

THE CHIROPRACTIC TREATMENT OF TINNITUS, VERTIGO AND HEARING LOSS

A Literature Review
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Abstract

Purpose

The purpose of this paper is to review the literature regarding the treatment of hearing loss and tinnitus through the use of chiropractic care. It also raises the awareness of an alternative course of treatment for hearing loss and tinnitus before taking drugs or seeking surgery.

Methods

This section discusses the research methods used to collect and select articles and information for the literature review of the treatment of hearing loss, vertigo and tinnitus through chiropractic care.

On July 24, 2004 a computerized search was conducted at Logan College of Chiropractics library. I used the MANTIS database to conduct my search on chiropractic treatment of hearing loss and tinnitus. MANTIS database provides titles, authors and the abstract of the article only. The key words "hearing and chiropractic or manipulation" were searched which gave me 48 articles. I only selected 12 of them that dealt with hearing loss treatment using chiropractics. Most of them dealt with court hearings on chiropractors or were of no interest to me. Next a search for "tinnitus and chiropractic or manipulation" was conducted using MANTIS database. This search gave me 12 articles. I chose 5 out of the 12 articles that were not overlaps of the previous search and dealt with chiropractic treatment of tinnitus. A search of presbycusis and chiropractic" was conducted

using MANTIS database. No results were found under this search.

For the full text journal articles found under MANTIS the EBSCO host database was used. The articles selected were based on their availability and relevance to the treatment of hearing loss, vertigo and tinnitus using chiropractics. Some journal articles I was unable to obtain due to the need of a password or membership, which Logan College of Chiropractic library did not have. The same searches conducted under Pub Med did not yield any results. The American Tinnitus Association, Kids Health for Kids, and Body Language Vitamin Company websites were used due to their helpful introductory and background information.

Results

I found many articles about treating hearing loss, vertigo and tinnitus through chiropractics as well as other natural methods. The Journal of Manipulative and Physiological Therapeutics has many articles that were useful to this research paper.

Conclusion

Chiropractic has been found to be beneficial to the treatment of neurological hearing loss and may slow down the process of presbycusis. There are many articles showing relief of tinnitus and vertigo through chiropractics.

Key Words: tinnitus, presbycusis, manipulation, vertigo, dysequilibrium, presyncope, nystagmus, vestibular, otolith, otoconia, hyperoculus, spondyloarthrosis, vertibrogenic

Introduction

Chiropractics involve the search for misalignment of two adjacent osseous (bony) structures in the body and applying a force in the direction of correction to minimize nerve interference using the hands. The term used for this type of correction is an adjustment. The word manipulation involves motioning a joint unspecifically in hopes of restoring normal function of the joint. Without nerve interference the body is able to work at maximal potential allowing optimal health. Many Doctors of Chiropractics perform full spine adjustments from the cranium to the coccyx. Other Chiropractors treat only specific areas of the spine. The clinical progress documented in many reports suggests upper cervical manipulation may benefit patients who have vertigo, tinnitus and hearing loss. (1)

Hearing loss occurs when there is a problem with one or more parts of the ear or ears. Someone who has hearing loss or impairment may be able to hear some sounds or nothing at all. Impairment means something is not working correctly or as well as it should. The ear is made up of three different sections: the outer ear (externa), the middle ear (media), and the inner ear (interna). These parts work together so you can hear and process sounds. The outer ear picks up sound waves and the waves then travel through the outer ear canal. When the sound waves hit the eardrum in the middle ear, the eardrum starts to vibrate. When the eardrum vibrates, it moves three tiny bones in the ear. These bones are called the hammer (malleus), anvil (incus), and stirrup (stapes). They help sound move along on its journey into the inner ear.

There are two types of hearing loss; either sensory or neural. Sensory

hearing loss occurs when the cochlea is not working correctly because the tiny hair cells are damaged or destroyed. Depending on the degree of loss, a person may be able to hear most sounds (although they would be muffled), only some sounds, or no sounds at all. Sensory hearing impairment is almost always permanent and a child's ability to talk normally may be affected. Neural hearing loss is when there is a problem with the connection from the cochlea to the brain. Neural means related to nerve, so neural hearing loss means the nerve that carries the messages from the cochlea to the brain is damaged. Congenital hearing loss occurs because a person was born without parts of the ear, parts that don't form correctly or doesn't work well. Other problems can happen later in life due to an injury or illness, including middle ear fluid, serious infections, head injury, or repeated exposure to loud sounds. (2)

Presbycusis is the loss of hearing that gradually occurs in most individuals as they grow older. Hearing loss is a common disorder associated with aging. About 30-35 percent of adults between the ages of 65 and 75 years have a hearing loss. The loss associated with presbycusis is usually greater for high-pitched sounds. For example, it may be difficult for someone to hear the nearby chirping of a bird or the ringing of a telephone. However, the same person may be able to hear clearly the low-pitched sound of a truck rumbling down the street.

Vertigo is one of the types of dizziness with dysequilibrium, presyncope and lightheadedness. It indicates a sensation of false movement kind of like a rotation, but sometimes the patient can describe it like a sensation of tilt.(10) The word dizziness indicates a sensation of disturbed relation to surrounding objects in

space with feeling of rotation or whirling characteristic of vertigo as well as non-rotatory swaying, weakness, faintness and unsteadiness. Nystagmus is the only objective sign in vertigo of central and peripheral origin. There are many forms of treatment of vertigo such as medications (specific and aspecific), surgery (conservative and destructive) and rehabilitation in relation to the characteristics and the causes of vertigo.(11)

Vertigo is a symptom, not a disease. The term vertigo refers to the sensation of spinning or whirling that occurs as a result of a disturbance in balance (equilibrium). It also may be used to describe feelings of dizziness, lightheadedness, faintness, and unsteadiness. The sensation of movement is called subjective vertigo and the perception of movement in surrounding objects is called objective vertigo. Vertigo usually occurs as a result of a disorder in the vestibular system (i.e., structures of the inner ear, the vestibular nerve, brainstem, and cerebellum). The vestibular system is responsible for integrating sensory stimuli and movement and for keeping objects in visual focus as the body moves.(17)

When the head moves, signals are transmitted to the labyrinth, which is an apparatus in the inner ear that is made up of three semicircular canals surrounded by fluid. The labyrinth then transmits movement information to the vestibular nerve and the vestibular nerve carries the information to the brainstem and cerebellum (areas of the brain that control coordination, balance, movement, blood pressure, and consciousness).(13)

Dizziness is a common complaint of patients presenting to the emergency department. The 4 main categories of dizziness that patients describe include

vertigo, near-syncope, dysequilibrium, and psychophysiologic dizziness. Of these 4 categories, vertigo is the most common (40-50%). Of the various causes of vertigo, benign positional vertigo (BPV) is the most common cause.

Approximately 25-40% of patients who present with the chief complaint of dizziness have BPV. Vertigo is an illusion of motion (an illusion is a misperception of a real stimulus) and represents a disorder of the vestibular proprioceptive system. BPV is caused by calcium carbonate particles called otoliths (or otoconia) that are inappropriately displaced into the semicircular canals of the vestibular labyrinth of the inner ear. These otoliths are normally attached to hair cells on a membrane inside the utricle and saccule. Because they are denser than the surrounding endolymph, changes in head movement vertically causes the otoliths to tilt the hair cells. This is how our brain knows which way is up or down (without looking). The utricle is connected to the semicircular canals. The otoliths may become displaced from the utricle by aging, head trauma, or labyrinthine disease. When this occurs, the otoliths have the potential to enter the semicircular canals. When they do, they almost always enter the posterior semicircular canal because this is the most dependent (inferior) of the 3 canals.(15)

Tinnitus is described as the perception of sound in the ear or head in the absence of an acoustic stimulus. (3) The person with tinnitus may hear a constant ringing sound, buzzing sound, or whistling sound. Most people with tinnitus complain of it being worse at night in the bed. It appears to be louder due to the person not being distracted or focused on anything else. There is also usually no

other sounds occurring in the room allowing the tinnitus to appear louder. The exact physiological cause or causes of tinnitus are not known. There are several likely sources, all of which are known to trigger or worsen tinnitus. Noise-induced hearing loss (exposure to loud noises) can damage and even destroy hair cells, called cilia, in the inner ear. Once damaged, these hair cells cannot be renewed or replaced. Millions of Americans have hearing loss due to noise exposure, and up to 90 percent of all tinnitus patients have some level of noise-induced hearing loss. Wax build-up in the ear canal is another cause of hearing loss. The amount of wax ears produce varies by individual. Sometimes, people produce enough wax that their hearing can be compromised or their tinnitus can seem louder. Certain medications can cause hearing loss if they are ototoxic (toxic to the ear). Other medications will produce tinnitus as a side effect without damaging the inner ear. Effects can depend on the dosage of the medication, can be temporary or permanent. In Physician's Desk Reference 1995 you can find a list of drugs with tinnitus as a side effect. Examples of these medications include Actifed with codiene cough syrup, Anestacon, Aspirin, Children's Advil, Claritin, Ibuprofen, Lariam, Motrin, MZM, Nicorette, Paxil, Pepto-Bismol, Prozac, Tavist/Tavist-D, Triaminic, Xylocaine, etc. Many people, including children, experience tinnitus along with an ear or sinus infection. Generally, the tinnitus will lessen and gradually go away once the infection is healed. Some people have misaligned jaw joints or jaw muscles, which can not only induce tinnitus, but also affect cranial muscles, nerves and shock absorbers in the jaw joint.

Cardiovascular diseases may cause tinnitus. Approximately 3 percent of

tinnitus patients experience pulsatile tinnitus. People with pulsatile tinnitus typically hear a rhythmic pulsing, often in time with the heartbeat. Pulsatile tinnitus can indicate the presence of a vascular condition where the blood flow through veins and arteries is compromised (a heart murmur, hypertension, or hardening of the arteries.) Rare, but sometimes people may have a benign and slow-growing tumor on their auditory, vestibular, or facial nerves. These tumors can cause tinnitus, deafness, facial paralysis, and loss of balance. Physical trauma to the head and neck can induce tinnitus or hearing loss. Other symptoms of head injury include headaches, nausea, vomiting, vertigo, and/or memory loss. (4)

The chiropractic profession was founded in 1895 following the observation by Dr. Daniel David Palmer improve hearing in Harvey Lillard after spinal manipulation therapy (SMT). The claim that hearing can be improved following SMT has been scoffed at as physiologically impossible, but a review of the medical and chiropractic literature suggests that hearing deficits may be associated with spinal joint motion restriction, spondyloarthrosis, irritation of the sympathetic nervous system, decreased cervico-cerebral circulation and/or decrease in tinnitus. Deafness can be a very distressing complaint leading to depression and patient difficulties in social, employment and educational situations. In many cases of deafness, no one definitive cause can be found following extensive medical investigation. (5)

It is estimated that 33 million Americans have a hearing loss significant enough to hinder communications with others. This number will likely increase significantly in the future with the "graying of America," and the chronic exposure

to high noise levels that is common in our modern society. Every day we experience sound in our environment such as the television, radio, washing machine, automobiles, buses, and trucks. But when an individual is exposed to harmful sounds--sounds that are too loud or loud sounds over a long time--sensitive structures of the inner ear can be damaged, causing noise-induced hearing loss (NIHL). The loudness of sound is measured in units called decibels. For example, normal conversation is approximately 60 decibels, the humming of a refrigerator is 40 decibels, and city traffic noise can be 80 decibels. Examples of sources of loud noises that cause NIHL are motorcycles, firecrackers, and firearms, all emitting sounds from 120 to 140 decibels. Sounds of less than 80 decibels, even after long exposure, are unlikely to cause hearing loss. Exposure occurs in the workplace, in recreational settings, and at home. Noisy recreational activities include target shooting and hunting, snowmobiling, riding go-carts, woodworking and other noisy hobbies, and playing with power horns, cap guns, and model airplanes. Harmful noises at home include vacuum cleaners, garbage disposals, gas-powered lawn mowers, leaf blowers, and shop tools. It is estimated that 88 percent of Americans over the age of 65 have some degree of hearing loss. Treatment of hearing loss will depend on your hearing problem. Hearing aids are tiny instruments you wear in or behind your ear. They make sounds louder. Personal listening systems help you hear what you want to hear while eliminating or lowering other noises around you. Some, called auditory training systems and loop systems, make it easier for you to hear someone in a crowded room or group setting. Cochlear implants have three parts: a headpiece, a speech processor, and a

receiver. The headpiece includes a microphone and a transmitter. It is worn just behind the ear where it picks up sound and sends it to the speech processor, a beeper-sized device that can fit in the pocket or on a belt. The speech processor converts the sound into a special signal that is sent to the receiver. The receiver, a small round disc about the size of a quarter that a surgeon places under the skin behind one ear, sends a sound signal to the brain. A cochlear implant is an electronic device that restores partial hearing to the deaf. It is surgically implanted in the inner ear and activated by a device worn outside the ear. Unlike a hearing aid, it does not make sound louder or clearer. Instead, the device bypasses damaged parts of the auditory system and directly stimulates the nerve of hearing, allowing individuals who are profoundly hearing impaired to receive sound. Cochlear implants do not restore normal hearing, and benefits vary from one individual to another. Most users find that cochlear implants help them communicate better through improved lip reading, and over half are able to discriminate speech without the use of visual cues. Cochlear implants are most often used with young children born with hearing loss. However, older adults with profound or severe hearing loss are beginning to receive these implants more often. (6)

Vertigo is one of the most common health problems in adults. According to the National Institutes of Health (NIH), about 40% of people in the United States experience vertigo at least once during their lifetime. Prevalence is slightly higher in women and increases with age. BPV was first described by Adler in 1897 and then by Bárány in 1922; however, Dix and Hallpike did not coin the

term benign paroxysmal positional vertigo until 1952. This terminology defined the characteristics of the vertigo and introduced the classic provocative test that is still used today. Using positional testing, BPV can readily be diagnosed in the emergency department.(12)

According to estimates by the American Tinnitus Association, at least 12 million Americans have tinnitus. Of these, at least 1 million experience it so severely that it interferes with their daily activities. There are many different courses of treatment of tinnitus being used today from natural treatments such as chiropractics or nutrition to medications. Some people have taken minerals such as magnesium or zinc, herbal preparations such as Ginkgo biloba, homeopathic remedies, or B vitamins for their tinnitus and found them to be helpful. Some tinnitus patients with hearing loss experience total or partial tinnitus relief while wearing hearing aids. A cochlear implant has two components: 1) an electrode array that is threaded into the cochlea, and 2) a receiver that is implanted just beneath the skin behind the ear. The electrode array sends electrical sound signals from the ear to the brain. Because electrode implantation destroys whatever healthy hair cells were left inside the cochlea, these implants are prescribed to deaf or near-deaf patients only. Many drugs have been researched and used as tinnitus relief agents. Anti-anxiety drugs like Xanax, antidepressants like nortriptyline, antihistamines, anticonvulsants, and even anesthetics like lidocaine have been used to treat tinnitus. Because side effects can happen with any drug or drug combination, patients have to decide for themselves if an undesirable side effect is worth the trade off of tinnitus relief. (4)

It is estimated that up to 40% of tinnitus patients have hyperacusis and 10% of tinnitus patients are more bothered by their hyperacusis than by their tinnitus. Hyperacusis is an abnormally strong reaction to sounds of moderate to normal loudness. That means normal every day sounds may sound louder to hyperacusis people. Dr. Gary Jacobson, Ph.D. wrote an article on the prevalence of tinnitus in a clinic on May 22, 2002. Patients begin to present to a clinic with tinnitus after the age of 40. Most patients have had their tinnitus for longer than one year. Approximately 29 percent feel that their tinnitus was caused by trauma, either noise trauma or a head injury. Approximately 14 to 15 percent have medical conditions, diseases, or treatments for diseases, and about 43 percent have no idea—it just came on, and we'll probably never know exactly why. For approximately 51 percent of the group of patients, their tinnitus came on gradually over time. For approximately 39 percent of the patients, tinnitus came on suddenly. (9)

Discussion

A review of the medical and chiropractic literature suggest that hearing deficits may be associated with spinal joint motion restriction, spondyloarthrosis, irritation of the sympathetic nervous system, decreased cervico-cerebral circulation and/or decrease in tinnitus. Search of the literature indicates that vertebrogenic hearing disorders are beginning to be investigated by medical researchers. Deafness has been found to be a very distressing complaint leading to depression and patient difficulties in social, employment and educational

situations. In many cases of deafness, no definitive cause can be found following extensive medical investigations. It is proposed that some cases may benefit from spinal manipulative therapy. (5)

One article reports a 75-year-old woman with episodic dizziness, pain and pressure in the left ear, hearing loss in the both ears that had progressively worsened, anxiety attacks, and an overall nervousness presented to their chiropractic office. Although she had these symptoms for the past several years, 5 weeks before her visit the vertigo and tinnitus had increased in frequency and severity. For 27 years the patient had been taking nerve medication for anxiety, nervousness, and insomnia on a palliative schedule. On examination Weber's test was negative, and Rinne's test was positive with both air and bone conduction reduced bilaterally, indicating a sensorineural hearing loss. The initial neutral lateral cervical radiograph depicted a retrolisthesis of the 3rd cervical vertebra. The 3rd cervical vertebral body appears to be 2 mm posterior to the C2 vertebral body and 2 mm posterior to the C4 vertebral body. There was moderate degeneration noted throughout from C4 to C7.

The next day after the initial examination, an audiologic examination was performed with a RAND 36 Health Survey and Beltone series 109 audiometer with ear cups. All of the initial examinations were performed before the administration of the first specific chiropractic adjustment. The patient's symptoms were consistent with Meniere's disease. Meniere's disease is characterized by recurrent prostrating vertigo, sensorineural hearing loss, and tinnitus. A typical attack of Ménière's disease is preceded by fullness in one ear.

Hearing fluctuation or changes in tinnitus may also precede an attack. A Ménière's episode generally involves severe vertigo (spinning), imbalance, nausea and vomiting. The average attack lasts two to four hours. Following a severe attack, most people find that they are exhausted and must sleep for several hours. There is a large amount of variability in the duration of symptoms. Some people experience brief "shocks", and others have constant unsteadiness. An unusual sensitivity to visual stimuli is common. The patient's radiographs revealed signs of cervical instability at the C3/C4 motion segment with considerable cervical degeneration between C4-C7. Degenerative changes in the cervical spine from C4-C7 are common with morbus Meniere's disease. (1)

Research is discussed that describes a possible vertebral, cranial and/or temporomandibular joint (TMJ) component to the etiology of tinnitus. A case history is also presented where conservative treatment using Sacro Occipital Technique (SOT) for vertebral, cranial and TMJ causes of tinnitus secondary to auditory trauma seemed to alleviate the patient's symptomatology. Chiropractic vertebral, cranial, and/or TMJ care for tinnitus is an often over looked conservative method of treatment. Often because tinnitus is essentially a subjective symptom the patient's extreme discomfort is overlooked by the practitioner or is dismissed. The practitioner then sometimes sees the tinnitus sufferer's emotional distress as the initiating cause rather than a secondary finding. Further controlled clinical studies using SOT for the conservative treatment of tinnitus is suggested. (3)

Another article describes symptom reports, multiple chiropractic

assessments and adjustments over 7 years with a patient experiencing neck pain and complex ear symptoms consistent with Meniere's syndrome. A 43-year-old female developed aural symptoms of severe otalgia, hearing difficulty, tinnitus and dizziness that increased and decreased in severity with her neck pain. The intervention was repeated application of chiropractic adjustments. Over seven years of observation and care the patient reported reduction in symptom severity after adjustments, with relief lasting up to 2 months. Hearing fluctuated in approximate synchrony with changes in angular displacement of upper cervical vertebrae during the treatment period. (7)

In a study on cervical vertigo, 15 subjects with cervical vertigo were selected from patients presenting with dizziness at an otorhinolaryngology medical office. Diagnosis was based on specific criteria and results of an otoneurologic examination. All patients were submitted to treatment protocol, including spinal manipulation, manual therapy on affected muscle groups, analgesic electrotherapy, labyrinth sedation, surface electromyography biofeedback, and an exercise program. Complaints of dizziness and related musculoskeletal dysfunction was observed. The results were musculoskeletal complaints present in 93% of the patients, mainly cervical pain, shoulder-girdle pain, and tension-type headache. Median duration of musculoskeletal symptoms was 7.5 years, whereas the median duration of dizziness before the beginning of treatment was 52 days. Treatment duration averaged 5 sessions and 41 days. At the end of treatment, 60% of patients reported remission, and 20% reported consistent improvement of vertigo. Remission of musculoskeletal symptoms was observed

in 26.7% of patients, and improvement was observed in 60% of patients. This article concluded that chronic, nontraumatic, cervical and shoulder-girdle dysfunction was an important causal and perpetuating factor of cervical vertigo in the population studied, and a consistent improvement was observed with the use of conservative treatment protocol involving multiple modalities for patients with cervical vertigo.(18)

Chronic subjective tinnitus is a common feature of clinical otosclerosis. Otosclerosis is a common cause of gradual hearing loss in adults. The hearing loss is usually conductive, that is, affecting the ossicles (bones of the middle ear) that conduct sound to the inner ear. Some sensorineural, or nerve loss, may also occur. The conductive hearing loss is caused by the growth of a spongy bone-like tissue that prevents the ossicles from moving well. Because of the spongy nature of this tissue, otosclerosis has also been known as "otospongiosis". Analysis of the records of 1,014 consecutive cases of clinical osteosclerosis, all confirmed by stapes surgery gives a preoperative prevalence of this symptom of 65%. The association of tinnitus with various predictors is considered, and a statistical analysis is presented. Tinnitus has an association with gender ($p=0.0001$), mean preoperative bone conduction (BC) level ($p=0.0012$), mean air conduction (AC) level ($p=0.0192$), and mean air-bone gap ($p=0.0075$). The associations between tinnitus and the age of the patient, the duration of deafness and the severity of foot pain pathological involvement were all nonsignificant. The association of tinnitus with the AC and BC thresholds is unexpectedly paradoxical. An economic predictive model for tinnitus is otosclerosis has been constructed from the 2

strongly significant variables, gender and mean BC hearing level, by logistic regression. In this large series of cases, the log odds in favor of finding tinnitus are about 0.810 for male subjects and 1.394 for female subjects when the BC level is zero. The log odds fall by 0.014 for each decibel of mean BC rise. Chiropractic care may prevent further sclerosis ultimately preventing hearing loss.

Supplements such as oral fluoride, calcium and vitamin D may also prevent further sclerosis. Taking oral sodium fluoride can stabilize the hearing loss associated with otosclerosis in about 80% of patients. This reduces bone absorption and enhances the calcification of new bone, essentially stopping further progression of otosclerotic damage. Sodium fluoride can also reduce tinnitus and any symptoms of imbalance. The usual dose of sodium fluoride is 20 – 40 mg per day. Side effects of sodium fluoride include rash, arthritis, and gastrointestinal distress. Dosage for children and pregnant women is reduced. After two years of treatment, if the disease has stabilized, patients may take a life-long maintenance dose of about 25 mg per day. Stopping the sodium fluoride can cause reactivation of the disease. (8)

Conclusion

As stated above there are many types of hearing loss, vertigo and tinnitus. Depending on the type of hearing loss, vertigo and tinnitus, chiropractics may be able to help relieve or prevent these problems in patients. Chiropractics has a major influence on the neurological system. If nerve interference is the cause of the hearing loss, vertigo or tinnitus, it may be relieved by chiropractic treatment.

There are other treatments available such as surgery or medications but these methods usually pose a higher risk to the patient. Some medications may actually cause tinnitus as stated above. This literature review was not done to discredit surgery or medications. It just points out that there are alternative methods of treating hearing loss, vertigo and tinnitus that pose less of a risk to the patient.

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