Case Study

Improvement in Symptoms Related to Depression, Anxiety and Pain in a Patient Undergoing Subluxation Based Chiropractic Care

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Abstract

Objective: To report the case of an elderly male with depressive and anxiety symptoms which improved while under chiropractic care for chronic shoulder and neck pain.

Clinical Features: A 58-year-old male with shoulder and neck pain sought chiropractic care. Past history revealed two major car accidents that involved hospitalizations. Concurrently, the patient had many symptoms related to his depression and anxiety, such as poor concentration, irritability, lethargy, panic attacks, and heart palpitations. The patient scored 46 on the Beck Depression Inventory-II, which indicates severe depression.

Interventions and Outcomes: The patient was seen 3 times per week for 3 months using Diversified technique to address vertebral subluxations. Improvement in quality of life was documented.

Conclusions: The progress documented in this case suggests that chiropractic adjustments along with ancillary procedures decreased the patient's shoulder and neck pain as well as his depressive and anxiety symptoms.

Key Words: Chiropractic, Depression, Anxiety, Neck pain, Shoulder pain, Subluxation, Cortical Asymmetry

Introduction

Depression

The Diagnostic and Statistical Manual, 4th ed. defines someone with depression as having five or more of the following symptoms during the same 2 week period and having a change from previous function:

1. Depressed mood most of the day, nearly every day, as indicated by either subjective report or observation made by others.
2. Markedly diminished interest or pleasure in all, or almost all, activities most of the day,
3. Significant weight loss when not dieting or weight gain,
4. Insomnia or hypersomnia nearly every day
5. Psychomotor agitation or retardation nearly every day
6. Fatigue or loss of energy nearly every day
7. Feelings of worthlessness or excessive or inappropriate guilt (which may be delusional) nearly every day (not merely self-reproach or guilt about being sick)
8. Diminished ability to think or concentrate, or indecisiveness, nearly every day (either by subjective account or as observed by others).

9. Recurrent thoughts of death (not just fear of dying), recurrent suicidal ideation without a specific plan, or a suicide attempt or a specific plan for committing suicide.1

Mood disorders, such as depression, are the most common mental disorders in modern society with about 16% of the population affected by major depressive disorder.2 A World Health Organization report ranks depression as the fourth leading contributor to the global burden of disease and predicts it to be the 2nd in Disability Adjusted Life Years (DALY) by year 2020. A DALY is defined by calculating the amount of life years lost to premature death and years lived with a disability of specified duration and severity.3

Although there have been a number of studies on depression, an exact pathophysiology is still unknown.4 The latest research suggests the following variables may be implicated: genes, stress response circuits (the hypothalamic-pituitary axis), norepinephrine-dopaminergic interactions, brain derived neurotrophic factors, histone modifications, decreased adult hippocampal neurogenesis, substance abuse withdrawal, circadian rhythms, and changes in functional brain anatomy (prefrontal/cingulated gyrus, hippocampus, amygdala, striatum, thalamus).5 Every day, researchers are learning more about this disorder as more fMRI studies are performed and more genetic and biological markers are identified.

Currently, the most common allopathic ways to treat depression is through psychotherapeutic interventions, pharmacological agents, and other somatic therapies. Out of these treatments, the most proven and effective anti-depressant drugs have been selective serotonin reuptake inhibitors, serotonin norepinephrine reuptake inhibitors, selective norepinephrine reuptake inhibitors, and tricyclic and tetracyclic inhibitors.

Some other treatments that have shown promising results are substance P antagonists, Corticotrophin-releasing factor antagonists, electroconvulsive therapy, transcranial magnetic stimulation, and cognitive-behavioral therapy.4 Even with newer medications and research, the effectiveness of antidepressants is only 50% and researchers still do not know the duration needed for an effect or the reasons for various side effects.3

Anxiety

Generalized Anxiety Disorder (GAD) is the most prevalent psychiatric disorder to be seen by primary care physicians. According to a study done by the World Health Organization, anxiety is present in 8% of the population and is more prevalent among women over 35 years old and men over 45. The main diagnostic criterion for GAD is uncontrollable anxiety and worry along with three out of six symptoms. These symptoms include restlessness, irritability, difficulty concentrating, muscle tension, sleep disturbances, and being easily fatigued.5

GAD has also been associated with other mood disorders, pain disorders, substance abuse, heart disease, and chronic pain disorders. The main treatment methods for anxiety are psychotherapy and pharmacotherapy, especially benzodiazepines and anti-depressant medications. Depression and anxiety share common symptoms and often times present together in a patient.5

Shoulder and Neck Pain

Shoulder and neck pain are very common complaint amongst patients. A study conducted in France from 1990-1995 showed an incidence of 7.3% in men and 12.5% in women experiencing chronic shoulder and neck pain, which was exacerbated with age, psychosocial factors, and occupational physical exertion. The cause of shoulder and/or neck pain is variable and can be due to musculoskeletal conditions, trauma, systemic conditions, infections, inflammatory conditions, or neoplasms.6,7

Thiel and Bolton suggest that patients presenting with symptoms of “reduced shoulder movement, neck pain, and shoulder and arm pain are likely to report immediate improvement in these symptoms after chiropractic manipulation of the cervical spine.”8 Another study focusing on shoulder pain revealed that manipulative therapy (high velocity/low amplitude adjustments) diminished the severity of shoulder and neck pain and improved the mobility of the shoulder and cervicothoracic spine.9 It is imperative for the chiropractor to determine whether the shoulder pain is related to the neck pain or if the two are mutually exclusive.

Vertebral Subluxation

According to a review of vertebral Subluxation by Kent, subluxations can lead to a myriad of physiological changes that include and are not limited to nerve irritation, spinal cord compression, myopathy, myospiopathology, biochemical changes, dysafferentation, and neurodystrophy. These physiological changes can cause many symptoms over time and influence health negatively.10

It is important to note that with new fMRI imaging and neurological advances, one of the suspected causes for vertebral subluxations is cortical asymmetry. Cortical asymmetry is defined as an imbalance between the two hemispheres of the brain. Since the brain controls most functions of the body including pain modulation, emotions, and muscle tone, it has been shown in studies that dominance or deficiency in a certain hemisphere leads to vertebral subluxations and other neurological difficulties like depression.11,12

Neurology

Cortical asymmetry and neurological status can be measured using instrumentation and eye movement analysis using optokinetic tape testing such as that taught in the Carrick Institute of Graduate Studies. Instrumentation has been designed to measure stress response as was done in this case.13

Functional neurologists use eye movements to address subtle cortical asymmetries and physiological brain lesions. One such analysis is performed by using an optokinetic
nystagmus tape. This is usually a white piece of cloth about 5cm wide and 1m long onto which 5x5cm² red pieces of cloth have been stitched at regular 5-cm intervals. This cloth is passed about 14 inches in front of the patient’s eyes from right to left and left to right while the practitioner is examining the response of the eye movements with regard to latency, velocity, amplitude, smoothness, fatigability, and direction.\textsuperscript{12}

Vertigone goggles are used for patients suffering from Benign Paroxysmal Positional Vertigo (BPPV) and are designed to have the patient go through specific head movements that mirror HallPike and Epley Maneuvers.\textsuperscript{14}

The DAVID Glasses are used for entrainment of specific brain waves and have different levels for different needs of the patient. By definition, entrainment occurs when an EEG reflects the brain wave frequency duplicating that of the stimuli, be it audio, visual, tactile, etc. In order to better understand the concept behind these glasses it is important to review the 4 primary brain waves - Beta (alert and awake, 15-38Hz), Alpha (ideal for stress relief and relaxation, 8-12Hz), Theta (present during light sleep or deep relaxation, 3-8Hz), and Delta (deep dreamless sleep, 0.2 – 3Hz).\textsuperscript{15}

The New Reality glasses perform a slightly different function. They use Creative Visualization and Relaxation (CVR) to ease stress and anxiety with a standard setting in all glasses, which means every person’s brain is getting the same frequency and stimulation (usually Theta frequency). New Reality’s testimonials and studies claim to decrease stress, increase blood flow to the brain, improve concentration, provide better sleep patterns, and increase endorphins in the blood.\textsuperscript{16} \textsuperscript{16}

The Pettibon Wobble Chair is an unstable chair that a patient sits on and performs specific movements like left to right and front and back. This motion is used to load and unload lumbar discs to promote motion and fluid exchange, nourish the discs and increase mechanoreption.\textsuperscript{17}

The purpose of this case report is to describe successful chiropractic care on a patient with chronic shoulder and neck pain as well as depression and anxiety.

Case Report

History

A 58 year old male presented with chronic left shoulder pain of one year duration. The pain was achy and radiated into the left arm and between the shoulders. It was aggravated by use when driving his truck or playing different musical instruments like the guitar and drums. The patient had never had such pain before and it was getting progressively worse. Additional complaints included poor attention, easily distracted, lacking motivation, poor concentration, worry, irritable, low energy, mood swings, panic attacks, anxiety, heart palpitations, depression, and hearing difficulty.

Past history revealed two major car accidents that required hospitalizations resulting in right knee replacement as well as left elbow and slight facial reconstruction. He also suffered cervical vertebral fractures that were not deemed severe enough for surgery. The other car accident was ten years prior. He was diagnosed with high cholesterol, depression, and anxiety by his medical doctor. He took Hydrocodone and Oxycontin for the pain from the car accidents. He also took Ativan for depression/anxiety. He estimated that he had been taking these medications for at least 10 years.

Examination

The physical exam revealed a high left shoulder (+12mm), high right iliac crest (+17mm), and anterior head translation of 55mm. Bilateral weight scales revealed 84 lbs. on the left side and 91 lbs. on the right side. Chiropractic exam involved muscle testing, motion palpation, and static palpation. Restrictions were revealed at atlas and axis upon left rotation. Other restrictions were at right side of sacrum and left anterior humerus.

The NeuroInfiniti Stress Response Evaluation revealed the following abnormalities: high Beta stress waves, low Theta recovery waves, high theta stress waves, low alpha recovery waves, low SMR recovery waves, very low skin conductance, slightly abnormal heart rate variability, and hypertonicity of the trapezius muscles on both sides of the neck.

It is a 12 minute computerized, non-invasive exam that uses sensors attached to areas such as the trapezius muscle, the top of the head, hands, and abdomen. The sensors are measuring 7 different nervous system activities which are brain waves, heart rate variability, heart rate, skin conductance, temperature, respiration rate, and muscle balance.

The SRE measures their reaction to certain stressors like keeping eyes open for 90 seconds, obnoxious, loud sounds, a simple math test, and controlled breathing. After each stressor, there is a recovery phase where the patient sits with their eyes closed and relaxes. Altogether there are 8 tests – 4 stressors and 4 recoveries. These results are compared to “Ideals” and the patient is able to see if their nervous system is functioning appropriately.

The ideal ranges are: Heart Rate – 56 to 66 B/min., Skin conductance – 0.80 to 1.50µS, temperature – 93.92 to 96.98°F, respiration rate – 6 to 12 B/min, SEMG of trapezius muscle – 0.5 to 2.5µV. There is also a certain normal pattern that the measurement of brain waves and heart rate variability should show. Stressful events like the math test and sounds should show a spike in Beta frequency while simultaneously showing a decrease in Alpha/Theta waves. Accordingly, the recovery phase should show spikes in Alpha/Theta waves and a decrease in Beta wave. The heart rate variability values should resemble a bell curve with low values in the Very Low and High categories and high values in the Low category.\textsuperscript{13}

Specifically, the average values for all 8 were: Heart Rate (51.5B/min, max value of 62B/min during math task), skin conductance (0.5µS, max value of 0.65µS during math stress), temperature (91.5°F, max value of 92.0°F during math stress), respiration rate (9.5B/min, max value of 13.9B/min during math task), SEMG (left trapezius - 5µV, max value of 12.2µV during sound stress). Right trapezius - 4µV, max value of 7µV during sound stress), EEG (calculated in percent power, Theta – 20%, Alpha – 18%, SMR – 8%, Beta – 35%), heart rate variability (Very Low – 12, Low – 39.3, High – 35). These
indicators reveal abnormal autonomic nervous system function with an imbalance between the sympathetic and parasympathetic nervous system processes.

Additionally, opticokinetic nystagmus testing revealed abnormal patterns in all directions (left to right, right to left, up to down, down to up) during the physical exam. The eyes were not able to pursue or saccade in a smooth, timely normal fashion, and the patient reported difficulties throughout. This is usually indicative of a very general cortical lesion and is inconclusive.

**Intervention**

Based on the physical exam findings, the patient was put on a 3 times per week schedule and was seen a total of 39 times in 3 months. On each visit, vertebral subluxations were located using the following factors: leg length inequality, global assessment, motion palpation, static palpation, and muscle testing. He was adjusted with Diversified Full Spine (contact specific, high velocity, low amplitude thrusts) technique. He was also evaluated for subluxations of the extremities when necessary.

The cervical spine was adjusted with a supine cervical set while the lumbar spine and sacrum were adjusted with a side posture. The thoracic spine was adjusted prone using crossed psoas or thumb psoas. The vector of adjustment was always posterior to anterior, lateral to medial, and inferior to superior, except in the case of atlas which was superior to inferior.

The extremity adjustments were performed using the Council on Extremity Adjusting protocols. The left humerus was adjusted supine with the doctor’s 1st and 2nd digit of the left hand around the glenohumeral joint and the doctor’s supporting hand tractioning the left arm into a 90 degree abduction position. The adjustment vector was slightly inferior to superior and anterior to posterior. The posterior tibia was adjusted by the doctor sitting on the foot and grasping the tibial plateau of the knee with both hands interdigitally (thumbs in front) and thrusting posterior to anterior.

The sternoclavicular joint was adjusted supine with contact medial to the sternoclavicular joint and thrusting anterior to posterior, medial to lateral, and inferior to superior while tractioning the affected shoulder with opposite hand. The acromioclavicular joint was adjusted by abducting the affected side shoulder and contacting the superior acromioclavicular joint and thrusting inferiorly. Vertebral subluxations were consistently found and adjusted in the cervical, lumbar, and sacral regions. Subluxations were found and adjusted sparingly in the thoracic region and extremities.

In addition to chiropractic adjustments, several modalities were implemented into his care. The Vertigone goggles, NewReality glasses, Digital Audio Visual Integration Device Portable and Lightweight (DAVID PAL36) Audio-Visual Entrainment (AVE) glasses, and a Pettibon wobble chair were used on various visits.

The Vertigone goggles were used to increase overall cerebral blood flow regulation through stimulation of the otolith organs and vestibular apparatus. The patient put on the goggles while in the supine position with his head off the table. He would match up the “R” in a bubble when he turns to the right and the “L” in a bubble when turning to the left. Each position is held 30 seconds.

This treatment was started on the 18th visit and used during a majority of all visits following an adjustment. To elicit a concomitant vestibular stimulation, the patient would also perform this Vertigone exercise on a wobble chair. The added instability of the wobble chair forced the brain (especially the spinocerebellar and vestibulospinal tracts) to fire even more, which increased the neuronal plasticity. 

The wobble chair exercise was implemented on the 19th visit and 6 other intermittent times over the course of care. On the 34th visit, and in order to address a possible left cortical functional deficiency, the Depression Reduction level was used on the DAVID PAL36 glasses. The patient put on the glasses and headphones and sat in a relaxed position with either eyes open or closed for 30 minutes and breathed in and out deeply every 2 beats heard in the headphones. This level settles down negative emotions from the right brain while stimulating the left brain to rebalance alpha asymmetry.

The New Reality glasses were used on one visit.

**Outcomes**

A reassessment was performed after three months of care. The patient self-reported feeling better. He had little neck or shoulder pain and stated he felt happy for the first time in about 10 years. A Short Form Health Survey (SF-36), Beck Depression Inventory (BDI-II), Neck Disability Index (NDI), and Quadruple Visual Analog Scale (QVAS) for neck and shoulder pain were given to assess the patient’s status.

The SF-36 measures general health status for two categories, Physical Component Summary (PCS) and Mental Component Summary (MCS), and four subcategories: General Health, Bodily Pain, Physical Function, and Mental Health. For these subcategories, the patient’s scores were 25, 12, 60, 20 at the start of care and 47, 51, 85, 56 at the time of reassessment.

The QVAS is a self-reported pain scale and is rated from 0-10 with 10 being the worst possible pain. The BDI-II is a 21 item self-report questionnaire that assesses a patient’s symptoms for depression. The NDI is also a self-reported questionnaire that measures pain and function/disability and is a criterion standard in various studies. The scores are displayed in Table 1. The patient showed improvement for each questionnaire. He also reported a significant decrease in his shoulder and neck pain. He was also functioning much better physically and mentally.

The SRE revealed several positive results. Heart rate, temperature, respiration rate, and skin conductance were all within normal levels. His neurological status improved significantly three months into care and his autonomic nervous system has begun to function and react more appropriately to stimuli.

Bilateral weight scales showed 86lbs. on the left and 90lbs. on
the right indicating an improvement in weight distribution from the start of care. The visit that the New Reality glasses were used the patient described enjoying a sense of calm afterwards.

Overall, the patient reported being happy once again and discussed his desire to stop all drug use with his medical doctor. He later reported that he had stopped taking all his pain medications.

**Discussion**

Chronic pain has long been implicated in people diagnosed with depression and/or anxiety. Depression and anxiety has been linked to hypothyroidism, diabetes mellitus, seasonal affective disorder, drug reaction, major health problems, job loss, and marital difficulties, among many other factors.\(^1,2\) A prudent practitioner needs to examine all possibilities when working with a patient presenting with depression or anxiety.

There are many theories proposed on why depression manifests.\(^3\) Likewise, there are many theories of how an adjustment can help with chronic pain, depression, and anxiety. Instrumentation can be used to measure the progress of the patient’s autonomic nervous system state as was done in this case. Every stressor should elicit a sympathetic nervous system response which correlates with increases in heart rate, skin conductance, respiration rate, heart rate variability, and muscle activity.

On the other hand, a patient relaxing with their eyes closed should elicit a parasympathetic nervous system response. This is associated with a decrease in all the aforementioned areas.\(^12,13\) Additionally, the instrument calculates how much time you spend in a certain brain wave during the whole test.

An individual with high Beta waves, for example, will have a propensity to be more alert throughout the day while a person with Alpha waves will exhibit more calmness. A few studies using Diversified Spinal Technique, Network Spinal Analysis and Torque Release Technique have shown that chiropractic has helped people by decreasing sympathetic output (or increasing parasympathetic output as in the case of heart rate variability normalization after chiropractic care) and increasing psychological well being.\(^20,25\) To understand neurologically how chiropractic adjustments have such an effect, it is necessary to review literature pertaining to the nervous system and how it is closely intertwined with the spine.

Researchers have found that a neuron needs three basic things for optimal functioning – oxygen, nutrition, and stimulation.\(^26\) While nutrition and oxygen are easily attainable given adequate environmental factors and good diet, stimulation is more difficult to attain. Something as simple as a slip on the sidewalk or as severe as a major car accident can lead to spinal motion dysfunction. This biomechanical dysfunction leads to altered proprioception (subconscious sensory information regarding self position and movement) from the spine’s mechanoreceptors (subconscious movement receptors in joints) and spinocerebellar tracts and diminishes the continued feedback sensory/motor system as well as a component in the central processing systems.

In addition, a loss of proprioception can lead to motor dysfunction regarding direction and amplitude. This process dampens the firing (less plasticity) of specific neuronal tracts which can lead to diminished firing of the cerebellum and ultimately the contralateral cortex due to a diachisis relationship.\(^12,27\) This lack of proprioception leads to a decreased frequency of firing of the nerve tracts affected and results in aberrant firing producing dysfunction in that tract.\(^12,28\) Restoring proper biomechanics of a subluxated joint through chiropractic adjustments results in restoring joint alignment, muscle tone, and proper proprioceptive feedback. As a result, stimulation has been increased centrally and neurons are functioning better.\(^12\)

In addition to all those positive changes, pain will also be decreased. This is because proprioception is closely linked to mechanoreception and nociception (tissue damage and chemical irritation receptor, usually perceived as pain). As alluded to before, inappropriate proprioception leads to alterations in mechanical receptors. Mechanical receptors work in concert with nociceptors. If mechanoreception increases than nociception decreases.\(^12\) This is vitally important to animal survival because when danger is imminent, it is crucial for the animal to subdue the pain and increase joint motion. Moreover, chronic nociception, as in this patient’s shoulder and neck, is a very subclinical debilitating mechanism. It leads to chronically high cortisol (stress mediated) which can lead to glucose intolerance, apoptosis of neurons, and inhibition of adult neurogenesis amongst other pathological physiological processes.\(^3\) All these processes are a result of a chronically high sympathetic nervous system state, which the SRE is able to detect.

Proprioceptive feedback also affects postural reflexes which include the vestibulospinal tract and reflex, the vestibulocolic reflex, cervicocolic reflex, and vestibular-ocular reflex, amongst many others. All these reflexes are being activated through the Petibon wobble chair exercise and stimulating the central nervous system globally through the reticular formation.\(^12,29\)

For example, the vestibulospinal tract mediates the reflexes necessary to maintain balance and posture in light of center of mass and gravitational changes. As the patient is moving his body back and forth and side to side on the unstable chair, his vestibulospinal tract is being stimulated. Also, this pathway projects to the cervical and thoracic levels of the spinal cord and is therefore involved with upper limb and neck movements, which will only provide more sensory input for the patient’s shoulder.\(^12,29\)

Furthermore, the vestibulospinal tract transports afferent information from the vestibular apparatus of the inner ear and descending efferent information from the inferior and lateral vestibular nuclei.\(^12\) This relates to the Vertigone procedure that was used not for BPPV in this case, but mainly for increasing cerebral blood flow in general.

According to Serrador, the maneuvers done by the patient that mirrored Epley’s stimulated the patient’s otolith system which in turn changes cerebral blood flow velocity.\(^30\) Increasing blood flow to the brain provides more nutrients and oxygen and leads to better function.\(^12\)
To further stimulate brain function, brain wave therapy was instituted using New Reality glasses and DAVIDPAL-36 audio-visual entrainment glasses. It is important to note that these treatments were both experimental in nature since no electroencephalograph was used to record the patient’s brain wave activity pre or post treatment.

According to New Reality research, they have developed a treatment called Frequency Following Response Technology that is able to entrain someone into Theta frequency within 7 minutes. As a result, the person would be in a more relaxed, stress-free state. No supporting reviewed research was found for these claims, but it has been shown to work anecdotally.

The DAVID PAL36 glasses were used specifically to target the left cortex region of the brain since research suggests depression is linked to a decrease activity in the left frontal lobe. The DAVID glasses were set on a Depression Reduction setting which translates to the patient receiving 10Hz (Alpha) frequency in his right cortex and 19Hz (Beta) in his left cortex. This simultaneously entrained the brain waves of the left (depressed) cortex to a higher frequency while decreasing the right cortex frequency. However, it is not known how long these effects last or if even a better outcome can be achieved through different frequencies. More research is needed on specific brain wave entrainment and its effects.

Although the interventions in this case were predominately neurologically based, it is important to understand the close relationship the nervous system has with neurotransmitters (monoamines and neuropeptides) and neurochemicals and depression/anxiety. As previously discussed, many theories and explanations exist for hormonal imbalance. One such detailed explanation focuses on a model called the Brain Reward Cascade that revolves around dopamine deficiency in the brain:

The dopaminergic system, and in particular the dopamine D2 receptor, has been implicated in reward mechanisms. The net effect of neurotransmitter interaction at the mesolimbic brain region induces "reward" when dopamine (DA) is released from the neuron at the nucleus accumbens and interacts with a dopamine D2 receptor. "The reward cascade" involves the release of serotonin, which in turn at the hypothalamus stimulates enkephalin, which in turn inhibits GABA at the substantia nigra, which in turn fine tunes the amount of DA released at the nucleus accumbens or "reward site." It is well known that under normal conditions in the reward site DA works to maintain our normal drives. In fact, DA has become to be known as the "pleasure molecule" and/or the "antistress molecule." When DA is released into the synapse, it stimulates a number a DA receptors (D1-D5) which results in increased feelings of well-being and stress reduction.

If this cascade is not functioning properly due to lack of neuronal firing or neurochemical regulation then the person will not have pleasant experiences and become more depressed. Furthermore, Desaulniers found in a literature review that neuropeptides are abundant in the dorsal horn of the spinal cord. This means that every level in the spinal cord has a link to the brain. Because vertebral subluxations can compromise neural integrity, it can be reasoned that correction of vertebral subluxations can influence neuropeptide function and the related brain reward cascade. This may further explain documented studies that show how chiropractic was able to subdue symptoms and improve quality of life.

Moreover, Beck explains that dysfunction in the left cortex is not merely enough to trigger depressive symptoms and that environmental factors need to be involved. In this patient’s case, his prolonged use of analgesics and Ativan for anxiety could have interfered with the brain reward cascade. Listed side effects for Hydrocodon and Oxycodon are anxiety and for Ativan is depression.

Limitations to Study

You cannot control all the variables affecting a person outside a practitioner’s office. It is not known if certain psychosocial elements in the patient’s life improved and are partially or completely involved in his symptom reduction.

It is also hard to prove how a person reacts to the instrumentation reassessment test given their familiarity with it a second time. If they are less apprehensive and more comfortable with the office and procedure, then they are more likely to exhibit less sympathetic response. However, this is purely speculative.

In addition, it is impossible to control the accuracy with which the patient performs the specified movements for VertiGONE goggles and Pettibon wobble chair.

Conclusion

From the retrospective questionnaires and SRE results, the patient had decreased pain, better physical and mental function, and better autonomic nervous system function. However, it cannot be concluded which treatment worked best for the patient. There have been no studies comparing the neurological effects of an adjustment, AVE glasses, Vertigone goggles, optokinetic tape, and Pettibon wobble chair.

The patient’s results could have been attributed to an interaction of all these interventions or just a few or maybe just a placebo effect from manual therapy. More research, especially studies of many subjects exhibiting chronic musculoskeletal pain and depression or anxiety, is needed to further our understanding of how chiropractic care benefits this patient.

Acknowledgements

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References


Table 1. Self-reported questionnaire results at the start of care and at three month reassessment.

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|               | 40% - moderate | 16% - minimal |
|               | 46 - severe depression | 11 - minimal depression |