Neck and Shoulder Pain Evaluation and Management

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OBJECTIVES

- Outline a comprehensive differential diagnoses for neck and shoulder pain
- Discuss physical exam signs which guide diagnostic testing and development of a treatment plan
- Review new treatment approaches for management of neck and shoulder pain

PATIENT SCENARIO

- 64 yr old female presents with acute right sided neck pain extending into the right shoulder for 4 weeks. Symptoms occurred after she lifted her mother's walker overhead into the trunk of her SUV
  - Pain is severe, rated as 9/10
  - Pain is burning, stabbing, and aching
  - Neck pain extends into the right anterolateral shoulder, aggravated by all arm movements
  - Numbness and tingling occur frequently in the right 4 & 5th fingers
  - Hand weakness reported especially when trying to turn keys to start car or open a door
- PMH notable for OA, anxiety &fibromyalgia

PATIENT SCENARIO

- She is a full time caregiver for her aging parents
- ROS: she endorses significant stress related to financial concerns and parents declining health
- PE
  - Normal cervical lordosis
  - Diffuse palpation tenderness over cervical spinous processes, cervical paraspinal muscles, right upper trapezius, & right AC joint
  - Apparent muscle spasm over right levator scapula and upper trapezius
  - Reflexes: Bilateral biceps, triceps and brachioradialis ¼, patella ¾, achilles ¼
  - Sensation intact C5-T1 dermatomes
  - Hoffman's positive bilaterally

PATIENT SCENARIO

- Physical Exam
  - Painful and restricted cervical AROM in all planes
    - Right rotation ~ 40 degrees, left rotation ~ 50 degrees
  - AROM and PROM of right shoulder reduced, limited by pain
    - ~90 degrees of abduction and flexion
    - 50 % range in ER/ IR
    - Strength 4/5 shoulder abduction/ flexion/ IR & ER, 5/5 elbow flexion & extension, 5/5 wrist flexion and extension, 5/5 finger abduction and DIP flexion
  - No muscle atrophy
  - Positive right Spurling's

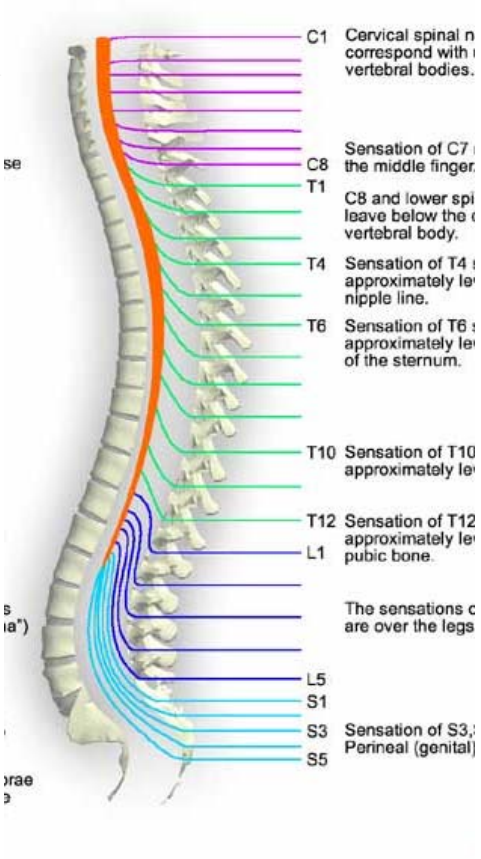
DIFFERENTIAL DIAGNOSES

- Cervical strain
- Cervical HNP/ exacerbation of DDD
- Exacerbation of underlying facet arthropathy
- Cervical radiculopathy
- Brachial plexopathy/ brachial neuritis
- Cervical myeloradiculopathy
- Cervical Dystonia
- Exacerbation of fibromyalgia
- Rotator cuff tear
- Impingement syndrome
- Shoulder instability
- Labral Tear
- Axillary neuropathy

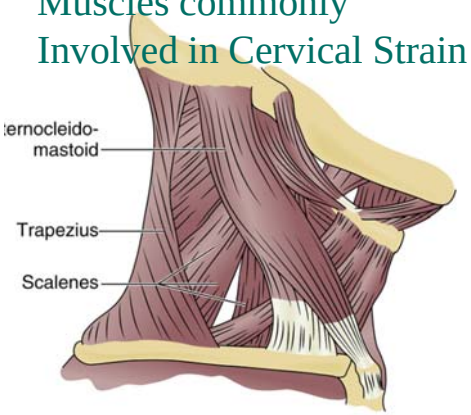
PHYSICAL EXAM

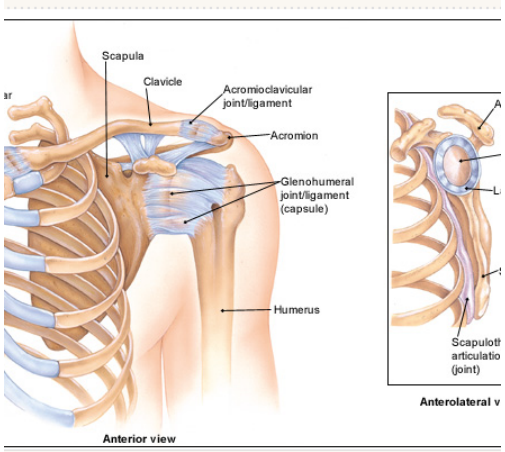
TABLE 5.1 Key Reflexes, Muscle Group, and Sensory Point Testing in Cervical Radiculopathy

Root	Reflex	Key Muscle group (Neck and Arm)	Key Sensation point
C2	Normal reflexes	Neck flexion	1 cm lateral to occipital protuberance
C3	Normal reflexes	Neck extension and lateral flexion	Supraclavicular fossa, mid-clavicle line
C4	Normal reflexes	Shoulder elevation	Skin over acromioclavicular joint
C5	Diminished biceps deep tendon reflex	Elbow flexor	Radial side of the antecubital fossa
C6	Diminished brachioradialis deep tendon reflex	Wrist extension	Dorsal surface, proximal phalanx of the thumb
C7	Diminished triceps deep tendon reflex	Elbow extension	Dorsal surface, proximal phalanx of the 3rd digit
C8	Normal reflexes	Long finger flexors	Dorsal surface, proximal phalanx of the 5th digit



Muscles commonly Involved in Cervical Strain





KEY FINDINGS ON HISTORY AND PE

TABLE 1

Key Findings in the History and Physical Examination

FINDING	*PROBABLE DIAGNOSIS*
Scapular winging, trauma, recent viral illness	Serratus anterior or trapezius dysfunction
Seizure and inability to passively or actively rotate affected arm externally	Posterior shoulder dislocation
Supraspinatus/infraspinatus wasting	Rotator cuff tear; suprascapular nerve entrapment
Pain radiating below elbow; decreased cervical range of motion	Cervical disc disease
Shoulder pain in throwing athletes; anterior glenohumeral joint pain and impingement	Glenohumeral joint instability
Pain or "clunking" sound with overhead motion	Labral disorder

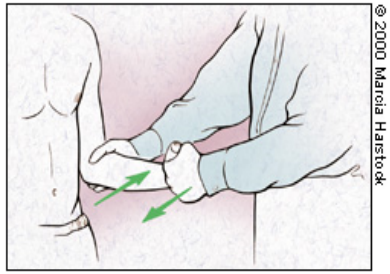


FIGURE 4.

Infraspinatus/teres minor examination. The patient attempts to externally rotate the arms against resistance while the arms are at the sides and the elbows are flexed to 90 degrees.

THOMAS W. WOODWARD, M.D., and THOMAS M. BEST, M.D., PH.D., The Painful Shoulder, Part 1: Clinical Evaluation. Am Fam Physician. 2000 May 15;61(10):3079-3088

SHOULDER EVALUATION

TABLE 2

Tests Used in Shoulder Evaluation and Significance of Positive Findings

TEST	*MANEUVER*	*DIAGNOSIS SUGGESTED BY POSITIVE RESULT*
Apley scratch test	Patient touches superior and inferior aspects of opposite scapula	Loss of range of motion: rotator cuff problem
Neer's sign	Arm in full flexion	Subacromial impingement
Hawkins' test	Forward flexion of the shoulder to 90 degrees and internal rotation	Supraspinatus tendon impingement
Drop-arm test	Arm lowered slowly to waist	Rotator cuff tear
Cross-arm test	Forward elevation to 90 degrees and active adduction	Acromioclavicular joint arthritis
Spurling's test	Spine extended with head rotated to affected shoulder while axially loaded	Cervical nerve root disorder
Apprehension test	Anterior pressure on the humerus with external rotation	Anterior glenohumeral instability
Relocation test	Posterior force on humerus while externally rotating the arm	Anterior glenohumeral instability
Sulcus sign	Pulling downward on elbow or wrist	Inferior glenohumeral instability
Yergason test	Elbow flexed to 90 degrees with forearm pronated	Biceps tendon instability or tendonitis
Speed's maneuver	Elbow flexed 20 to 30 degrees and forearm supinated	Biceps tendon instability or tendonitis
"Clunk" sign	Rotation of loaded shoulder from extension to forward flexion	Labral disorder

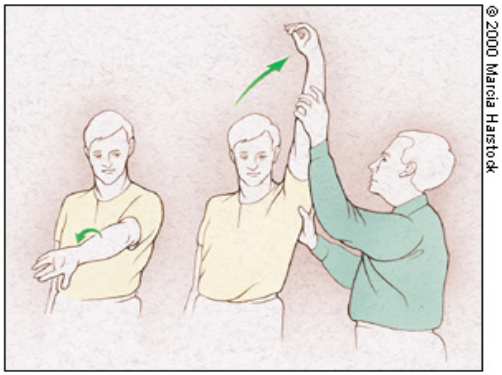


FIGURE 5.

Neer's test for impingement of the rotator cuff tendons under the coracoacromial arch. The arm is fully pronated and placed in forced flexion.

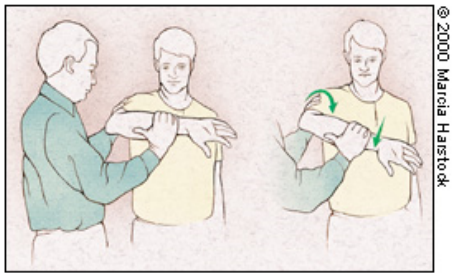


FIGURE 6.

Hawkins' test for subacromial impingement or rotator cuff tendonitis. The arm is forward elevated to 90 degrees, then forcibly internally rotated.

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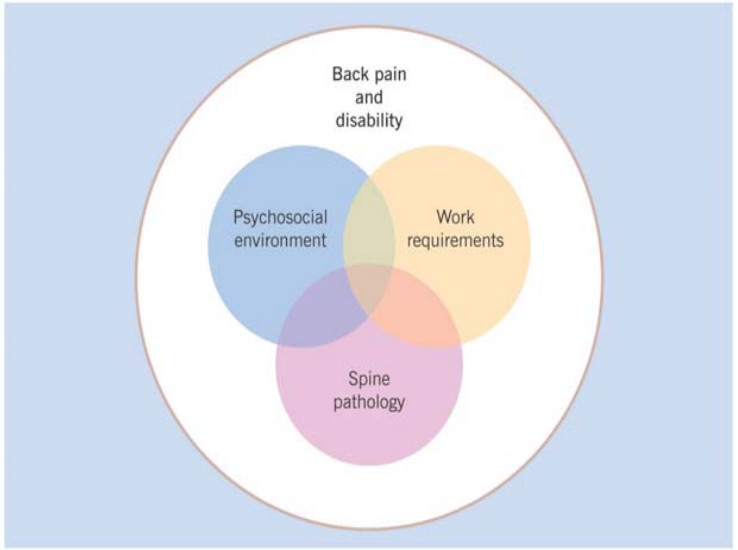
BIOPSYCHOSOCIAL PHENOMENOM

- Significant psychosocial factors (anxiety, depression, work/ performance stressors) play a role in the management of LBP/ Neck pain and disability prevention

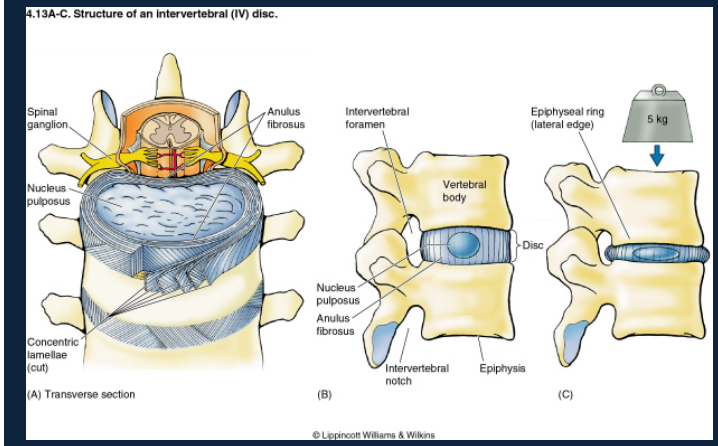


CERVICAL STRAIN

- Cervical sprain or strain typically refers to acute pain arising from injured soft tissues of the neck, including muscles, tendons, and ligaments
- Symptoms include nonradiating neck pain, neck stiffness, fatigue, and worsening of symptoms with cervical range of motion. The pain often extends into the trapezius region or interscapular region. Headache, probably the most common associated symptom, originates in the occiput region and radiates frontally.
- Paresthesias, radiating arm pain, dysphagia, visual symptoms, auditory symptoms, and dizziness may be reported
- PE: decreased or painful cervical range of motion
  - tenderness of the cervical paraspinal, trapezius, occiput, or anterior cervical (i.e., sternocleidomastoid) muscles
  - Normal neurologic exam

CERVICAL DEGENERATIVE DISEASE

- Genetics, aging, and attrition and trauma may all play an important role.
- Disc degeneration results in altered, abnormal load distribution, which in turn leads to a cascade of structural changes that affect the various components of the spinal column.
- These structural changes may change spinal posture and stability and may compromise neural function.
- Two large groups of patients can be recognized:
  - patients whose main complaint is limited to **axial pain**
    - complain of stiffness and pain in the cervical spine.
  - patients with **radicular pain**

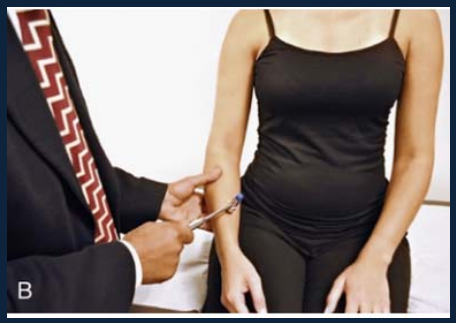


CERVICAL HNP WITH RADICULOPATHY

- Cervical radiculopathy is defined as dysfunction of a cervical nerve root resulting in painful neck, arm, and associated sensory, motor, and reflex abnormality
- Involvement of the ventral root of the spinal nerve would result in motor weakness, and involvement of dorsal root of the spinal nerve would result in sensory deficits

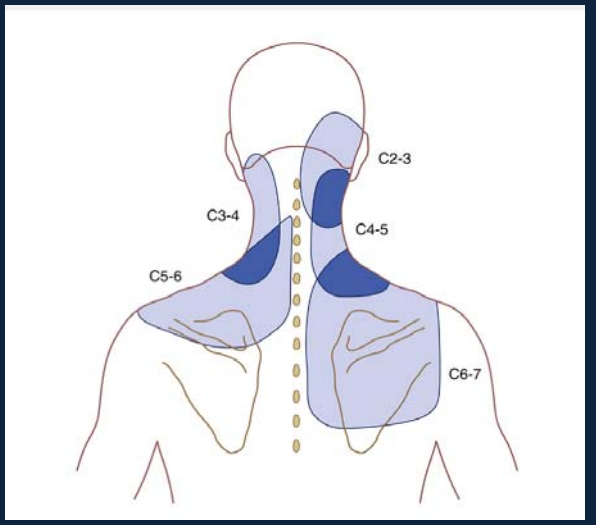
TABLE 5.2 Sample of Cervical Root Innervated Muscles/Muscle Groups in the Neck and Arm

C2	Sternocleidomastoid, rectus capitis, longus colli
C3	Trapezius, splenius capitis
C4	Trapezius, levator scapulae
C5	Deltoid, biceps, supraspinatus, infraspinatus
C6	Wrist extensors, biceps, brachioradialis, supinator
C7	Wrist flexors, triceps
C8	Thumb extensor and adductors. Wrist ulnar deviators, flexor digitorum superficialis



CERVICAL FACET ARTHROPATHY

- Symptoms
  - Unilateral NP without radiation into UEs
  - Pain often worsens with neck extension and rotation
  - Pain referral patterns
- Physical Exam
  - Palpation tenderness best performed in supine
    - C2 spinous process is first protuberance below occiput
    - C7 spinous process is largest and most palpable
  - Palpate ~ 1.3 – 2.5 cm lateral to spinous process
  - Normal neurologic exam
  - Normal UE PROM/ AROM



Differential Diagnoses

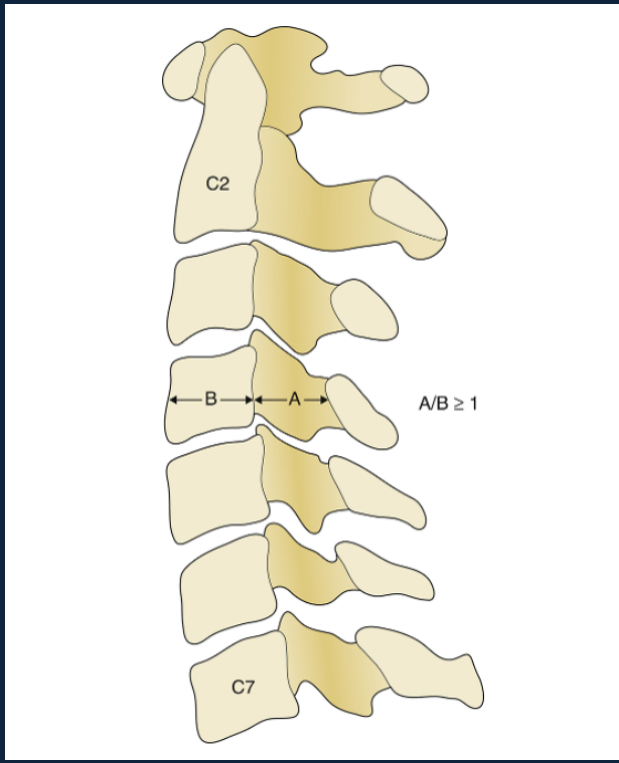
Degenerative disc disease
Myofascial pain syndrome
Internal disc disruption
Disc herniation
Cervical stenosis
Cervical radiculopathy or myelopathy
Spondylolysis
Tumor
Infection
Osteoid osteoma

SYMPTOMATIC CERVICAL FACET ARTHROPATHY

- Paired synovial joints
- Coronal oblique orientation allows greater flexion, extension and lateral bending
- Etiology
  - Degenerative
  - Post-traumatic (acceleration/ deceleration)
  - Adjacent segment degenerative changes (above/ below level of fusion)
- Primary pain generator in ~ 25% patients with chronic neck pain
- Often associated with HA
- C2-3 and C5-6 cited as most commonly affected

CERVICAL SPONDYLOTIC MYELOPATHY

- Frequently encountered in middle-aged and elderly patients
  - Both males and females impacted
- Progress degenerative changes of the spine involves discs, facet joints, joints of Luschka, ligamentum flavum and lamina resulting in gradual encroachment of the spinal canal with spinal cord compromise
- C4-C7 are most common
- Normal AP dimension 17-18 mm
- Spinal stenosis AP dimension ~10 mm



CSM

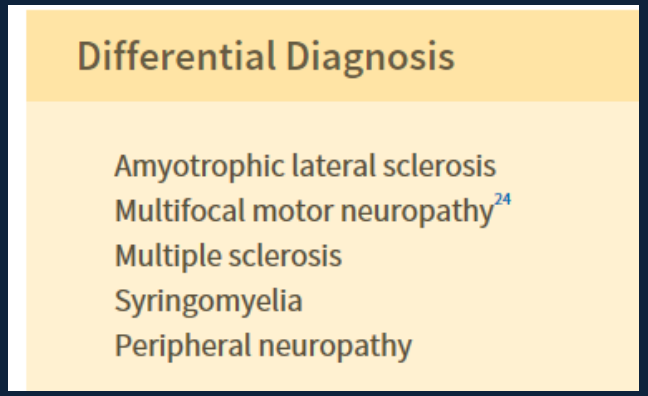
- Encroaching structures may also compress anterior spinal artery, resulting in spinal cord ischemia beyond compression site
- Demyelination, myelomalacia, cord atrophy
- Dynamic instability can result in anterolisthesis or retrolisthesis

CSM SYMPTOMS

- Present with combination of UMN symptoms in the lower extremities and LMN symptoms in the upper extremities
  - Gait dysfunction results from a combination of factors
    - Ataxia due to impaired joint proprioception
    - Hypertonicity
    - Weakness
    - Muscle control deficiencies
  - Impaired vibration and joint position sense is attributed to compression of the posterior columns.
  - Symptoms related to the upper extremities are mostly the result of fine motor coordination deficits
  - Bilateral hand numbness

CSM CLINICAL PEARLS ON PHYSICAL EXAM

- Wide based gait
- LE hyperreflexia, clonus
- Weakness and atrophy of intrinsic hand muscles
- Reduced fine motor control
- +Lhermitte's sign
- Proximal muscle weakness
- + Hoffman's response
- Altered single limb stance & tandem gait



DIAGNOSTIC TESTING

- Plain X-rays
- CT
- MRI
- NM Bone SPECT scan
- Gold Standard for evaluation of symptomatic facet arthropathy is fluoroscopically guided medial branch blocks
  - Medial branches of dorsal rami supply nociceptive fibers to the facet joints
  - High false positives with single block
- MSK Ultrasound
- EMG/ NCS testing

NECK PAIN GUIDELINES

EXAMINATION – OUTCOME MEASURES

A Clinicians should use validated self-report questionnaires for patients with neck pain, to identify a patient's baseline status and to monitor changes relative to pain, function, disability, and psychosocial functioning.

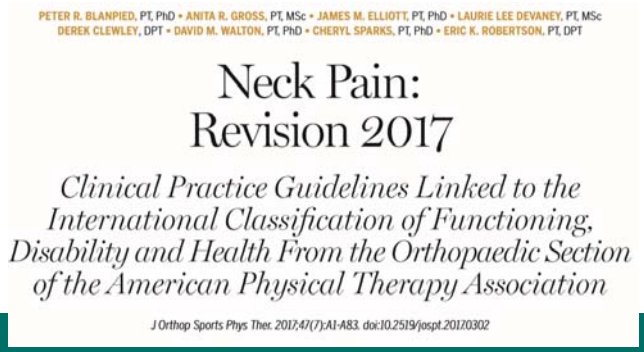
EXAMINATION – ACTIVITY LIMITATIONS AND PARTICIPATION MEASURES

F Clinicians should utilize easily reproducible activity limitation and participation restriction measures associated with the patient's neck pain to assess the changes in the patient's level of function over the episode of care.

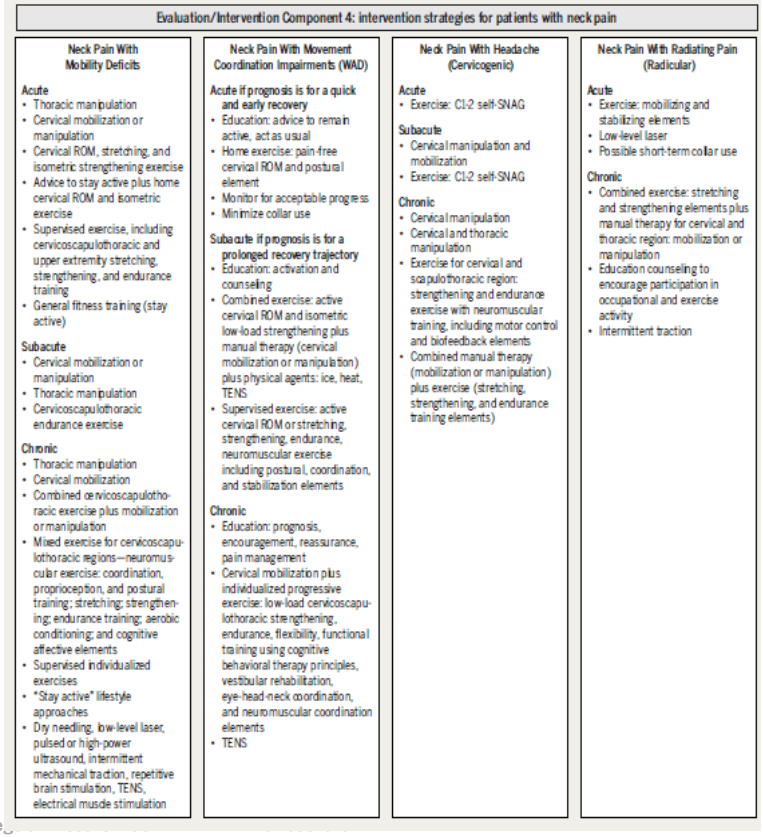
DIAGNOSIS/CLASSIFICATION

C Clinicians should use motion limitations in the cervical and upper thoracic regions, presence of cervicogenic headache, history of trauma, and referred or radiating pain into an upper extremity as useful clinical findings for classifying a patient with neck pain into the following categories:

- Neck pain with mobility deficits
- Neck pain with movement coordination impairments (including whiplash-associated disorder [WAD])
- Neck pain with headaches (cervicogenic headache)
- Neck pain with radiating pain (radicular)



NECK PAIN GUIDELINES



Evaluation/Intervention Component 4: intervention strategies for patients with neck pain

Neck Pain With Mobility Deficits

Acute
- Thoracic manipulation
- Cervical mobilization or manipulation
- Cervical ROM, stretching, and isometric strengthening exercise
- Advice to stay active plus home cervical ROM and isometric exercise
- Supervised exercise, including cervicoscapulothoracic and upper extremity stretching, strengthening, and endurance training
- General fitness training (stay active)

Subacute
- Cervical mobilization or manipulation
- Thoracic manipulation
- Cervicoscapulothoracic endurance exercise

Chronic
- Thoracic manipulation
- Cervical mobilization
- Combined cervicoscapulothoracic exercise plus mobilization or manipulation
- Mixed exercise for cervicoscapulothoracic regions—neuromuscular exercise: coordination, proprioception, and postural training; stretching; strengthening; endurance training; aerobic conditioning; and cognitive affective elements
- Supervised individualized exercises
- "Stay active" lifestyle approaches
- Dry needling, low-level laser, pulsed or high-power ultrasound, intermittent mechanical traction, repetitive brain stimulation, TENS, electrical muscle stimulation

Neck Pain With Movement Coordination Impairments (WAD)

Acute if prognosis is for a quick and early recovery
- Education: advice to remain active, act as usual
- Home exercise: pain-free cervical ROM and postural element
- Monitor for acceptable progress
- Minimize collar use

Subacute if prognosis is for a prolonged recovery trajectory
- Education: activation and counseling
- Combined exercise: active cervical ROM and isometric low-load strengthening plus manual therapy (cervical mobilization or manipulation) plus physical agents: ice, heat, TENS
- Supervised exercise: active cervical ROM or stretching, strengthening, endurance, neuromuscular exercise including postural, coordination, and stabilization elements

Chronic
- Education: prognosis, encouragement, reassurance, pain management
- Cervical mobilization plus individualized progressive exercise: low-load cervicoscapulothoracic strengthening, endurance, flexibility, functional training using cognitive behavioral therapy principles, vestibular rehabilitation, eye-head-neck coordination, and neuromuscular coordination elements
- TENS

Neck Pain With Headache (Cervicogenic)

Acute
- Exercise: C1-2 self-SNAG

Subacute
- Cervical manipulation and mobilization
- Exercise: C1-2 self-SNAG

Chronic
- Cervical manipulation
- Cervical and thoracic manipulation
- Exercise for cervical and scapulothoracic region: strengthening and endurance exercise with neuromuscular training, including motor control and biofeedback elements
- Combined manual therapy (mobilization or manipulation) plus exercise (stretching, strengthening, and endurance training elements)

Neck Pain With Radiating Pain (Radicular)

Acute
- Exercise: mobilizing and stabilizing elements
- Low-level laser
- Possible short-term collar use

Chronic
- Combined exercise: stretching and strengthening elements plus manual therapy for cervical and thoracic region: mobilization or manipulation
- Education counseling to encourage participation in occupational and exercise activity
- Intermittent traction

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Neck Pain:
Revision 2017

Clinical Practice Guidelines Linked to the International Classification of Functioning, Disability and Health From the Orthopaedic Section of the American Physical Therapy Association

J Orthop Sports Phys Ther. 2017;47(7):A1-A83. doi:10.2519/jospt.2017.0302

EVIDENCE BASED GUIDELINES

Practical Applications

- Forty-one RCTs were used to develop 11 treatment recommendations.
- Recommendations were made for acute neck pain using exercise and a multimodal approach to manipulation, mobilization.
- Recommendations were also made for chronic neck pain using manipulation, mobilization, and exercise and multimodal approaches to manipulation, manual therapy, exercise and massage.

Evidence based Guidelines for the Chiropractic Treatment of adults with Neck pain
J. Manipulative Physiol Ther 2014;37:42-63.

TREATMENT STAGES

- *Acute phase* is directed at pain reduction, control of inflammation and spasm, and prevention of deconditioning
  - local icing, NSAIDs, +/- muscle relaxant
  - For radiculopathy, consider short course of oral steroid, neuromodulating medication, cervical traction, activity modification
  - Postural reeducation
    - Ex. Avoid neck hyperextension/ overhead activities with extension aggravated NP
    - Drink with a straw
    - Adjust monitor height
    - Face the shower for while shampooing
  - Gentle mobilization and stretching
  - Isometric neck exercises (preserve neck muscle strength and tone)
  - Low level aerobic conditioning

TREATMENT STAGES

- *Restorative Phase* is directed toward normalizing range of motion, correcting biomechanical deficits, enhancing flexibility, strengthening torso and extremity muscles. When muscles contract optimally, *spine stabilization* occurs.
  - Optimize posture
  - Improve neuromuscular control in both static and dynamic positions
  - Various methods are available to improve joint and soft tissue flexibility
  - Manipulation and mobilization may be helpful
  - an active stretching and strengthening program will result in more permanent and lasting improvement
  - Maintain/ enhance cardiovascular conditioning

TREATMENT STAGES

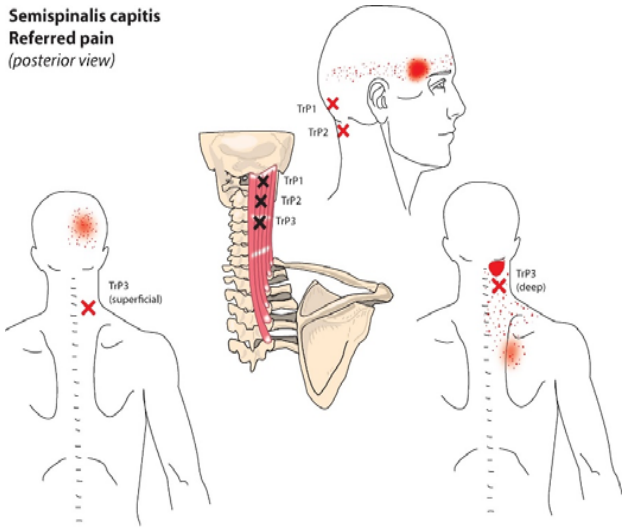
- *Maintenance Phase* is directed toward sport/activity specific training
  - consolidation of previous exercises with progression to complex multiplanar movements replicating sport/activity
  - continued aerobic training, postural correction, and flexibility exercises
  - Cessation of medication management

CERVICOGENIC HEADACHE

- For chronic cervicogenic headache
  - moderate quality evidence supports static-dynamic cervico-scapulothoracic strengthening/endurance exercises including pressure biofeedback immediate post treatment and probably improves pain, function and global perceived effect at long-term follow-up.
  - Low grade evidence supports sustained natural apophyseal glides (SNAG) exercises.
  - *Gross A, Kay TM, Paquin JP, Blanchette S, Lalonde P, Christie T, Dupont G, Graham N, Burnie SJ, Gelley G, Goldsmith CH, Forget M, Hoving JL, Brønfort G, Santaguida PL, Cervical Overview Group. Exercises for mechanical neck disorders. Cochrane Database of Systematic Reviews 2015, Issue 1. Art. No.: CD004250. DOI: 10.1002/14651858.CD004250.pub5.*

ADDITIONAL TREATMENT OPTIONS

- Dry Needling
- Acupuncture
- Cervical Dystonia
  - Neurotoxin injections



PATIENT MANAGEMENT

- Diagnostic Testing – EMG/ NCS, Cervical MRI
- Right shoulder US guided evaluation
  - Subacromial bursal fluid, mild supraspinatus and infraspinatus tendonitis without tear
  - US guided subacromial bursal lidocaine and corticosteroid injection
- PT to include shoulder and neck ROM, soft tissue mobilization, manual traction, progressive cervical and UE strengthening exercises
  - Given LE hyperreflexia and documented cervical stenosis without myelomalacia, chiropractic treatment deferred
- Neuromodulating medication (Gabapentin)
- Recommended antidepressant therapy (Duloxetine)
- Significant improvement over 4 months with restoration of UE AROM and strength

TAKE HOME POINTS

- Pathoanatomical features should guide Differential Diagnoses
- Utilize existing guidelines and appropriateness criteria in clinical decision making for imaging studies for neck pain and shoulder pain in the acute and chronic stages
- Use validated self-report questionnaires for patients with neck pain to identify a patient's baseline status and to monitor changes relative to pain, function, disability, and psychosocial functioning
- Guidelines strongly suggest combining patient education, manual treatment approaches with therapeutic exercises
- Ensure patient compliance with exercises

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