Manual Osteopathic Management in Cervicogenic Headache

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Introduction

Cervicogenic headache is a secondary headache that starts in the atlanto-occipital and upper cervical joints and radiates towards the front of the head.¹ Cervicogenic headache is less prevalent than tension-type headache or migraine but is nevertheless diagnosed in 0.4% to 2.5% of the general population.² This headache has a very negative impact on quality of life.³ One potential non-pharmacological approach to the treatment of these patients is spinal manual therapies. This study aims to provide a combination of available clinical trials examining the effects of spinal manual therapies on cervicogenic headache frequency, pain, and disability.

Mechanism of Cervicogenic Headache

Cervicogenic headache is defined as a referral pain to the head with the source in the cervical spine. The mechanism of this pain involves convergence between cervical and trigeminal afferents in the trigeminocervical nucleus. In this nucleus, nociceptive afferents from the C1, C2, and C3 spinal nerves converge onto second-order neurons that receive afferents from adjacent cervical nerves and the first division of the trigeminal nerve (V) via the trigeminal nerve spinal tract. Convergence between cervical afferents allows for upper cervical pain to be referred to regions of the head innervated by cervical nerves (occipital and auricular regions). Convergence with trigeminal afferents allows for referral into the parietal, frontal, and orbital areas.⁴

Symptoms

- Unilateral pain in face or head
- pain and stiffness of the neck
- pain around the eyes
- pain in the neck, shoulder, or arm on one side
- Steady pain without pulsation
- Pain is aggravated with specific neck movements and positions
- Head pain aggravated by coughing, sneezing, or taking a deep breath
- Every attack of pain can last from hours to days
- Stiffness and reduced range of motion in the neck
- blurred vision
- sensitivity to light and noise

• nausea⁵

Functional Limitations

During exacerbations, patients may experience significant functional limitations, including insomnia, reduced work time, and inability to perform physical activity or drive a vehicle. The patient may feel pain during activities that involve the cervical spine or upper extremities, such as talking on the telephone, working at the computer, reading a book, cooking, and driving.⁶

Diagnostic Criteria

The diagnostic criteria for cervicogenic headache are outlined in the ICHD-3 and summarized in Table 1.⁷



Table 1

Diagnostic Studies

A comprehensive history and physical examination should be the foundation of the diagnosis. Special maneuvers on physical examination, including checking the cervical spine movements, such as passive flexion, extension, rotation, and segmental palpation of the cervical facet joints; and assessing tenderness over the cervical muscle groups, helps in diagnosing the pain.⁸

An X-ray may be attained to rule out gross abnormalities but will not usually provide the level of detail needed for diagnostic purposes. Radiologic degenerative changes of the cervical spine do

not essentially relate to the patient's symptoms and examination findings, but C2-C3 arthritic changes in the absence of other gross or radiographic abnormalities may explain the etiology.

Magnetic resonance imaging or computed tomography of the cervical spine will help rule out anatomic sources such as a tumor, vascular malformation, infection, or spondylotic arthritis that may be compressing the medial (sensory) branches of C2-C3.⁹

Ultrasound may help evaluate the course of the occipital nerve. It may show a site of entrapment. Through this method, a practitioner may be able to directly visualize: (1) entrapment of the nerve within the suboccipital muscles, within the vasculature, or by a mass lesion; (2) enlargement of the cross-sectional area of the greater occipital nerve, which typically is 2.0 ± 0.1 mm2; or (3) direct injury to the nerve itself.¹⁰

Manual Therapy in Cervicogenic Headache

Manual therapy is non-surgical conservative management, including varied hands/fingers-on methods directed to the spine and extremities to evaluate, analyze, and treat various symptoms and disorders.¹¹

Manual therapy is composed of different methods, which may be put into four major groups: a) manipulation (thrust manipulation), b) mobilization (non-thrust manipulation), c) static stretching, and d) muscle energy techniques.

In a Danish study conducted by a chiropractor, thirty-nine subjects suffering from frequent headaches who fulfilled the IHS criteria for cervicogenic headache (excluding radiological criteria) were recruited. Half of the group received high-velocity, low-amplitude cervical manipulation twice/week for three weeks. The other half received a low-level laser in the upper cervical region and deep friction massage (including trigger points) in the lower cervical/upper thoracic part, also twice/week for three weeks. The change from week 2 to week 6 in analgesics use per day, headache intensity per episode, and headaches per day were measured. In this study, Despite a significant reduction in the manipulation group on all three outcome measures, differences between the two treatment groups failed to reach statistical significance.¹²

The second Danish study was based on an extended study population from the first study.¹³ Fiftythree subjects suffering from frequent headaches who fulfilled the International Headache Society criteria for cervicogenic headache (excluding radiological criteria) were recruited. After randomization, 28 people received high-velocity, low-amplitude cervical manipulation twice a week for three weeks. The remaining 25 received low-level laser in the upper cervical region and deep friction massage (including trigger points) in the lower cervical/upper thoracic part, also twice a week for three weeks. The changes from week 1 to week 5 in analgesic use per day, headache intensity per episode, and in the number of headache hours per day, was registered in a headache diary. The use of analgesics decreased by 36% in the manipulation group but was unchanged in the soft-tissue group; this difference was statistically significant. The number of headache hours per day decreased by 69% in the manipulation group, compared with 37% in the soft-tissue group. Finally, headache intensity per episode decreased by 36% in the manipulation group, compared with 17% in the soft-tissue group. This study showed that Spinal manipulation has a significant positive effect in cases of cervicogenic headache.

The Australian multicenter study was conducted by 25 qualified physiotherapists with unblinded treatment and blinded outcome measures.¹⁴ In this study, 200 participants who met the diagnostic criteria for cervicogenic headache were randomized into four groups: manipulative therapy group, exercise therapy group, combined therapy group, and a control group. The primary outcome was a change in headache frequency. Other results included changes in headache intensity and duration, the Northwick Park Neck Pain Index, medication intake, and patient satisfaction. Physical outcomes included pain on neck movement, upper cervical joint tenderness, a craniocervical flexion muscle test, and a photographic measure of posture. At baseline, there were no differences in headache-related and demographic characteristics between the groups. At the 12-month follow-up assessment, both manipulative therapy and specific exercise had significantly reduced headache frequency and intensity, and the neck pain and effects were maintained (P < 0.05 for all). The combined therapies were not significantly superior to either therapy alone, but 10% more patients gained relief with the combination. Effect sizes were at least moderate and clinically relevant. In conclusion, Manipulative therapy and exercise can reduce the symptoms of cervicogenic headache, and the effects are maintained.

An American study conducted by three experienced chiropractors evaluated the dose-response for chiropractic care of cervicogenic headache in this study. Twenty-four adults with chronic cervicogenic headaches were recruited. Patients were randomly allocated to 1, 3, or 4 visits per week for three weeks. All patients received high-velocity, low-amplitude spinal manipulation. Doctor of Chiropractics could apply up to 2 physical modalities at each visit from heat and soft tissue therapy. They could also recommend modification of daily activities and rehabilitative exercises. Outcomes included 100-point Modified Von Korff pain and disability scales and headaches in the last four weeks. As a result, only 1 participant was insufficiently compliant with treatment (3 of 12 visits), and one patient was lost to follow-up. There was a substantial benefit in pain relief for 9 and 12 treatments compared with three visits. At 4 weeks, the advantage was 13.8 (P = .135) for 3 visits per week and 18.7 (P = .041) for 4 visits per week. At the 12-week follow-up, the advantage was 19.4 (P = .035) for 3 visits per week and 18.1 (P = .048) for 4 visits per week. This study supported the benefit of larger doses, 9 to 12 treatments, of chiropractic care for the treatment of cervicogenic headache.

A physician conducted the German study with blinded participants and unblended treatment and outcome measures.¹⁵ In this study, 52 children and adolescents (21 boys, 31 girls) aged 7-15 were recruited. After prospective baseline citations for two months, patients were either allocated to placebo or proper manipulation with another 2-month follow-up. Main outcome measures were defined as: percentage of days with headache, total duration of headache, days with school absence due to headache, consumption of analgesics, the intensity of headache. As a result, no significant difference comparing the groups with placebo and proper manipulation concerning the defined main outcome measures was seen. It was concluded that no efficacy of cervical spine manipulation in 52 children and adolescents was seen.

Four experienced chiropractors conducted the 2nd American pilot study, while additional chiropractors in each clinic served as a backup therapist.¹⁶ In this study, eighty patients with chronic cervicogenic headaches were recruited. The primary outcome measures were modified Von Korff pain and disability scales for cervicogenic headache (CGH) and neck pain (minimum clinically meaningful difference=10 on a 100-point scale), number of headaches in the last four weeks, and medication use. Data were collected every four weeks for 24 weeks. The primary outcome was the CGH pain scale. Participants were randomized to either 8 or 16 treatment sessions with either SMT or a minimal LM control. Patients were treated once or twice per week for eight weeks. Adjusted mean differences (AMD) between groups were computed using generalized estimating equations for the longitudinal outcomes overall follow-up time points (profile) and using regression modeling for individual time points with baseline characteristics as covariates and imputed missing data. For the CGH pain scale, comparisons of 8 and 16 treatment sessions yielded minor dose effects. There was an advantage for spinal manipulative therapy (SMT) over the control. Patients receiving SMT were also more likely to achieve a 50% improvement in pain scale: adjusted odds ratio=3.6 (1.6 to 8.1) for the profile, 3.1 (0.9 to 9.8) at 12 weeks, and 3.1 (0.9 to 10.3) at 24 weeks. Secondary outcomes showed similar trends favoring SMT. For SMT patients, the mean number of CGH was reduced by half. Clinically essential differences between SMT and control intervention were observed favoring SMT. Dose effects tended to be small.

Selecting patients for cervical manual therapy

In order to reduce the complications, the clinician should determine the safety of the techniques. Before performing any cervical manipulation, the clinician should take a complete history and physical examination, in order to discover red flags and contraindications. Absolute contraindications (Table 2) and red flag symptoms (Table 3) have been identified to assist clinicians with decision-making.¹⁷

Acute fracture	Acute soft tissue injury
Dislocation	Osteoporosis
Ligamentous rupture	Ankylosing spondylitis
Instability	Rheumatoid arthritis
Tumor	Vascular disease
Infection	Vertebral artery abnormalities
Acute myelopathy	Connective tissue disease
Recent surgery	Anticoagulant therapy

Table 2. Absolute contraindications to performing cervical spine manipulation (CSM)

Previous diagnosis of vertebrobasilar insufficiency
Facial/intra-oral anesthesia or paresthesia
Visual disturbances
Dizziness/vertigo
Blurred vision
Diplopia
Nausea
Tinnitus
Drop attacks
Dysarthria
Dysphagia
Any symptom listed above aggravated by position or movement of the neck
No change or worsening of symptoms after multiple manipulations

Table3. Red Flags

The failure of clinicians to identify signs signifying that a patient is at increased risk may be attributed to the lack of reliable and valid screening tools, as well as poor history taking and insufficient clinical reasoning. The most common adverse event informed in these cases was arterial dissection. This finding has been well documented, and as a result, pre-manipulative screening tools have mostly focused on identifying patients who experience vertebrobasilar insufficiency (VBI) or may have cervical arterial dysfunction (CAD) to rule out risk of arterial dissection associated with cervical spinal manipulation, although the use of these tests remains controversial. The controversy stems from the high rate of false-positive results associated with these tools.¹⁸

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