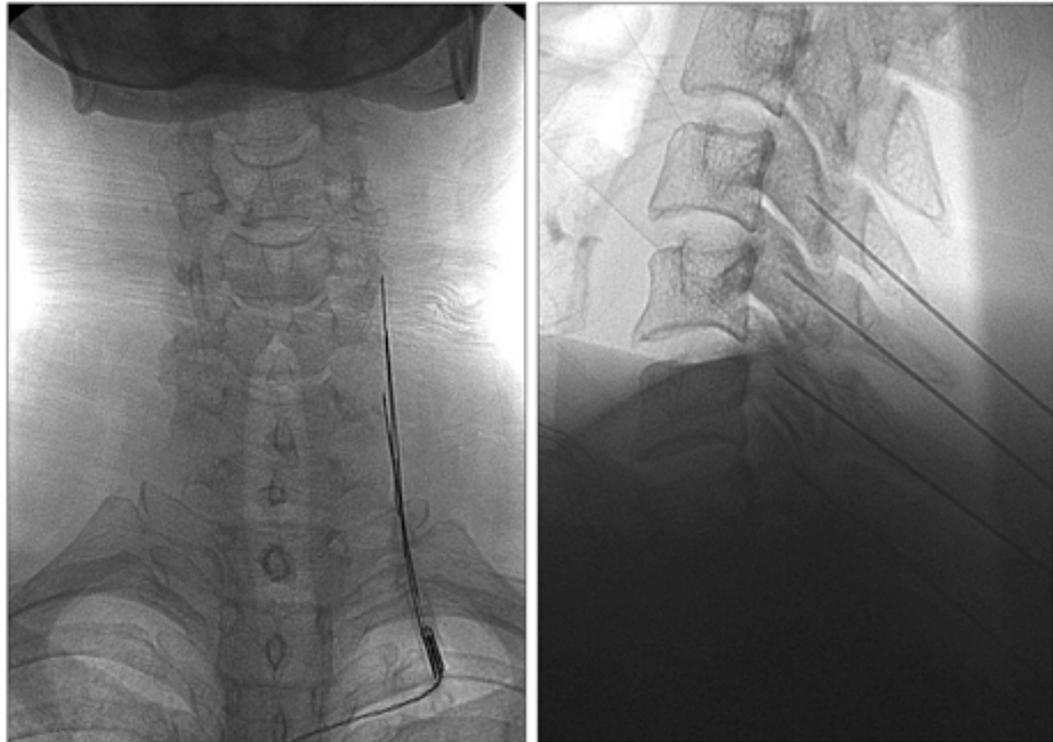
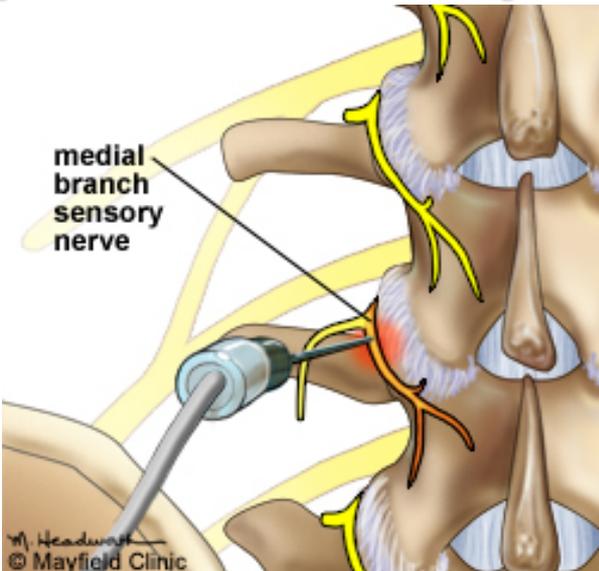
Facet joint injection

- ▶ True synovial joints: has a synovial membrane, hyaline cartilage surfaces, and a fibrous capsule
- ▶ Facet joint injection of either the joint itself or of the nerve supply (two medial branches per of the dorsal rami per joint, one at the level and one above the level affected) may provide both diagnostic and therapeutic value.
- ▶ Denervation with radiofrequency of the medial branch nerves may provide long-lasting relief.



Medial Branch Radiofrequency Neurotomy

- ▶ Relief x1 year: 0.5–3 yrs
- ▶ Lesion: 80°C x 90 s
- ▶ Peripheral sensory Epineurium lesion
- ▶ Endoneurium intact



Thank You!

