

Neurodynamics of vertebrogenic somatosensory activation and Autonomic Reflexes - a review:

Part 4 Vertebrogenicity

Peter Rome and John Waterhouse

Abstract: A discussion on the disturbance of articular physiology and its general identification is presented. The recognition of vertebrogenicity is essential to the manual professions of chiropractic, osteopathy and more recently, manipulative medicine and physiotherapy. The clinical appreciation of this clinical entity is supported in the literature.

Indexing terms: Vertebral subluxation; Neurophysiology; Somatosensory; Autonomic nervous system.

Introduction

A review of the aberrant disturbance of particular articulations is now recognised by various professions. In chiropractic it has been long designated as a subluxation, or vertebral subluxation when involving spinal segments.

As a focal, structural, and functional complex, a subluxation may be identified as an articular dysfunction, typically but not limited to the spine and pelvis, which is characterised by anatomical and neurophysiological signs and symptoms.

While the anatomical element is less than a dislocation (luxation), the dis-relationship is deemed sufficient to initiate somatosensory pathophysiological neural reflexes. (1) The clinical application of this complex is considered to be based on altered articular physiology or joint motion, which suggests that the somatic component has the capacity to alter neural physiology input, which may in turn impact upon the autonomic nervous system (ANS) and somatovisceral pathoneurophysiological reflexes.

Review

Hypotheses, research, and reviews regarding vertebrogenic visceral conditions together with empirical and anecdotal clinical evidence have been summarised in a number of sources involving the chiropractic, osteopathic and medical literature. Papers regarding the VSC

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hypotheses (2) have been offered by Bolton, (3, 4) Budgell, (5, 6) Henderson, (14) Haavik, (12) Sato (19) and others.(7, 8, 9, 10, 11, 13, 15, 16, 17, 18, 20,21, 22)

Generally, chiropractic consultations involve patient care of subluxations involving spinal segments. However, other articulations may also be presented for correction. Traditionally there are four primary elements of subluxations: (23, 24)

1. Neurophysiological dysfunction – particularly involving somatosensory activation and aberrant reflexes. These include somato-autonomic, somatosensory, somatosympathetic, somata-parasympathetic, and somatovisceral reflexes. For example, the articular disturbance may include referred pain such as sciatica, intercostal neuralgia or cervicogenic headaches.
2. Articular dysfunction – altered joint physiology – hypermobility, hypomobility, aberrant movement. Segmental fixation is a common example which may be determined on examination, palpation, and functional radiographic studies.
3. Altered juxtaposition of articular surfaces except in the case of a neutral fixation. Displacements are not always demonstrable radiologically depending on the degree of translation.
4. Alleviation of symptoms following adjustive intervention would suggest confirmatory empirical evidence.

The vertebral adjustment is defined here as:

The spinal adjustment is the advanced form of refined manual or instrument intervention directed to restoring joint and neural physiology of an articular subluxation and ameliorate associated signs and symptoms.

At times, the concept of the subluxation seems to be confined to only the somatic element of osseous displacement. An articulation on a dry skeleton could be viewed in such a limited light as purely an osseous displacement, without other ramifications. This is appreciably different when it is considered as a limited static and kinetic dis-relationship of articulations with neural ramifications. This somatic concept tends to overlook the integrated influence upon activated neural physiology within an SAV triad. In effect, it may be construed as a purely osseous disturbance, without consideration of the effect on joint mechanoreceptors or other sensory receptors in the surrounding holding elements. In addition, the sensory input to the ANS from surrounding vascular, neural and soft tissue elements, must also contribute to centralisation of the neural input. (25)

While subluxations are reported in the medical literature, they are often regarded as purely physical osseous displacements, without somatosensory or autonomic considerations. The omission of reference to neural involvement can be rather misleading. Seldom is there a differentiation as to a degree of subluxation, or the stage at which it may become a luxation or clinically significant. Cailliet devotes a whole chapter to subluxations in one of his texts – *'Subluxations of the cervical spine including the "whiplash" syndrome.'* He notes *'derangement of the opposing joint surfaces'* and also states that *'definite signs and symptoms may exist in the presence of "negative" X-rays.'* (26)

The 'displacement only' model appears to be based solely on localised cervical discomfort and radiological displacement criteria, as in *Grisel's Syndrome*. Aberrant dysfunction does not appear to be a common consideration, unless in acute or subacute instability under conventional care. As a dysfunction (hyper, hypo mobility or aberrant movement) an attitude of *if you can't see it, it doesn't exist* is unscientific and irrational. One cannot visually *'see'* a headache or myopia, but they are recognised as conditions. (27)

As a form of tacit recognition for this concept, the VSC has historically been identified under various terms in medical literature, as well as that of the other manipulative sciences. In adopting these terms, the professions have effectively recognised and clinically noted and published awareness of the physiological responses and potential effects attributed to vertebrogenic associations.

The reversal, removal or moderation by manipulative remediation of the contributing somatic element, may be seen as a direct way to potentially modify an aberrant subluxation-related somatovisceral reflex involving the ANS.

The Australian medical doctor Murtagh, has adopted the term *spinal dysfunction* for identifying this same lesion. That broad term may be seen as alluding to aberrant function but does not imply all the other factors of the vertebral complex. This nomenclature compares with one adopted by Seaman and Winterstein in 1997 when they nominated the term joint complex dysfunction. (11, 13, 16, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38)

In consideration of joint motion, the chapter titled *Pathophysiology and clinical aspects of the motor segments* by Schmorl and Junghanns (39) lists further subheadings examining pathophysiology of the articulations between the motor segments and the intervertebral foramina and inefficient motor segment (Intervertebral insufficiency). Given that normal joint motion is termed joint physiology, (40) the term pathophysiology of articulations is appropriate.

Schmorl and Junghanns essentially allude to intervertebral dysfunction (the equivalent of a chiropractic subluxation or VSC), and the ramifications associated with them. Their discussion on the effect of these additional stimuli and associated spondylogenic symptoms and syndromes, covers a wide range of Somatic Autonomic Visceral disorders that are too numerous to mention in this dissertation. Many of the cited references supporting these are in the German language, making accessibility problematic.

Further recognition of the VSC hypotheses is offered in the medical text by Schmorl and Junghanns as noted in the following extracts from their authoritative volume - *The Human Spine In Health And Disease* (39):

- ▶ *'Like any other joint, the motor segment may become locked.....As a result of recent experience, there is no doubt that the causes for such disturbances are located in the motor segment.'* (p 221-222)
- ▶ *'The motor segment can suffer in its entirety substantial injury without bone involvement. These are primarily subluxations ...'* (p 250)
- ▶ *'Slight traumatic functional disturbances...are almost always reversible.'* (p 251)
- ▶ *'Painful limitation of motion'* (p 251)
- ▶ *'Stiffening of the involved segment.'* (p 251)
- ▶ *'Articular locking is also possible in the spinal articulations.'* (p 376)
- ▶ *'Spondylogenic hypotonic functional disturbances in the intestinal tract.'* (p 219)
- ▶ *'Spondylogenic-vascular in origin.'* (p 219)
- ▶ *'Gynaecologic vertebral syndrome'* (p 219)
- ▶ *'Disturbances have been traced ...to an impairment of the autonomic nervous system frequently connected with spondylogenic symptoms ...'* (p 218)
- ▶ *'Various other relations exist between the sequelae of intervertebral instability and the autonomic nervous system that cause transmitted spondylogenic syndromes.'* (p 218)

Ralston differentiates a physiological subluxation from a pathological subluxation in the paediatric cervical spine, but it is suggested that a pathological subluxation would more likely be

deemed a luxation. He does however differentiate between a physiologic anterior subluxation and a pathologic subluxation. (41)

Maile and Siongo describe a fixation form of subluxation where vertebrae become '*fixed in a position normally achieved during rotation*' - dysfunction. However, they regard this as a '*rare disorder*'. On the other hand, chiropractors and manual therapists would find this to be a common presentation with segmental fixation within the readily recognised normal range of articular physiology. There is evidence to indicate that facet fixation leads to joint degeneration. This has the potential for further somatosensory noxious reflex activity. (11, 13, 16, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60)

From the 1950s, some medical doctors - particularly in Europe, began adopting the established chiropractic and osteopathic vertebrogenic concepts. This involvement has continued almost exclusively in Europe (See Part VI of this series, [European Medical Reports](#)). These reports provide an extract from a range of published medical papers involving the manual manipulative management of a range of somatovisceral conditions. There does not seem to be the same degree of interest in the English language medical publications. The geographical contradictions in the application of medical science with clinical outcomes involving spinal manipulation are noted but are hard to reconcile.

Conclusion

Evidence relating to the subluxation is contained in the literature. Much of that evidence is drawn from medical literature. As a manual/mechanical, restorative, procedures, the clinical outcomes are recorded largely as case reports are anecdotal

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Peter Rome

DC (ret), FICC

cadaps@bigpond.net.au

John D Waterhouse

DC, FACC

Private practice, Melbourne

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