

# CERVICOGENIC HEADACHE AND NECK PAIN ATTRIBUTED TO A SUBOCCIPITAL VERTEBRAL SUBLUXATION COMPLEX: A SINGLE CASE REPORT OF ARTICULO-AUTONOMIC PATHOPHYSIOLOGY INVOLVING MULTIPLE HEALTH PROFESSIONS

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**Abstract:** This paper seeks to discuss the clinical and inter-professional issues in the recognition of an aetiology and treatment of a patient with chronic neck pain, and headaches. This was ultimately attributed to a vertebral-autonomic dysfunction of an upper cervical segment of the spine - a vertebral subluxation complex (VSC). The patient's discomfort may have been prolonged due to this unrecognised clinical presentation of a classic biomechanical neuromusculoskeletal lesion. Limitations in the recognition of the neurological and orthopaedic signs and symptom patterns associated with vertebral mechanical dysfunction are likely to have led to a delay in appropriate care.

**Indexing Terms:** Cervicogenic headache, Chiropractic adjustment, Inter-professional collaboration, Inter-Professional Relationships, Neck Pain, Segmental Spinal Pain, Spinal Manipulation, Suboccipital subluxation, Vertebral adjustment, Vertebral Subluxation Complex

## Introduction

The clinical features generated from articular biomechanical disturbances are described in this paper as chiropractic vertebral subluxations of the cervical spine. Unfortunately for patients, these subluxations do not seem to be as well recognised outside the manipulative sciences.

The World Health Organisation (WHO) identifies the *subluxation complex (vertebral)* of the cervical region as code item M99.11 in its International Classification of Diseases (ICD-10). More specifically, the ICD-10 classifies 'subluxation of C0/C1 cervical vertebrae' with the designation S13.110, and code S13.120 being assigned as *subluxation of C1/C2 cervical vertebrae*. (1, 2, 3)

**Quick View:** This case report shows that the vertebral subluxation complex (VSC) is overlooked by practitioners of other disciplines leading to needless investigations. When VSC is found and corrected by a trained chiropractor the patient often quickly improves and shows strong benefits.

Neck pain has been described as 'pain, ache or discomfort' between C0 and T3. (4) It has been noted as the fourth leading cause of disability. (5) Atlantoaxial or atlanto-occipital subluxations have been identified as possible etiological factors by chiropractors and in a 2015 Mayo Clinic paper by Cohen. (5)

There is however a distinct wide range in epidemiological studies on neck pain frequency. It has been estimated that in any one year some 25.8% (4.8%-79.5%) of the population will experience neck pain, with 14.4% (0.4%-41.5%) at any one time. (6, 7)

Depending on definition criteria, most people can expect to experience degrees of neck pain during their life due to a 12-month prevalence of 27.2%-71.5%. Some 1.7%-11.5% would be associated with disability. (8)

Of items germane to this case report, *cervicogenic headache* is now listed as item 11.2.1 in the International Classification of Headaches Disorders. Item 11.2.3 is listed as *Headache attributed to craniocervical dystonia*. *Occipital neuralgia* is listed as item 13.4 in the ICHD. (9, 10) *Cervico-cranial syndrome* is listed in the WHO ICD-10 under item M53.0. (11) Occipital neuralgia is listed on the ICD-10 as code M54.81. (11) Gasik states that cervicogenic headaches were first included in the ICD in 2004. (12)

Cervicogenic headaches, cervicogenic migraine, occipital neuralgia as well as a range of other symptoms may be attributed to these subluxations as either subtle or overt biomechanical disturbances of cervical vertebrae. (13, 14, 15) Other cervicogenic symptoms may present as neck stiffness (muscular), (16) cervical segments hypomobility, (13, 17) referred pain, (18, 19, 20) paresthesias, (21) vertigo, (16, 21, 22, 23) and autonomic disturbances. (20, 21, 24, 25) Depending on the nature of the disruption and the particular segmental level(s) involved, cervicogenic symptoms may also include both localised pain, and radiating neuralgia. (16, 26, 27)

The potential neurological symptoms associated with vertebral subluxation complexes (VSCs) are regularly encountered by chiropractors and other manual therapists. Being of spinal origin, treatment can be directed more towards a biomechanical cause of pain and potentially associated Z-joint inflammation as a possible option to analgesics or NSAIDs. (28, 29, 30, 31)

Generally, patients with these vertebrogenic symptoms are primarily managed under chiropractic care through procedures called *vertebral adjustments*, as one of the most effective interventions. (32, 33) The model of care is available through some medical hospital facilities. (34, 35, 36, 37, 38, 39, 40)

Other models of care for this type of upper cervical and suboccipital conditions may range from interventions such as rhizotomies, (41) facet injections, (26, 42) anesthesiologic blockade, (42) non-steroidal anti-inflammatories, (26, 43) muscle relaxants, (26, 44) steroids, (26, 45) neuro-stimulation, (46) or analgesic medication. (43, 44, 45, 46)

The clinical presentation of biomechanical syndromes of vertebrogenic origin has clearly been established. Corrective care when dysfunctional spinal segments are involved is considered to be directed at the *cause(s)* of those symptoms rather than symptomatic care. Secondary supportive and therapeutic measures may also be employed such as exercise planning, massage, as well as occupational, postural, and lifestyle advice.

### Historical background

Although conditions associated with biomechanical disturbances of the neck have been recognised for many decades, derivation of the term cervicogenic is comparatively recent. (47)

The earliest chiropractic mention of headaches of cervical origin was in 1910 when Palmer nominated C1 ('*atlas*') as a key segment in such conditions. (48) There are over 70 papers on cervicogenic headaches listed in the electronic *Index to Chiropractic Literature* (ICL). This agency

also returns some 690 papers on neck pain and thirty on neck stiffness, all published since 1984, (49) The earliest 'cervicogenic' paper noted in the ICL was published by Vernon in 1989. (50)

PubMed first lists the term *cervicogenic* in the title of medical papers in 1956, some 46 years after Palmer. (48, 51) The index's next listing of this term is 1970, (52) with a number of papers and textbooks concerning the concept emanating from Europe. (53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63) According to a PubMed search, the term *cervicogenic headache* first appeared in a medical journal in 1983, with the next in 1986 by the same lead author. (41, 64)

A further PubMed search indicated that the term *cervicogenic* first appeared in osteopathic papers on PubMed in 2000 (65) and in physiotherapy papers in 2002. (66)

In 1966, a medical text by Ruth Jackson associated a wide range of neck-trauma-related symptoms in her text when she stated that '*Pain in the head, or headaches, is a frequent complaint in cervical spine disorders.*' (67) In addition, there are three more recent comprehensive chiropractic texts on cervicogenic symptoms associated with whiplash-type injuries. (13, 68, 69)

While there are now a number of papers on the condition of cervical spine related syndromes, a seeming limited acceptance of the concept appears to have followed a convincing study by Braaf and Rosner on this topic in the 1970s. (70) It is now noted that chiropractic care is available through the Johns Hopkins Medicine (71) and Mayo Clinic networks, (32) other hospitals throughout the world (72), as well as US and Canadian armed forces facilities. (73, 74, 75, 76)

Sato et al detail the association of the upper three cervical nerves through cranial nerves V, VII, IX and X and their contribution to '*headache sensations*'. (25)

There is further recognition by other health professionals of cervicogenic headaches and mechanical facet-based symptoms as outlined by Murtagh (34) and others. (65, 77, 78, 79, 80, 81) Consequently, practitioners can be aware of a manual management option for the condition when it is considered appropriate.

## Case Report

A 36 year-old mother of two presented with severe recurring headaches was referred to one of the authors (KBH) following a persistent exacerbation over some 10 months. During that time, she had continued to suffer severe headaches with neck pain and stiffness. The distribution of pain extended unilaterally on the right, from the suboccipital region to the vertex, typically following the path of the greater occipital nerve.

The patient described a healthy lifestyle prior to this time. As a gym instructor, this mother also expressed a degree of fitness by running 5km daily, as well as regular weight lifting exercises.

In further detail, the patient reported experiencing a suboccipital pressure sensation for almost a decade prior to her current exacerbation. Over those years she reportedly experienced similar, but milder and continuous symptoms, particularly with the pressure sensation. This later episode began to develop two weeks prior to the current severe onset.

## Presenting history

### Narrative

The patient stated that over the previous 10 months she had experienced an acute pain in the posterior aspect of her upper neck and a severe associated headache. Although she had experienced intermittent headaches and a pressure pain at the '*back of her head*' for some nine years previously, she had not consulted her general allopathic practitioner. She explained that she thought these milder headaches were related to her menstrual cycle, and considered them to be a self-manageable condition. In addition, the patient could not recall previous trauma or other possible causes for the onset of the condition at that time. However on this occasion, the pain in

her neck and head was more severe and '*different*' to her previous experiences over the years. These symptoms ceased after two weeks.

A further two weeks later, following her 5 km run and weight training, the patient explained that as she stooped to pick up an item from the floor, she felt a severe pain extending from the top of her cervical spine (indicated by her as the C1/C2 area) to the skull vertex. She then collapsed and found it impossible to move her head as this resulted in severe nausea. This eased after a few minutes and she managed to return home.

Following this recurrence, she consulted her General Medical Practitioner (GP) that same day and was told that '*you are most likely suffering from a virus*', and to return in one week if she had not improved. She experienced continued symptoms of head pressure and pain to the vertex of her head, occipital headaches and extreme sensitivity to noise and bright lights. The patient did not indicate an awareness of the potential serious nature of these symptoms at that time.

Some two weeks later, the patient again visited her GP as her condition had not improved. She was later told that a subsequent blood test did not reveal signs of viral infection. She was then referred to a physiotherapist for treatment for '*suspected damaged neck muscles*'. The patient accepted her doctor's diagnosis as such because her blood tests were negative.

Some six weeks after the onset of this current episode, the patient attended the physiotherapist on referral. The physiotherapist advised her that '*the joints in [her] neck were very stiff*'. Treatment primarily consisted of massage. This appeared to aggravate her neck pain so she did not attend any further sessions.

As the patient was still suffering from the same symptoms of headaches and neck pain, she returned to her GP and requested a referral to a neurologist.

The patient then attended a neurologist some eight weeks after the onset of symptoms. She reported that he '*thought [she] was suffering from viral meningitis*.' She understood from her neurologist that following a subsequent CT scan and MRI investigation, he excluded a brain tumour and aneurysm. He then reportedly concluded that although a lumbar puncture had not been conducted, he still thought that she was suffering from viral meningitis and would probably '*get better in two months*'. The patient accepted this advice and waited not two months, but three months.

As she had not responded to medical treatment, and as her symptoms had persisted for some 24 weeks by this stage, she decided to seek alternative care. She then attended a non-medical acupuncturist, but did not respond to this care either.

She then decided to consult a naturopath who reportedly advised her that her '*immune system was depressed*' and that this resulted in slowing her recovery from the virus. This observation was offered although a viral infection had not been confirmed through pathology tests.

One month later while on holidays, the patient stated that she decided to consult a chiropractor. His examination apparently revealed a vertebral subluxation complex (VSC) located at the C1/C2 segmental level. The patient's cervical vertebra (C1) was then apparently duly adjusted (articular fixation release by specific segmental mobilisation) resulting in a marked and prompt reduction in her neck pain. A second adjustment four days later released all her symptoms. She was then advised to seek further chiropractic treatment upon returning home from her holiday.

On arriving home, she consulted a second chiropractor who arranged for a radiological examination. This chiropractor also reportedly diagnosed suboccipital subluxations as upper cervical dysfunction. However, following a further adjustment, she felt slight vertigo. On questioning by the practitioner, she was advised that this could be a normal temporary

occurrence. She was reluctant to return to this practitioner. It has been understood that this reaction was likely a case of transient syncope. (82)

The following month, now some eight months after the onset of symptoms, the patient requested a second opinion from her GP. Although her symptoms had reduced, she was subsequently referred to an orthopaedic surgeon. The surgeon arranged a further radiological examination and noted that she '*had a neck problem*', but was not specific in describing the diagnosis. He advised that he was unable to help her and prescribed anti-inflammatory drugs. The patient could not recall the specific brand of NSAID used at the time.

The patient then consulted an osteopath who also confirmed the mechanical vertebral problem at the suboccipital level. She responded well to his treatment, but on her sixth visit the neck pain returned. The practitioner declined to continue osteopathic care due to this exacerbation of symptoms, and suggested a temporary cessation in treatment.

The patient then consulted a second chiropractor (KBH).

### Presenting history Chronological table

February 27 <sup>th</sup>	Sudden onset of acute symptoms. Symptoms eased after two weeks.
March 16 <sup>th</sup>	Visited GP following severe exacerbation of symptoms (Same day)
April 1 <sup>st</sup>	Returned to GP
April 15 <sup>th</sup>	Attended Physiotherapist
April 30 <sup>th</sup>	Attended Neurologist (MRI, CT)
June 30 <sup>th</sup>	Recommended to return to Neurologist
August	Attended Acupuncturist Attended Naturopath ('immune system depressed')
August/Sept	Holidays. Attended first Chiropractor (2 visits)
October	Second Chiropractor (1 visit) Radiological Examination
October 8 <sup>th</sup>	Attended Orthopaedic surgeon 2nd Radiological Examination
November	Attended Osteopath (6 visits)
December	Presented to current chiropractic practitioner (KBH)

Note: Dates approximate as recalled by patient in December with KBH

### Examination

The nature of the patient's history raised concern and awareness as to the actual aetiology. Consequently, particular attention was paid to the possible presence of red flags, particularly to signs of pre-existing arterial compromise.

Vertebral artery patency tests were conducted together with individual muscle testing, coordination and various reflexes and all were found to be within normal limits. The patient's heart, lung, and neck arteries appeared within normal limits with no abnormal sounds detected on auscultation. No signs of vertebral artery compromise were detected. Other neurological and orthopaedic examinations were unremarkable other than some hypertonicity of the posterior cervical muscles bilaterally. (83, 84, 85)

A further cervical spine examination revealed bilateral positive Kemp's Sign. (83) In addition, there was a mild reduction on right cervical rotation of some 25%, but this limitation was asymptomatic. The 0-10 Visual Analogue Scale (VAS) pain reading was 7-8. Later, this reading varied from consultation to consultation. Consideration of aggravating and relieving factors was also explored.

Ultimately, a spinal examination identified an upper cervical subluxation complex involving C0/C1 and C1/C2. This was considered consistent with the clinical findings apparently made by the previous two chiropractors and the osteopath.

### Radiological Examination

The patient's films from the radiographic examination conducted some three months earlier were obtained from the previous practitioner. This examination had been conducted at a medical radiology facility. The report read as follows:

**'Cervical Spine.** The discs are intact. The vertebrae are normal in appearance. The cervical lordosis is reversed but the A-P alignment is unremarkable.

**Thoracic Spine.** The A-P alignment shows a minor curvature concave to the right centred on T3-T4 compensated above and below. The disc spaces and vertebrae appear normal.

**Lumbar Spine and Pelvis.** There is a roto-scoliosis concave to the right centred on the thoraco-lumbar junction. There is perhaps a minor degree of pelvic tilt, the right hip sitting higher than the left.

On lateral projection the discs and vertebrae show no gross change but the lordosis is exaggerated. The patient also has a moderate degree of sway back present.'

### Diagnosis

The patient's description of symptoms, the site of pain and headaches, as well as examination findings, tended to confirm the diagnosis of VSCs at the C0/C1/C2 level. This complex was primarily noted by segmental fixation (segmental hypomobility) as well as muscle and facet tenderness. This primary level of suboccipital dysfunction would explain the neurological components and associated symptoms of the upper cervical VSC. (86, 87)

Structurally and functionally, the suboccipital finding appeared compromised by the kyphotic cervical spine. It appeared that the exaggerated A-P spinal curves of the upper spine would have been compensatory due to a hyperlordotic lumbar spine. (88, 89)

It was considered probable that the overall postural aberrations contributed to the chronicity of this patient's upper cervical symptoms and were likely to be a predisposing factor, in the absence of a history of trauma. (90)

Although suspected from the start, the history and work-up appeared to fulfil all the requirements for a working diagnosis explaining the cervicogenic symptoms experienced by this patient, '*a suboccipital VSC.*'

After explaining clinical conclusions to the patient, outlining a care plan, and detailing the informed consent policy, the patient assented to care and was duly accepted. (91, 92)



The patient attended for care primarily consisting of spinal adjustments on six occasions over three weeks. Management comprised pre-adjustment muscle relaxation through trigger point releases, followed by full spine chiropractic care. The patient was also instructed in an exercise program which was designed to address reversal of the cervical kyphosis and the lumbar lordosis. In addition, she was instructed to maintain spinal mobility and flexibility. The patient was discharged symptom-free after the third week. (93, 94)

## Discussion

It is submitted that this clinical presentation of cervicogenic symptoms was not widely recognised by all practitioners involved in this case. When eventually diagnosed, the patient responded to appropriate care. There is however, growing recognition of dysfunctional cervicogenic conditions as noted through *PubMed* and the *Index to Chiropractic Literature*. Once assessed and diagnosed, it is then a matter of appropriate care being administered, together with consideration of the patient's preferences. (91)

As vertebral subluxation complexes become more widely recognised, patients are increasingly seeking manipulative options in management of these physical spine-related conditions. (95, 96, 97, 98, 99)

In 2000, it was stated by its Federal President that the Australian Medical Association was establishing a complementary medicines working group '*... as evidence mounts that Australians are increasingly using alternatives to medical practitioners ... 44%.*' (100) This report also noted that of respondents in one patient survey, '*... 39% had used a chiropractor ...*' (100) A 1985 survey on asthmatics by Donnelly et al stated that '*The most popular form of alternative medicine was chiropractic...*' and further that '*... there is much concern about the increasing popularity of alternative medicine ...*'. (101)

As demonstrated in this case a tendency to rely on plain film, MRI, or CT examinations as the sole criteria for diagnosis of VSCs would appear to have limitations. However functional views of the spine may contribute more to the diagnosis and analysis of dysfunctional vertebral segments and offer a greater appreciation of the spinal status. Even so, the judicious use of radiological examinations can exclude the more serious possibilities, reveal contraindications, or provide a more comprehensive biomechanical assessment. While such imaging facilities can at times be helpful diagnostic tools, there are still limitations in the information that each provides. The advantage for a practitioner is in interpreting diagnostic imaging and directly correlating the patient's history and their radiological findings. (102, 103, 104, 105, 106, 107, 108)

As far back as 1979 a Royal Commission in New Zealand recommended that '*In the public interest and in the interests of patients there must be no impediment to full professional co-operation between chiropractors and medical practitioners.*' (109)

A 1997 study in the USA state of South Dakota found that 50.5% of chiropractic practitioners received 1 to 3 referrals per month from medical practitioners, with 2% receiving more than 6 referrals per month. (110) In a 1995 Health Ministry funded survey in the Netherlands it was found that 25 of 51 (49.02%) chiropractors received frequent medical referrals, and 11 of 51 (21.57%) received frequent referrals from physiotherapists. (111) Regular inter-professional referrals to chiropractors sought '*upon request*' from general medical practitioners in Queensland, Australia, are issued by 20% of GPs. (112) In New South Wales, 64.1% of GPs are prepared to refer patients to chiropractors or osteopaths '*at least a few times per year*'. (113)

In essence, there is evidence of gradual inter-professional collaboration together with a deeper understanding of the VSC, its role in vertebral articular neural pathophysiology, and of its contribution to patient quality of life. (25, pp-1, 138, 231, 258; 114, 115, 116)

## Case Summary

This paper discussed a clinical example of neural manifestation associated with mechanical spinal dysfunction, a VSC. This may be designated a vertebral subluxation syndrome. (VSS). (117) Such cases usually resolve relatively efficiently and uneventfully under chiropractic care.

The presented case depicts an example of differing inter-professional models of care. The presence of a VSC as an aetiology was apparently not considered in the early stages. This led to an unnecessary delay in the resolution of a patient's discomfort, and her regaining her quality of life, these are apart from such factors as costs and inconvenience. Such situations cannot be in the best interest of overall patient care.

The case also highlights the variables in diagnostic opinions confronting patients in their pursuit of recovery. This may lead to a confusing range of recommendations and treatments for patients, from which they must ultimately select. It must be accepted that chiropractic care is established as a needed and desired option for many patients as they seek an optimal quality of life.

This case highlights the need for greater awareness of specific vertebrogenic conditions. The submission of this case report is an attempt to explicate key issues relating to the desirability of inviting inter-professional co-operation and a greater understanding of the potential and limitations of some models of healthcare.

## Conclusion

Health practitioners must continue to be cognisant of accepting those patients best suited for their care, and refer those who are deemed more suitable for a more appropriate management.

In the interest of patients as the primary concern, the authors call for inter-professional co-operation and recognition of the role played by each registered health profession. Collaboration is evident in the areas of education, research, and conference presentations, but perhaps not so evident in clinical practice. Communication needs to be continued into day-to-day clinical practice. Acknowledgement is made to those objective individual medical practitioners who are patients of chiropractors, or who do refer patients when appropriate and are receptive to broader scientific thinking, a trend that is far more advanced in many countries.

The subtleties of segmental spinal function appear to have been critical in the case presented. Although the patient attended nine different practitioners, there was a significant delay of some six months in diagnosis and the commencement of appropriate care.

A call is made for greater awareness of the VSC and the potential resolving of its management through chiropractic care. This offers a conservative option for a range of conditions that can be further facilitated by greater inter-professional collaboration.

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