



The Challenges of Cervicogenic Headache

Andrew Blumenfeld¹ · Sara Siavoshi²

Published online: 13 June 2018

© Springer Science+Business Media, LLC, part of Springer Nature 2018

Abstract

Purpose of Review The purpose of this manuscript is to illuminate the diagnostic challenges in patients who present with both headache and neck pain.

Recent Findings The differential diagnosis for headache and neck pain includes many conditions. Furthermore, cervical musculoskeletal abnormalities including head forward posture and myofascial trigger points may play an overlapping role in many of these conditions.

Summary Multiple headache disorders may be present within the same patient. A multidisciplinary team approach addressing all components of the headache may lead to better outcomes for these patients.

Keywords Cervicogenic headache · Migraine · Neck pain · Tension headache

Introduction

Do all patients who present with headache and neck pain have cervicogenic headache?

This manuscript highlights areas of overlap between different headache types and provides insight on how to assess patients who have both headache and neck pain.

The differential diagnosis for patients with headache and neck pain can be sub-divided into primary and secondary causes, and includes the following:

A. Primary Headache Disorders

1. Migraine
2. Tension-type headache with pericranial tenderness

B. Secondary Headache Disorders

1. Headache associated with Cranio-cervical dystonia
2. Headache attributed to Chiari malformation
3. Headache attributed to cervical carotid or vertebral artery dissection
4. Headache attributed to whiplash
5. Cervicogenic headache

The challenge of headache and neck pain is further complicated if more than one condition from the above list is present. The differential diagnosis in this setting raises the questions: could the neck symptoms be part of the primary headache disorder or are the neck symptoms actually the source of the headache or does the patient have two distinct conditions such as a primary headache disorder complicated by a secondary headache? The emphasis on treatment may depend on the practitioner's understanding of the cervicogenic headache (CGH) definition as well as their preference of treatment approach. To lump all headache and neck pain under the heading of cervicogenic headache will lead to an oversimplification of headache pathology and potentially inadequate or inappropriate treatment options.

While primary headache patients (including migraine and tension-type headache) have a fairly high prevalence of neck pain (68%), neck pain is usually present in the setting of cervicogenic headache which is considered a secondary headache disorder (secondary to a disorder of the neck) with a unique treatment approach [1, 2].

This article is part of the Topical Collection on *Migraine and Beyond*

✉ Andrew Blumenfeld
Blumenfeld@neurocenter.com

Sara Siavoshi
ssiavoshi@ucsd.edu

¹ The Headache Center of Southern California, 6010 Hidden Valley Road, Carlsbad, CA, USA

² University of California San Diego, 9500 Gilman Dr, La Jolla, CA 92093, USA

Definitions and Clinical Characteristics

The diagnosis of CGH is often difficult due to the conflicting definitions of CGH.

The definition of CGH has varied among different groups of physicians with somewhat conflicting views on the basis of defining this headache type. The definition described by The Cervicogenic Headache International Study Group (CHISG) (see Table 1 for the full list of headache features recommended by CHISG) allows for clinical features such as unilateral headache with nausea, photophobia, phonophobia, and neck pain, and these features often overlap with other headache types, such as migraine, tension-type headache (TTH), and occipital neuralgia (ON) [3••].

Alternatively, the International Classification of Headache Disorders (ICHD BETA 3) has a more limited definition and defines CGH by its anatomic dependency on a cervical source. Furthermore, neck pain is not the essential symptom for diagnosis.

“Headache caused by a disorder of the cervical spine and its component bony, disc and/or soft tissue elements, usually but not invariably accompanied by neck pain.

Diagnostic criteria:

- A. Any headache fulfilling criterion C
- B. Clinical, laboratory, and/or imaging evidence of a disorder or lesion within the cervical spine or soft tissues of the neck, known to be able to cause headache

Table 1 CHISG criteria

Major criteria of cervicogenic headache

I. Symptoms and signs of neck involvement:

- a. Precipitation of head pain, similar to the usually occurring one:
 - i. By neck movement and/or sustained awkward head positioning, and/or:
 - ii. By external pressure over the upper cervical or occipital region on the symptomatic side (see comment 1 below)
- b. Restriction of the range of motion (ROM) in the neck
- c. Ipsilateral neck, shoulder, or arm pain of a rather vague nonradicular nature or, occasionally, arm pain of a radicular nature.

Points (I) (a through c) are set forth in a surmised sequence of importance. It is obligatory that one of more of the phenomena in point (I) are present. Point (a) suffices as the sole criterion for positivity within group (I); points (b) or (c) do not. Provisionally, the combination of (I) (b and c) has been set forth as a satisfactory combination within (I). The presence of all three points (a, b, and c) fortifies the diagnosis (but still point (II) is an additional obligatory point for scientific work).

II. Confirmatory evidence by diagnostic anesthetic blockades.

Point II is an obligatory point in scientific works

III. Unilaterality of the head pain, without side shift.

For scientific work, point III should preferably be adhered to.

IV. Head pain characteristics

- a. Moderate-severe, nonthrobbing, and nonlancinating pain, usually starting in the neck
- b. Episodes of varying duration
- c. Fluctuating, continuous pain

V. Other characteristics of some importance

- a. Only marginal effect or lack of effect of indomethacin
- b. Only marginal effect or lack of effect of ergotamine and sumatriptan
- c. Female sex
- d. Not infrequent occurrence of head or indirect neck trauma by history, usually of more than only medium severity

None of the single points under (IV) and (V) are obligatory.

VI. Other features of lesser importance: various attack-related phenomena, only occasionally present, and/or moderately expressed when present

- a. Nausea
- b. Phonophobia and photophobia
- c. Dizziness
- d. Ipsilateral “blurred vision”
- e. Difficulties on swallowing
- f. Ipsilateral edema, mostly in the periocular area

It is considered that the combination of (I) (a) (that is, [a1] and/or [a2]) and (II) secures (proves?) the diagnosis. Presence of the other points under (I) (Ib) and (Ic) utterly fortifies the diagnosis. Tentatively, it is proposed that the combination (Ib), (Ic), (II), (and [III]) also may be consistent with the diagnosis (“provisional combination”) [3].

- C. Evidence of causation demonstrated by at least two of the following:
 1. Headache has developed in temporal relation to the onset of the cervical disorder or appearance of the lesion
 2. Headache has significantly improved or resolved in parallel with improvement in or resolution of the cervical disorder or lesion
 3. Cervical range of motion is reduced and headache is made significantly worse by provocative maneuvers
 4. Headache is abolished following diagnostic blockade of a cervical structure or its nerve supply
- D. Not better accounted for by another ICHD-3 diagnosis” [4].

The broader definition by CHISG leads to many more patients receiving a diagnosis of CGH. This however opens the door to a slippery slope whereby any headache associated with neck pain may be attributed to a cervicogenic source. Since the criteria note in CHISG includes migrainous features such as nausea, vomiting, and photo/phonophobia, there is a risk of missing an underlying migraine disorder which would limit the treatment approach.

Using a symptom-based definition of cervicogenic headache leads to further conflict with occipital neuralgia which can also share many similar features.

Occipital neuralgia must be distinguished from occipital referral of pain arising from the upper cervical joints (as in cervicogenic headache) and from tender myofascial points in neck muscles (as in tension-type headache). Occipital neuralgia is defined by the following:

- A. Unilateral or bilateral pain fulfilling criteria B through E
- B. Pain is located in the distribution of the greater, lesser, and/or third occipital nerves
- C. Pain has two of the following three characteristics:
 1. Recurring in paroxysmal attacks lasting from a few seconds to minutes
 2. Severe intensity
 3. Shooting, stabbing, or sharp in quality
- D. Pain is associated with both of the following:
 1. Dysesthesia and/or allodynia apparent during innocuous stimulation of the scalp and/or hair
 2. Either or both of the following:
 - a. Tenderness over the affected nerve branches
 - b. Trigger points at the emergence of the greater occipital nerve or in the area of distribution of C2
- E. Pain is eased temporarily by local anesthetic block of the affected nerve
- F. Not better accounted for by another ICHD-3 diagnosis

The distinction between ON, CGH, TTH, and migraine may often be difficult and thus diagnostic anesthetic blockade may aid in accurate diagnosis. However, migraine and CGH may also show positive treatment response to greater occipital nerve blocks [5, 6]. Thus, using nerve blocks alone is not sufficient to separate these different headache types.

Table 2 displays areas of overlap between migraine, TTH, CGH, and ON as well as key differences that differentiate CGH.

Cervical musculoskeletal abnormalities have been traditionally linked to different headaches.

The prototype of this is headache attributed to cervical dystonia. In this setting, involuntary muscle spasm pulls the headache and neck from the normal anatomical neutral position resulting in abnormal posture, neck tremor, sensory tricks, muscle hypertrophy, and tenderness. Trigger points may develop in the trapezius, splenius capitus, splenius cervicis, and sternocleidomastoid muscles. These trigger points refer pain into the head, manifesting as chronic headaches with neck pain.

A more frequently noted abnormal posture is an excessive forward head position (FHP). FHP is a clinical entity that has been identified by multiple authors as a significant factor in a variety of musculoskeletal pain syndromes. This posture often results from sustained or frequently repeated tasks in the setting of sub-optimal ergonomics. Disuse of muscles leads to the abnormal posture. The severity of FHP can be assessed by measuring the number of fingerbreadths that can be vertically placed between a line dropped down from the tragus of the ear and the upper portion of the medial trapezius, while the patient stands with their best neutral spine position. FHP is usually associated with shortening of the cervical extensor muscles. Those muscles that are usually shortened (depending on the degree of FHP) include the sub-occipital paraspinals, scalenes, sternocleidomastoid, levator scapulae, upper trapezius, pectoralis major, and pectoralis minor. Those muscles that are usually over-lengthened include the rhomboids, middle trapezius, lower trapezius, and thoracic paraspinals [7].

Table 2 Areas of overlap between migraine, TTH, CGH, and ON as well as key differences that differentiate CGH

Clinical features	Migraine	TTH	CGH	ON
Cervical spine or neck soft tissue lesion			+	
Exacerbated by movement	+		+	
Responds to diagnostic block of cervical structure or its nerve supply			+	
Posterior head and neck pain	+	+	+	+
Myofascial trigger points	+	+	+	+
Migraine features	+		+	
Response to greater and lesser occipital nerve blockade	+		+	+

FHP has been assessed in patients with chronic tension-type headache and was found to be greater in CTTH patients than in controls [8].

Physical therapy treatments over 3 weeks resulted in improvement in neck mobility and headache [9].

Anatomic Considerations

Activation of the trigeminal nerve and its connections is a well-established component of migraine pathophysiology. The inputs to the trigeminal nucleus caudalis include occipital and cervical afferents. This convergence between upper cervical and trigeminal nociception via the trigeminal nucleus caudalis provides a logical mechanism for headache resulting from cervical pathology as well as neck pain in primary headache disorders [10]. Myofascial trigger points are well known to have referral patterns of pain into the head [11]. These trigger points can be present in multiple headache types including whiplash, tension-type headache, and headache attributed to cervical dystonia. In addition to convergence in the trigeminal nucleus caudalis, these trigger points also provide a method for patients to have both headache and neck pain.

Case Example

Consider the case of a 41-year-old female with a long history of chronic migraines previously well controlled on a beta blocker. She presents to headache/pain clinic with worsened headache symptoms over the last 3 months, following a motor vehicle accident which resulted in whiplash injury. In addition to increased frequency and intensity of migraine features, she endorsed a greater predominance of pain symptoms in the posterior head and neck area than she had experienced previously. Exam revealed tender myofascial trigger points along the cervical paraspinalis, occipitalis, and trapezius muscles. A trial of greater and lesser occipital nerve blocks were attempted which resulted in 40% improvement. Given sub-optimal relief, she underwent anesthetic blockade of the c2-3 zygapophyseal joint which was followed by approximately 70% improvement. She was still experiencing eight migraines per month however, a significant increase above her baseline before her accident. Her preventive treatment regimen was thus modified with the addition of topiramate along with enrollment in a physical therapy program which resulted in improvement of patient's headache frequency back to her pre-accident baseline.

Discussion

Several pearls should be deduced from the above case:

- Both primary and secondary headache disorder may be observed concomitantly in the same patient
- Focusing on only one aspect of the patient's headache and failing to recognize additional headache features may result in unresponsiveness to treatment and an unsatisfied patient
- The responsiveness of a headache to a diagnostic/treatment block or myofascial trigger point injection does not preclude the presence of a primary headache disorder
- The value of a multidisciplinary approach to treating headaches should be utilized at all times possible

Conclusion

Multiple sources of headache may be present within the same patient. The convergence of upper cervical segment nociceptive afferents in the trigeminocervical complex provides an anatomical basis for both headache and neck pain to frequently co-exist. It is up to both neurologists and pain specialists to reconcile these intersections and address the multiple sources of pain in those headache patients who present with both headache and neck pain. Quite often this may require a team of experts working together. Oversimplification of the diagnosis to migraine alone or cervicogenic headache alone may leave the patient with inadequate treatment.

Compliance with Ethical Standards

Conflict of Interest Sara Siavoshi and Andrew Blumenfeld declare no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

References

Papers of particular interest, published recently, have been highlighted as:

- Of importance
 - Of major importance
1. Ashina S, Bendtsen L, Lyngberg AC, Lipton RB, Hajiyeva N, Jensen R. Prevalence of neck pain in migraine and tension-type headache: A population study. *Cephalalgia*. 2015;35(3):211–9.
 2. Kaniecki R. Migraine and tension-type headache: an assessment of challenges in diagnosis. *Neurology*. 2002;58(9 Suppl 6):S15–20.

3. Sjaastad O, Fredriksen TA, Pfaffenrath V. Cervicogenic headache: diagnostic criteria. *Headache*. 1998;30:442–5. **This presents the revised 1998 CHISG criteria.**
4. The International Classification of Headache Disorders. 3rd edition (beta version) ICHD-3 beta. *Cephalalgia*. 2013;33:629–808.
5. Weibelt S, Andress-Rothrock D, King W, Rothrock J. Suboccipital nerve blocks for suppression of chronic migraine: safety, efficacy, and predictors of outcome. *Headache*. 2010 Jun;50(6):1041–4.
6. Bogduk N, Govind J. Cervicogenic headache: an assessment of the evidence on clinical diagnosis, invasive tests, and treatment. *Lancet Neurol*. 2009;8(10):959–68.
7. Fernández-de-Las-Peñas C, Cuadrado ML, Pareja JA. Myofascial trigger points, neck mobility, and forward head posture in episodic tension-type headache. *Headache*. 2007;47(5):662–72.
8. Fernández-de-las-Peñas C, Alonso-Blanco C, Cuadrado ML, Pareja JA. Forward head posture and neck mobility in chronic tension-type headache: a blinded, controlled study. *Cephalalgia*. 2006;26(3):314–9. **An interesting take on linking possible pathophysiology between musculoskeletal disorders and chronic headaches.**
9. Fernández-de-las-Peñas C, Alonso-Blanco C, Cuadrado ML, Pareja JA. Neck mobility and forward head posture are not related to headache parameters in chronic tension-type headache. *Cephalalgia*. 2007;27(2):158–64.
10. Goadsby PJ, Bartsch T. On the functional neuroanatomy of neck pain. *Cephalalgia*. 2008;28:1–7.
11. Robbins MS, Kuruvilla D, Blumenfeld A, Charleston L IV, Sorrell M, Robertson CE, et al. Trigger point injections for headache disorders: expert consensus methodology and narrative review. *Headache the journal of head and face. Pain*. 2014;54(9):1441–59. <https://doi.org/10.1111/head.12442>.