ORIGINAL RESEARCH

Health Outcomes Following Cervical Specific Protocol in 300 Patients with Meniere's Followed Over Six Years

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ABSTRACT

Objective: Multiple factors and several common triggers contribute to Meniere's disease (MD), but the hypothesis of this study is related to one cause: an upper cervical subluxation complex (UCSC), the result of whiplash trauma, caused by vehicular accident or blow to head.

Methods: UCSC pattern was established utilizing Tytron thermography, Thompson cervical syndrome and modified Prill leg length inequality tests, determining when and where to adjust. Upper cervical adjustment listings were obtained by Blair x-ray analysis. Ninety percent of patients had atlas listings of posterior and inferior on the opposite side of the involved ear. When patients were in pattern, Palmer toggle recoil and/or Pierce Results knife-edge adjustments were performed.

Results: Vertigo intensity rated by 300 patients on a scale of 0 to 10, with 10 being the worst imaginable. Prior to treatment mean score was 8.5, six weeks post treatment average was down to 3.0, after one year 2.0, two years 1.4, three years 0.9, four, five and six years 0.8, an improvement of over 90%. Ninety seven percent claimed a dramatic improvement in vertigo. Three percent had side effect of headache.

Conclusion: Patients with a history of both vertigo and trauma should be referred to an upper cervical specific chiropractor for examination.

Key Words: *Meniere's disease (syndrome), vertigo, Eustachian tube dysfunction, upper cervical subluxation complex, whiplash*

Introduction

History

Prosper Meniere, Chief of Medicine at the Imperial Institute for Deaf Mutes in Paris France, reported the gross pathological findings in a young girl suffering from vertigo, tinnitus, and deafness in a paper read in 1861. He pointed out that episodic vertigo usually had a benign course and the treatments typically used, including bleeding, leeching, cupping and purging, could be more harmful than the disease itself. Ironically, due to the fact that the central patient Meniere described in his papers died from her disease, it is no longer believed that she suffered from Meniere's disease (MD). Morbidity is not an outcome of MD.[1] In 1938, Hallpike and Cairns in London, and Yamakawa in Japan independently described the pathological finding of endolymphatic hydrops in the temporal bones of patients with MD at autopsy. In 1926 Georges Portmann carried out the first physiological operation for MD. The operation, endolymphatic sac decompression performed with hammer and gouge, was successful.[2]

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Parameters

In addition to the three hundred consecutive patients followed from six to fourteen years at the Meniere's Research Institute (the MRI), over three thousand peer reviewed papers were reviewed. Written verification of Meniere's disease from an otolaryngologist was required for inclusion in this study. The first three patient questionnaires were filled out in the office; the last five were mailed out. If a patient's symptoms became bilateral during the study, the originally involved ear was used statistically. When a patient dropped out of the study, the next consecutive patient was added.

Symptoms

The vertigo patient perceives either that the world is spinning around them or that they themselves are spinning. With many other disabilities, some portion of a normal life can be continued. Vertigo disrupts virtually every aspect of life, since the patient loses the ability to do anything normally, especially when movement is involved. In addition to the obvious hazard of falling, moving around is hampered by the fact that even small head movements often make the spinning sensation worse. The resulting nausea, sweating and vomiting combine to make the patient subjectively very ill. Vertigo is to dizziness what migraine is to headache.

Diagnosis

A differential diagnosis of Meniere's disease is a subjective diagnosis of exclusion. When all other possible diseases with the same symptoms are excluded, the condition is called Meniere's disease. MD is sometimes referred to as Meniere's syndrome. A syndrome is a collection of symptoms. According to the Prosper Meniere Society a diagnosis of Meniere's disease requires at least two spontaneous episodes of vertigo, each lasting 20 minutes or longer, hearing loss verified by a hearing test on at least one occasion, tinnitus or aural fullness and exclusion of other known causes of these sensory problems.[3]

The Merck Manual states that the cause of Meniere's disease is unknown and the pathology is poorly understood. Based upon the authors research, "…trauma to the head," was added as a risk factor.[4] Although the underlying etiology of MD is unknown, it appears that fluid build up in the endolymphatic space, caused either by over production or reduced absorption, exposes hair cells responsible for sensing movement and balance to progressive damage and paralysis. However, recent studies have demonstrated that not all Meniere's patients have endolymphatic hydrops, and that many patients with hydrops do not suffer from Meniere's disease.[5] Previously, a diagnosis of certain Meniere's could only be proven upon autopsy, which was rarely performed. Intratympanic delivery of gadolinium selectively enhances perilymph, delineating it from endolymph utilizing newer scanners with greater magnetic strength and improved image sequencing have made ultrastructural detail achievable.[6] Interestingly, most patients with unilateral MD were found to have bilateral idiopathic lymphatic hydrops with this new imaging technique.

In the first stage of MD the hearing loss affects only the low tones (bass) when the levels of endolymph are high in the cochlea. The hearing returns to normal after an attack of dizziness. In the second stage the hearing continues to fluctuate but it never returns to its normal levels. Over a period of days or even several times in a single day, the hearing may have different degrees of acuity. In the third stage (burn out) the hearing is very impaired and distorted but more stable. It may still fluctuate slightly but with a more linear pattern, with the tinnitus and recruitment remaining very troublesome.[7] In patients who chose not to undergo surgical treatments, it was found that over 71% of these patients reported complete control of vertigo after 8 years. Thus, it is true that for some patients the attacks of vertigo will subside with time. The term burn-out is appropriate as this reduction in vertigo is not due to a recovery of the balance system. Rather it is because the balance portion of the inner ear becomes irreversibly damaged, so that it no longer functions. This natural time course of events makes the evaluation of clinical treatments extremely difficult. The estimated benefit of any given procedure or treatment must take into account the likely decline of vertigo with time. The above data are average figures and there is considerable variation from patient to patient. Some patients may continue to have vertigo attacks for 20 years or more.[8]

The percentage of cases that become bilateral varies greatly in the literature, from less than ten to more than sixty percent, averaging about thirty percent. The average time interval for conversion from unilateral to bilateral Meniere's was 7.6 years. Patients should be counseled regarding this potential when interventions are considered, especially with respect to ablative treatments.[9]

Histopathology

New theories center on the fact that Meniere's disease may not have a single cause but may well be a common endpoint of a variety of anatomic (structural) or physiologic (functional) variables, including ischemic or even autoimmune injuries. A theme in reports on etiology and pathology of Meniere's disease is an increase in immunoglobulins both in the endolymphatic fluid and in serum. This would suggest an underlying infection, possibly viral, or autoimmune component with this condition.[10] Although the herpes virus is often found in MD patients, it is no longer considered a cause.[11] Finally, a team of researchers at the University of Virginia reported in 2002 that the vestibular nerve cells in patients with unilateral Meniere's disease are demyelinated.[12]

Cerebrospinal fluid

The fluid spaces of the inner ear are connected to the cerebrospinal fluid (CSF) by a small duct called the cochlear aqueduct. In most humans, this duct is believed to be patent, so that pressure changes of the CSF are transmitted directly to the ear. It has been reported that low CSF pressure is associated with glaucoma and endolymphatic hydrops.[13]

Medical treatment

Physicians may initially suggest a reduced salt level diet, in the range of 1400 mg/day, to see if symptoms can be alleviated. Steroids**,** such as dexamethasone, also may help control vertigo attacks in some people. This procedure can

also be performed with local anesthesia applied by your doctor. Although dexamethasone may be slightly less effective than gentamicin, dexamethasone is not likely to cause further hearing loss. The effectiveness of steroids can also be tried orally. If vertigo attacks associated with Meniere's disease are severe and debilitating and other treatments don't help, surgery may be an option.

Surgical treatment

The endolymphatic sac plays a role in regulating inner ear fluid levels. These surgical procedures may alleviate vertigo by decreasing fluid production or increasing fluid absorption. In endolymphatic sac decompression, a small portion of bone is removed from over the endolymphatic sac. In some cases, this procedure is coupled with the placement of a shunt, a tube that drains excess fluid from your inner ear. In a previously published double blind, placebo controlled study, the efficacy of an endolymphatic sac-mastoid shunt was compared with a purely placebo operation (mastoidectomy) in controlling the symptoms in 30 patients with typical Meniere's disease.[14] The results were the same. Vestibular nerve section involves cutting the nerve that connects balance and movement sensors in your inner ear to the brain. With a Labyrinthectomy the surgeon removes a portion the inner ear, thereby removing both balance and hearing function from the affected ear. This procedure is performed only if you already have near-total hearing loss in your affected ear.

Chiropractic approach

The Meniere's Research Institute has established a link between whiplash (vehicular accident or fall to the head) and Meniere's disease. The mean average from the time of the trauma to the onset of symptoms is fifteen years.[15] (Fig. 1) Insertion of a middle-ear ventilation tube can temporarily alleviate Meniere's symptoms, suggesting Eustachian tube dysfunction (ETD) is a contributing feature. Clinical practice also shows that treating disorders of the upper and lower cervical spine and temporomandibular joints can lessen Meniere's disease symptoms. Similarly, stellate ganglion blocks can be beneficial in controlling Meniere's disease symptoms, highlighting the influence of the autonomic nervous system. In this reflex pathway, irritation of facet joints can first lead to an activated anterior cervical sympathetic system in the mediolateral cell column; simultaneously leading to an axon reflex involving nociceptive neurons, resulting in neurogenic inflammation and the prospect of ETD.[16]

Methods

History

Harvey Lillard immediately became profoundly deaf while exerting himself in a cramped, stooping position. Seventeen years later, in 1895, magnetic healer D.D. Palmer racked the second cervical vertebra, axis, into position by using the spinous process as a lever, performing the first chiropractic adjustment. Soon the man could hear as before.[17] D.D.'s son, B.J. Palmer, presented the hole-in-one (HIO) upper cervical technique to the profession during Palmer School of Chiropractic's Lyceum in 1931.[18] He believed that the neurological component of the subluxation resulted from pressure or tension applied to the spinal cord and its meninges, creating an increased amount of heat. He started analyzing spinal x-rays in 1908 and differences in bilateral paraspinal temperatures in 1924. To locate the level of the subluxation he developed the electroencephaloneuromentimpograph.[19,20]

Pattern work as developed by B.J.'s clinic director, Lyle Sherman, was used to help determine when and where to adjust the cervical spine.[21] In this study of three hundred Meniere's patients, thermographs of the cervical spine were recorded using a Tytron C-300 instrument. (Fig. 2) In each case a detailed case history was taken on the first visit, followed by a spinal examination. A report of findings was given, recommending a minimum set of three cervical x-rays when evidence of an upper cervical subluxation was discovered in each patient. X-ray analysis of the upper cervical vertebrae based on the work of William Blair was used to determine chiropractic listings of subluxation.[22] Lateral cervical, A-P open mouth and nasium x-rays were taken. Lateral films were analyzed to determine evidence of whiplash injuries. Posterior atlas listings, along with the lack of normal cervical curve, were considered evidence of a history of neck trauma in this study. The A-P open mouth view was used to study lateral deviations of the neural rings, which may cause neurological irritation. With the nasium x-rays the antero-lateral margins of each of the articulations were classified as being either juxtaposed, overlapped, or underlapped. Overlapping is synonymous with anterior and superior atlas listings with laterality of the side of the overlap, underlapping indicates posterior and inferior C1 listings on the opposite side of the underlap. These appositional judgments of each articulation may then be combined to deduce the actual unilateral or ambilateral misalignment pathways of atlas in relation to occiput, and an anatomically accurate misalignment listing and adjustive formula may thus be derived.[23] There are only four atlas listings under this system; anterior and superior on either the right or left, or posterior and inferior on either the right or left. Using the anterior tubercle of atlas as the reference point, considering the rocker configuration of the atlanto-occipital articulation, if atlas moves posterior then it must also move inferior.[24]

Leg length inequality checks were performed on each patient visit, utilizing the work of Clay Thompson, DC, Ruth Jackson, MD and Clarence Prill, DC.[25-27] Thompson popularized the cervical syndrome check for the upper cervical subluxation complex in the 1940's. Since then, no one has come up with a reason relative leg length would change when a patient gently turns their head from side to side, while either prone or supine, thus not under the effects of gravity, except upper cervical subluxation.[28]

Thompson cervical syndrome test: hold patient's shoes with thumbs under the heel, while applying very mild cephalic pressure. Lift the legs one inch off from the table, keeping the shoes one inch apart. Compare the welts to estimate the leg length differential. Notate differential of short leg to closest 1/8 inch. Instruct patient to slowly turn their head to the right, then to the left. If the legs change length only while turning to the right, notate the amount of change as a right cervical syndrome (RCS). If the legs change length only while turning to the left, notate the amount of change as a left cervical

syndrome (LCS). If the leg length changes while turning the head in both directions, notate the total amount of change as a bilateral cervical syndrome (BLCS). If there is no change in leg length when the head is turned, there is no cervical syndrome. Positive cervical syndrome tests were considered to be the strongest evidence of the presence of an upper cervical subluxation complex in this study.

A conservative approach in determining evidence of subluxation was used. That is, when in doubt, no adjustment was given. The leg checks were the main criterion used to decide when to adjust or not. To help determine whether the major subluxation was at the level of atlas or axis, Prill modified leg length tests were utilized.[29] With patient prone, patient was instructed to gently and steadily raise their feet toward the ceiling, while the doctor resisted such movement with his hands. The peripheral nerves were being tested, those that innervate the postural muscles holding one upright in gravity, so it was imperative that the patient only lift their legs slightly and maintain this pressure for at least two seconds. This test was for atlas, the top cervical vertebra. The occiput "rocks" on atlas during flexion and extension. Instructing patients to rotate their feet while the doctor provided resistance and checking relative leg length was used to test axis. This corresponds to the rotation of the head on the neck, 50% of which occurs at the level of C2.

When it was determined that the patient was in a pattern of atlas subluxation, a toggle recoil adjustment was performed, with the patient in a side-posture position, or a Pierce technique[30] adjustment was performed with the patient prone. Side posture was used when laterality was the main component of the subluxation. The term used for this type of misalignment is translation, and most often occurs with a side impact trauma, for instance, a "T-bone" type of automobile accident. When posteriority was the major component of the subluxation, the prone position was favored. This misalignment usually is the result of the typical "rear ended" type of vehicular accident. (Figs. 3,4)

A Thuli chiropractic table, using the cervical drop piece was utilized. For side posture adjustments the headpiece was set to drop straight down, and with prone adjustments, it was set to drop down and forward. The patient was then rested for fifteen minutes and rechecked, to make sure that the pattern had been broken. Then all tests were repeated.

The need for a new technique came from observations made in practice by Dr. Burcon. He found that x-rays forwarded from full spine chiropractors rarely captured the atlanto-occipital articulations; therefore, no atlas subluxation listing could be derived. Medical films were usually taken with the patient supine, outside of the effects of gravity. Furthermore, most upper cervical specific chiropractors assumed that unbalanced legs always indicated an upper cervical subluxation. Most upper cervical techniques assume that a good upper cervical adjustment will work its way down to the sacrum, correcting misalignments along the way. Burcon believes that this is possible, but often unrealistic when there is a significant kink between two vertebrae in between the two ends of the spine. For instance, many whiplash patients have a significant kink in the area of C5. Burcon found that these patients failed to hold their upper cervical adjustments until a lower cervical adjustment was performed.

Results

Vertigo averaged 8.5 before cervical specific chiropractic adjustments. Most patients reported an inability to function, i.e., drive, work or socialize, at a rating of 5 or above. After six weeks it lowered to a mean of 3.0, after one year it was down to a mean of 2.0, after two years it was down to 1.4, three years 0.9 four years 0.8, holding at 0.8 after five and six years. (Fig. 5) Many patients noticed an improvement before they left the office after their first adjustment. The longest it took for a patient to report a noticeable improvement was fourteen weeks. The only negative side effect noted was an increase in the frequency and magnitude of headaches in nine patients. For them headaches increased an average of 2.3 to 5.7.

The improvements in these patients made a significant difference for 291 out of 300 patients, affecting whether or not they could work, drive and/or have a positive relationship with their spouse. They might get dizzy, but would not have vertigo. They might get nauseaous but would no longer vomit. For those that still had attacks, they occurred less often, lasted for a shorter duration and were not as intense. Recovery time was also significantly shorter.

All 300 patients showed evidence of upper cervical subluxation upon neurological examination, and all exhibited both evidence of a history of whiplash and an existing atlas subluxation in radiographs. Two hundred seventy out of 300 patients had posterior and inferior atlas listings, with atlas laterality on the opposite side of the involved ear, causing a subluxation on the involved side. (Fig. 6) It took an average of fifteen years from the time of the head/neck trauma until the onset of Meniere's type symptoms.

Discussion

Meniere's disease not only includes the symptom complex consisting of attacks of vertigo, low-frequency hearing loss, aural fullness and tinnitus but comprises symptoms related to the Eustachian tube, the upper cervical spine, the temporomandibular joints and the autonomic nervous system.[31] The MRI whiplash as the cause of MD hypothesis has been presented to over two thousand ear, nose and throat surgeons and over one thousand chiropractors on four continents.[32-40] It provides a theory including the following six neurological and structural irritations:

1. Inflammation of the subluxated Atlanto Occipital articulation with edema putting pressure on adjacent structures, i.e., the Eustachian tube. (Fig. 7)
2. Traction of Cranial nerves VII through XII, also Jacobson's and Arnold's nerves.
3. Torque of the Trigeminocervical nucleus and tract causing Eustachian tube dysfunction.
4. Irritation of the sympathetic nerves can elicit spasms within the vertebral artery, leading to a decrease in blood flow to the brainstem.[41]

5. Chronic CSF backjets into the fourth ventricle due to obstruction of outflow through the foramen magnum may affect the flocculonodular lobe of the cerebellum resulting in nystagmus, vertigo and balance disorders.
6. The endolymphatic sac performs absorptive and secretory, as well as phagocytic and immunodefensive, functions. It is innervated by the superior cervical ganglion, which is located laterally adjacent to C2, axis. If irritated by an upper cervical subluxation complex it can send amplified sympathetic signals to the sac.

Inflammation

Ninety percent of neck disorders are caused by trauma. Of these 85% are caused by motor vehicle collisions. There is a relationship between whiplash, the cervical syndrome, cervical nerve root irritation, the sympathetic nervous system and headaches, including migraines.[42] MD patients are five times more likely to have migraines than the general population. The cervical nerve roots are more vulnerable to pressure of irritation from ruptured discs, hemorrhage, inflammatory process of the capsules, spurs, and abnormal motion of the joints due to relaxation or tearing of the capsular and ligamentous structures. Healing of sprained ligamentous structures takes place by the formation of scar tissue, which is less elastic and less functional than normal ligamentous tissue. Therefore, sprains result in some degree of permanent injury.[43]

Following whiplash trauma, as time passes there is an increased probability of abnormal motion or subluxations. The resulting lesion can create chronic inflammation leading to post traumatic fibrosis and adhesions. (Fig. 8) This irritation will cause spasms of the associated cervical spinal muscles, which in turn irritates the superior sympathetic ganglia and/or postganglionic sympathetic fibers. Additionally, if not properly treated, the lesion will cause ischemia leading to chronicity of symptoms possibly including cervicalgia, hand numbness, high blood pressure,[44] vision problems, dizziness, nausea, headache and deafness. Swelling, stiffness and calcification lead to compression of the delicate nerve tissues associated with the spinal cord and sympathetic nerve pathways and ganglion. The Occipital-Atlanto-Axial Complex is a diarthrodial-synovial joint, a freely movable joint. As the head leaves vertical and moves horizontally, there is a compensatory shifting of the vertebral spine to maintain a center of gravity that is continued all the way through the entire spine. Upper cervical specific chiropractors are always trying to make the head vertical, the atlas horizontal and the cervical spine vertical. Prolonged head tilt can make you dizzy. The brainstem expects the eyes and ears to be level to the horizon.

Traction

Although the dentate ligaments serve a protective role for the central nervous system during normal spinal movement, particularly the second pair, during abnormal movement of the cervical vertebrae, i.e., cervical articular dysfunction causing uncoupled subluxation, they are capable of transmitting pathological forces to the spinal cord and brainstem. John D. Grostic's "Dentate ligament-cord distortion hypothesis," provides a theory for how these tractional forces can lead to spinal cord "embarrassment" in the presence of upper cervical misalignment.[45]

Biomechanical ranges of motion in the OA (occipital-atlanto) joint are primarily flexion and extension. There is minimal lateral flexion and side bending in a coronal plane, with relatively little or no rotation. Atlanto-axial (C1-2) joint range of motion is generally considered to be rotatory motion. In the absence of whiplash trauma, the upper cervicals tend to subluxate anteriorly and superiorly, creating lesions by impinging nerves. Non-specific chiropractors tend to adjust on the symptomatic side, often exacerbating Meniere's patients' symptoms.

Trigeminal torqueing

The tensor veli palatini is a broad, thin muscle that is innervated by the medial pterygoid nerve, a branch of mandibular nerve, the third branch of the Trigeminal nerve (CN V). Equalization of air pressure in the tympanic cavity is essential for preventing damage to the tympanic membrane and a resulting loss of hearing acuity. The auditory tube is normally closed at its pharyngeal end. The major sensory divisions of the trigeminal nerve carry primarily light touch, pain, and temperature pathways to the thalamus by way of the tract of trigeminal cervical nucleus. There is a significant relationship between sensation and dysfunction in the face and head region, and their relationship to craniovertebral region dysfunction and hence referred pain in either direction.[46]

Reduced blood flow

Vertebral artery blood flow may also be altered, leading to brain blood flow patterns and tissue compromise.[47] Irritation of sympathetic nerves can elicit spasms within the vertebral artery, leading to decrease in blood flow to the brain stem.[48] The vertebral arteries reach the interior of the skull by ascending through the transverse foramina of the cervical vertebrae, turning medially along the upper surface of the posterior arch of atlas and then penetrating the posterior atlanto-occipital membrane and the underlying dura to enter the subarachnoid space. Subluxation of the atlas may diminish blood flow through the vertebral arteries and their intracranial branches that supply the spinal cord, CN VIII, medulla, cerebellum and inner ear via the labyrinthine artery.

The dentate ligaments are strong enough to distort the spinal cord and fold its peripheral blood vessels.[49] These ligaments may increase in strength and size after subjection to a long period of abnormal stress. Collapse of the small veins of the cord produces venous congestion resulting in nerves that are more excitable, hence more susceptible to neurological dysfunction.[50] Guyton states that the most important proprioceptive information for maintenance of equilibrium is derived from joint receptors in the neck.

The role of the vertebral veins, also known as the vertebral venous plexus (VVP), can cause chronic craniocervical venous backpressure and subsequent neurodegenerative conditions and diseases such as multiple sclerosis. It can lead

to chronic venous backups and edema in the brain, also affecting cerebrospinal fluid pressure gradients and subsequent flow and volume. Correct CSF volume is essential to brain cushioning, protection and support. It may play a role in normal pressure hydrocephalus, which has been associated with Parkinson and Alzheimer's disease.

The vertebral-basilar arterial supply to the brain and its likely role in chronic ischemia which, like chronic edema from backed up veins is one of the main suspects in demyelination and other neurodegenerative conditions and subsequent diseases. The tight neurovascular tunnels the VVP and vertebral-basilar arteries must pass through in the upper cervical spine and foramen magnum in the base of the skull on its way to the motherboard of the brain, the brainstem.

"Insertion of a middle-ear ventilation tube can temporarily alleviate Meniere's symptoms, suggesting Eustachian tube dysfunction (ETD) is a contributing feature. Clinical practice also shows that treating disorders of the upper and lower cervical spine and temporomandibular joints[51] can lessen Meniere's disease symptoms. Similarly, stellate ganglion blocks can be beneficial in controlling Ménière's disease symptoms, highlighting the influence of the autonomic nervous system. In this hypothetical reflex pathway, irritation of facet joints can first lead to an activated anterior cervical sympathetic system in the mediolateral cell column; simultaneously leading to an axon reflex involving nociceptive neurons, resulting in neurogenic inflammation and the prospect of ETD.[53]

CSF flow dysfunction

The most likely place for obstruction to CSF flow to occur is in the upper cervical spinal canal. The cause can be genetic design problems and/or whiplash. Head tilt causes the brain, blood and CSF inside the cranial vault to shift to the low side. There is a principle in neurology when it comes to the brain and the cranial vault, called the Monroe-Kellie principle.[54] There are essentially three elements inside the cranial vault: the brain, blood and CSF. Since the cranial vault is a closed container for the most part, if the volume of one of the elements increases, then one or both of the other two elements must decrease in volume. A brain tumor for example can compress blood and CSF vessels, as can Chiari malformations.

In a recent study, eight MS patient exhibited obstructions to their CSF flow when examined by phase coded CSF cinematography in the upright position. All MS patients exhibited CSF flow abnormalities that were manifest on MR cinematography as interruptions to flow or outright flow obstructions somewhere in the cervical spinal canal, depending on the location and extent of their cervical spine pathology. Normal examinees did not display these flow obstructions. Additionally it was found that peak CSF inflow and peak CSF inflow velocity were sharply reduced in normal examinees in the upright position when compared to inflow and inflow velocity in the recumbent position.[55]

Edema formation frequently complicates head/neck trauma. Recent studies have revealed the existence of a brain-wide paravascular pathway for cerebrospinal (CSF) and interstitial fluid (ISF) exchange, the glymphatic system. In cytotoxic edema, energy depletion enhances glymphatic CSF influx, while suppressing ISF efflux. Paravascular inflammation plays a critical role in vasogenic edema.[56]

One-Sided Neurological Disorders

Twenty-four of the patients in this study are currently or have previously suffered from Trigeminal neuralgia[57-58], sixty from migraine[59] and one hundred and twenty with TMJ dysfunction.[60] Since half of these patients that have derangement in the craniovertebral region also have complaints of headache, we would also assume that treatment of these regions should reduce the afferent/sensory input to the trigeminal cervical nucleus and reduce the headaches. Bell's palsy is a common condition that results in weakness or total paralysis of one half of the face.[61-62] Early symptoms may include pain in or behind the ear. This is followed by a rapidly worsening weakness of one half of the face. Bell's palsy was a precursor to Meniere's disease in fifty-nine of these cases. Symptoms included unilateral facial paralysis, extreme sensitivity to sound, pain in the TMJ joint and neck pain. Patients suffering from Bell's palsy may benefit from a holistic chiropractic approach that not only includes a focus on face and TMJ, but from significant vertebral subluxation.

Two patients in the study also have Glossopharyngeal neuralgia. Simultaneous TN and GPN suggest a structural lesion in an area that could capture both trigeminal and glossopharyngeal nerve pathways. From an anatomic perspective, the spinotrigeminal nucleus and tract (CN V), the solitary nucleus (CN VII, IX, and X) and the nucleus ambiguus (CN IX and X) are in close proximity in the medulla.[63]

The adult head weight averages twelve pounds. It rests on two articulations approximately one inch long by one half inch wide, resulting in twelve pounds per square inch of pressure when the head is balanced. When atlas is subluxated forward and to the side, pressures can build to forty pounds per square inch on the opposite side. Because every misalignment is different, different combinations of neurological insults occur near the brainstem, resulting in the varying degree of severity of the symptoms MD patients suffer. It was determined that whiplash subluxations tend to be found in pairs, with atlas and C5 being the most common. These patients' chief complaints were vertigo with vomiting. The second most common was axis and C6 found with hearing problems, ear fullness and tinnitus. The third most common pair of subluxations was both C1 and C5, and C2 and C6, with one pair being the major and one pair being the minor.

Conclusion

One hundred percent of three hundred consecutive patients medically diagnosed with Meniere's disease also having suffered a whiplash trauma is unlikely coincidental. Furthermore, ninety percent having a listing of posterior and inferior towards the opposite side of the effected ear is significant, as is ninety seven percent getting their vertigo under control within six weeks. All patients with a history of vertigo should be questioned about a history of trauma, especially whiplash from an automobile accident, contact sports injury, or serious falls. Patients often forget these

accidents, thinking that they were not hurt because they did not break any bones and were not bleeding. All films; MRIs, CT Scans and x-rays, should be taken with the patient in a weight bearing position, seated or standing, not lying down. Patients with a history of both vertigo and trauma should be referred to an upper cervical specific chiropractor for examination.

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Figure 1 - Notice the cropping of MD cases that were diagnosed about fifteen years after whiplash.

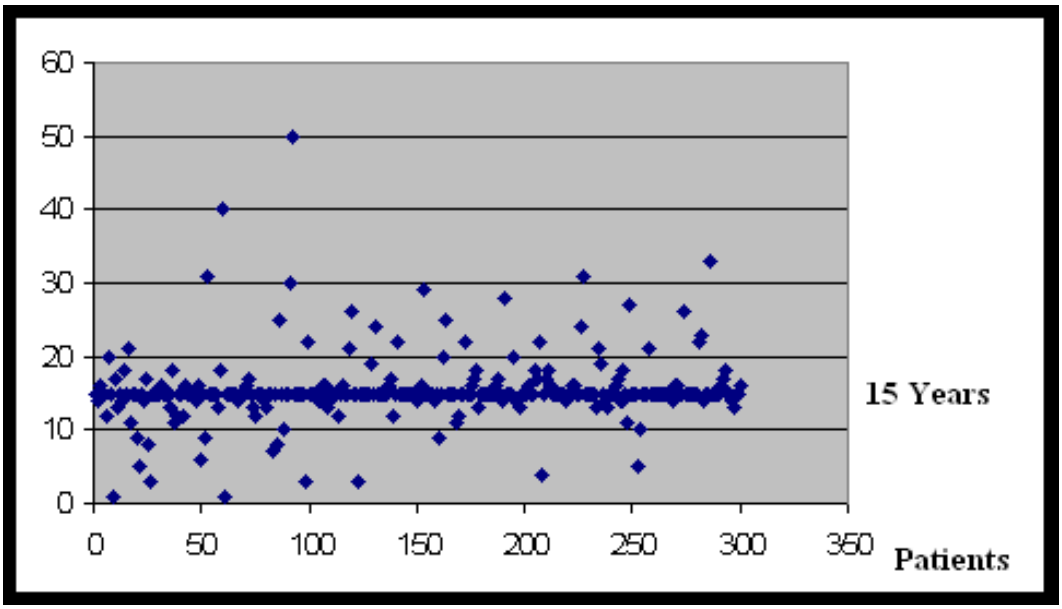

Figure 2 - Line analysis pattern work of a typical whiplash patient pre-treatment and six weeks post (red). The middle lines, the Delta-T, create the informational color graph seen on the right.

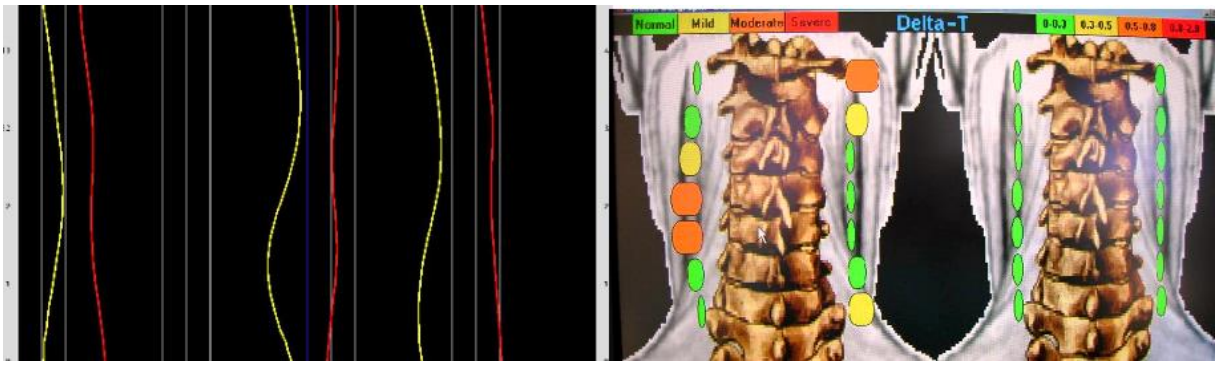

Figure 3 - Whiplash results in head translation, forward head position and/or head tilt.

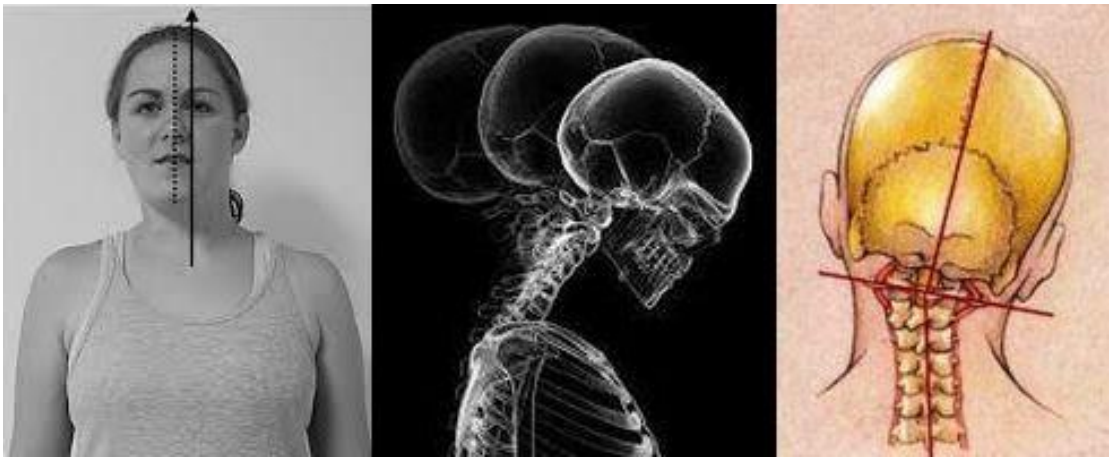

Figure 4 - Examples of side posture toggle recoil (Atlas) and Pierce technique (C5) adjustments.

Figure 5 - Vertigo cut by more than 60% at six weeks, more than 90% after four years.

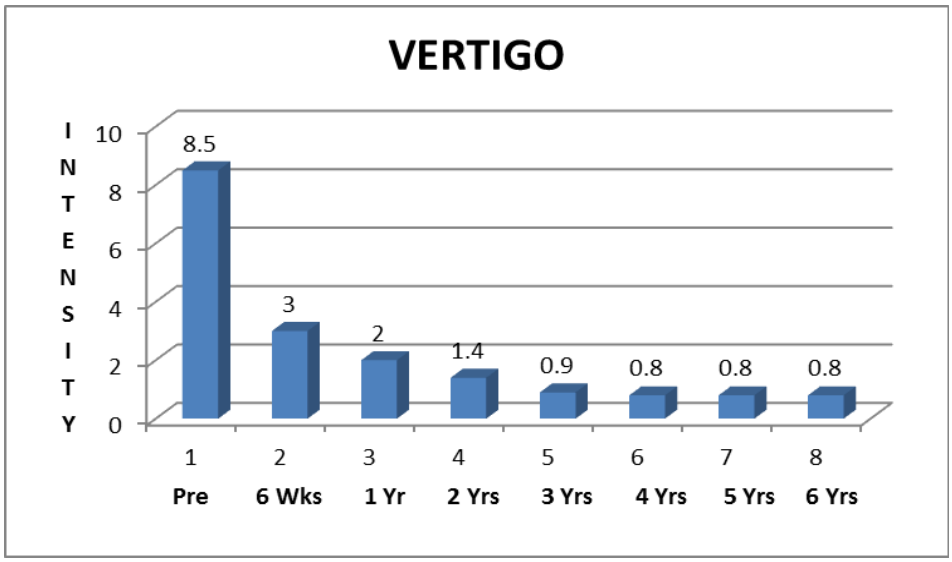

Figure 6 - Atlas is underlapped on the right articulation with Occiput, creating right head tilt. Atlas is in juxtaposition and the patient is medication and symptom free after six weeks.

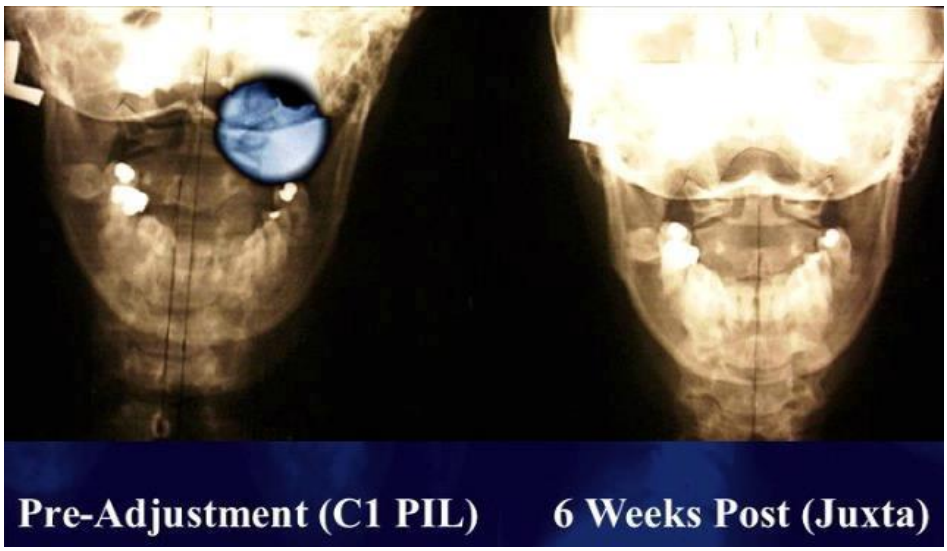

Figure 7 - Close proximity of Eustachian Tube and the upper cervicals

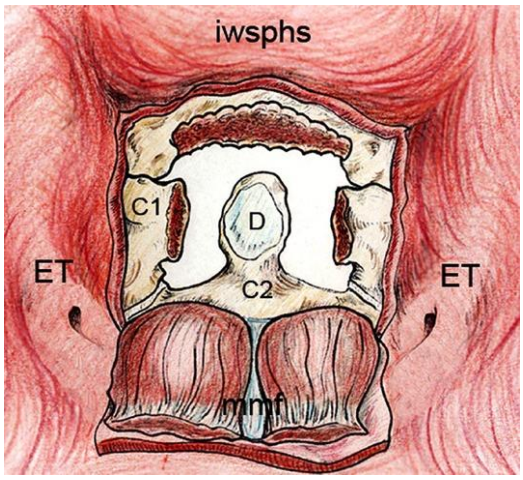

Figure 8 - Typical degenerative changes 15 years post whiplash.