AO: Atlas Only?

Introduction to Atlas Orthogonal Chiropractic Technique

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Upper cervical specific

Dan Murphy DC DABCO, wrote[1]:

> *Over the past 100 years, the practice of chiropractic has branched into dozens of specialty techniques. However, historically, for a third of this time, from the 1930s into the 1960s, the predominant practice of chiropractic involved primarily the upper cervical spine.*

As for the reasons why Upper Cervical has taken such a back seat to other techniques just as worthy of discipline is up for dispute. Possibly today, the logic and dynamic probing instigated by BJ Palmer tends to get lost in the ramblings of devotees who have elevated the man above the message. Or have promulgated the belief that many of his assertions, whilst worthy of research, indeed were not, by today's 'gold' standards. True, some of his messages may have been plainly wrong, like many of his contemporary medical counterparts who practiced archaic methods then labeled as health care. This has opened the way for more allopathically accepted methodologies like mobilisation and therapeutic manipulative techniques. These undoubtedly have a place, but are somewhat different from the theory and practice of adjusting the occipito-atlanto-axial joint area, which this article investigates. It was largely a paradigm more akin to the creation of health, rather than the treatment of disease, which nowadays seems passé.

Is it scientifically supported that atlas/C1 is the most influential area of the skeletal system, and most difficult to apply a specific corrective force to?

Clinically, for neck pain syndromes, chiropractic atlas adjustment works to good reliability[2], but when it comes to other diseases and syndromes the research was, until recent years, lacking. In the neuro-musculo-skeletal realm, pharmacology has limited efficacy, and that is largely why chiropractic and other physical therapies flourish, despite venomous opposition, as reported by authors like Eisenberg or Shekelle, and that which has gone on record in legal precedent.[3]

Introduction

Atlas Orthogonal Chiropractic Technique (AO) is a specialty technique because it focuses on adjusting the atlas vertebra and studying its relationship to human anatomy and health. It is based upon the pioneering work of Drs. BJ Palmer and, subsequently, Dr John Grostic.

It is a whole-body technique because it focuses on the atlas as a biomechanical and neurological "keystone" of body function, much like BJ Palmer did when he wrote:

> *WHY should three superior cervical vertebrae be so important that facts warrant our making statement that nothing done at any other place in human body is of value in restoration of health, except as it is done here*?[4]

Chiropractors have moved away from Palmer's notion that the upper cervical area "is cause of every dis-ease possible in the human race", but unfortunately we have also moved away from understanding upper cervical chiropractic. So much so that chiropractic teaching institutions exist totally without any upper cervical specific technique in their curriculum, perhaps in order to disengage from this early fundamentalism of treating "all dis-ease".

The AO program recognises the need to work with other healing arts and also with other chiropractors, and in conjunction with other technique or secondary systems if the chiropractor wishes. Referral is given without delay in the event that the patient worsens or does not achieve symptomatic improvement within a reasonable amount of visits.

History

In 1909 BJ Palmer introduced *spinography* at the Palmer School in Davenport, Iowa. To this day, upper cervical specific chiropractors deem that this is the best tool for accuracy in assessing vectors of adjustment. Reproducible, reliable and within acceptable error, based on clinical results and research (see Table one).

John F. Grostic consulted a chiropractor for a condition that did not respond to orthodox medical approaches, and with the success of such, graduated as a chiropractor in 1933. He modified Palmer's enlightened approach ("hole in one") to incorporate a more quantifiable listing of vectors.

Dr Roy Sweat, the developer of AO, was born June 25, 1927 in Albany Georgia. After leaving the military in 1946 he entered Palmer College of Chiropractic in Davenport Iowa in January of 1947 and completed the four year course of study and graduated in January of 1950.

In 1952 Dr. Sweat began a course of study specialising in the upper cervical occipital-atlanto-axial complex under Dr. John F. Grostic in Ann Arbor, Michigan. In 1960 Dr. Grostic chose Dr. Sweat to become an instructor at his seminars. Dr. Grostic died in 1964, at which time Dr. Sweat and four other doctors organized the Grostic Presentation Seminars and continued the specialised training seminars in Atlanta Georgia.

In 1981 Dr. Sweat created the program of Chiropractic Atlas Orthogonality, which continued in the specialized educational seminars. The AO program is taught as an elective course at Sherman Chiropractic College and at Palmer College, and as a post-graduate course at Life Chiropractic College. He is an associate professor of Life Chiropractic College in Marietta, Georgia and is involved with their research program.

Dr. Sweat received the Daniel David Palmer Scientific Award on June 9, 1995 from Palmer College. He has recognised the need for specialties within chiropractic practice and for doctors of chiropractic to refer within these specialties.

He has stated that the first generation of chiropractors *discovered* the principles of the profession, the second generation proved it was worth discovering via clinical successes, because "it works and that what counts", and the third (we in practice today) must demonstrate *why* it works. Further, we must not leave it to the medical profession explain the "why" to us. Research is the key. It would also be nice to know the *when* in the equation.

Instrument adjusting

Eugene T. Patronis, Jr., Ph.D., professor at the School of Physics, Georgia Institute of Technology describes the operation of the Atlas Orthogonal Adjusting Instrument as follows:

> *"A mechanical impulse is imparted to the metal stylus by means of a spring loaded plunger. The strength of this impulse is determined by the initial degree of compression given to the plunger spring. The impulse imparted to the stylus by the plunger excites a compressional wave in the stylus. The velocity of this wave in the stylus material is determined by the square root of the ratio of the Young's modulus to the density of the stylus material. At the patient-stylus interface, dependent on the impedance match, a portion of this wave energy is transmitted into the patient and a portion is reflected back to the plunger."*[5]

Dr Sweat adjusted the atlas for 25 years by hand and in 1970 designed a chiropractic adjusting instrument and has made a series of six different models.

He comments that because he has eliminated the aspect of manual adjusting skills, a new graduate can deliver an adjustive thrust with equal quantity and quality.

He has designed an atlas orthogonal x-ray frame, x-ray chair and attachments for the x-ray machine, and even a computerized x-ray analysis program.

Knowledge of the upper cervical spine begs specific questions of Occiput to Axis:

1. Why do we use so much rotation for a rotary break adjustment of Occ-C1 when standard ranges of motion are only around 5º?
2. What is the co-efficient of friction in the joint complex and how much force is require to "move" it?
3. How do you move, adjust or manipulate a joint complex with such a complexity of arcs, concavities and neuro-muscular stabilisers?

Anatomical knowledge is the key, taught from a chiropractic perspective, and that is what is done in the AO programs. BJ Palmer wrote of the value of knowing the normal osteology in understanding why this area is so important:

One difficulty we have found in instructing on this question, even amongst Chiropractors who are supposed to know spinal columns better than other distinctively separate types of students, is that they do not sufficiently know their NORMAL osteology.

Table One: research into x ray line analysis reliability

Scientific study	Conclusions or comments
Grostic & DeBoer. Roentgenographic measurement of Atlas laterality and rotation: A retrospective pre- and post-manipulation study. JMPT 5(2) June 1982	"Under the circumstances presented in this retrospective study, these data tend to show that spinal manipulative therapy altered the position of the atlas in the postulated direction"
Aldis & Hill. Analysis of a chiropractor's data. J and Proc, Royal Soc., NSW. 112:93-99, 1979	Mathematicians statistically analyzed data obtained from an upper cervical chiropractor. Pre- and post-adjustment studies showed significant changes in both laterality and rotation.
Rochester RP. Inter- and Intra-Examiner reliability of the Upper cervical x ray marking system: A third and expanded look. Chir Res J 1994: Vol 3(1)23-31	This study concluded that all aspects of the upper cervical marking procedures are reliable.
Owens EF. Line drawing analyses of static cervical x ray used in chiropractic. JMPT 1992; 15(7);442-9.	"reliability studies exist showing that inter- and intra-examiner reliability are sufficient to measure lateral and rotational displacements of C1 to within + or - 1 degree"
Jackson BL, et al. Inter- and Intra-Examiner reliability of the Upper cervical x ray marking system: A second look. JMPT 1987	"Examination of the data suggest that the reliability (stability over time) for the practitioners is very good. The data on reliability (equivalence over experts) across the practitioners also suggests reliability is very good"
Harrison DE. Repeatability Over Time of Posture, Radiograph Positioning, and Radiograph Line Drawing; An analysis of six Control Groups. JMPT, 2003; 26(2):87-98.	Conclusions were that Posture is stable over time; radiographic positioning is repeatable; and the CBP radiographic line drawing is reliable. CBP, like upper cervical , do line vector/alignment analyses on x rays.

Leg Length Inequality

Travell wrote “A discrepancy of 0.5cm, can perpetuate myofascial trigger points”. The AO doctor uses a supine leg length check as a pre and post-adjustment measure. Many

authors have studied the phenomenon of unequal leg length, and proposed that it can perpetuate myofascial trigger points[6], create scoliosis syndromes[7] and low back pain.

Agreement on whether there is a discrepancy in length has also been good in numerous significant studies on prone leg checking.[8 9]

Leg length changes after adjustment can be explained as a change in mechanoreceptor firing altering input to the cerebello-thalamo-cortical pathway, inhibiting cotical-ponto-medullary inhibition of the muscles of posture and segmental motion via the alpha-motor neuron on the descending medial longitudinal fasciculus (vestibulospinal tract). Simply put: If subluxation is present, the tone of postural muscles will increase unilaterally. This may cause leg length inequality, and responses to changes in mechanoreceptor stimulation may also occur via local stress or pressure challenges.

We would of course be excited to know that a branch from the cortical pontine medullary tract is also sent to the hypothalamus which, via the descending reticular formation and intermediolateral (IML) columns, can affect vasoconstriction and immune function[10] (IML is visceral efferent, synapsing in lamina VII).

Scanning Palpation: Palpable nerve facilitation
The AO protocol makes major use of palpatory skills in detecting full spine, particularly suboccipital, pain point tenderness, myofascial trigger points and hypertonicity. Pain point tenderness has exhibited acceptable inter-examiner reliability. The course of the first two spinal nerves runs dorsally to the intervertebral joints while all others leave the intervertebral foramina in front of the articular processes. (Note: this is not motion palpation.)

The AO practitioner contacts the soft tissue overlying the approximate points of exit of the left and right C1 and C2 spinal nerves, and assesses tissue compliance, inflammation and point tenderness. The four points are then rated from 0-3, with 3 being severe and eliciting a "jump sign" from the patient. This, in conjunction with the leg check, x ray listings, clinical data and history indicate the need for adjustment.

How can chiropractors explain clinical results from adjusting the atlas?
The Occipital-Atlanto-Axial joint has been described as the most complex in the axial skeleton[11]. The mechanism of how any type of adjustment can specifically "move" the atlas, and why it affects such diverse clinical conditions is controversial. We can, however, postulate credible hypotheses, based on widely accepted facts and theories, explaining the clinical outcomes after adjustment of the upper cervical spine. Some theories follow:

Vestibular: The cervical spine is a rich reservoir of proprioceptive vestibular input. Dysfunction of spinal segments in this area are likely to affect vestibular function, which in turn, may affect visceral function. Research[12] on rabbits suggests vestibular projections to the areas of the autonomic nervous system known as the nucleus tractus solitarius and the dorsal motor nucleus of the vagus nerve. Studies on rats show that upper cervical

proprioceptors make direct connection to portions of the vestibular complex, and stimulation or inhibition may result in vertigo or nystagmus[13]. Through the above, relationship may be postulated between postural controls, somatic mechanoreceptors, visual reflexes, and visceral autonomics.

Periaqueductal Grey: Cervical spine connections to the periaqueductal grey (PAG) have been observed in animal research. The PAG plays an important role in analgesia as well as in motor activities, such as vocalization, cardiovascular changes, and movements of the neck, back, and hind limbs. The strongest PAG-spinal connections have been observed to exist to the upper cervical cord[14]. The upper cervical connections terminate in laminae V, VII, and VIII, containing pre-motor interneurons of the neck muscles.

Mechanoreceptor function: Mendel[15] and McLain[16] stated the purpose of the mechanoreceptors in the intervertebral disc and facet joint capsular ligaments is to tell the central nervous system about changes in spinal alignment and position. Thus it can be understood that this afferent receptor input plays a vital role in posture.

Posture: If cervical spine dysfunction can affect vestibular function, then postural influences may relay to the autonomic nervous system. For example, a paper observing the phenomenon of sweating suggests "...that the autonomic nervous system is controlled at least in part, by body posture."[17]

Dural connections: Hack *et al*,[18] concluded after 11 dissections of human cadavers that there is a physical attachment between the rectus capitis posterior minor muscle and the dura mater of the spinal cord.

Brain Stem connections and Cervicogenic Headache: The trigeminal cervical nucleus can extend down to C4. Studies injecting noxious chemicals into the upper neck musculature showed that there was subsequent contracture of muscles of the TMJ. There may also be headache. Nilsson[19] also stated that the prevalence of cervicogenic headache in random population sample "...appears to be a relatively common form of headache, similar to migraine in prevalence." What is hypothesized is a confusion of the sensory information to the thalamus, causing cortical firing to the head area of the homunculus, by a disturbance of upper cervical afferentation, involving the trigeminal pathways. Bogduk[20] wrote that cervicogenic headache can arise from abnormalities in normal joint end-play, and abnormalities of position found on radiographs. He clearly states:

> The neuroanatomical basis for cervicogenic headache is convergence in the trigeminocervical nucleus between nociceptive afferents from the field of the trigeminal nerve and the receptive fields of the first three cervical nerves. Structures innervated by C1-3 have been shown to be capable of causing headache...

Evidently, there is renewed interest in upper cervical today. My personal experience and enquiries from around Australia and the world[21], patient groups illuminating their own experience through the power of the World Wide Web[22], medical books endorsing it at

risk of being criticised by the establishment[23] [24], and excellent compendia of research for chiropractors and clinicians[25] paint the way for an interesting future.

Summary: Why is the upper cervical area so important to health?

1. It is the most complex area of articulation in the body.
2. There is communication between this area and the vestibular system directly
3. There may be direct muscular connection between this area and the spinal cord (dura)
4. There is direct input to the Thalamus from levels above C3.
5. There is mechanoreceptor input to the thalamus from the entire body. However, the number of these receptors being far greater in the upper cervical area, coupled with an absence of synapses that potentially modify representation in the neuraxis, makes the upper cervical area unique and highly influential.
6. Input into the periaqueductal grey area from the cervical spine has a role in various activities including pain regulation.

The Upper Cervical programs, like most chiropractic techniques, are largely ignored by the majority of mainstream medical peer-reviewed literature, usually accompanied by chants of lacking research. Though true, they are also backed by a century of results and discerning consumer choice, which, we hope is influencing the current younger generations. Atlas Orthogonal, and other upper cervical programs, are also re-emerging in popularity, based upon the demand experienced by this author largely through the internet experience (see appendix one).

Appendix One: Short list of upper cervical web sites relevant to this article.

1. www.atlasorthogonal.com.au
2. www.upcspine.com
3. www.atlasorthogonality.com
4. www.atlasorthogonal.info

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