Neck Pain

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September 13, 2025

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I have no conflicts of interest to report.

Neck Pain

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- Fourth leading cause of disability, behind back pain, depression and arthritis/arthralgias

  (*JAMA* 2013;310:591-608)

- Pain: non-neuropathic 43%; neuropathic alone 7%; mix 50%

  (*Reg Anesth Pain Med* 2017;42:52-61)

- Prevalence: point 7.6%; annual 37.2%; lifetime 48.5%

  (*Eur Spine J* 2006;15:834-48)

- More common among women
- Association with activities and occupations
- Major overlap/association with psychosocial factors

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Audience Participation:

Log into PollEverywhere on your cell phones…

or

Send text message ---

jamesheffern812 to 22333

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One case of trauma-related neck pain…

Case #1

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- 55 year old man presents two days after MVA with worsening posterior neck pain
- MVA: seat-belted driver at red light, struck from behind; airbags did not deploy, but significant rear-end damage, car towed
- Initial symptoms: No LOC; chest wall pain and tenderness; sore left shoulder; minor neck pain and headache
- Initial management: EMS → spine board, transport to local ED; CT neck and head cleared; CTA chest – aorta cleared, no rib fractures; rx ketorolac IM; discharged home – ice, rest, ibuprofen
- PMH: HTN, DM2, OA knees
- Current symptoms: severe pain, posterior neck and in interscapular area of upper back; pain worse with even limited movement; pain left anterior chest and shoulder
- Exam: no surface bruising; tight/tender posterior neck muscles; tender spinous processes; CROM limited by pain and tightness; tender left pectoral muscles

Which of the following is true about whiplash injury?

A Facet joint injury is a major factor in causing pain

0%

B Reduced CROM at initial presentation predicts long term impairment

0%

C Up to 50% of patients will report neck pain 1 year after injury

0%

D Early mobilization is preferable to limiting motion

0%

Traffic-Related Whiplash Injury (Whiplash Associated Disorder – WAD)

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- Cadaver and other studies suggest significant role for facet joint and capsule disruption, esp. C5-C7
- Also, significant contribution from muscle/tendon strain and ligament injuries
- Early and delayed onset of pain
- Reduced CROM on initial assessment strong indicator of persistent impairment
  - Especially coupled with pain intensity and other complaints
- Collision-specific factors less prognostic
- Psychosocial factors play a large role in symptoms and recovery
- No clear “best-treatment” protocol, but early mobilization recommended

Decision Aids in Imaging after Neck Injury

NEXUS Criteria

- Focal neurologic deficit present
- Midline spinal tenderness present
- Altered level of consciousness present
- Intoxication present
- Distracting injury present

Canadian C-Spine Rule

- Age ≥65 years, extremity paresthesias, or dangerous mechanism
- Low risk factor present
  - Sitting position in ED
  - Ambulatory at any time
  - Delayed neck pain
  - No midline tenderness
  - “Simple” rear-end MVC
- Able to actively rotate neck 45° left and right

Whiplash Associated Disorder: Acute Management

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- Soft collar for comfort – brief/limited use
- Symptom control of soft tissue strain component
  - Physical measures: ice, heat, massage, acupressure…
  - Meds: topical NSAIDs; oral NSAIDs; muscle relaxants briefly for spasm
- Early mobilization → consider PT referral strongly

Cases of non trauma-related neck pain…

Case #2

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- 37 year old woman presents seeking evaluation of occipital headache, posterior neck pain, slightly throbbing, worse with head and neck movement noted on awakening Monday AM
- Is a new homeowner; she and husband spent weekend painting walls and ceiling in several rooms of their home.
- PMH: no prior head/neck injuries; no chronic medical issues; occasional muscle strain headache
- Exam: tightness and tenderness in neck extensors; tenderness at occipital scalp; pain on active head/neck rotation and extension; tightness at posterior neck on flexion

Reasonable Triage Algorithm for Non-Traumatic Neck Pain

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1. Likely mechanical issue – e.g., strain, sprain
2. Clinical evidence of radiculopathy
3. Clinical evidence of myelopathy
4. Other potential cause, including “red flags”
   - Fever
   - Unexplained weight loss
   - Underlying cancer
   - High-energy transfer trauma
   - Bowel/bladder dysfunction

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Cervical Spine Anatomy and Mobility

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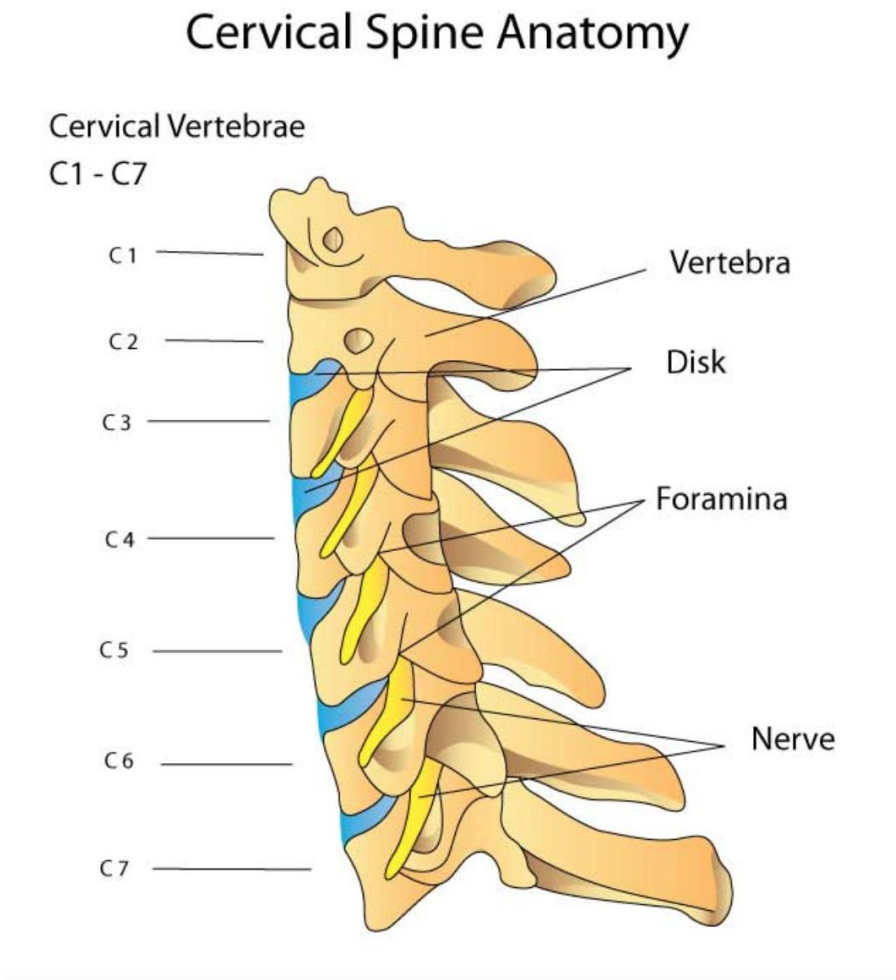

Cervical Spine Mobility

- Rotation → 80-90 degrees to each side
  - 50% at atlantoaxial joint
- Forward flexion → 65 degrees
  - One third at atlantooccipital joint
- Extension → 75 degrees
  - One third at atlantooccipital joint
- Lateral flexion → 45 degrees
  - 50% at atlantooccipital joint

Head/Neck Extensor & Rotator Muscles

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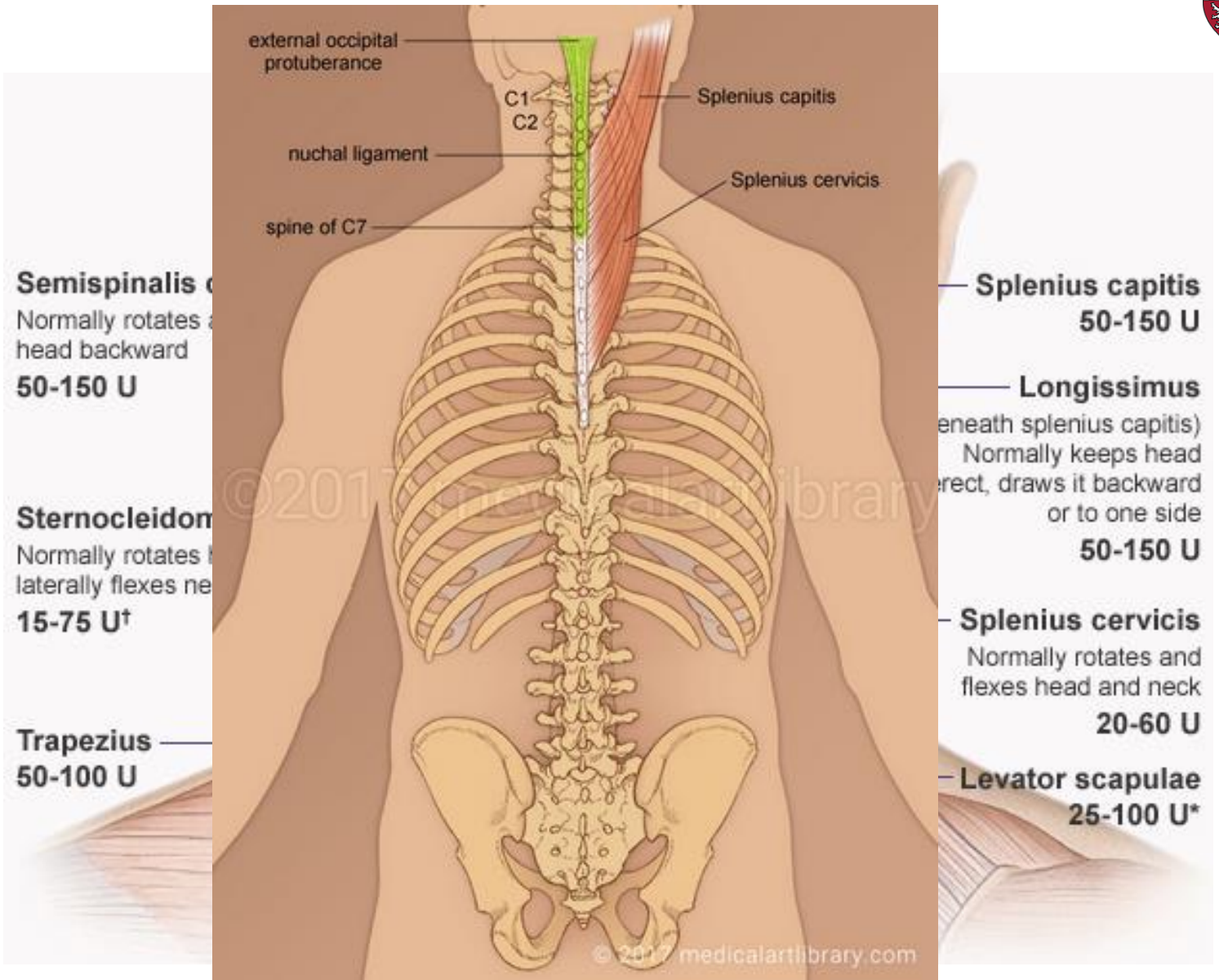

Neck Extensor Muscle Strain

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- Strain/spasm of major neck extensors
  - Deep: splenius capitus, splenius cervicis, semispinalis capitus, longissimus
  - Superficial: trapezius
- Triggered by unusual activity or posture; also whiplash injury
- Often associated occipital and even frontal headache from contiguous scalp muscles (+/- injury to occipital nerve - rarely)
- Exam: tenderness to palpation; tightness spasm of affected muscles; ROM +/- reduced by pain; no associated radicular symptoms/signs
- Treatment: ice massage; local heat followed by stretching/ROM exercises; “acupressure”; topical NSAID; oral NSAID or acetaminophen; +/- muscle relaxant; soft collar; early mobilization; PT if no or limited improvement

Evidence: Interventions for Acute Mechanical Neck Pain

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- Topical diclofenac shown superior to placebo in 2 moderately-sized RCTs
- General recommendation for use of oral NSAIDs and/or acetaminophen, extrapolating from studies of use in mix of clinical settings, including neck pain
- Cyclobenzaprine effective at moderate (15mg/d) or high (30mg/d) dose, but not low dose (7.5 mg/d) in 2 RCTs of 1405 patients with acute neck pain (1/3) or back pain (2/3)
- Pragmatic RCT of manipulation/mobilization (SMT), medication (Med) or home exercise (HEA) among 272 subjects → improvement in pain relief among all groups, but better for SMT than for Med; SMT not better than HEA
  - ≥50% reduction at 12 weeks: SMT 82%; HEA 77%; Med 69%

(*Ann Intern Med*. 2012;156:1-10.)

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CLINICAL GUIDELINE

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Nonpharmacologic and Pharmacologic Management of Acute Pain From Non–Low Back, Musculoskeletal Injuries in Adults: A Clinical Guideline From the American College of Physicians and American Academy of Family Physicians

Amir Qaseem, MD, PhD, MHA; Robert M. McLean, MD; David O'Gurek, MD; Pelin Batur, MD; Kenneth Lin, MD; and Devan L. Kansagara, MD, MCR; for the Clinical Guidelines Committee of the American College of Physicians and the Commission on Health of the Public and Science of the American Academy of Family Physicians*

Recommendation 1: Treat w/ topical NSAID +/- menthol gel as first line therapy to reduce/relieve sx (including pain); improve physical function; and improve treatment satisfaction

Recommendation 2a: Treat w/ oral NSAIDs to reduce/relieve sx (including pain); improve physical function; and improve treatment satisfaction or w/ oral acetaminophen to reduce pain

Recommendation 2b: Treat with specific acupressure to reduce pain and improve physical function or w/ TENS to reduce pain

Recommendation 3: ACP and AAFP suggest against treating w/ opioids, including tramadol

(*Annals Intern Med*. 2020;173:739-48)

Case #3

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- 36 year old man calls to report awakening with severe right lower neck pain, worse with head movement
- Shoveled snow 3 weeks earlier and last went to the gym 2 weeks ago; otherwise, no unusual activities
- PMH: bipolar, HTN, hypercholesterolemia
- Seen episodically by a colleague in your practice →
  - Exam: tightness/tenderness of head/neck extensors; neuro exam unremarkable
- Treated symptomatically with ibuprofen and cyclobenzaprine

Case #3 (cont.)

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- Limited relief from meds on phone follow up
- Soft collar added → modest improvement overnight
- Calls one day later to report continued neck pain and new right arm pain radiating to thumb and forefinger
- Scheduled for follow up visit…

Case #3: What now?

Emergent MRI

0%

C-spine radiographs and CRP or ESR

0%

Detailed physical exam

0%

Trial of gabapentin or a TCA

0%

Neck Pain: Issues with Imaging

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- C-spine MR
  - Control g
  - Abnorma
    → herr
  - Other de
- Abnormal C
  - Age rang
  - 87.6% wi
  - 5.3% wit
  - 2.3% wit
  - All abnor
  - Abnorma

rs

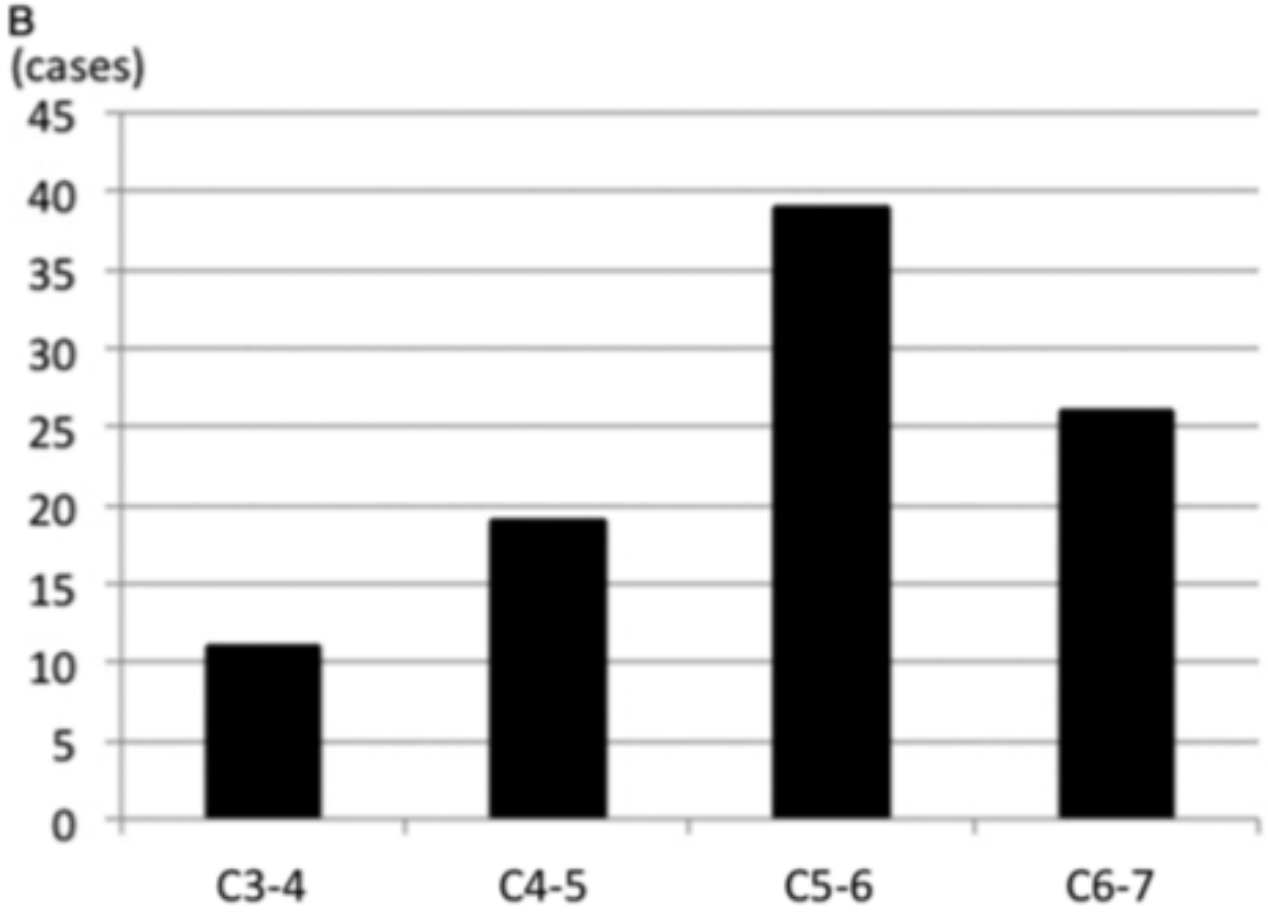

Figure 3. Frequency distribution of cervical SCC in asymptomatic subjects. A, Frequency distribution of SCC with age and sex. B, Frequency distribution of SCC along the spine. SCC indicates spinal cord compression.

Cervical Radiculopathy: Examination

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- Distribution of pain
- Range of motion
- Sensory exam
- DTRs
- Motor testing
- Provocative maneuvers
  - Spurling test
  - Neck tornado test (Choi test)
  - Upper limb tension test (ULTT (A))
- Relief maneuvers
  - Shoulder abduction test
  - Axial manual traction test

Cluster of Wainner

3/4: +ve LR → 6.1

4/4: +ve LR → 30.3

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For the various maneuvers,
check out --

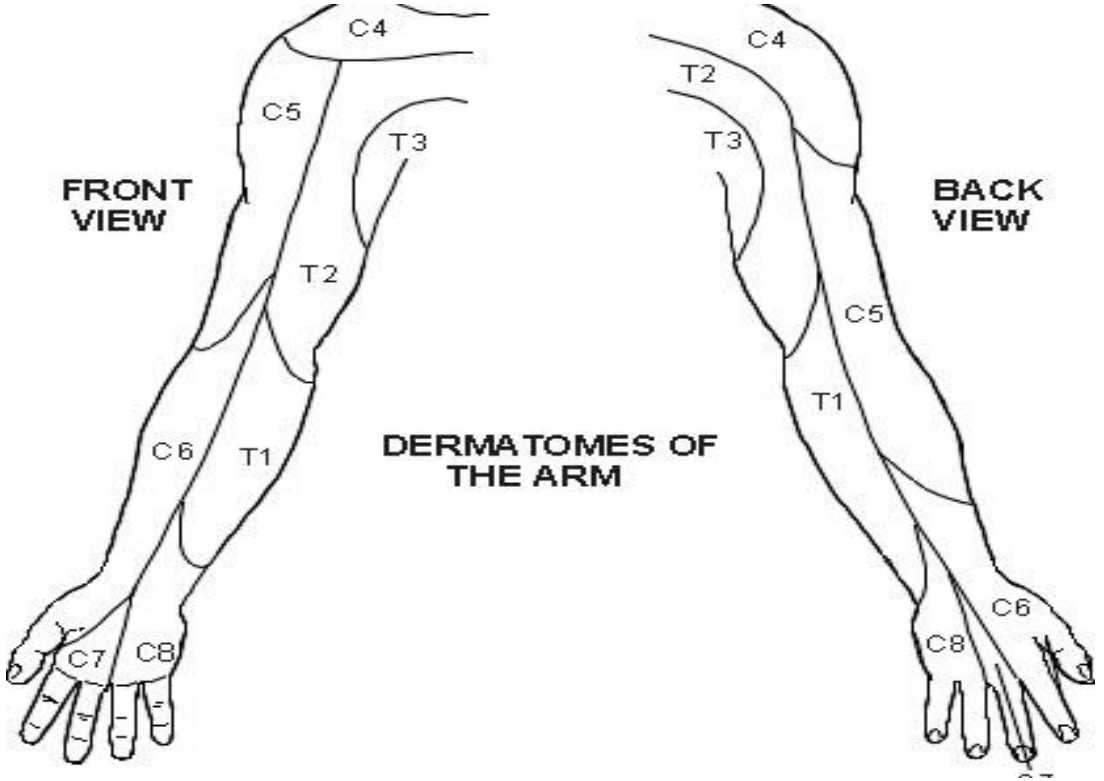
“Physiotutors”
on YouTube

Cervical Radiculopathy: DTRs and Sensory Exam

DTRs

- C5, C6: Biceps
- C6: Brachioradialis
- C7: Triceps

Sensory



Cervical Root Motor Testing:

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C1-2: forward neck flexion

C3: lateral neck flexion

C4: shoulder lift

C5: arm abduction (and biceps flexion)

C6: arm flexion and wrist extension

C7: wrist flexion, arm extension and finger extension

C8: finger flexion/hand grip

T1: finger abduction

Cervical Radiculopathy Exam: Key Maneuvers

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- Provocative maneuvers
  - Spurling test
  - Upper limb tension test (ULTT (A))
  - Neck tornado test (Choi test)
- Relief maneuvers
  - Shoulder abduction test
  - Axial manual traction test

Spurling's Test

Upper Limb Tension Test (A)

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Neck Tornado (Choi) Test

Spurling Test vs Neck Tornado Test

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- Diagnostic case-control study
- 67 patients with cervical radiculopathy and 68 controls with neck pain without cervical radiculopathy
- Spurling test
  - Sensitivity: 55.2% (95% CI 43.3%-67.1%)
  - Specificity: 98.5% (95% CI 95%-101.4%)
- Neck tornado test
  - Sensitivity: 85.1% (95% CI 76.6%-93.6%)
  - Specificity: 86.8% (95% CI 78.8%-94.8%)

Choi et al. *Int J Med Sci. 2017;14:662-7*

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Spurling Test vs Neck Tornado Test

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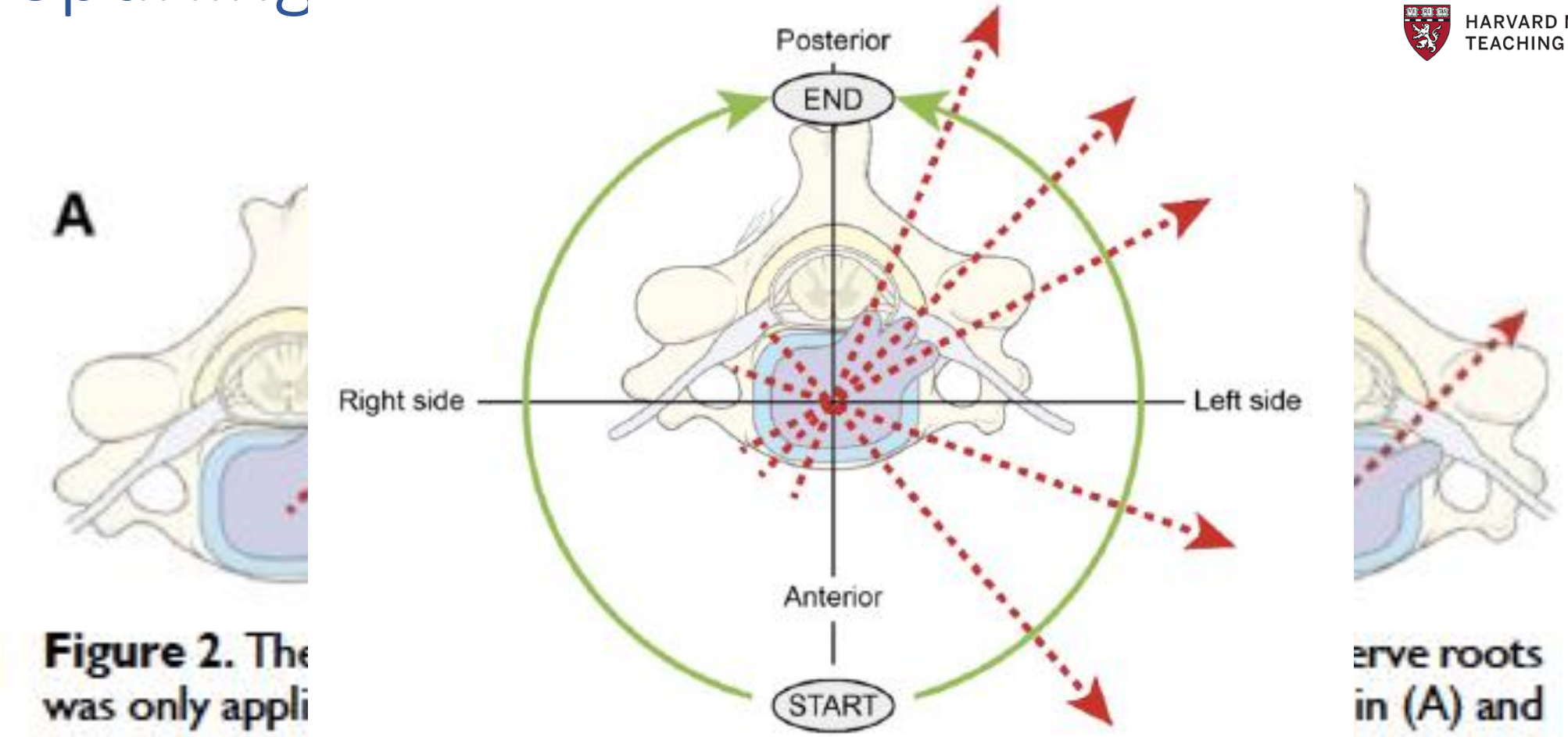

Figure 2. The
was only appli
(C) and positi

erve roots
in (A) and

Figure 3. Force is applied at all angles by rotating the neck in a 180° tornadic pattern.

Choi et al. Int J Med Sci. 2017;14:662-7.

Cervical Radiculopathy: Relief maneuvers

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- Shoulder abduction test
- Axial manual traction test

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Case #3 (cont.): MRI findings…

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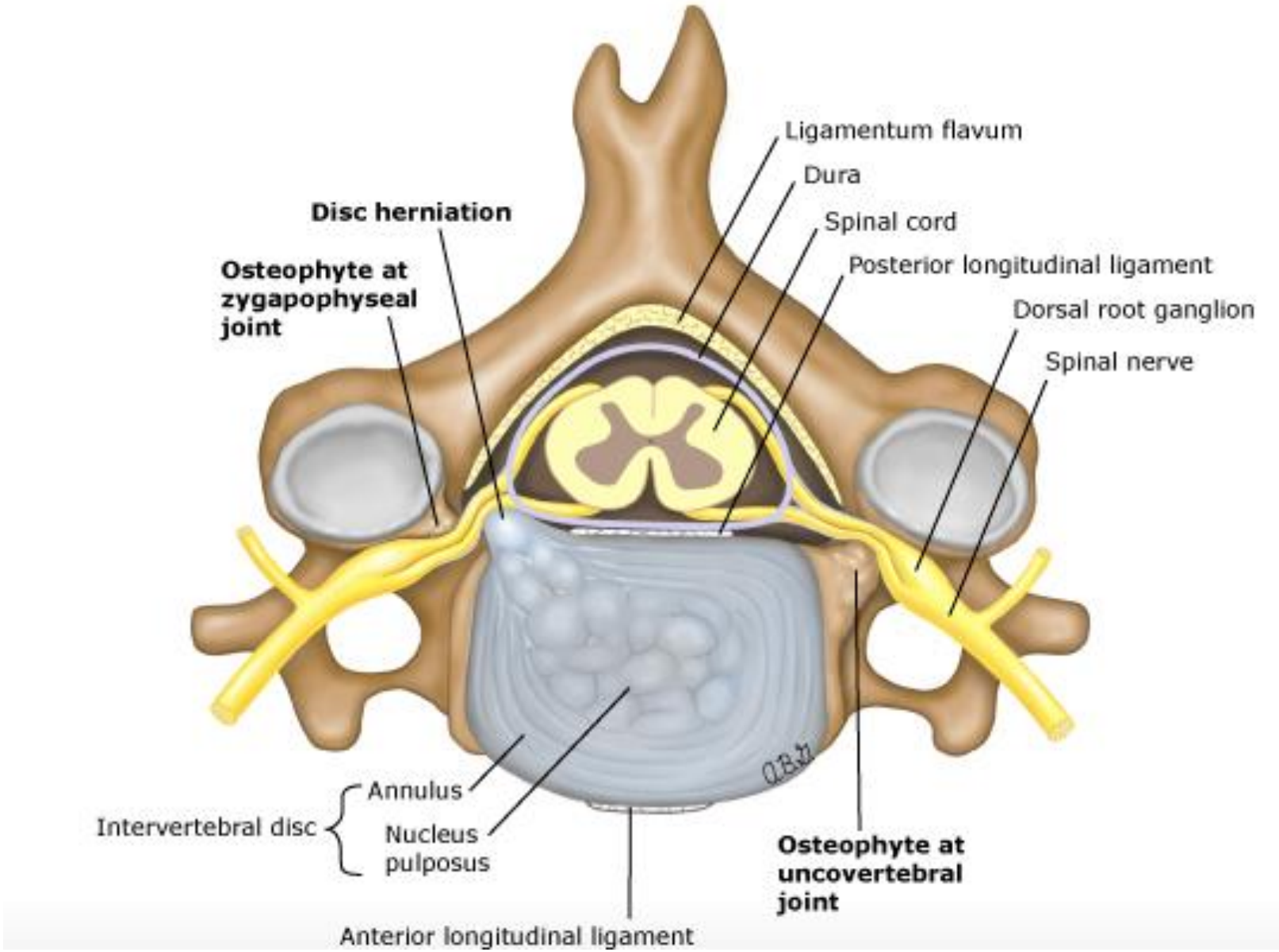
1. At C5-C6, a large right disc protrusion results in moderate to severe spinal canal narrowing along the right aspect of the spinal canal, flattening the right ventral aspect of the cord without underlying cord signal change and likely compressing the exiting right C6 nerve root. In addition, uncovertebral and facet arthropathy results in severe bilateral neural foraminal narrowing.
2. At C6-C7, uncovertebral and facet arthropathy results in severe bilateral neural foraminal narrowing. A central protrusion results in mild to moderate spinal canal narrowing.

Causes of cervical radiculopathy



UpToDate

Cervical Radiculopathy

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- Common cause of neck pain and upper-limb motor and sensory symptoms and DTRs
  - Epidemiology: 4th and 5th decade; M > W
  - Most common at lower nerve roots: C7 > C6 > C5,C8
- Etiology → cervical disc herniation, spondylosis (facet and uncovertebral jx)
- Clinical diagnosis sufficient if no "red flags"
- Symptomatic care: NSAIDs, ? short-term immobilization, PT, physical measures, avoidance of provocative activities
- Favorable outcome in majority of cases over 6-8 weeks
- MRI → surgical referral for persistent/worsening symptoms or weakness at 6-12 weeks
- Limited evidence for benefit from either oral or epidural steroids

Case #4

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- A 50 year old man reports severe left lateral neck pain with abrupt onset while playing tennis; he is lefthanded
- Pain radiates to jaw, sharp in character, worse with head movement
- Seen in clinic, noted to have mild speech difficulty, pronator drift (right) and anisocoria (left eye miotic) and ? left ptosis…

Case #4: What next?

Patient to chew/swallow aspirin 325 mg

0%

Neck and head CTA or MRA

0%

Neck/carotid ultrasound

0%

Neurosurgical/vascular surgical consult

0%

Carotid Artery Dissection

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- Classically, tearing pain, often but not always with abrupt onset
  - Frequent associated headache, 20% thunderclap
- Accounts for 2.5% of all strokes, 20% in young individuals
- Pain in neck, radiates to base of skull behind ear
- Subtle or not so subtle neurologic findings, including immediate ischemic stroke
- Associated Horner syndrome
  - Ptosis
  - Miotic pupil
  - Anhydrosis
- Dx: Emergent CTA or MRA
- Rx: Thrombolysis for ischemic stroke and extracranial dissection; antiplatelet or anticoagulation otherwise
- Prognosis: Most neurologic complications/recurrences early; recanalization common over time

Case #5

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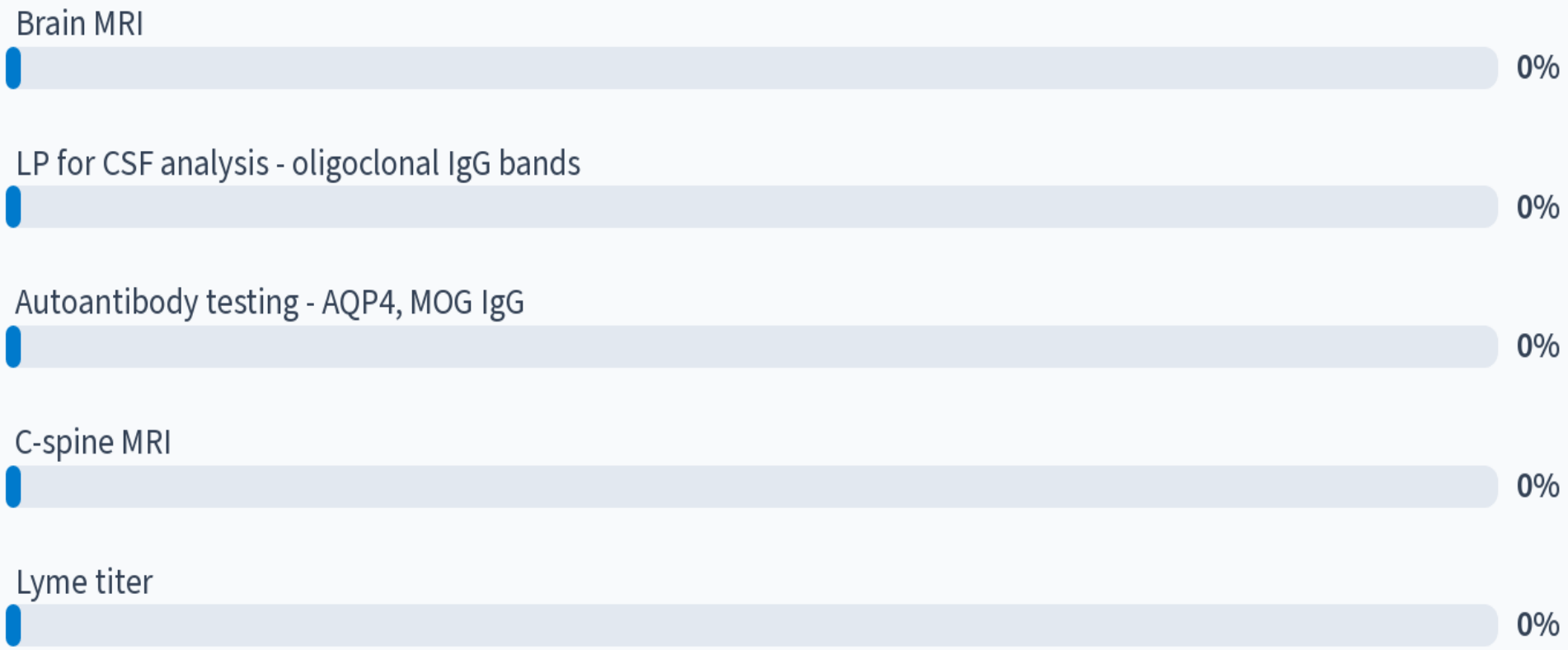
- 71 year old woman presents for routine visit and reports low, posterior neck pain and new difficulty with ambulation, also hand weakness
- She reports shooting electric pain down back and arms when she bends forward
- Exam shows exaggerated DTRs in UEs and LEs, with clonus of foot extension and flexion and positive babinski; also, poor fine motor control of hands…

Case #5: What test should be ordered next?



Degenerative cervical myelopathy

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- Neck pain vaguely localized, often dull and not severe
- Caused by multi-level degenerative changes
- Variable presentation, usually insidious – gait disturbance, sensory loss, muscle weakness and atrophy of the hands with neck and arm pain
- Positive Hoffman and Babinski reflexes
- Positive Lhermitte's sign
- Dx: C-spine MRI (more extensive imaging, EMG if concern over other conditions – e.g., ALS, MS)
- Rx: Intermittent neck immobilization; pain mgt.; restriction of high-risk activities; surgery for progression/severe sx
- Prognosis/course: Very varied

Recent Guidance on Management of Degenerative Cervical Myelopathy (DCM)

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- Surgery recommended for individuals with moderate or severe DCM using a standardized severity assessment tool - mJOA instrument
- Use diffusion-weighted MR signal changes in the cervical cord to evaluate prognosis following surgical intervention (conditional recommendation)
- Surgery is a valid option for mild DCM (conditional recommendation)
- There is equipoise in the outcome of anterior vs posterior surgical approaches where either technique could be used (strong recommendation)
- There are four DCM phenotype clusters that may inform surgical outcomes and can be used in counseling patients (conditional recommendation)

Fehlings et al. *Global Spine J*. 2025;15:2585-93.

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Case #6

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- 60 year old woman presents seeking evaluation of right lateral neck pain X 2 days
- Pain is burning/itching in character, extending up and behind ear
- Sleeping poorly due to increased sensitivity of scalp behind ear on the same side…

Case #6: What is the correct treatment for the presumed most likely dx?

Amoxicillin/clavulanate 875/125mg q12h x 7d

0%

Gabapentin 300mg q8h x 14d

0%

Prednisone 60mg qd x 5d, then taper

0%

Valacyclovir 1000mg q8h x 7d

0%

Zoster in C3 & ?C4 Dermatome(s)

Cervicofacial Zoster: Dermatomes

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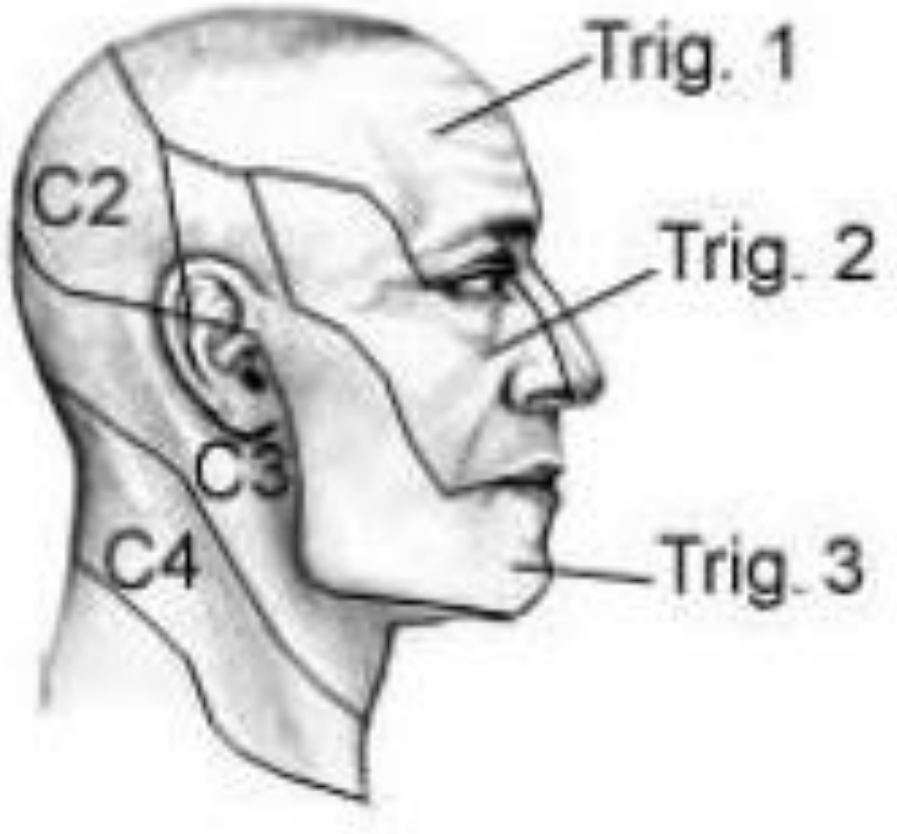

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Cervical zoster

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- Pain in lateral neck, extending up to base of skull and scalp behind ear depending on dermatome affected
- Character of the pain often burning/itching, often with an underlying dull component or episodes of shooting pain
- Prodromal pain may last 1-5 days, and sometimes longer, before appearance of classic vesicular rash
- Dx: Sensory exam notable for hyperesthesia/dysesthesia in affected dermatome
- Rx: valacyclovir or famcyclovir
  - No clear proven benefit from adjunctive steroid or antineuropathic agents for acute neuritis

Case #7

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- 20 year old college student is seen for the second time in 4 days; seen earlier in week with severe sore throat, noted to have T 101.3 and exudative pharyngitis, treated with “Z-pack”
- Limited improvement, then worsening, now with T 103, rigors and severe left anterior neck pain, worse with head movement; also, dyspnea
- Exam → persistent exudative pharyngitis, L > R, tender swollen anterior chain lymph nodes bilaterally and tender L sternomastoid

Case #7: What do you do now?

Admit and start ceftriaxone and vancomycin

0%

Obtain immediate Panorex jaw radiographs

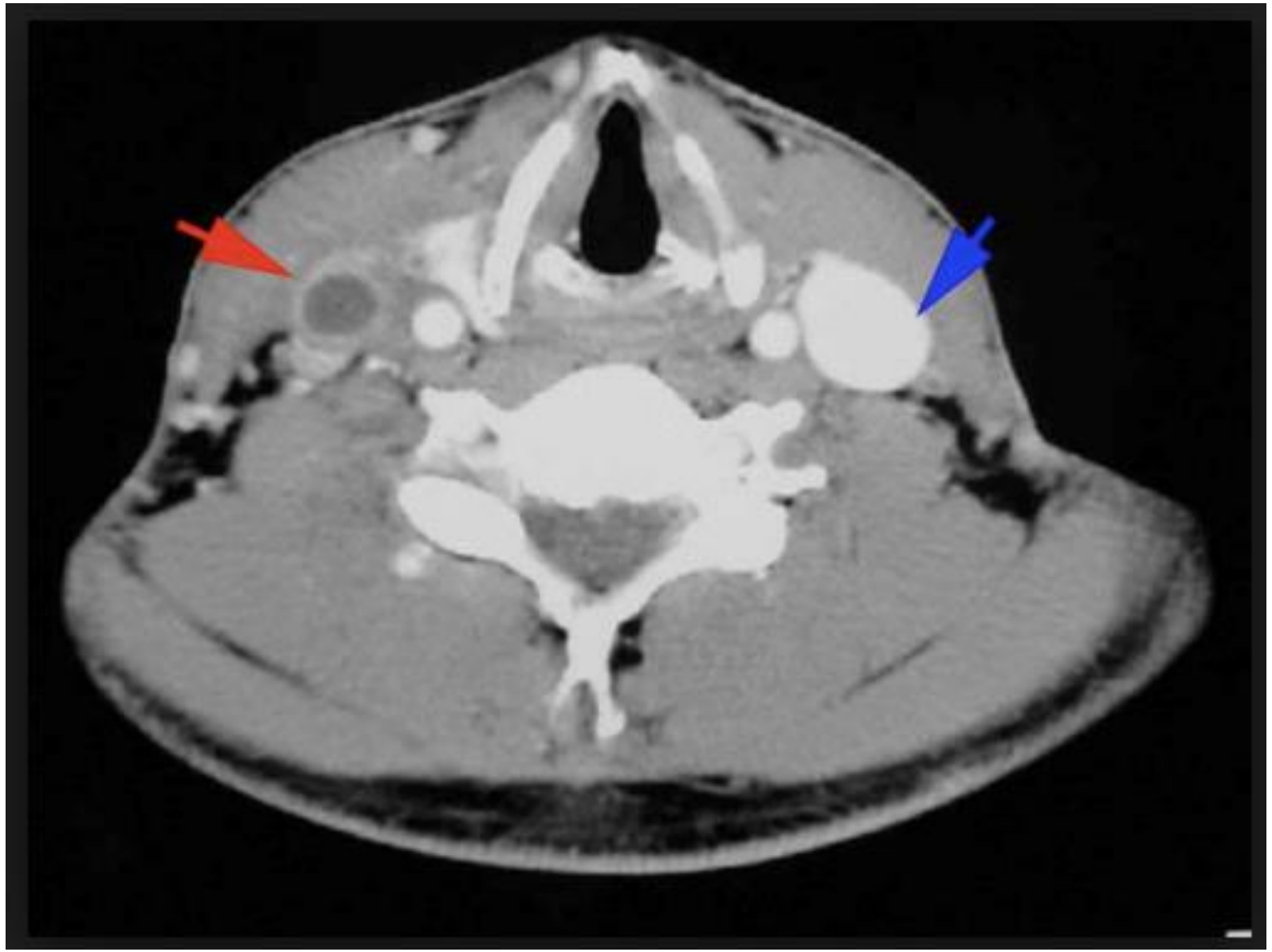
0%

Obtain immediate intra-oral peritonsillar ultrasound

0%

Obtain immediate neck and chest CTA

0%



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Lemierre Syndrome

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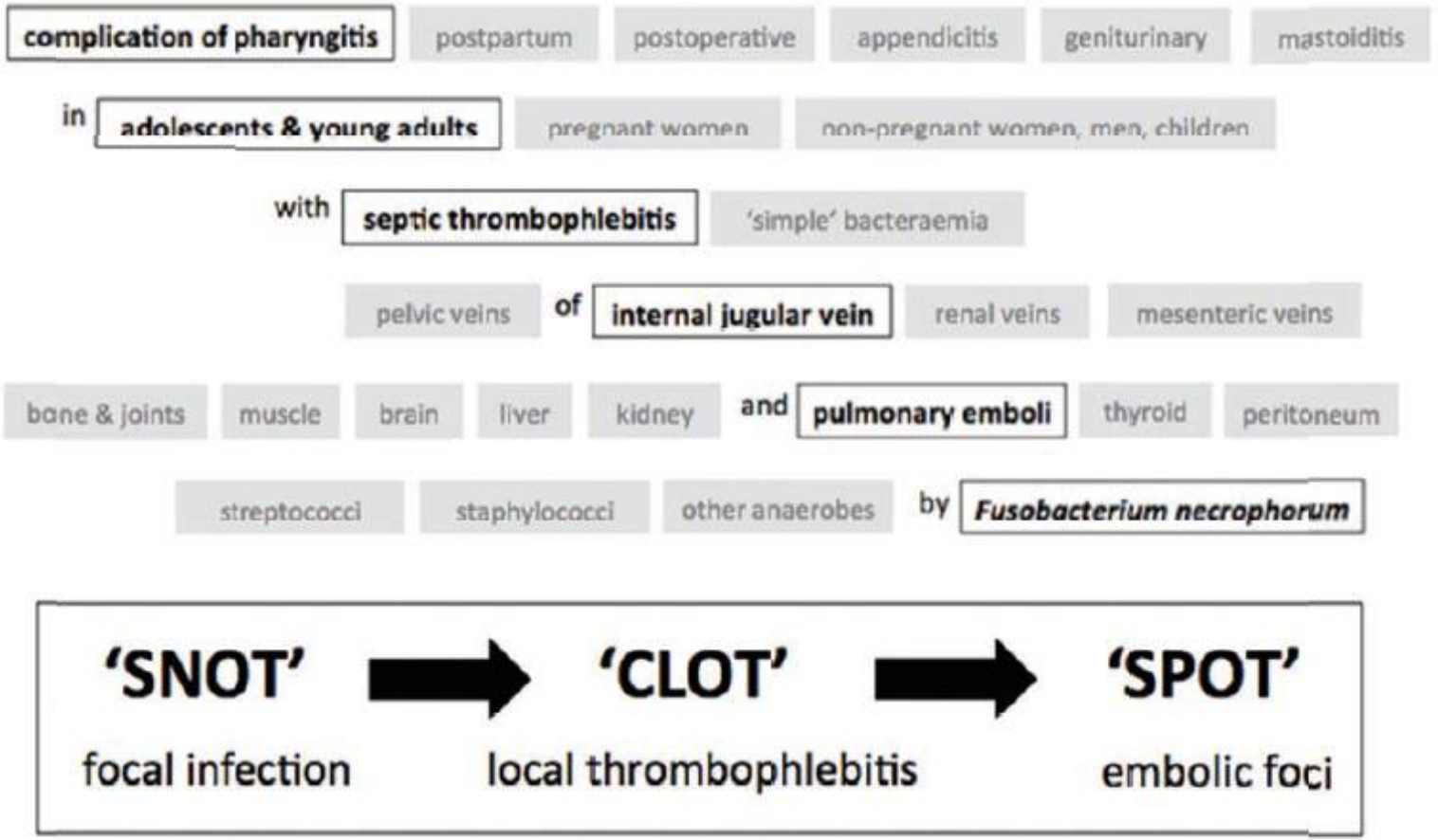

Figure 1 Lemierre's syndrome — an eponym with many synonyms. The classic syndrome (black text) with variations recognised by André Lemierre in his 1936 paper (grey boxes).

Osowicki et al. Journal of Infection. 2017;74:S47-53

Lemierre Syndrome

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- Jugular vein suppurative thrombophlebitis
  - Causative organism: Fusobacterium necrophorum most commonly; other mouth anaerobes, group A strep
  - Usually preceded by pharyngitis, spreading to peritonsillar area and carotid sheath
  - Often associated with septic pulmonary emboli
- Evaluation: High resolution CT neck w/ contrast
- Treatment: beta-lactamase resistant beta lactam (e.g., ampicillin-sulbactam, piperacillin-tazobactam, ticarcillin-clavulanate) or a carbapenum; metronidazole
  - Surgical ligation/excision of the internal jugular rarely needed
  - Drainage of associated abscesses

Neck Pain:DDX

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- Muscle strain/spasm
- Osteoarthritis/degenerative changes
  - Facet joint disruption
  - Discogenic pain
- Cervical radiculopathy
- Degenerative cervical myelopathy
- Carotid dissection
- Zoster
- Infection (e.g., Lemierre's syndrome, osteomyelitis/discitis +/- epidural abscess)
- Malignancy

Neck Pain: Selected Bibliography

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