

DSA 19: Neck Pain
Ryan Seals, DO

Reading Assignments

1. This DSA
2. Review: Year 1 DSA- Cervical Region and Somatic Dysfunction Dx for OA-C7
3. Foundations of Osteopathic Medicine. (2010). Chila, Anthony G. Lippincott Williams & Wilkins, 3rd Edition. Chapter 38, p. 513-527

Learning Objectives

- A. Be able to provide differential diagnosis, treatment, management, and explanation of common and important causes of Neck Pain
 - a. Mechanical neck pain- cervical sprain/strain, somatic dysfunction
 - b. Degenerative diseases of the cervical spine: cervical facet arthritis
 - c. Neurologic Causes: Herniated disc, spinal stenosis
 - d. Referred Pain: Myocardial Infarction
- B. Biomechanical Model of Osteopathic Medicine:
 - a. Identify biomechanical relationships in which somatic dysfunction can either be a cause of or a result of the clinical conditions listed above.
 - b. Explain the effects of performing OMT to address biomechanical relationships of the low back/ pelvis
- C. Neurologic Model of Osteopathic Medicine:
 - a. Identify the nerves that cause pain in the above disorders.
 - b. Explain the effects of performing OMT to address pain.
- D. Behavioral Model of Osteopathic Medicine
 - a. Describe behavioral modifications that may be useful in the treatment of the above common clinical conditions.
 - b. Describe exercises that may be useful in the treatment of the above common clinical conditions.
- E. List indications and contraindications for OMM in the above conditions
 - a. Understand risks and benefits of OMT to the cervical spine including HVLA
- F. Recall relevant literature related to the use of manual medicine on the above disorders

Significance

- 20th most common diagnosis in family practice
- Lifetime prevalence around 70%
- After 3 months of nonoperative treatment, 29% of patients had total relief of symptoms, 49% improved, and 22% did not improve.

Etiology

- muscle tension - stress, anxiety, fatigue, incorrect posture
 - Majority of axial neck pain is *muscular* in origin
- nerve root irritation - postural, degenerative, spasm; especially likely if pain unilateral or acute
- degenerative disk and joint changes - stress on pain-sensitive facet joints or soft tissue, nerve root irritation; likely in elderly and chronic pain or stiffness
- referred pain from shoulder or TMJ
- referred pain from viscera: *myocardial infarction*
 - can refer from chest into left shoulder and left side of neck
 - will typically have shortness of breath, nausea, and/or diaphoresis
 - assess for cardiac risk factors

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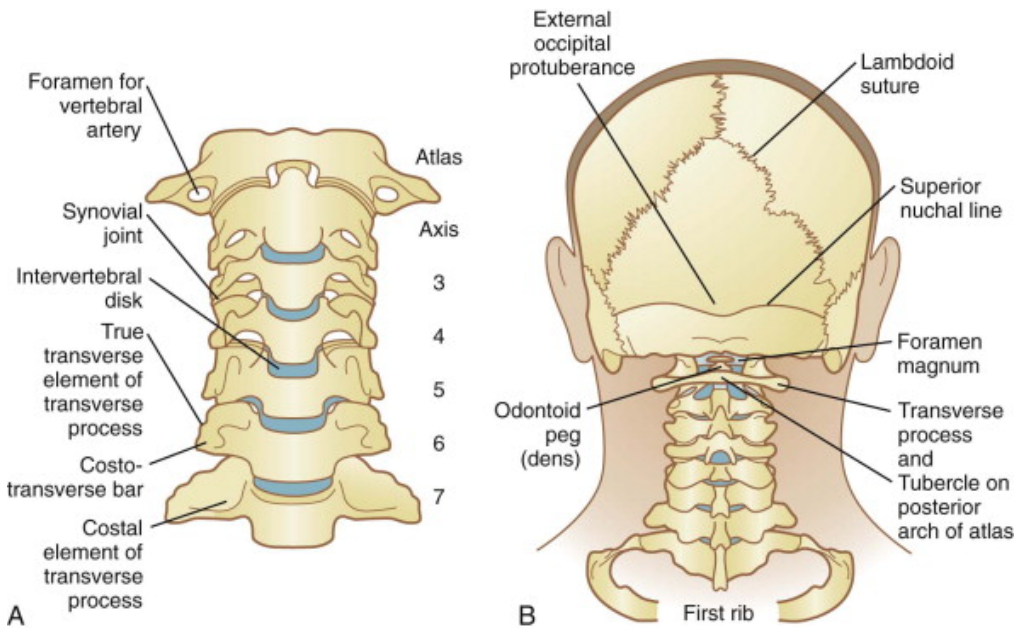


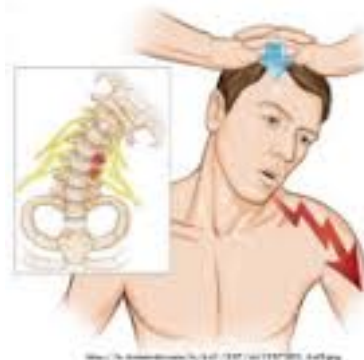
Image from Kelley's textbook of Rheumatology

History

- Chief concern (CC):
 - neck pain or stiffness
- History of present illness (HPI):
 - duration of pain
 - acute trauma or strain
 - radiation of pain down arms, weakness, numbness or paresthesias in arms - cervical radiculitis
 - bilateral symptoms with or without lower extremity symptoms - *consider cervical cord compression syndrome* (cervical disk protrusion, fracture, neoplasm; neck extension usually exacerbates if disk protrusion; immediate cervical immobilization and neurosurgical consultation)
 - Red flags- neurologic symptoms (weakness, numbness, vertigo), bowel or bladder incontinence/retention, trauma, suspicion for cardiac etiology

Physical

- look for sites of tenderness especially over spine
- look for trigger points (tender points of muscle spasm)
- check voluntary range of motion for restricted or painful motion - flexion (normal 45 degrees), extension (normal 55), left/right rotation (normal 70), left/right lean (normal 40)
- look for increased or decreased cervical lordosis (normal lordosis 35-45 degrees)
- Spurling's test (Rotate head toward affected side and add compression, + if radicular pain- see image to right)
- Strength, sensation, and reflexes



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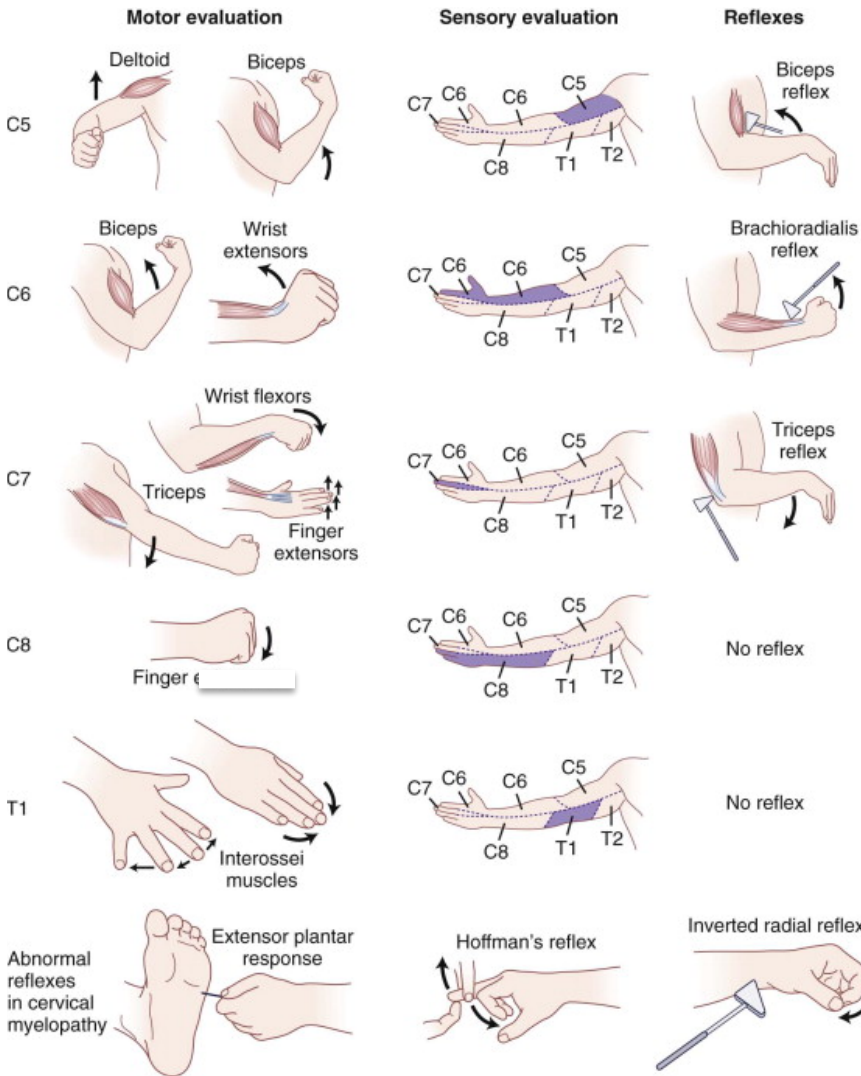


FIGURE 3.6-6 Neurologic evaluation of a patient with cervical radiculopathy and myelopathy. (From Rao RD, Currier BL, Albert TJ, et al: Degenerative cervical spondylosis: Clinical syndromes, pathogenesis, and management. J Bone Joint Surg Am 89:1360-1378, 2007.)

- Due to the way the nerves travel, the nerve most likely affected by a disc herniation is the more *inferior* one.
- Example: If there is a herniation of C5-C6, then the C6 nerve root is most likely affected.

Osteopathic Exam

- Examine cervical spine, thoracic, rib cage, and upper extremity
- Check for trigger points and counterstrain tender points

Pathophysiology

Neck Pain

Joseph S. Cheng, Matthew J. McGirt and Clint Devin
Kelley's Textbook of Rheumatology, 45, 625-638

Axial neck pain may originate from any tissue that receives innervation, including zygoapophyseal joints, cervical disks, vertebral periosteum, posterior neck muscles, cervical dura mater, occipito-atlantoaxial joints, and vertebral arteries. Sources may include degenerative, traumatic, malignant, infectious, or systemic inflammatory processes. Zygoapophyseal {facet} joints and cervical disks have the greatest quantity of direct supporting data suggesting these sites as the origin of axial neck pain.

This pattern of pain can be accurately diagnosed and treated for at least a short time with anesthetic injections targeted at the joint capsule itself, or with blockage of the respective dorsal primary ramus.

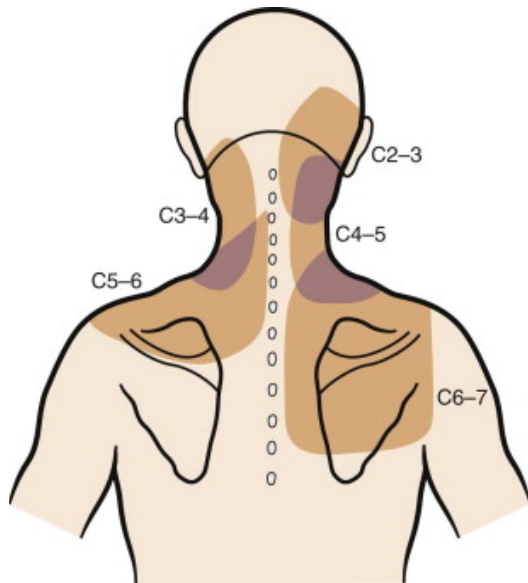
Degenerative arthritis within the upper cervical spine can manifest as suboccipital headaches which are thought to result from irritation of the greater occipital nerve. Typically, arthritis within the atlanto-occipital joints is made worse by provocative neck flexion and extension, whereas atlantoaxial arthritis is made worse by rotation

The cervical disk is a controversial source of axial neck pain, which occurs as the result of insult to the highly innervated annulus fibrosus. Interventions directed at treating the disk for isolated axial neck pain have been found to be unpredictable, although the cervical disk is likely to contribute to axial neck pain.

Myofascial pain due to irritation of the muscles about the neck can contribute to axial neck pain. Patients with chronic myofascial pain have been shown to have a lower level of high-energy phosphates in involved muscle tissue. Myofascial pain can be the original source of neck pain or, more commonly, a manifestation of postural adaptations and compensatory overuse of normal tissue that remains after the injured structure heals. A more generalized form of this is fibromyalgia, a widespread disorder defined by diffuse pain affecting all four quadrants of the body, with at least 11 of 18 pressure points noted as positive. Patients have associated symptoms of fatigue, cognitive difficulties, and irritable bowel syndrome, and a nondermatomal pattern of dysesthesias, weakness, and paresthesias

Systemic inflammatory arthropathies causing neck pain typically demonstrate the classic pattern of morning stiffness, polyarticular involvement, rigidity, and associated cutaneous manifestations. Rheumatoid arthritis (RA) often involves the cervical spine, initially causing stiffness and later causing pain, potentially leading to *instability*. After the hands and feet, the cervical spine is the most common site of disease involvement in RA. The atlantoaxial joint can demonstrate instability with potential for neurologic injury. Because of these potentially catastrophic complications, dynamic radiographs of the cervical spine should be obtained before any procedure requiring intubation is performed.

Differential Diagnosis



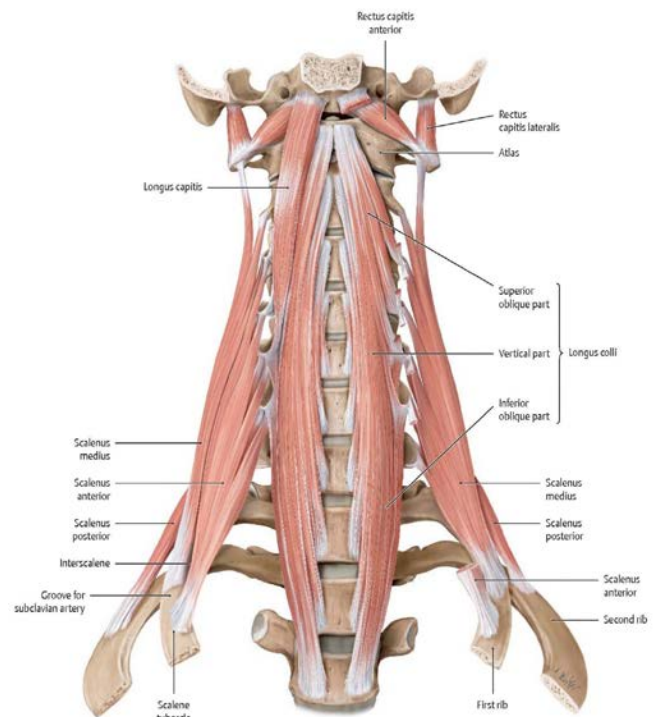
Facet Pain

- Pain radiation pattern for facet syndrome
- Pain is worse with *extension*
- Please review back pain DSA for more detailed description of spinal degeneration
- OMT and exercises can help reduce stress on facet joints
- Facet joint injections are sometimes needed to alleviate the pain

FIGURE 3.6-3 Composite map of axial pain patterns from facet joints at C2-3 to C6-7. (From Dwyer A, Aprill C, Bogduk N: Cervical zygapophyseal joint pain patterns. I. A study in normal volunteers. *Spine* [Phila Pa 1976] 15:453-457, 1990.)

Whiplash

- Injury due to hyperextension of the neck (car accident, trauma, sports, abuse)
- Soft tissue injury often involving anterior longitudinal ligament, sternocleidomastoid, scalenes, longus colli (structures strained with extension injury)
- Main complaint is neck pain, but often associated with tinnitus and dizziness
 - Think of attachment of SCM to temporal bone as potential cause
- Treatment is early mobilization and exercise (including OMT)
- NSAIDs may or may not be helpful



C Prevertebral and lateral (deep) neck muscles, anterior view

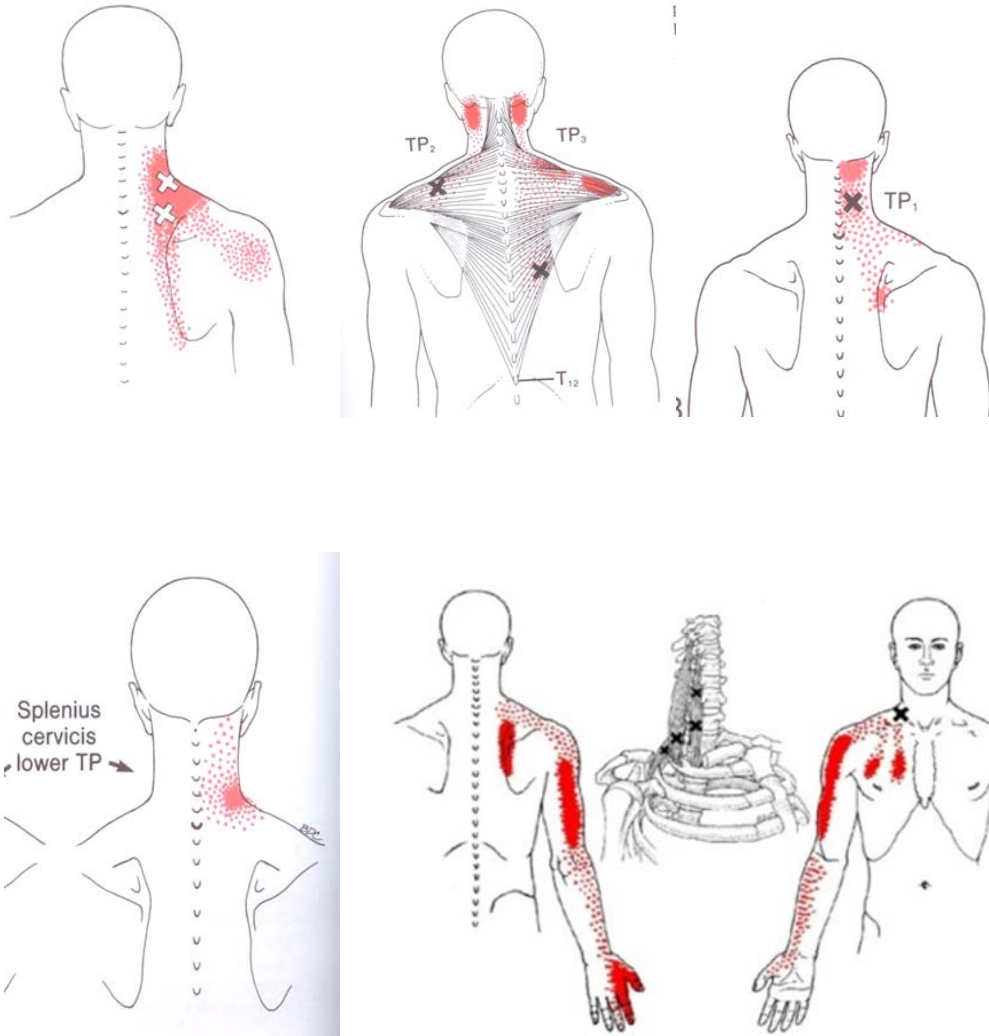
Illustrator: Karl Wesker

pp. 8-9

Schuenke et al. • THIEME Atlas of Anatomy • Neck and Internal Organs
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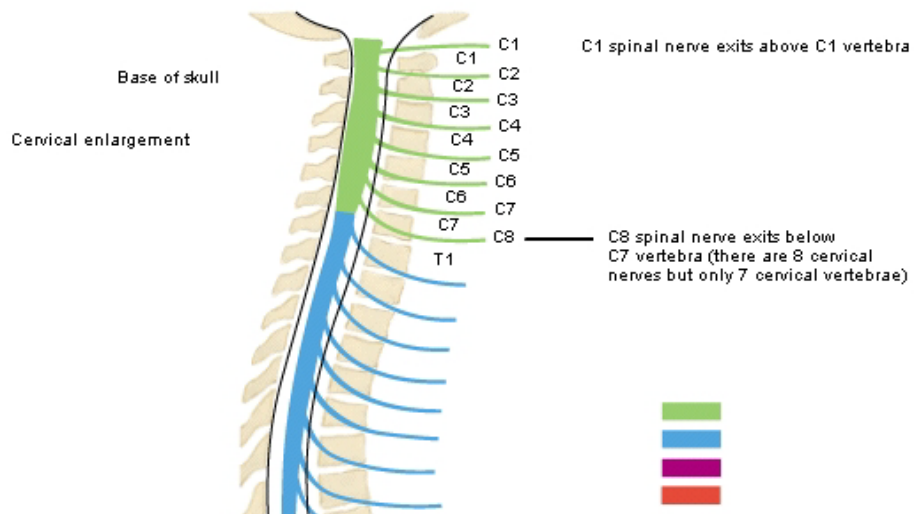


Trigger Points



From top left to right: Levator Scapulae, trapezius, cervical multifidi
 From bottom left to right: splenius cervicis, scalene

Relation of Spinal Nerve Roots to Vertebrae



Radicular Pain

- Lateral recess stenosis typically results from posterior disc protrusion in combination with some superior articular facet hypertrophy.
- Presents with radiculopathy (*sharp and electric pain*)
 - Radiculopathy- disturbance or disease of spinal nerve
- These patients present with pain or neurologic symptoms in a *dermatomal* distribution
 - Review neuro exam chart above
- Due to the way the nerves travel the nerve most likely affected by a disc herniation is the more inferior one (see image above).
- Examples: If there is a herniation of C5-C6 then the C6 nerve root is most likely affected. C7-T1 herniation would affect C8 nerve root

Myelopathy: progressive spinal cord dysfunction (spinal stenosis)

- Can be from acute disc herniation or more commonly progressive degenerative changes
 - Review low back pain DSA for mechanism of spinal degeneration
- difficulty with manual *dexterity and balance*
- Diffuse hand numbness
- *gait disturbance*
- *upper motor neuron signs* such as Hoffman sign, Babinski sign, hyperreflexia, and clonus

Treatment- conservative treatment is all that is needed in the majority of cases (NSAIDs, PT, OMM)

- epidural steroids may be used as next line treatment
- Surgery for cases with neurologic progression or refractory to treatment

Diagnostic Imaging

Usually not indicated acutely without worrisome information gained in history or exam

Consider imaging if:

- Over 65 y/o
- Severe trauma (distracting injuries, altered mental status)
- Known or high risk of osteoporosis
- Sensory or motor deficits (to rule out nerve or cord compression)
- Persistent (>6 weeks) pain
- Progressive pain despite treatment
- Night pain (rule out cancer)
- Intense pain at rest
- Fever, chills or night sweats (infection)
- Previous surgery
- Abnormal bone scan (mets or osteoporosis or multiple myeloma)
- Unreliable history (altered mental status, intoxication)
- Metastatic disease.

If indicated MRI is best for evaluating discs, nerves, and spinal cord

CT scan is best for evaluating bones

Osteopathic Considerations

Treatment

Diagnose and treat your patients with OMM if you have ruled out serious pathology. You may want to do indirect treatments if it is within the first few days after an injury, but let your patient's tolerance be your guide. Prescribe home stretching exercises as well to improve ROM and prevent stiffness (look at previous DSA-L)

During osteopathic exam and treatment, make sure and consider the OA, AA, typical cervicals (C2-7), scalenes, sternocleidomastoid, upper thoracics, and upper ribs.

Recall diagnosis and treatment of the cervical spine for muscle energy, HVLA, and counterstrain.

Contraindications:

- Cord compression (neurologic signs including bowel/bladder incontinence)
- Fracture (or suspected fracture)
- Rheumatoid Arthritis or Down's Syndrome (avoid upper cervical HVLA)
 - Due to instability of the ligaments around the dens
- Acute herniated disc (avoid HVLA and treat with caution)
- Delaying a more definitive form of treatment

See discussion on the safety of cervical HVLA on the following page

Cervical Spine HVLA complications **Excerpts from the AOA position paper 08/05**

Background and Statement of Issue

There has recently been an increasing concern about the safety of cervical spine manipulation. Specifically, this concern has centered on devastating negative outcomes such as stroke.

Benefit

Manipulation relieves cervicogenic headache and is comparable to commonly used first line prophylactic prescription medications for tension- type headache and migraine. Meta-analysis of 5 randomized controlled trials showed that there was a statistically significant reduction in neck pain using a visual analogue scale.

Harm

Since 1925, there have been approximately 275 cases of adverse events reported with cervical spine manipulation. A conservative estimate of the number of cervical spine manipulations per year is approximately 33 million and may be as high as 193 million in the US and Canada. The estimated risk of adverse outcome following cervical spine manipulation ranges from 1 in 400,000 to 1 in 3.85 million manipulations. The estimated risk of major impairment following cervical spine manipulation is 6.39 per 10 million manipulations. However, the risk of a vertebrobasilar accident (VBA) occurring spontaneously, is nearly twice the risk of a VBA resulting from cervical spine manipulation. [A recent report] did conclude that VBA following cervical spine manipulation is “idiosyncratic and rare”. Further review of this data showed that 25% of the cases presented with sudden onset of new and unusual headache and neck pain often associated with other neurologic symptoms that may have represented a dissection in progress.

Comparison of Alternative Treatments

NSAIDs are the most commonly prescribed medications for neck pain. Approximately 13 million Americans use NSAIDs regularly. 81% of GI bleeds related to NSAID use occur without prior symptoms. The annual cost of GI tract complications in the US is estimated at \$3.9 billion, with up to 103,000 hospitalizations and at least 16,500 deaths per year. This makes GI toxicity from NSAIDs the 15th most common cause of death in the United States.

Risk factors

VBA accounts for 1.3 in 1000 cases of stroke, making this a rare event. The most common risk factors for VBA are migraine, hypertension, oral contraceptive use and smoking. A study done in 1999 reviewing 367 cases of VBA reported from 1966-1993 showed 115 cases related to cervical spine manipulation; 167 were spontaneous, 58 from trivial trauma and 37 from major trauma. “Most vertebrobasilar artery dissections occur in the absence of cervical manipulation, either spontaneously or after trivial trauma or common daily movements of the neck, such as backing out of the driveway, painting the ceiling, playing tennis, sneezing, or engaging in yoga exercises.” In some cases manipulation may not be the primary insult causing the dissection, but an aggravating factor or coincidental event.

Conclusion

Osteopathic manipulative treatment of the cervical spine, including but not limited to High Velocity/Low Amplitude treatment, is effective for neck pain and is safe, especially in comparison to other common treatments. Because of the very small risk of adverse outcomes, trainees should be provided with sufficient information so they are advised of the potential risks.

Research

Ann Intern Med. 2012 Jan 3;156(1 Pt 1):1-10

Spinal manipulation, medication, or home exercise with advice for acute and subacute neck pain: a randomized trial. [Bronfort G1](#), [Evans R](#), [Anderson AV](#), [Svendsen KH](#), [Bracha Y](#), [Grimm RH](#).

Background:

Mechanical neck pain is a common condition that affects an estimated 70% of persons at some point in their lives. Little research exists to guide the choice of therapy for acute and subacute neck pain. This is a randomized, controlled trial.

Participants:

272 persons aged 18 to 65 years who had nonspecific neck pain for 2 to 12 weeks.

Intervention:

12 weeks of SMT, medication, or HEA. (Spinal Manipulation Therapy or Home Exercise)

Measurements:

The primary outcome was participant-rated pain.

Results:

For pain, SMT had a statistically significant advantage over medication after 8, 12, 26, and 52 weeks ($P \leq 0.010$), and HEA was superior to medication at 26 weeks ($P = 0.02$). No important differences in pain were found between SMT and HEA at any time point.

Conclusion:

For participants with acute and subacute neck pain, SMT was more effective than medication in both the short and long term. However, a few instructional sessions of HEA resulted in similar outcomes at most time points.

J Altern Complement Med. 2013 Jun;19(6):543-9. 2012 Dec 28.

Osteopathic treatment of patients with long-term sequelae of whiplash injury: effect on neck pain disability and quality of life. [Schwerla F](#), [Kaiser AK](#), [Gietz R](#), [Kastner R](#).

Objectives:

The clinical sequelae and manifestation resulting from whiplash injury are defined as late whiplash syndrome (LWS). The objective of this study was to investigate whether a series of osteopathic treatments of patients with LWS may improve their symptoms.

Setting:

Forty-two (42) patients (mean age 39 years) suffering from LWS due to car rear-end collisions were included.

Intervention:

Five (5) individualized and custom-tailored osteopathic treatments at 1-week intervals were performed.

Results:

A direct comparison between the untreated period and the treatment period revealed clinically relevant and statistically significant improvements in the osteopathic treatment period for the NPAD (Neck Pain and Disability Score). Prior to treatment, 17 patients (43.6%) were diagnosed with a positive PTSD; this number fell to only 6 (15.4%) during observation.

Conclusions:

Five (5) osteopathic treatments had a beneficial effect on the physical as well as the mental aspects of LWS and lives up to its claim of being a complementary modality in the treatment regimen of this condition.

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DSA Summary

Neck Pain Causes

- Mechanical
 - Muscle Sprain/Strain
 - Soft tissue injury (e.g. whiplash) causing muscle pain and stiffness
 - Tenderness located in muscles involved
 - Neurologic exam should be normal
 - Treated with exercise, mobilization, OMT, +/- NSAIDs
 - Trigger Points
 - Hypertonic bands in muscle belly with characteristic radiation pattern
 - Treat with OMT, stretching, dry needling, or injection
 - Somatic Dysfunction
- Degenerative Changes
 - Facet Arthritis
 - Due to arthritic changes on the facet joint
 - Can cause sharp pain with radiation that is typically worse with extension
- Neurologic
 - Radiculopathy- related to spinal nerve causing radiating pain
 - Usually from disc herniation or vertebral foramina stenosis
 - Pain is classically sharp and electric
 - Typically get neurologic deficits along that level
 - Myelopathy-disturbance of the spinal cord
 - Usually from narrowing around the cord from degenerative changes in the discs, vertebrae/facets, and ligaments
 - Symptoms are often bilateral and non-localized
 - Difficulty with manual dexterity, diffuse hand numbness
 - Upper motor neuron signs
 - Emergent surgical evaluation if symptoms have rapid onset or progression
 - Conservative management (PT, OMT) is appropriate for stable cases that aren't progressing rapidly
- Referred- Cardiac, Pulmonary, GI

Physical Exam

- ROM, palpation, somatic dysfunction diagnosis
- Neurologic exam: reflexes, sensation, muscle testing, Spurling's test
- Understand segmental diagnosis for OA-C7
- Recall counterstrain tenderpoints for AC1-AC8
- Preview counterstrain tenderpoints PC1-PC8

Treatment

- OMT is indicated as conservative management for neck pain
- Some techniques may be relatively contraindicated in neck pain
 - Direct techniques if patient has warning signs and no clear diagnosis
 - Suspected Fracture
 - Concerns for severe cord or nerve injury
 - HVLA to upper cervical spine in RA or Down's patient, acute disc herniation, or any worrisome neurologic signs/symptoms
- Recall treatment of the cervical spine with HVLA, ME, CS