Diagnosis of Cervicogenic Headache

Practitioners of orthopaedic physical therapy are very familiar with patients presenting for management of neck pain and headache. It has long been accepted that cervical structures, particularly those innervated by the upper three cervical nerves, have the capacity to refer pain into the head and cause headache[1,2]. The anatomical substrate for this referred head pain is the trigeminocervical nucleus[3]. Anatomically, any nociceptive activity arising from disease or disorders in upper cervical joint structures (C0-3), in muscles innervated by the upper three cervical nerves, or in the nerves themselves can access the trigeminocervical nucleus and thus can be responsible for headache[3].

Despite knowing for many decades that cervical structures can refer pain to the head, the history of cervicogenic headache has been quite turbulent. It was not until 1983 that Sjaastad and colleagues[4] put forward an hypothesis, based on meticulous study of headache presentations, that cervical musculoskeletal disorders produced a distinct headache type, which they named "cervicogenic headache". However, there was not universal acceptance of the hypothesis for cervicogenic headache. In fact, cervicogenic headache was not recognized as a separate headache type in the 1988 publication by the International Headache Society of the diagnostic criteria for headache disorders, cranial neuralgias, and facial pain[5]. While a description of headaches associated with disorders of the neck was documented, the idea of a discreet headache type from the neck was rejected. The International Association for the Study of Pain[6] was the first, in 1994, to formally accept the entity and classification of cervicogenic headache and to document the criteria for this headache type, criteria based substantially on the work of Sjaastad et al[4,7]. In 1998, Sjaastad and colleagues revised the criteria for cervicogenic headache[8]; these are the diagnostic criteria now promoted by the Cervicogenic Headache International Study Group (CHISG). With respect to the wider international community, it was not until 2004 that cervicogenic headache was provisionally accepted as a discrete headache type by the International Headache Society as published in their revised International Classification of Headache Disorders (ICHD-II)[9].

What are the characteristics of cervicogenic headache and why has there been a reluctance to embrace, unreservedly, cervicogenic headache as a classifiable headache type? According to the CHISG criteria, cervicogenic headache can be characterized symptomatically as a unilateral or unilaterally dominant headache, without sideshift, associated with ipsilateral neck, shoulder, or arm pain. Pain begins in the neck and headache is aggravated by neck movement or neck postures[8]. However, the International Headache Society[9] has contended in the ICHD-II that it is not sufficient to rely on manifestations of headache for diagnosis as no symptoms are unique to any headache type. Indeed, the problem of symptomatic overlap in the common frequent intermittent headache types such as migraine, tension-type, and cervicogenic headache is well recognized and plagues the accuracy of differential diagnosis of these headaches[10-14]. Of particular interest to physical therapists is the fact that neck pain accompanies 60-70% of all headache types[15-17]; it is not a feature unique to cervicogenic headache. For instance, in a large cross-sectional, population-based study of 51,050 persons, Hagan et al[16] found that the incidence of neck pain associated with migraine headache was twice that for persons with non-migrainous headache. There is familiarity with the trigeminocervical nucleus underlying the physiological basis for an upper cervical disorder referring pain into the head; however, recent research has shown that there are bi-directional interactions between trigeminal afferents and afferents from the three upper cervical nerves in the trigeminocervical nucleus[18-20]. In other words, nociception from a trigeminal source can be perceived as pain in the neck and this bi-directionality can explain the occurrence of neck pain as one possible symptom of migraine. Consistent with this pathophysiology, there are no indications that the pathogenesis of migraine is related to cervical musculoskeletal disorders and equally there is no evidence that the trigeminovascular system is involved in cervicogenic headache[21]. Thus, the core features of neck pain or occipital tenderness are not unique to cervicogenic headache, which supports the concerns expressed

The Journal of Manual & Manipulative Therapy
Vol. 14 No. 3 (2006), 136 - 138

in the ICHD-II about the lack of uniqueness of any symptom to a particular headache type.

The ICHD-II document points to the need to establish causal relationships between headache and a disorder in the neck in order to establish a true diagnosis of cervicogenic headache. Two alternatives are nominated. The first is a demonstration of clinical signs that link a source of pain in the neck with the headache and the second is abolition of headache with diagnostic anaesthetic blocks. The CHISG criteria[8] advocate that the elimination of headache through use of diagnostic nerve or joint blocks is the pre-eminent diagnostic method. Indeed, it is regarded as the current "gold standard" for the diagnosis of cervicogenic headache. Nevertheless, despite the strong advocacy by the CHISG that blocks must be undertaken in order to make a diagnosis of cervicogenic headache, Afridi et al[22] and Anthony[23] have shown that blocks of the greater occipital nerve can also abolish other headache types such as migraine for periods of up to 30 days[22]. Thus, there are problems of specificity with diagnostic blocks. They are not fail-safe for the diagnosis of cervicogenic headache.

The alternative method as indicated in the ICHD-II is the clinical examination. Clinical signs must be able to link a source of pain in the neck with the headache. There are studies that have investigated musculoskeletal impairment in patients with cervicogenic headache and variously compared this group with migraine, tension-type headache, and control subjects. For instance, studies have confirmed that range of motion is reduced[24, 25], muscle function (aspects of muscle control and strength) is impaired[26, 27], that there are palpable joint signs in the upper cervical joints[28-30], and that there is asymmetry of tenderness and skin-fold thickness[31]. What is notable are the early indications that such signs are not present in migraine and tension-type headache[25,28,30]. However, as highlighted by Bogduk[32], the spread and overlap of values, for example in range of movement when the headache subjects are compared to control subjects, means that a particular range of movement of itself is not necessarily indicative of a patient with cervicogenic headache.

If musculoskeletal disorders are considered generally, a clinical diagnosis of a painful joint disorder is made on the basis of the presence of at least a painful movement impairment accompanied by a reaction in the muscle system. Thus, when the previously cited selection of studies on musculoskeletal impairment in cervicogenic headache are viewed collectively[24-28,30], reduced range of cervical motion, the presence of painful joint dysfunction in the upper cervical joints, and impairments in cervical muscle function have variously been documented in cervicogenic headache. Our recent research (Jull & Amiri, submitted for publication) has demonstrated that the presence of this pattern of musculoskeletal impairment (restricted cervical motion in conjunction with painful upper cervical joint dysfunction and cervical muscle function impairment), rather than an isolated sign, can distinguish cervicogenic headache from other common frequent intermittent headache types such as migraine and tension-type headache.

Successful management of any headache disorder relies on accurate differential diagnosis. The headaches most likely to respond to management methods such as manipulative therapy and therapeutic exercise to the cervical region are logically cervicogenic headaches. There is evidence that this treatment regime can be successful for the management of this headache type[33]. Clinicians assessing patients presenting with neck pain and headache must, therefore, marry the presenting headache history and clinical features with presenting dysfunction in the cervical musculoskeletal system to be assured that they are offering treatment to appropriate patients. While this may seem a logical and relatively straightforward process, the clinical presentation of the headache patient can be complex and challenging. For instance, it may be logical to consider that a person who presents with persistent headache following a whiplash injury would be suffering from a trauma-induced cervicogenic headache, but this may not be the case. Radanov et al[34], for instance, determined that of 112 patients with chronic headache after an acceleration/deceleration neck injury from a motor vehicle crash, 37% could be classified as tension-type headache, 27% as migraine, and 18% as cervicogenic with a further 18% not able to be classified. Notably, 93% of these patients reported associated neck pain with headache.

What is the future of cervicogenic headache diagnosis and what is the goal of physical therapists? Our future goal, as called for in the ICHD-II, is the establishment of an accurate, clinically based differential diagnosis of cervicogenic headache. In particular, there is a need to distinguish this headache type from the other common frequent headaches of migraine and tension-type headache. It will be a pattern of headache symptoms coupled with a pattern of physical signs of cervical musculoskeletal dysfunction that will achieve this goal. The evidence for this pattern is building, and future research must investigate and ultimately establish its reliability and validity so that it is accepted universally.

Gwendolen Jull, M Phty, Grad Dip Manip Ther, PhD, FACP
Professor of Physiotherapy
The University of Queensland
Australia

REFERENCES

1. Feinstein B, Langton JNK, Jameson RM, Schiller F. Experiments on referred pain from deep somatic tissues. *J Bone Joint Surg* 1954;36A:981-987.
2. Hunter CR, Mayfield FH. Role of the upper cervical roots in the production of pain in the head. *Am J Surg* 1949;78:743-751.
3. Bogduk N. Anatomy and physiology of headache. *Biomed Pharmacother* 1995;49:435-445.
4. Sjaastad O, Saunte C, Hovdahl H, et al. "Cervicogenic" headache: An hypothesis. *Cephalalgia* 1983;3:249-256.
5. International Headache Society Classification Committee. Classification and diagnostic criteria for headache disorders, cranial neuralgias and facial pain. *Cephalalgia* 1988;8:13-90.
6. Merskey H, Bogduk N. *Classification of Chronic Pain.* 2nd ed. Seattle, WA: IASP Press, 1994:94-95.
7. Sjaastad O, Fredriksen TA, Pfaffenrath V. Cervicogenic headache: Diagnostic criteria. *Headache* 1990;30:725-726.
8. Sjaastad O, Fredriksen TA, Pfaffenrath V. Cervicogenic headache: Diagnostic criteria. The Cervicogenic Headache International Study Group. *Headache* 1998;38:442-445.
9. Headache Classification Subcommittee of the International Headache Society. *The International Classification of Headache Disorders*. 2nd ed. *Cephalalgia* 2004;24:1-151.
10. Antonaci F, Fredriksen T, Sjaastad O. Cervicogenic headache: Clinical presentation, diagnostic criteria and differential diagnosis. *Curr Pain & Headache Reports* 2001;5:387-392.
11. Fishbain D, Lewis J, Cole B, et al. Do the proposed cervicogenic headache diagnostic criteria demonstrate specificity in terms of separating cervicogenic headache from migraine? *Curr Pain & Headache Reports* 2003;7:387-394.
12. Rokicki L, Semenchuk E, Bruehl S, et al. An examination of the validity of the IHS classification system for migraine and tension-type headache in the college student population. *Headache* 1999;39:720-727.
13. Srikiatkhachorn A, Phanthumchinda K. Prevalence and clinical features of chronic daily headache in a headache clinic. *Headache* 1997;37:277-280.
14. Xiaobin Y, Cook A, Hamill-Ruth R, Rowlingson J. Cervicogenic headache in patients with presumed migraine: Missed diagnosis or misdiagnosis? *J Pain* 2005;6:700-703.
15. Fishbain D, Cutler R, Cole B, et al. International Headache Society headache diagnostic patterns in pain facility patients. *Clin J Pain* 2001;17:78-93.
16. Hagen K, Einarsen C, Zwart J, et al. The co-occurrence of headache and musculoskeletal symptoms amongst 51,050 adults in Norway. *Eur J Neurology* 2002;9:527-533.
17. Henry P, Dartigues JF, Puymirat C, et al. The association cervicalgia-headaches: An epidemiologic study. *Cephalalgia* 1987;7:189-190.
18. Bartsch T, Goadsby P. Stimulation of the greater occipital nerve induces increased central excitability of dural afferent input. *Brain* 2002;125:1496-1509.
19. Bartsch T, Goadsby P. The trigeminocervical complex and migraine: Current concepts and synthesis. *Curr Pain & Headache Reports* 2003;7:371-376.
20. Bartsch T, Goadsby P. Increased responses in trigeminocervical nociceptive neurons to cervical input after stimulation of the dura mater. *Brain* 2003;126:1801-1813.
21. Frese A, Schilgen M, Edvinsson L, et al. Calcitonin gene-related peptide in cervicogenic headache. *Cephalalgia* 2005;25:700-703.
22. Afridi S, Shields K, Bhola R, Goadsby P. Greater occipital nerve injection in primary headache syndromes: Prolonged effects from a single injection. *Pain* 2006;122:126-129.
23. Anthony M. Cervicogenic headache: Prevalence and response to local steroid therapy. *Clin & Experimental Neurol* 2000;18:S59-S64.
24. 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.
25. Zwart JA. Neck mobility in different headache disorders. *Headache* 1997;37:6-11
26. Jull G, Barrett C, Magee R, Ho P. Further characterisation of muscle dysfunction in cervical headache. *Cephalalgia* 1999;19:179-185.
27. Watson DH, Trott PH. Cervical headache: An investigation of natural head posture and upper cervical flexor muscle performance. *Cephalalgia* 1993;13:272-284.
28. Gijsberts TJ, Duquet W, Stoekart R, Oostendorp R. Pain-provocation tests for C0-4 as a tool in the diagnosis of cervicogenic headache [Abstract]. *Cephalalgia* 1999;19:436.
29. Jull G, Bogduk N, Marsland A. The accuracy of manual diagnosis for cervical zygapophysial joint pain syndromes. *Med J Australia* 1988;148:233-236.
30. Zito G, Jull G, Story I. Clinical tests of musculoskeletal dysfunction in the diagnosis of cervicogenic headache. *Man Ther* 2006;11:118-129.
31. Sjaastad O, Fredriksen T, Petersen H, Bakketeig L. Features indicative of cervical abnormality; A factor to be reckoned with in clinical headache work and research? *Functional Neurology* 2003;18:195-203.
32. Bogduk N. The neck and headaches. *Neurologic Clinics N Am* 2004;22:151-171.
33. Jull G, Trott P, Potter H, et al. A randomized controlled trial of exercise and manipulative therapy for cervicogenic headache. *Spine* 2002;27:1835-1843.
34. Radanov B, Di-Stefano G, Augustiny K. Symptomatic approach to posttraumatic headache and its possible implications for treatment. *Eur Spine J* 2001;10:403-407.

The Journal of Manual and Manipulative Therapy is indexed in the Cumulative Index to Nursing and Allied Health Literature (CINAHL), MANTIS, EBSCO databases, and in EMBASE, the Excerpta Medica database.