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 zygapophyial (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

**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.

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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).

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. 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. Pain referral zones for myofascial trigger points are shown in Figure 2a–c.

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

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

<table>
<thead>
<tr>
<th>Structures</th>
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<tbody>
<tr>
<td>Joints and ligaments of the median atlanto-axial joint</td>
</tr>
<tr>
<td>Lateral atlanto-axial joints</td>
</tr>
<tr>
<td>Atlanto-occipital joint</td>
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<tr>
<td>C2/3 and C3/4 zygapophysial (facet) joints</td>
</tr>
<tr>
<td>C2/3 intervertebral disc</td>
</tr>
<tr>
<td>Muscles: suboccipital, upper posterior cervical, upper prevertebral cervical muscles, trapezius and sternocleidomastoid</td>
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Table 2. Clinical characteristics of cervicogenic headache

<table>
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<tr>
<th>Characteristics</th>
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<tr>
<td>Unilateral head or face pain</td>
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<tr>
<td>Pain may be on the contralateral side, but there should be profound unilateral dominance</td>
</tr>
<tr>
<td>Pain may occasionally be bilateral (if structures on both sides are affected)</td>
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<tr>
<td>Pain starting in the neck or occipital region, which may spread to oculo-temporo-frontal areas where maximum pain may be perceived</td>
</tr>
<tr>
<td>Pain of generally deep, nonthrobbing and constant character</td>
</tr>
<tr>
<td>Intermittent attacks lasting hours to days, or constant pain with superimposed attacks of more severe pain</td>
</tr>
<tr>
<td>Pain triggered by neck movement or sustained awkward neck posture</td>
</tr>
<tr>
<td>Ipsilateral nonradicular neck, shoulder or arm pain</td>
</tr>
<tr>
<td>Reduced range of motion of the neck</td>
</tr>
<tr>
<td>Reproduction of headache pain on palpation of neck structures</td>
</tr>
<tr>
<td>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</td>
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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.

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

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**Figure 1A.** Pain referral patterns of the cervical joints. C0/1 and lateral C1/2 joints

**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

**Figure 2A–C.** Pain referral zones for trigger points in sternocleidomastoid, trapezius and suboccipital muscles

**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
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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. 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, 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**