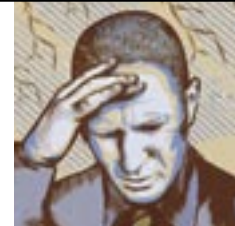




Neck related causes of headache



BACKGROUND Headaches emanating from sources in the cervical spine, so-called cervicogenic headache (CGH), are much more common than is usually thought by practitioners not trained in musculoskeletal medicine.

OBJECTIVE This article outlines a basic clinical assessment of the neck which will enable the general practitioner to determine whether or not there is a possible neck source for the presenting headache.

DISCUSSION The skills of musculoskeletal clinical assessment are relatively simple and easy to acquire, and can ensure that this important clinical entity is not overlooked. Reproduction of the patient's pain during the musculoskeletal examination indicates that a musculoskeletal cause is likely. Static diagnostic imaging studies of the neck have no role in the diagnosis of CGH. Spinal manual therapy has been shown to be efficacious in the treatment of CGH. Treatment aimed at relevant myofascial trigger points can also be useful. Specifically targeted diagnostic injection is required for definitive anatomical diagnosis. If such diagnostic procedures lead to a diagnosis of facet joint pain, treatment with radiofrequency neurotomy has proven efficacy.

The quoted incidence of cervicogenic headache (CGH) in the general population using International Headache Society (IHS) criteria,^{1,2} is said to be as high as 18%,³ or as low as 1%.⁴ Cervicogenic headache is in fact a very common clinical entity, and the discrepancy in the reported prevalence lies in the lack of musculoskeletal skills in the medical community^{5,6} which results in CGH often going unrecognised. The scant mention of CGH in reviews of headache in mainstream medical journals adds to this ignorance.^{7,8}

Autonomic symptoms such as nausea, vomiting and photophobia form part of the diagnostic criteria of CGH,^{1,2} but clinicians unaware of this may attribute these symptoms to the more classic diagnoses of migraine or tension type headaches.

Although CGH cannot be formally diagnosed on clinical grounds alone, a thorough clinical assessment can give a strong indication of a musculoskeletal origin for the pain. The definitive criterion is complete relief of normal headache pain after controlled diagnostic local anaesthetic blockade of the cervical structure/s or their nerve supply.⁹ This requires practitioners with special skills (and facilities) which are not freely available, and this further compromises the reported diagnostic prevalence of CGH.

Using such diagnostic techniques, it has been found that the lateral atlanto-axial joint is responsible for at least 16% of occipital headaches.¹⁰ The prevalence of headache from the C2/3 zygapophysial (facet) joint (ZJ) was found to be 27% among patients with headache after whiplash, and 53% among those with headache as the dominant symptom after whiplash.¹¹

Afferents from the trigeminal nerve, and the first three cervical spinal nerves converge in the brainstem to form



Steve Jensen

MBBS, FAFMM, is Senior Lecturer in Musculoskeletal Medicine, Swinburne University of Technology Graduate School of Integrative Medicine, Victoria, Past President, Australian Association of Musculoskeletal Medicine, and a musculoskeletal physician, Footscray, Victoria. jensen@tpg.com.au

the cervicotrigeminal nucleus, creating the anatomical basis whereby pain from the cervical spine structures can be perceived in the head and/or face. Therefore, any structure innervated by any of the first three spinal nerves may be the source of CGH (*Table 1*).⁹

Clinical assessment

History

As with all medical consultations, the cornerstone of clinical assessment is the taking of a thorough history. Basic schemas for a pain history have been published previously.¹² The primary objective of the history is to exclude potentially serious or life threatening 'red flag' conditions. The next goal is to ascertain the type of headache that the patient is presenting with, according to IHS criteria.

Clinical features that suggest a diagnosis of CGH are outlined in *Table 2*. As mentioned previously, the

presence of strong autonomic features including nausea, vomiting, photophobia, phonophobia, blurred vision or dizziness should not dissuade the practitioner from a diagnosis of CGH.

Pain diagrams (*Figure 1a, b*) are a useful clinical tool, and have been found to be a useful guide to the affected level of cervical spine dysfunction based on previously published ZJ pain referral patterns.¹³⁻¹⁵ Pain referral zones for myofascial trigger points are shown in *Figure 2a-c*.¹⁶

Examination

Reproducing the patient's pain during the musculoskeletal examination indicates that the pain is very likely musculoskeletal in origin. In cases of headache, this involves using clinical examination techniques targeting structures of the neck and associated muscles that may be a source of the headache. If symptoms are not reproduced in a thorough musculoskeletal examination as outlined below, then the headache is probably not cervicogenic. Examination follows the framework of:

- inspection – 'look'
- movement – 'move', and
- palpation – 'feel'.

Inspection

It is important to observe the general demeanour and mobility of the patient on their way from the waiting room to the consulting room, and during the clinical interview. For example, a range of cervical spine motion much greater during casual observation compared to that during formal testing may be an indication of significant psychosocial distress, or, rarely, malingering. Inspection should note the following:

- willingness to move the head
- level of the shoulders relative to one another
- position of the head, looking for any lateral flexion, rotation, or postural anomalies such as a protruding chin, and
- evidence of any wasting or deformity in the neck, shoulder girdles or upper limbs.

The astute general practitioner will utilise this part of the examination to also inspect for any incidental suspicious skin lesions, or lumps and bumps.

Movement

Movement is carried out actively by the patient, in the six cardinal planes of flexion, extension, left and

Table 1. Musculoskeletal structures in the neck that may be a source of headache and/or facial pain

- Joints and ligaments of the median atlanto-axial joint
- Lateral atlanto-axial joints
- Atlanto-occipital joint
- C2/3 and C3/4 zygapophysial (facet) joints
- C2/3 intervertebral disc
- Muscles: suboccipital, upper posterior cervical, upper prevertebral cervical muscles, trapezius and sternocleidomastoid

Table 2. Clinical characteristics of cervicogenic headache

- Unilateral head or face pain
 - pain may be on the contralateral side, but there should be profound unilateral dominance
 - pain may occasionally be bilateral (if structures on both sides are affected)
- Pain starting in the neck or occipital region, which may spread to oculo-temporo-frontal areas where maximum pain may be perceived
- Pain of generally deep, nonthrobbing and constant character
- Intermittent attacks lasting hours to days, or constant pain with superimposed attacks of more severe pain
- Pain triggered by neck movement or sustained awkward neck posture
- Ipsilateral nonradicular neck, shoulder or arm pain
- Reduced range of motion of the neck
- Reproduction of headache pain on palpation of neck structures
- May be accompanied by nausea, vomiting, photophobia, phonophobia, dizziness, and ipsilateral blurred vision, lacrimation and conjunctival injection, making it difficult clinically to differentiate from other types of headache

right rotation and left and right lateral flexion, with the clinician observing the range and also rhythm of each movement, as well as whether there is any reproduction of the patient's pain. If pain reproduction has not occurred, then gentle overpressure can be applied at the end of range in order to gently further stress the cervical spine structures.

Fully flexing the cervical spine, and then rotating it to either side, assesses rotation at the upper cervical spine only. It has been reported that in CGH, this movement is commonly restricted to the side of headache.¹⁷

The compression test (Figure 3) is a further provocative motion test for cervical spine dysfunction and can be used if pain reproduction has not yet occurred.

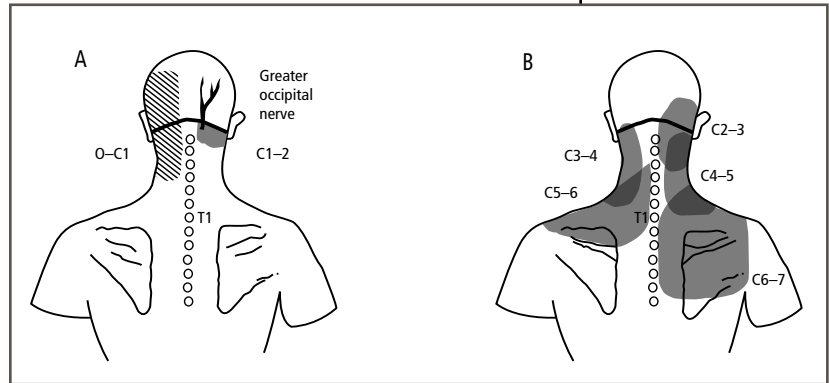


Figure 1A. Pain referral patterns of the cervical joints: C0/1 and lateral C1/2 joints
 Reproduced with permission: Dreyfuss P, Michaelson M, Fletcher D. Atlanto-occipital and lateral atlanto-axial joint pain patterns. *Spine* 1994;19:1125-31
 Figure 1B. C2/3 to C6/7 ZJ, posterior view. The C2/3 ZJ also refers to the ipsilateral temporal region of the skull, as well as over the orbit and forehead
 Reproduced with permission: Dwyer A, Aprill C, Bogduk N. Cervical zygapophysial joint pain patterns I: a study in normal volunteers. *Spine* 1990;15:453-7

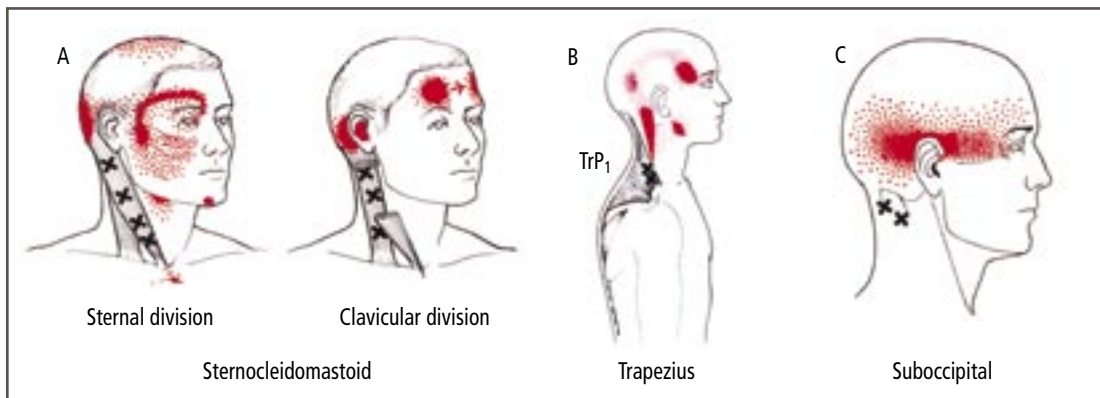


Figure 2A-C. Pain referral zones for trigger points in sternocleidomastoid, trapezius and suboccipital muscles
 Reproduced with permission: Travell JG, Simons DG. *Myofascial pain and dysfunction. The trigger point manual.* Baltimore: Williams & Wilkins, 1993

Palpation

Palpation of the spine, in order to elicit tenderness and pain reproduction, is perhaps the most important of the musculoskeletal clinical skills needed to localise the source of the pain. For example, patients whose pain is arising from the C2/3 ZJ, are more likely to be tender over that joint.¹¹

For palpation, the patient should lie prone. If your examination couch does not have a porthole for the face, lying the patient prone with arms by their sides, with a pillow under their chest, forehead on the couch, and then flexing the neck as far as comfortable results in the patient still being able to breathe comfortably while encouraging relaxation of the spinal muscles, and maintaining a satisfactory posture for palpation of the neck to ensue.

In the midline, the first spinous process to be felt

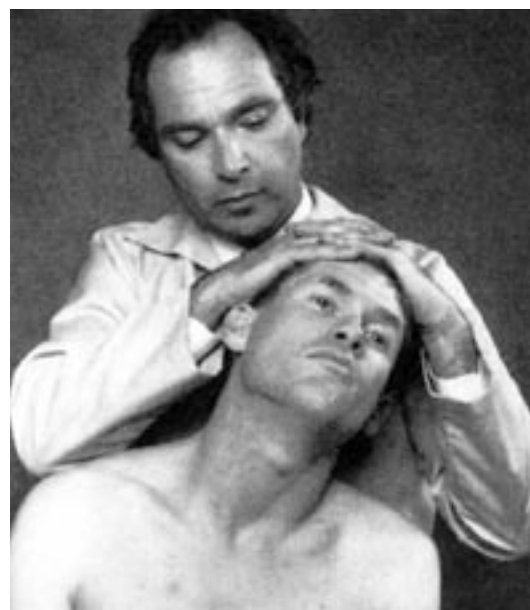


Figure 3. The compression test: the patient's head should be slightly laterally flexed, rotated and extended. Steady pressure to the head compresses the articular pillar on the painful side
 ©Elsevier Australia. Reproduced with permission

below the occiput is C2. C3, C4 and C5 are usually difficult to palpate because of the normal cervical lordosis. C6 can be easily identified as it is usually easily palpable and disappears under the examining finger on extension of the neck. The largest 'fixed' prominence is the spinous process of C7.

Palpation is performed in a systematic way, starting with the spinous processes, and followed by the ZJs.



Figure 4A, B. Unilateral palpation 2–3 cm lateral to the midline, over the articular pillar, looking for underlying joint stiffness, tenderness and pain reproduction
©Elsevier Australia. Reproduced with permission



Figure 5. Palpation of the left C1/2 (lateral atlanto-axial) joint by rotation of the head about 30° to the ipsilateral side and palpating just under the occiput, 2–3 cm from the midline
©Elsevier Australia. Reproduced with permission

The ZJs are located 2–3 cm from the midline (*Figure 4a, b*). Palpation of the lateral atlanto-axial joint of C1/2 is undertaken by rotating the patient's head to the ipsilateral side (*Figure 5*). Attention is then turned to palpating the muscles such as the suboccipital muscles, trapezius and sternocleidomastoid that may be a source of headache.

Diagnostic imaging

The only role for diagnostic imaging in the assessment of CGH is by guiding the needle used in diagnostic blockade of the putatively painful structure. There is no correlation between changes seen on static imaging studies – including magnetic resonance imaging (MRI) scans – of commonly seen 'abnormalities' such as disc degeneration, disc bulges, and ZJ arthritis and potential sources of the patient's pain.⁹

Management

The cornerstone of management of any musculoskeletal problem lies in performing a thorough clinical assessment to gain the confidence of the patient, and then adequately reassuring the patient by providing a plausible biological explanation for the patient's pain while encouraging normal activity.^{18,19}

A recent Cochrane review²⁰ concluded that physical therapies, including spinal manipulation and mobilisation, are effective treatments for chronic recurrent headaches, including migraine, when combined with low intensity endurance training neck exercises, and have little risk of serious adverse effects. Therefore, for chronic headaches in general, and particularly for CGH, a therapeutic trial of manual therapy should be considered.

Myofascial trigger points are somewhat controversial, with manuals devoted to the topic,¹⁶ while others point out the deficiencies of the trigger point theory.⁹ Nonetheless, for headaches thought to have a strong myofascial component, a trial of trigger point therapy, by office manoeuvres such as myofascial stretching, with or without local anaesthetic injection, constitutes a worthwhile clinical trial.

More invasive therapeutic endeavours can be considered for debilitating cases of CGH for which conservative measures have been ineffective. It is for these cases that definitive diagnosis with specifically targeted diagnostic injections is required. There is now strong supportive evidence for the use of radiofrequency neurotomy (RFN) for chronic cervical facet joint pain in general,²¹ and specifically for C2/3 ZJ

pain,²² provided strict diagnostic criteria are adhered to. The limiting factors for such interventions are the availability of skilled personal and adequately equipped institutions to enable these procedures to be carried out safely and accurately.

Conclusion

Musculoskeletal causes of headache are much more common than is usually recognised. The clinical skills necessary to evaluate the neck and surrounding structures are relatively easy to grasp, and an appropriate assessment of the neck is not time consuming and therefore well within the realm of a busy GP. Once the clinical suspicion of CGH is raised, a trial of office based interventions such as mobilisation and manipulation, combined with low intensity endurance neck training exercises, is supported by the literature. For recalcitrant and debilitating cases, consideration should be given to referral to a special facility capable of performing appropriate diagnostic nerve and joint blocks, and procedures such as RFN.

Conflict of interest: none declared.

References

- Headache Classification Committee of the International Headache Society. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. 2nd ed. 2003.
- Antonaci F, Fredericksen TA, Sjaastad O. Cervicogenic headache: clinical presentation, diagnostic criteria, and differential diagnosis. *Curr Pain Headache Rep* 2001;5:387–92.
- Nilsson N. Prevalence of cervicogenic headache in a random sample of 20–59 year olds. *Spine* 1995;20:1884–8.
- Rasmussen BK. Epidemiology of headache. *Cephalalgia* 1995;15:45–68.
- Vlahos K, Broadhurst N, Bond M. Knowledge of musculoskeletal medicine at undergraduate and postgraduate levels. *Australasian Musculoskeletal Medicine* 2002;7:28–32.
- Freedman KB, Bernstein MD. The adequacy of medical school education in musculoskeletal medicine. *J Bone Joint Surg* 1998;80:1421–27.
- Sturm JW, Donnan GA. Diagnosis and investigation of headache. *Aust Fam Physician* 1998;27:587–9.
- Lance JW. Headache and face pain. *Med J Aust* 2000;172:450–5.
- Bogduk N. The neck and headaches. *Neurol Clin* 2004;22:151–71.
- Aprill C, Axinn MJ, Bogduk N. Occipital headaches stemming from the lateral atlanto-axial (C1/2) joint. *Cephalalgia* 2002;22:15–22.
- Lord S, Barnsley L, Wallis B, Bogduk N. Third occipital headache: a prevalence study. *J Neurol Neurosurg Psychiat* 1994;57:1187–90.
- NHMRC. Acute pain management: information for general practitioners. Canberra: Commonwealth of Australia, 1999.
- Speldewinde GC, Bashford GM, Daidson IR. Diagnostic cervical zygapophysial joint blocks for chronic cervical pain. *Med J Aust* 2001;174:174–6.
- Dwyer A, Aprill C, Bogduk N. Cervical zygapophysial joint pain patterns I: a study in normal volunteers. *Spine* 1990;15:453–7.
- Dreyfuss P, Michaelsen M, Fletcher D. Atlanto-occipital and lateral atlanto-axial joint pain patterns. *Spine* 1994;19:1125–31.
- Travell JG, Simons DG. Myofascial pain and dysfunction. The trigger point manual. Baltimore: Williams & Wilkins, 1993.
- Hall T, Robinson K. The flexion-rotation test and active cervical mobility: a comparative measurement study in cervicogenic headache. *Man Ther* 2004;9:197–202.
- Indahl A, Haldorsen EH, Holm S, Reikeras O, Ursin H. Five year follow up study of a controlled clinical trial using light mobilisation and an informative approach to low back pain. *Spine* 1998;23:2932–9.
- McGuirk B, King W, Govind J, Lowry J, Bogduk N. Safety, efficacy, and cost effectiveness of evidence based guidelines for the management of acute low back pain in primary care. *Spine* 2001;26:2615–22.
- Bronfort G, Nilsson N, Haas M, Evans R, Goldsmith CH, Assendelft WJ, Bouter CM. Noninvasive physical therapies for chronic recurrent headache. *Cochrane Database Syst Rev* 2004;(3):CD001878.
- Lord SM, Barnsley L, Wallis BJ, et al. Percutaneous radio frequency neurotomy for chronic cervical zygapophysial joint pain. *New Engl J Med* 1996;335:1721–6.
- Govind J, King W, Bailey B, Bogduk N. Radiofrequency neurotomy for the treatment of third occipital headache. *J Neurol Neurosurg Psychiat* 2003;74:88–93.

Email: afp@racgp.org.au

AFP