▪ Headache Medicine 2022, 13(3):186-191 ▪ p-ISSN 2178-7468, e-ISSN 2763-6178

Headache Medicine

▪ DOI: 10.48208/HeadacheMed.2022.19

Review

Cervicogenic headache: a narrative review

Kleber Fernando Pereira, Wesley Gabriel Novaes Botelho, Luiz Gustavo Pagliarin, Alcântara Cesar Ramos

Universidade Federal do Paraná, Toledo, Parana, Brazil

Kleber Fernando Pereira
kleber.ufpr@gmail.com

Edited by:
Marcelo Moraes Valença

Abstract

Introduction

To contextualize cervicogenic headache describing its etiology, pathophysiology, clinical picture, diagnostic criteria and treatments, to guide medical society in the face of the pathology that is increasing in its incidence.

Methods

The study carried out searches in the PubMed, Nature, Scielo and Wiley databases, using the descriptors cervicogenic headache, and works published between the years 1980 and 2022 were analyzed, in all languages, in addition to the respective English translations. As an inclusion factor, it was considered: "works published within the scope of the study within the mentioned time interval and related to cervicogenic headache and as an exclusion factor: "works not related to the study topic and with reports already outdated according to current literature".

Results

1,319 articles were found, analyzing the articles, 27 articles were selected, and according to their relevance in the subject, they are part of the scope of the work. In relation to cervicogenic headache, it is possible to classify it as a secondary headache, attributed to cervical disorders, with heterogeneous symptomatology, usually presenting as a unilateral, non-throbbing and non-excruciating headache, which may be triggered by trigger points in the cervical region and may still be present themselves with autonomous prodromes. Its etiology and pathophysiology are directly linked to cervical disorders and irritation of C1-C2-C3 afferent fibers, in addition to the convergence to the cervical trigeminal nucleus, increasing the variability of symptoms. Its diagnosis is based on diagnostic criteria and there are a wide variety of treatments with limited effectiveness.

Conclusion

Cervicogenic headache is presented in heterogeneous forms, making its diagnosis difficult or even underdiagnosed with erroneous treatment in up to 50% of cases, its increase, because of the pandemic, alerts to the improvement in the diagnosis and treatment of cervicogenic headache and associated musculoskeletal disorders.

Keywords:
Headache disorders secondary
Neck Pain
Trigeminal nuclei

Received: September 20, 2022
Accepted: September 24, 2022

Introduction

Cervicogenic headache is classified as a secondary headache attributed to a cervical disorder, according to the International Headache Society (IHS).[1] It was first described in 1983 by Sjaastad, as a distinct headache with a trigger of neck muscle movement and decreased cervical range of motion.[2] A Danish study performed random sampling, demonstrating that its prevalence is underestimated[3] and its incidence is increasing, as a result of the SARS-CoV 2 pandemic, because of the changing socio-cultural spectrum (home office) and because of the pathological side effects.[4]

Regarding pathophysiology, data indicate that irritation occurs in the nociceptive fibers of C1-C2-C3, leading to the generation of prodromal and symptoms related to the corresponding territories of the nerve afferents of these fibers, and despite this, the overlapping of regions innervated by the trigeminal nerve is possible due to the presence of convergence in the trigeminal-cervical nucleus.[5] Moreover, the clinical pattern of penumbra between migraine and cervicogenic headache, due to the involvement of converging regions, makes it difficult to diagnose and to treat them adequately in up to 50% of the cases.[6]

The prevalence of cervicogenic headache varies according to the diagnostic criteria used, following the IHS criteria the prevalence is 0.4%[2], and according to the Cervicogenic Headache International Study Group (CHISG) the prevalence in the population is 4.6%[7], with the average prevalence within the headache population being approximately 17,8%[3]. The diagnostic criteria will be discussed and detailed later.

The symptomatology of cervicogenic headache is heterogeneous, in general the clinical picture presents with pain of variable intensity, usually moderate, lasting from a few hours to weeks, with a pattern of greater incidence of 1 to 3 days, not throbbing and not excruciating. It may present with prodromal symptoms related to the C1-C3 nerve roots, such as throbbing and stabbing in the neck and occipital region ipsilateral to the pain, hypoesthesia, dysphagia, xerostomia, and stiffness on passive movement of the neck[8,9]. The treatment of cervicogenic headache has evolved and today there are several forms of physiotherapy, nerve blocks and pharmacological treatment that satisfactorily control the crises.[10]

The purpose of this integrative literature review is to guide the medical society regarding cervicogenic headache, its clinical picture, diagnosis, and treatment, as well as t o highlight its sub diagnosis and differential diagnoses.

Methodology

The present study analyzed the scientific literature available in the complete databases of PubMed, Nature, Scielo and Wiley, independently and manually. The keywords used as search descriptors were: cervicogenic headache, and papers published between the years 1980 and 2022 were analyzed, in all languages, besides the respective English translations. The inclusion factor was: "papers published within the scope of the study within the time interval mentioned and related to cervicogenic headache and the exclusion factor was: "papers not related to the study theme and with reports already outdated according to the current literature". Data collection was conducted between the months of June and July 2022, with analysis and writing of the paper between August and September 2022.

Results

In the databases used in the search 1,319 articles were found (Nature 15 articles, PubMed 169 articles, Scielo 7 articles, Wiley 1,118) of which 115 were eligible, and there were 9 duplicates, leaving 106 articles.

After reading and analyzing the articles, 27 articles were selected, and, according to the relevance of the subject, belong to the scope of the work.

Etiology and Pathophysiology

MRI analyses and invasive and noninvasive clinical tests indicate that cervicogenic headache is a referred pain in the regions of the territories belonging to afferent roots that converge in the cervical trigeminal nucleus, allocating nerve fibers of the descending tract of the trigeminal nerve and the upper cervical fibers.[11,12] The practical effect of this communication is the reference of pain caused by irritation of the roots of C1-C3 in the trigeminal afferent territories.

Regarding the cervical nerves, it is possible to describe the main sites of innervation. The C1 nerve (suboccipital nerve), is responsible for the deep sensory innervation in the suboccipital region, atlanto-occipital joint, pre-vertebral muscles, sternocleidomastoid and trapezius.[13,14] The C2 nerve root is responsible for the sensory innervation of the sternocleidomastoid, trapezius, semi spinal, splenium of the

head, lateral and medial aspect (together with the C3 root) of the atlantoaxial joint, and its medial branch emerges in the semi spinal muscle to become the greater occipital.[15] The C3 branch is responsible for the innervation of the posterior cervical muscles and also for the zygapophyseal joints of C2-C3, moreover its terminal fibers become the third occipital nerve.[16]

The disorders responsible for irritation of these fibers arise from several factors, and about 70% of the cases are related to the C3 fibers. Disturbances in the zygapophysial joints of C2-C3, such as trauma, joint alterations, muscle trigger points, inflammatory diseases that affect the cartilages, and more recently, a decrease in the variability of the cervical spine due to factors such as laptop use, reduced work space, home office, and infection by SARS-CoV-2 (leading to hospitalization and the need for rest) are scientifically supported triggering factors of cervicogenic headache.[4,5,17]

Clinical Picture

There are divergences regarding the clinical picture, due to overlapping symptoms with primary headaches and pure occipital neuralgia. Two definitions with antagonistic points stand out. The main points are the presence or absence of prodromal and organic signs and symptoms.[18,19]

According to CHISG and Sajaastad, the cervicogenic cephalalgias is a headache characterized by unilateral pain of variable intensity, with irradiation to the frontal, supraorbital, temporal, parietal and occipital regions triggered by stimuli or movement of the cervical region, and due to malposition of the cephalic region. Moreover, in clinical practice the patient may report that the pain starts in the frontal region, passing through the temporal, parietal and ipsilateral occipital regions, retrospectively following the dermatomes up to the cervical region.[2,8,9] In this description there is the presence of prodromes related to the nerve roots, such as throbbing and stabbing in the neck and occipital region ipsilateral to the pain, hypoesthesia, dysphagia, xerostomia, and stiffness on passive movement of the neck and upper limb.[10,20]

The IHS disregards prodromes and differentiates cervicogenic from other possible diagnoses such as tension headache, occipital neuralgia, and migraine. These criteria cause the sensitivity to decrease greatly but increase the specificity. Therefore, 50% of the cases of cervicogenic headache are treated as other pathologies impairing the quality of life of the patient.[6,21,22]

Diagnosis

The diagnosis is based on the criteria established by the two major groups CHISG and IHS and will be detailed below.

Diagnostic criteria adapted by Antonaci and colleagues[23], (CHISG):

1. Unilateral headache without lateral displacement.
2. Symptoms and signs of neck involvement: pain triggered by neck movement or sustained inappropriate posture, and or, external pressure in the posterior occipital neck region; ipsilateral neck or occiput pain; ipsilateral neck, shoulder, and arm pain; reduced range of motion.
3. Pain episodes of variable duration or continuous, fluctuating pain.
4. Pain of moderate intensity, not throbbing and not excruciating.
5. Pain of onset in the neck, radiating to the orbital, frontal, and temporal regions.
6. Temporary elimination of pain with anesthetic blocks, provided that complete anesthesia is obtained or sustained cervical trauma occurs shortly before onset.
7. Various events related to the attack: autonomic signs and symptoms, nausea, vomiting, ipsilateral edema and flushing in the periocular area, dizziness, phonophobia, photophobia, or ipsilateral blurred vision.

Diagnosis requires the presence of items 1 and 5, and any other three.

Diagnostic criteria for International Headache Society[1]:

A. Any headache that meets criterion C.
B. Clinical and/or imaging evidence of a disorder or injury to the cervical spine or soft tissues of the neck known to cause headache.
C. Evidence of causality demonstrated by at least two of the following findings:
   1. The headache developed in temporal relation to the onset of the cervical disorder or appearance of the lesion.
   2. The headache significantly improved or resolved in parallel with the improvement or resolution of the cervical disorder or injury.
   3. The cervical range of motion is reduced, and the headache is significantly aggravated by provocative maneuvers
   4. The headache is eliminated after diagnostic blockage of a cervical structure or its nerve supply.
D. Not better explained by another diagnosis

Notes:

1. Imaging findings in the high cervical spine are common in patients without headache; they are suggestive, but not firm evidence of causality.

2. Tumors, fractures, infections, and rheumatoid arthritis of the upper cervical spine have not been formally validated as causes of headache but are accepted to meet criterion B in individual cases. Cervical spondylosis and osteochondritis may or may not be valid causes that meet criterion B, again depending on the individual case.

3. When cervical myofascial pain is the cause, the headache should probably be classified as tension-type headache; however, pending further evidence, an alternative diagnosis of headache attributed to cervical myofascial pain may be raised.

4. Headache caused by high cervical radiculopathy has been postulated and, considering the now well-understood convergence between high cervical and trigeminal nociception, this is a logical cause of headache. Depending on other evidence, this diagnosis has a differential to headache attributed to upper cervical radiculopathy.

5. Characteristics that tend to distinguish cervicogenic headache from migraine and tension-type headache include pain from the side, provocation of typical headache by digital pressure on the neck muscles and by head movement, and posterior-anterior radiation of pain. However, although these may be characteristics of cervicogenic headache, they are not unique to it and do not necessarily define causal relationships.

6. Migraine features such as nausea, vomiting, and photophobia/phonophobia may be present in cervicogenic headache, although to a generally lesser degree than in migraine, and may differentiate some cases from tension-type headache.

Treatment

Currently several methods and drugs are indicated for the treatment of cervicogenic headache, with limited efficacy.[11] Among the medications are muscle relaxants, antidepressants, and neuromodulators.[10] A double blind study with 40 patients, using pregabalin at a dose of 450 mg/day divided into three doses, demonstrated efficacy in decreasing the amount of days with pain, ten days per month compared to control, over a period of 12 weeks.[24] In clinical practice (level of evidence C) the use of gabapentin at an average dose of 600 mg daily has shown positive effects, with rapid and sustained response, but controlled studies are needed.

Non-pharmacological therapies are widely accepted for the treatment of cervicogenic headache, with restricted efficacy and remission time. Blockade alone had an immediate response in 94% of patients, however, the mean pain-free duration was 23.5 days.[25] Major occipital nerve excision and radiofrequency neurotomy have also not been shown to be effective, even with a mean of 244 days and 297 days with decreased pain, respectively, the studies are inconclusive.[11] A randomized clinical study conducted in Brazil, selected a population with cervicogenic headache and separated them into 3 groups (Group I: anesthetic block with corticoid associated with Maitland's physiotherapy, Group II: anesthetic block with corticoid associated with conventional physiotherapy, Group II: anesthetic block with corticoid without physical therapy), demonstrating, with statistical significance, that Maitland's technique associated with occipital nerve block demonstrated pain reduction (scale of 1 to 10), with a subjective score of 1.6 for the combined treatment with Maitland's technique and block, 3.7 for conventional physical therapy combined with block, and 5.2 for block alone.[10]

Clobation - a technique that consists of emitting radiofrequency and generating degeneration at the site where it is applied- has shown an efficacy of > 50% in reducing pain in 92% of patients, being considered a partial response.[26] Neuromodulation by electrical stimulation through implantable devices in the occipital nerve territory had a partial response in about 50% of the patients in reducing pain.[27] Thus, it is possible to infer that the association of techniques using medications and physical therapy or blocks, are the current basis of treatments with the best responses in the studies.

Conclusion

Cervicogenic headache is a cervical disorder and, as exposed, it can present several clinical manifestations, varying in location and clinical presentation with differential diagnosis of several nosological entities. Increasingly, lifestyles and habits have had a direct impact on the increase in its incidence and prevalence, reinforcing the need for the training of physicians in identifying the pathology. Osteomuscular and orofacial cervical disorders, potentially precipitating convergent

root irritation should also be treated appropriately to avoid diagnostic confounding factors.

As far as the treatment is concerned, the therapies have limited effectiveness, but the disclosure of the pathology, the off-label use of medications, and the increase of physical therapy in the therapeutic arsenal have been showing positive results. Finally, cervicogenic headache must be included in the differential diagnosis of primary headaches, thus avoiding underdiagnosis and inadequate treatment, in order to provide patients with a better quality of life.

Conflict of interest: The authors report no conflict of interest

Funding: No

Author's contributions: WGNB and LGP, wrote the paper; KFP and ACR, wrote the paper and did the final editing.

Kleber Fernando Pereira
https://orcid.org/0000-0002-5102-6273
Wesley Gabriel Novaes Botelho
https://orcid.org/0000-0001-7315-4201
Luiz Gustavo Pagliarin
https://orcid.org/0000-0003-1447-4613
Alcântara Cesar Ramos
https://orcid.org/0000-0002-7390-7282

References

1. Olesen J. **International Classification of Headache Disorders.** *The Lancet Neurology* 2018;17(5):396-397 Doi:10.1016/s1474-4422(18)30085-1
2. Sjaastad O and Fredriksen TA. **Cervicogenic headache: criteria, classification and epidemiology.** *Clin Exp Rheumatol* 2000;18(2 Suppl 19):S3-6
3. Nilsson N. **The prevalence of cervicogenic headache in a random population sample of 20-59 year olds.** *Spine (Phila Pa 1976)* 1995;20(17):1884-1888 Doi:10.1097/00007632-199509000-00008
4. Mingels S, Dankaerts W, van Etten L, Bruckers L and Granitzer M. **Spinal postural variability relates to biopsychosocial variables in patients with cervicogenic headache.** *Scientific Reports* 2021;11(1):Doi:10.1038/s41598-021-93138-3
5. Masharawi Y, Mansour AM, Peled N and Weisman A. **A comparative shape analysis of the cervical spine between individuals with cervicogenic headaches and asymptomatic controls.** *Scientific Reports* 2021;11(1):Doi:10.1038/s41598-021-98981-y
6. Anarte-Lazo E, Carvalho GF, Schwarz A, Luedtke K and Falla D. **Differentiating migraine, cervicogenic headache and asymptomatic individuals based on physical examination findings: a systematic review and meta-analysis.** *BMC Musculoskeletal Disorders* 2021;22(1):Doi:10.1186/s12891-021-04595-w
7. Sjaastad O and Bakketeig LS. **Prevalence of cervicogenic headache: Vågå study of headache epidemiology.** *Acta Neurologica Scandinavica* 2008;117(3):173-180 Doi:10.1111/j.1600-0404.2007.00962.x
8. Correia C and Monteiro PJAMP. **Headache of cervical origin.** 1992;5(3):155-158
9. Botelho WGN, Signori LS and César ARdA. **Occipital nerve block and Maitland physiotherapy: review of treatment techniques based on positive results.** *Headache Medicine* 2021;12(3):231-234 Doi:10.48208/HeadacheMed.2021.33
10. César ARdA, Costa IDPd, Botelho WGN, Sperafico N, Groto AD and Felício AC. **Postural physiotherapy for cervicogenic headache after occipital nerve block: a retrospective study.** *Research, Society and Development* 2021;10(12):Doi:10.33448/rsd-v10i12.19994
11. Bogduk N and Govind J. **Cervicogenic headache: an assessment of the evidence on clinical diagnosis, invasive tests, and treatment.** *The Lancet Neurology* 2009;8(10):959-968 Doi:10.1016/s1474-4422(09)70209-1
12. Bogduk N. **Cervicogenic headache: Anatomic basis and pathophysiologic mechanisms.** *Current Pain and Headache Reports* 2001;5(4):382-386 Doi:10.1007/s11916-001-0029-7
13. Dreyfuss P, Michaelsen M and Fletcher D. **Atlanto-Occipital and Lateral Atlanto-Axial Joint Pain Patterns.** *Spine* 1994;19(Supplement):1125-1131 Doi:10.1097/00007632-199405001-00005
14. Schellhas KP, Smith MD, Gundry CR and Pollei SR. **Cervical Discogenic Pain.** *Spine* 1996;21(3):300-311 Doi:10.1097/00007632-199602010-00009
15. Vital JM, Grenier F, Dautheribes M, Baspeyre H, Lavignolle B and Sénégas J. **An anatomic and dynamic study of the greater occipital nerve (n. of Arnold).** *Surgical and Radiologic Anatomy* 1989;11(3):205-210 Doi:10.1007/bf02337823
16. Bogduk N. **The Innervation of the Vertebral Column.** *Australian Journal of Physiotherapy* 1985;31(3):89-94 Doi:10.1016/s0004-9514(14)60626-7
17. Mingels S, Dankaerts W, van Etten L, Bruckers L and Granitzer M. **Lower spinal postural variability during laptop-work in subjects with cervicogenic headache compared to healthy controls.** *Scientific Reports* 2021;11(1):Doi:10.1038/s41598-021-84457-6
18. Barmherzig R and Kingston W. **Occipital Neuralgia and Cervicogenic Headache: Diagnosis and Management.** *Current Neurology and Neuroscience Reports*

2019;19(5):Doi:10.1007/s11910-019-0937-8
19. Bogduk N. **Distinguishing Primary Headache Disorders from Cervicogenic Headache: Clinical and Therapeutic Implications.** *Headache Currents* 2005;2(2):27-36 Doi:10.1111/j.1743-5013.2005.20204.x
20. Sjaastad O, Fredriksen TA and Pfaffenrath V. **Cervicogenic Headache: Diagnostic Criteria.** *Headache: The Journal of Head and Face Pain* 1990;30(11):725-726 Doi:10.1111/j.1526-4610.1990.hed3011725.x
21. Fredriksen TA, Antonaci F and Sjaastad O. **Cervicogenic headache: too important to be left un-diagnosed.** *The Journal of Headache and Pain* 2015;16(1):Doi:10.1186/1129-2377-16-6
22. Fishbain DA, Lewis J, Cole B, Cutler RB, Rosomoff RS and Rosomoff HL. **Do the proposed cervicogenic headache diagnostic criteria demonstrate specificity in terms of separating cervicogenic headache from migraine?** *Current Pain and Headache Reports* 2003;7(5):387-394 Doi:10.1007/s11916-003-0039-8
23. Antonaci F, Ghirmai S, Bono G, Sandrini G and Nappi G. **Cervicogenic Headache: Evaluation of the Original Diagnostic Criteria.** *Cephalalgia* 2016;21(5):573-583 Doi:10.1046/j.0333-1024.2001.00207.x
24. Boudreau GP and Marchand L. **Pregabalin for the Management of Cervicogenic Headache: A Double Blind Study.** *Canadian Journal of Neurological Sciences / Journal Canadien des Sciences Neurologiques* 2014;41(5):603-610 Doi:10.1017/cjn.2014.2
25. Anthony MJC and Rheumatology e. **Cervicogenic headache: prevalence and response to local steroid therapy.** 2000;18(2; SUPP/19):S-59
26. Wu B, Yue L, Sun F, Gao S, Liang B and Tao T. **The Feasibility and Efficacy of Ultrasound-Guided C2 Nerve Root Coblation for Cervicogenic Headache.** *Pain Medicine* 2019;20(6):1219-1226 Doi:10.1093/pm/pny227
27. Eghtesadi M, Leroux E, Fournier-Gosselin M-P, Lespérance P, Marchand L, Pim H, . . . Boudreau GP. **Neurostimulation for Refractory Cervicogenic Headache: A Three-Year Retrospective Study.** *Neuromodulation: Technology at the Neural Interface* 2018;21(3):302-309 Doi:10.1111/ner.12730