OMT for Cervicogenic Headache

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A Primary Care Physician Approach

Lecture Section

Presented at AOMA Fall Seminar, Nov. 7-8, 2015
Tucson, Arizona
Disclosures

• None
Learning Objectives

1. Discuss epidemiology, functional anatomy and pathophysiology involved in cervicogenic headache.
2. Describe history and physical findings consistent with cervicogenic headache.
3. Discuss evidence-based recommendations for manual medicine in cervicogenic headache.
4. Discuss and view a demonstration of OMT for cervicogenic headache.
What is Cervicogenic Headache?

A Condition recognized by: Cervicogenic Headache International Study Group, and the International Headache Society:

• Pain referred to head from cervical musculoskeletal structures.
• Lack of systemic or local head region cause for headache
• Commonly associated with cervical tendinitis, tenderpoints, trigger points, or joint inflammation.
• Improvement seen following treatment of somatic dysfunction of the cervical spine.

Seffinger, Hruby, 2007
Epidemiology

• All ages (mean 42). Women affected 4 times more than men (Haldeman S, 2001).
• 16% of general population suffer from headaches (Rasmussen BK, 1991)
• Cervicogenic headache accounts for 15-20% of all headaches (Pfaffenrath V. 1990)
• Lost productive time among active workers due to headache is an estimated $20 billion annually. (Seffinger, 2007)
Common Historical Elements

- Moderate to severe non-throbbing headache pain
- Constant or fluctuant, dull, aching, or viselike
- Varying duration of episodes
- Neck movement or sustained position worsens
- Location: Posterior, lateral, vertex, behind orbit, frontal
- Unilateral head or face pain without side shift
- Radiation to ipsilateral neck, shoulder, arm
Other Historical Elements

• Whiplash or injury prior to onset
• Difficulty identifying mitigating factors
• Valsalva maneuver, cough, may trigger
• Lack of response to medications
• Cervical tendonitis, tenderpoints, trigger points, or cervical joint inflammation
• Occasional associated nausea, phonophobia, photophobia, dizziness, ipsilateral blurred vision, difficulty swallowing, or periorbital edema
Physical Findings Overview

• Muscle spasm
• Range of motion restrictions
• Tenderness

• Criteria for Somatic Dysfunction (Medicare):
  – T: Tenderness
  – A: Asymmetry
  – R: Restricted motion
  – T: Tissue texture changes
Reliable Physical Findings (Kappa > 0.4)

• Physical examination of c-spine in headache patients demonstrated acceptable interexaminer reliability
  – Restriction of cervical rotation
  – Pain induced by motion
  – Pain at tenderpoints
  – Active and passive segmental mobility
  – Pain provocation tests upper c-spine
Common Physical Findings - CHA

- Restriction in passive range of motion at AA joint [Most Common Finding]
- Active & Passive ROM restriction: OA, AA, C2-3
- Head pain reproduced by:
  - Digital pressure over Greater Occipital N, Occiput, OA, C2-4 on affected side
  - Ipsilateral suboccipital, cervical, or shoulder trigger points
- Stiffness of neck muscles (not nuchal rigidity)
- Asymmetric neck/head position relative to shoulders
- Poor functioning supporting neck and shoulder muscles
Labs and Radiographs

• Labs negative for systemic pathology
• Neck and head radiographs, MRI, CT negative
• Cervical disc bulging is nonspecific
FUNCTIONAL ANATOMY
Motion in Cervical Spine

• Upper Cervical Complex (OA, AA) – Atypical motion

• Upper Typical Cervical Spine (C2-3)
  – Preference for rotation

• Lower Typical Cervical Spine (C4-7)
  – Preference for sidebending

Source: ECOP
Typical Articular Facets

• 2 superior
• 2 inferior
• Function of these joints is to help determine and limit motion in certain directions and prevent slippage between vertebrae

Source: ECOP
Typical Cervical Vertebrae Movements

The orientation of the facets in the typical cervical vertebrae are such that it causes side-bending and rotation to occur to the SAME side.

Source: ECOP
Typical Cervical Motion

Backward Bending

Forward Bending

Rotated & SB Right

Rotated & SB Left

Source: ECOP
Occipito-Atlantal Joint

Occiput on Atlass
The anatomy of the OA joint dictates its motion: 50% of flexion and extension occurs at the OA joint. Minor but CLINICALLY SIGNIFICANT side-slipping and rotation motion also occurs.

Source: Phil Greenman, D.O. slides
AA JOINT (C1-C2)
The anatomy of the AA joint dictates its motion: 50% of cervical motion occurs at the AA joint. For practical purpose the AA joint moves in rotation only; there is a little bit of “wobble” but it is CLINICALLY INSIGNIFICANT.

Source: Phil Greenman, D.O. slides
Oblique Capiti

• Superior
  – Connects TP of Atlas to Occiput
  – Contraction sidebends the head ipsilaterally

• Inferior
  – Connects Axis (SP) to Atlas (TP)
  – Contraction rotates the head ipsilaterally

Source: Myer, H., Clinical Applications for Counterstrain, TOMF Publications
Multifidus

- Arises from articular processes of lower C4-C7. Inserts into to spinous process of vertebra above
- Stabilizes vertebrae
- Refers pain to occipital region, neck, and scapular region

Source: Myer, H., Clinical Applications for Counterstrain, TOMF Publications
Splenius Capitus

- Connects thoracic spine to the head and neck
- Bilateral contraction extends the head and neck
- Unilateral: side-bends and rotates head and neck ipsilaterally

http://www.triggerpoints.net/sites/default/files/Splenius%20Capitis%2C%20Splениus%20Cervicis%20.jpg
Semispinalis

- Connect thoracic spine to the head and neck
- Bilateral contraction extends the head and neck
- Unilateral: rotates head contralaterally


Source: Frank Netter’s Anatomy
Levator Scapula

- Originates from the transverse processes of C1-4. Inserts into medial border of the scapula
- levator scapulae elevates the scapula and rotates it medially
- Refers pain to suboccipital, neck, and scapular region

Source: Myer, H., Clinical Applications for Counterstrain, TOMF Publications
Trapezius Muscle

• Superficial posterior muscle
• Connects thoracics, shoulders, neck, and head
• Attaches to scapula
• Elevates and retracts
• Extends and side-bends neck, and rotates head to opposite side

Source: Myer, H., Clinical Applications for Counterstrain, TOMF Publications
Sternocleidomastoid Muscle

• Superficial anterior muscle
• Connects manubrium and clavicle to the mastoid process and occiput
• Flexor of cervical spine with bilateral contraction
• Unilateral contraction: sidebends head and neck ipsilaterally, rotates head contralaterally

Sources: F. Netter, MD, Anatomy; Myer, H., Clinical Applications for Counterstrain, TOMF Publications
Autonomics to Head

<table>
<thead>
<tr>
<th>Sympathetics</th>
<th>T1 – T4</th>
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<tbody>
<tr>
<td>Parasympathetics</td>
<td>CN III, VII, IX, X</td>
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Source: Ward, Foundations for Osteopathic Medicine, 2nd ed., LWW.
Joint Innervation / Referral

• Occipital n. (C1-3) innervate posterior scalp (occipital neuralgia)
• Suboccipital n. (C1) innervates OA Joint (occipital neuralgia)
• C2 spinal n. innervates AA and C2-C3 Joints (occipital, parietal, frontal, periorbital pain)
• 3rd occipital n. (C3) innervates C2-C3 joint (frontotemporal and periorbital pain)
## Innervation-Based Expected Referral

<table>
<thead>
<tr>
<th>Somatic Dysfunction</th>
<th>Expected Referral</th>
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<tbody>
<tr>
<td>OA</td>
<td>Occipital</td>
</tr>
<tr>
<td>AA</td>
<td>Occipital, parietal, frontal, periorbital pain</td>
</tr>
<tr>
<td>C2-3</td>
<td>Occipital, parietal, frontal, periorbital pain, frontotemporal</td>
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</table>
Lymphatics from the Head

**Right Side**
- Right Lymphatic Duct
- Junction of the right internal jugular and subclavian veins

**Left Side**
- Thoracic Duct
- Junction of the left internal jugular and subclavian veins

Source: Ward, Foundations for Osteopathic Medicine, 2nd ed., LWW.
Pathophysiology

• CHA caused by Somatic Dysfunction of the Cervical Spine
• CHA more often related to OA and AA dysfunction.
• Trigeminal and spinal accessory cranial nerve pathways (bidirectional pain referral) may facilitate CHA
• Peripheral sensitization in soft tissues of neck causes CHA
• Organic disease via Vagus n. can sensitize upper cervical segments and lead to CHA
• Myodural bridge may transmit tension from cervical to cranium, leading to CHA
Pathophysiology

• Cervical facet joints refer pain to head
  – 50% of CHA had C2-C3 joint pain resolved by nerve block.
  – Nerve blocks to occipital nerve and lower cervical segments (abolished symptoms)
  – C1-C2 facet produced pain in posterior auricular area

• Cervical trigger point refer pain to head
  – Trigger point injection abolished headache symptoms
Cervical-Trigeminal Pain Pathway.

- C-spine somatic dysfunction sends afferent pain signals from spinal cord (spinal nerves and CNXII).
- Signals converge at Trigeminal Nucleus Caudalis and ascend to pons and trigeminothalamic tract.
Trigeminal Nucleus Caudalis (TNC)

• Sensory info processed in thalamus and then sensory cortex.
• Pain is perceived by brain as coming from trigeminal sensory field of face and head.
TMJ/Headache Case

E.B is a 34-year-old Caucasian woman who presents to my office with a chief complaint of headache.
• **CHIEF COMPLAINT:** Headache

• **HISTORY OF PRESENT ILLNESS:**
C: burning, aching, and pressure in the ear, hairline, and gum line on the right side.
O: Three weeks.
P: At first the pain was intermittent and more severe. Now it is constant, but somewhat less severe.
M: Symptoms are lessened with OTC analgesics, and worsened by chewing, such that she avoids eating tough foods.
A: associated right sided neck pain, as well as a “ticking” in the right ear which is heard and felt when she chews.
P: Denies previous occurrence of current jaw and head symptoms, but does admit to a history of neck pain.
PAST MEDICAL HISTORY: The past medical history includes neck and low back strain, and asthma.

PAST SURGICAL HISTORY: The past surgical history includes a tonsillectomy.

PAST TRAUMA HISTORY: The past trauma history includes motor vehicle accidents in 1984 and 1988, and, starting about three months ago, a series of dental visits that required her jaw to be held open for extended periods. Also, she began gum chewing 6-7 weeks ago.
History

• **ALLERGIES:** erythromycin, seasonal allergies

• **MEDICATIONS:** Advil (over-the-counter ibuprofen 200 mg), 2-4 tablets, 2-3 times per day.

• **SOCIAL:** The patient is single with no children. She is employed in clerical work.

• **HABITS:** The patient has about 6 drinks of alcohol per week, has smoked a half pack per day for 10 years, and drinks 1 cup of coffee per day.
• **REPRODUCTIVE**: G1P0; periods regular; last pap 9 months ago was normal.

• **REVIEW OF SYSTEMS**: Review of systems includes wearing contacts. A history of intermittent neck and lower back pain is noted, which began with a car accident in 1984. Moderate but temporary relief from this pain is obtained with chiropractic adjustments, which she receives once per week.
PHYSICAL EXAMINATION

• **Vitals:** BP=135/85; P=85, reg; R=14, reg; T=98.6. This patient is a 34-year-old Caucasian female in no apparent distress. She is alert and oriented X3, with a normal affect.

• **HEENT:** Head is normocephalic with normal hair texture and distribution. Pupils are equal and reactive to light and accommodation. Red reflexes and extraocular movements are normal. Tympanic membranes have good color and position.
PHYSICAL EXAMINATION

• **HEART**: Auscultation of the heart reveals regular rate and rhythm with no murmurs, clicks, or rubs.

• **LUNGS**: Auscultation of the lung fields reveals clear breath sounds, with no wheezes, rales, or rhonchi.

• **NEURO**: Mental status is normal. Cranial nerves II-XII are normal. Muscle stretch reflexes are 2/4 bilaterally in the upper and lower extremities. Muscle strength is bilaterally equal, at 5/5 in the upper and lower extremities.
OSTEOPATHIC STRUCTURAL EXAM

• **ASYMMETRY:** elevation of the left shoulder and the right iliac crest. left medial malleolus and the left anterior superior iliac spine were cephalad.

• **TART:** Tissue texture changes, and increased myofascial tension in the cervical and lumbar regions, and in the thoracic region as well. tenderness to palpation in the cervical, thoracic, and lumbar paraspinal musculature.

• **SEGMENTAL:** OASRRL; C2-4SLRL; T5(E)SLRL; T10-12(N)SRRL; L3-5(N)SLRR. Right innominate anterior rotation; Sacrum (L) on (L) anterior torsion. Cranium: left sphenobasilar synchondrosis (SBS) torsion; Right occipitomastoid and right parietosquamous sutural restrictions.

• **TMJ:** On jaw opening, the chin deviated to the right, and there was a reduced anterior glide of the right mandibular head. Hyperemia and tenderness to palpation were noted over the right temporomandibular joint.
Case...OMM TREATMENT

- Indirect suboccipital release, indirect treatment of the sacral torsion, and the indirect and myofascial treatment of the cervical, thoracic, and lumbar somatic dysfunctions.
- Muscle energy and indirect treatment were applied to the right mandibular head restriction, muscle energy was used to treat the innominate rotation.
- Cranial treatment included a direct release of the noted sutural restrictions, indirect treatment of the SBS torsion, and incitative lateral fluctuation at the temporal bones.
- Following treatment, decreased myofascial tension and improved mobility were noted in the cervical region. In the cranium, improved mobility of the right temporal bone and the right mandibular head was noted.
Course of Treatment

• The patient returned 2 days after her initial visit with an acute exacerbation of right sided headache refractory to over-the-counter analgesics, but also with less neck pain.

• At that time, she was prescribed Ibuprofen 800 mg I PO q 6-8 hours as needed. She was treated twice over the next week, at the end of which time she reported her headache to be much less severe, such that she was able to reduce her ibuprofen use to 800 mg once per day with good pain control.

• From this point on she was seen once per week for 3 more weeks. She reported at her 7th and last visit on 9/17/2001 that her head and jaw symptoms were completely resolved, and had been for the previous week.
Case Conclusion:

• The history and findings in this case thus appeared to support a diagnosis of TMJ dysfunction and cervicogenic headache, and a short course of osteopathic manipulative treatment was given, directed at reducing the noted somatic dysfunctions.

• During the course of treatment, pain and medication usage were reduced.

• After six osteopathic manipulative treatments the patient’s symptoms resolved and no further intervention was required.
Case REFERENCES:


MANUAL MEDICINE RESEARCH AND CERVICOGENIC HEADACHE—
Biondi, D., 2005

- Review of literature in JAOA
- Exercise and manipulative treatment found efficacy not substantially affected by age, gender, or headache chronicity (Jull G, 2005)
- Efficacy of physical treatment modalities for the long-term prevention and control of headaches appears greatest in patients who are involved in ongoing exercise and physical conditioning programs
• craniosacral, strain-counterstrain, and muscle energy techniques are particularly well suited
• HVLA manipulation can be carefully used in some patients, -not unusual to observe an increase in headache intensity after manual modes of therapy of this type
• (OMT) generally better tolerated when initiated with gentle muscle stretching and manual cervical traction.
• Therapy can be slowly advanced as tolerated to include strengthening and aerobic conditioning.
• Using anesthetic blockade and neurolytic procedures for temporary pain relief can enhance the efficacy and advancement of physical modes of therapy.
Nilsson et al, 1997

- Prospective RCT with blinded observer, 53 subjects.
- 28 HVLA, 25 control (low level laser)
- “Spinal Manipulation seems to have a positive effect in reducing hours of headache and intensity of headache and analgesic consumption in cases of cervicogenic headache” (P values 0.03 - 0.04)
Bronfort, et al., 2004

• Systematic review (Cochrane), 22 studies, 2628 patients (5 headache types) (21 RCTs)
• For ...cervicogenic headache, there is evidence that both neck exercise...and spinal manipulation are effective in the short and long term when compared to no treatment.
• There is also evidence that spinal manipulation is effective in the short term when compared to massage or placebo spinal manipulation...
• Systematic review, 9 RCTs, involving 607 CHA patients met study’s inclusion criteria.
• 6 RCTs suggested SM is more effective than physical therapy, gentle massage, drug therapy, or no intervention.
• 3 RCTs showed no differences in pain, duration, and frequency of headaches compared to placebo, manipulation, physical therapy, massage, or controls.
• Adequate control for placebo effect was achieved in 1 RCT, trial showed no benefit of SM beyond placebo.
• Majority of RCTs failed to provide details of adverse effects.
• “There are few rigorous RCTs testing the effectiveness of SM for treating (CHA). The results are mixed...Therefore, the therapeutic value of this approach remains uncertain.”
Jull et al, 2002

- Multi-center RCT, unblinded tx and blinded outcome assessment, 200 subjects, 4 groups: Manipulative, Exercise, Combined, Control
- Manipulative and Exercise had reduced headache frequency and intensity...$P < 0.05$. (as compared with Control)
- Combined was no better than either Manipulation or Exercise groups.
Summary EBM Recommendations

• Manual Tx and Exercise for moderate to severe pain are effective
• Exercise and physical conditioning programs are beneficial for long-term prevention and control of symptoms
• Benefits:
  – Decreased pain frequency, intensity, duration
  – Improved functionality
  – Decreased use of medications
• Risks: Hyperextension with rotation at upper cervical spine – caution re: vertebral artery

Seffinger, Hruby, 2007
Contraindications - Manual Medicine for Mechanical Neck Pain

- Acute cervical vertebral fracture
- History acute trauma with no diagnosis
- Bone disease
- Muscle or joint disease
- Vertebral / carotid artery dissection
A.T. Still and the FIRST OSTEOPATHIC TREATMENT
A Legacy is Left

Osteopathic Manipulative Treatment has been used clinically in the treatment of headaches... throughout the history of osteopathic medicine.
A.T. Still on Headache

In all continued or periodic headaches I have found the shut-off in:

• bones of the neck at their union with the head
• other joints as far down as the fourth dorsal
• even as far as the lumbar, sacrum and coccyx.
• I have found abnormal positions of both bone and muscle resulting in the production of such effects.
Barber on Headache

• Headache not caused by fevers, the stomach, or the uterus, can be almost instantly cured by stretching the neck, and a pressure on the nerves at the base of the occipital bone.

Source: Osteopathy Complete, Elmer Barber DO., 5th ed., Kansas City 1906
Goals in Osteopathic Care of Cervicogenic Headache

- Address Structural Impediments to function
- Assist venous and lymphatic circulation and promote arterial flow
- Normalize spinal reflexes and reduce compression neuropathies
- Educate and Improve Environment
- Support self-healing mechanisms and relieve pain
References

- Pfaffenrath V. et al, Diagnostics of cervicogenic headache, Functional Neurology 1990; 5:159-64
- Osteopathy Complete, Elmer Barber DO., 5th ed., Kansas City 1906
- Paul Posadzki, PhD, MSc, BSc, et al., Spinal Manipulations for Cervicogenic Headaches, A Systematic Review of Randomized Clinical Trials, Headache. 2011;51(7):1132-1139.
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~THANK YOU~