

NECK PAIN/STRAIN – EVALUATION AND TREATMENT

Background

1. Definition: a nonspecific term including a group of diagnoses consisting of pain in the neck region resulting from mechanical injury to cervical anatomic structures.
 - Structures include the cervical vertebrae (C1-C7), cervical paraspinal muscles and muscles of the anterior neck, and associated ligaments.
2. General Information: A classification system for neck pain was established in 2007 by a multidisciplinary task force to better guide assessment and intervention¹
 - Grade I: No signs of major pathology; little impact on daily activity
 - Grade II: No signs of major pathology; may impact daily activity
 - Grade III: Neck pain with neurological signs or symptoms
 - Grade IV: Neck pain with major pathologyPatients with Grade IV pain should be evaluated emergently for suspected condition.

Pathophysiology

1. Etiology of disease:
 - Acute
 - Injury causing mechanical stress to anatomic structures.
 - Structures strained beyond physiologic/anatomic barriers.
 - Chronic
 - Previous acute injury without healing.
 - Repetitive microtrauma to anatomic structures.
2. Pathology of disease:
 - Muscle strain/ligament sprain result in microvascular bleeding/ irreversible cell damage.
 - Tissue necrosis/inflammatory response follow.
 - Tissue remodeling then occurs with formation of scar tissue.
 - Soft tissue damage (particularly the alar ligaments) has been demonstrated by MRI in patients 6 years post whiplash injury²
 - Sensitization and hyperstimulation of peripheral nerves can decrease threshold for pain in chronically affected tissue.
3. Incidence, Prevalence:
 - 66% of all people will experience neck pain in their lives³
 - In any given year, 30-50% of adults experience neck pain⁴
 - Prevalence of neck pain highest in middle age³
4. Risk Factors:
 - Trauma: sports injury, MVA
 - Everyday life: poor posture, sleeping position, nature of work (maintaining non-neutral positioning for long periods of time), depression and anxiety, neck strain³
 - Middle age^{3,4}
 - Risk factors predisposing to chronic neck pain⁵
 - Age >40
 - coexisting low back pain
 - long history of neck pain
 - bicycling as regular activity

- loss of strength in hands
- worrisome attitude
- poor quality of life
- less vitality
- Risk factors identified for whiplash-associated disorder (WAD)⁶
 - female
 - rear collision
 - prior history of neck pain
 - younger age
 - stationary vehicle
 - severity of collision
 - not being at fault
 - monotonous work
- Female Sex and rear end collision are the 2 most consistent predictors of neck pain post motor vehicle accident⁶

4. Morbidity:

- Chronic tension headaches, upper back muscle spasm, psychosocial stress
- Accounts for lost work time equal to low back pain in some industries³
- Causes severe disability in 5% of affected people³

Diagnostics

1. Goal: Exclusion of major pathology or injury requiring emergent care. See Differential Diagnosis.

2. History

- CC: pain, stiffness, tightness in upper back or neck
- HPI:
 - movement and activity typically make pain worse
 - rest usually provides some relief
 - quality of pain can be sharp/stabbing if acute; or dull/aching if onset is insidious
 - absence of radiating pain. Presence suggests neurological involvement and is discussed elsewhere.
 - onset, duration, and frequency of pain can vary depending on nature of injury
 - recommended to use validated self-report questionnaires (i.e. Neck Disability Index or Patient-Specific Function Scale) to identify baseline pain, function, disability⁵

3. Physical Examination:

- Observe general movement and resting posture
- Inconsistency throughout exam may suggest malingering
- Assess range of motion in all 3 planes of motion (normal values)
 - flexion/extension (60°/75°)
 - lateral flexion (45°)
 - rotation (90°)
 - decreased range of motion is single best predictor of long-term handicap in patients with acute whiplash injury⁷
- Palpate major muscle groups and bony structures for tenderness indicating involved tissue
 - cervical paraspinal muscles, upper trapezius, sternocleidomastoids
 - spinous processes of C1-C7

- articular pillars of C1-C7
 - nuchal ligament
 - Neurological exam of bilateral upper extremities, including muscle strength, muscle tone, reflexes, sensation
 - Abnormal findings here would suggest neurological involvement
See also Cervical Nerve Root Compression
 - Special tests to rule out nerve root compression should be negative
See also Cervical Nerve Root Compression
 - Spurling's test
 - Cervical Distraction test
 - Upper limb tension test
4. Diagnostic Testing:⁸
- Imaging: Patients with history of acute trauma and Grade III/IV Whiplash associated injury should undergo radiographic imaging unless cleared per Canadian C-Spine criteria (SOR:A)⁸
 - Choice of plain films, CT, or MRI based on suspected injured structures
See also C-Spine Imaging
 - For uncomplicated neck pain < 4 weeks duration, radiography not initially indicated⁹
 - Radiography indicated in patients who fail 4-6 weeks of conservative care^{8,9}
 - Radiography indicated in patients with "red flags"⁹
 - age <20 or >50
 - non-mechanical pain
 - neck rigidity in the sagittal plane in the absence of trauma
 - dysphasia
 - CNS signs/symptoms
 - arm or leg pain with neck movement
 - sudden onset and/or associate headache
 - History of severe trauma
 - suspected cervical compression myelopathy
 - MRI indicated in suspicion of myelopathy, neoplasm, or infection, radicular symptoms with motor deficits; or radicular symptoms persisting after 6-8 weeks of conservative treatment (SOR:B)⁸

Differential Diagnoses

Key Differential Diagnoses:

- Musculoskeletal: vertebral fracture, disc herniation, osteoarthritis, foraminal stenosis
- Neurological: cervical myelopathy, radiculopathy
- Infectious: discitis, meningitis, influenza
- Psychosomatic: depression, fibromyalgia, malingering

Extensive Differential Diagnoses:

- Musculoskeletal: myositis, osteomyelitis, neoplasm, diffuse skeletal hyperostosis
- Neurological: multiple sclerosis, syringomyelia
- Infectious: abscess
- Psychosomatic: Munchhausen's syndrome
- Rheumatological: rheumatoid arthritis, ankylosing spondylitis, polymyalgia

- rheumatica, giant cell arteritis

Therapeutics

1. Goals of treatment:

- Reduce pain / muscle irritation / muscle spasm
- Reestablish normal cervical lordosis and range of motion
- Restore function
- Coordinated multidisciplinary management approach associated with quicker resolution in whiplash patients¹⁰

2. Acute Treatment:

- Posture modification:
 - Avoid slouching, carrying heavy bags over shoulders
 - Adjust sleep position with neutral head and neck position and support
 - Limit strenuous neck rotation movements, and extended time spent driving, reading, or watching TV¹¹
- Pharmacologic:
 - Acetaminophen 2-4 g per day as first line of therapy (SOR:A)⁸
 - NSAIDS: COX-2 specific or non-specific depending on patient tolerability (SOR:A)⁸
 - iii. Muscle relaxants:
 - cyclobenzaprine 10-30 mg per day most effective in first 4 days post acute injury (SOR:B)⁸
 - adding cyclobenzaprine to high-dose ibuprofen does not provide additional pain relief for minor trauma¹²
 - cyclobenzaprine associated with greater prevalence of neurologic side effects¹²
 - Opioids: short term use effective for moderate-severe pain when benefit outweighs risks (SOR:A)⁸
- Exercise:
 - Early return to normal activity (SOR:B)⁸
 - Supervised exercise (SOR:B)⁸
 - Strengthening vs. endurance exercise showed no difference in clinical outcomes¹⁰
- Mobilization/Manipulation:
 - Provide short term benefit^{5,8,10}
 - 9-12 sessions of cervical manipulation shown to be superior to 3 sessions for cervicogenic headache¹³
 - Single session of thoracic manipulation as additional therapy showed increased function and immediate pain reduction compared to placebo [NNT=5-7]¹³
- Passive Treatment (i.e. Patient not actively involved in exercises or activities)
 - Most passive treatments were not more effective than placebo or no treatment including:¹⁴
 - Ultrasound
 - E-stim
 - rest
 - middle frequency electrotherapy and iontophoresis
 - use of patient information sheets
 - Pulsed electromagnetic therapy was better than placebo at decreasing pain levels¹⁴

- Low level laser therapy and magnetic stimulation were associated with improved function and decreased pain at 10-12 weeks¹⁰
- Immobilization
 - Cervical collars: no evidence of effectiveness; may prove to be detrimental to proper return to function^{8,10,14}
 - Use longer than 3 days likely prolongs disability⁸
- 3. Long-Term Care:
 - Physical therapy:
 - Supervised proprioceptive and therapeutic exercise program recommended as beneficial for pain and function (SOR:A)¹⁵
 - Multimodal exercise with mobilization and manipulation showed strongest evidence of benefit; [NNT = 4 to 5]¹⁰
 - Pharmacologic:
 - antidepressants and anticonvulsants are supported for chronic and neuropathic pain, especially in patients with concomitant depression (SOR:A)⁸
 - daily orphenadrine and paracetamol associated with greater pain reduction in first 8 days¹⁰
 - corticosteroid injections: not associated with greater pain reduction/recovery¹⁰
 - Modalities:
 - Pulsed electromagnetic field therapy (SOR:B)⁸
 - Acupuncture: beneficial and cost effective for chronic neck pain (SOR:A)¹⁶
 - Percutaneous neuromodulation therapy: associated with immediate post-treatment decrease in pain, better sleep, and more physical activity after 3 weeks¹⁰
 - Mechanical cervical traction (continuous or intermittent) shows no statistically significant evidence of decreased pain or increased function¹⁷
- 4. Course of Care – no evidence that particular course of care (longer/shorter, early/late) with any one or combination of non-invasive interventions associated with better prognosis¹⁰

Follow-Up

1. Return to Office:
 - Follow-up in office no later than 4-6 weeks for re-evaluation. If no improvement, diagnostic studies may be indicated.
 - WAD
 - More frequent follow-up at 1 week, 3 weeks, 6 weeks for WAD indicated if pain persists or worsens¹⁸
 - Reductions in treatments should be occurring by 6 weeks if pain / symptoms resolving (30% of cases)¹⁸
 - Resolution 50% by 3-month assessment; continue treatment if still improving¹⁸
2. Refer to Specialist: if unable to efficiently manage pain and multimodal exercise therapy program ineffective
3. Consider hospital admission if signs of major pathology develop:
 - fever, chills, headache
 - signs of cervical nerve root compression
 - paresthesias with neck movement
 - focal deficits

- traumatic re-injury

Prognosis

1. Most people do not experience complete resolution of symptoms⁴
2. Between 50-85% will experience some persistent pain at 1 year^{4,19}
3. Level of expectations for recovery is important factor for prognosis²⁰
4. Predictors of poor prognosis
 - middle age⁴
 - self-reported symptom severity^{4,19}
 - regular bicycling⁴
 - prior pain/injuries and poor health⁴
 - psychological distress and passive coping techniques¹⁹
 - unemployment⁴
5. Predictors of better prognosis⁴
 - young age
 - better psychological health and good social support
6. Broad occupation type is important in prognosis²¹
 - white collar workers recovered quicker than blue collar workers
 - military officers recovered quicker than enlisted troops after cervical disc surgery
 - female seamstresses and factory workers recovered quicker after changing jobs

Prevention

1. There is no evidence showing that any interventions are associated with prevention of neck pain¹⁰
2. Physical training and stress management specifically show no association with prevention¹⁰

Patient Education

1. Neck pain algorithm from AAFP
[\[http://familydoctor.org/online/famdocen/home/tools/symptom/513.printerview.html\]](http://familydoctor.org/online/famdocen/home/tools/symptom/513.printerview.html)

References

1. Guzman, J, et al. Clinical practice implications of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders: from concepts and findings to recommendations. *Spine* 2008; 33:S199-213.
2. Krakenes, J, Kaale, BR. Magnetic resonance imaging assessment of craniovertebral ligaments and membranes after whiplash trauma. *Spine* 2006; 31:2820.
3. Binder A. Neck pain. *Am Fam Physician*. 2005 Jan 1;71(1):117-118.
4. Carroll, LJ, et al. Course and prognostic factors for neck pain in the general population: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine* 2008; 33(4S):S75-82.
5. Childs, JD, et al. Neck pain: clinical practice guidelines linked to the International Classification of Functioning, Disability, and Health from the Orthopaedic Section of the American Physical Therapy Association. *J Ortho Sports Phys Ther*. 2008 Sep; 38(9):A1-34.
6. Wiles, NJ, Jones, GT, Silman, AJ, Macfarlane, GJ. Onset of neck pain after a motor vehicle accident: a case-control study. *J Rheumatol* 2005; 32:1576.
7. Kasch, H, Bach, FW, Jensen, TS. Handicap after acute whiplash injury: A 1-year prospective study of risk factors. *Neurology* 2001; 56:1637.

8. Douglass, A, Bope, E. Evaluation and treatment of posterior neck pain in family practice. *J Am Board Fam Pract*. 2004; 17:S13-22.
9. Bussieres, AE, Taylor, JA, Peterson, C. Diagnostic imaging practice guidelines for musculoskeletal complaints in adults-an evidence-based approach-Part 3: spinal disorders. *J Manipulative Physiol Ther*. 2008 Jan; 31(1): 33-88.
10. Hurwitz, DC, et al. Treatment of neck pain: noninvasive interventions: results of the Bone and Joint Decade 200-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine*. 2008; 33:S123-52.
11. Pain in the neck and arm: a multicentre trial of the effects of physiotherapy, arranged by the British Association of Physical Medicine. *Br Med J* 1966; 5482:253.
12. Turturro, MA, Frater, CR, D'Amico, FJ. Cyclobenzaprine with ibuprofen versus ibuprofen alone in acute myofascial strain: a randomized, double-blind clinical trial. *Ann Emerg Med* 2003; 41:818.
13. Gross, A, et al. Manipulation or mobilization for neck pain. *Cochrane Database of Systematic Reviews*. 2010; 1(CD004249).
14. Verhagen, AP, et al. Conservative treatments for whiplash. *Cochrane Database of Systematic Reviews*. 2007; 2(CD003338).
15. Ebell, M. Cochrane Briefs: Exercises for mechanical neck disorders. *Am Fam Physician*. 2006 Oct 1; 74(7):1125-6.
16. Kelly, R. Acupuncture for pain. *Am Fam Physician*. 2009 Sept; 80(5).
17. Graham, N, et al. Mechanical traction for neck pain with or without radiculopathy. *Cochrane Database of Systematic Reviews*. 2008; 3(CD006408).
18. International Chiropractors Association of California. Management of whiplash associated disorders. Sacramento (CA): International Chiropractors Association of California; 2009. 55p. accessed via www.ahrq.gov 14 Aug 2010
19. Carroll, LJ, et al. Course and prognostic factors for neck pain in whiplash-associated disorders (WAD): results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine*. 2008; 33(4S):S83-92.
20. Holm, LW, et al. Expectations for recovery important in the prognosis of whiplash injuries. *PLoS Med*. 5(5):e105.
21. Carroll, LJ, et al. Course and prognostic factors for neck pain in workers: results of the Bone and Joint Decade 2000-2010 Task Force on Neck Pain and Its Associated Disorders. *Spine*. 2008; 33(4S):S93-100.

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