
CASE STUDY

Upper Cervical Chiropractic Management of a Patient Diagnosed with Idiopathic Parkinson's Disease: A Case Report

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ABSTRACT

Objective: To demonstrate the effectiveness of upper cervical chiropractic care in managing a single patient with idiopathic Parkinson's disease and to describe the clinical findings.

Clinical Features: A 63-year-old man was diagnosed with Idiopathic Parkinson's disease after a twitch developed in his right hand at rest. Other findings included loss of energy, anxiety and localized middle back pain.

Intervention and Outcomes: Hole-In-One (HIO) Knee Chest protocol was used over a 4 week period using x-ray procedures, and analysis, skin temperature differential (pattern) analysis and Knee Chest adjusting technique. Contact-specific, low amplitude, high-velocity, moderate-force adjustments were delivered to the Atlas vertebra. The patient experienced significant improvements in his quality of life using SF-36, PDQ-39 and subjective intake during upper cervical care. The patient also showed considerable improvements in overall bodily pain, active and passive cervical range of motion, postural correction and better quality of sleep following the cessation of restless leg syndrome.

Conclusions: We conclude that improvement of the Atlas alignment was associated with reduction of most of his Parkinson's symptoms including decrease in frequency and intensity of his middle back pain, improvement in his quality of life and improvement in his motor function.

Keywords: *Idiopathic Parkinson's disease, upper cervical care, middle back pain, subluxation, chiropractic, Knee Chest, HIO.*

Introduction

In the United States, 50,000-60,000 new cases of Parkinson's disease (PD) are diagnosed each year, adding to the one million people who currently have PD.¹ Parkinson's disease is considered a chronic and progressive disorder of the central nervous system and characterized by gradual loss of dopaminergic neurons in the substantia nigra.² Because dopamine is considered as an inhibitory neurotransmitter, it is thought that the lack of dopamine allows the basal ganglia to

send continuous excitatory signals to the corticospinal motor control system.³ Therefore over excitation of the motor cortex (caused by lack of inhibition) creates typical Parkinson's symptoms such as bradykinesia, rigidity, resting tremor (initially unilaterally and usually of the hands), postural instability and good response to levodopa.⁴ However, the clinical recognition among the various Parkinsonian syndromes cannot always be made with accuracy.

Some characteristic clinical features are useful in the differential diagnosis.⁵ Growing evidence suggests that PD and

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depression are linked. Patients with PD often present depressive symptoms during the course of their disease.⁶

Several prospective studies have reported a higher risk of developing PD among individuals with depressive symptoms or taking antidepressants.⁷⁻¹¹ Depression, anxiety, sleep disorders and other cognitive changes are part of the non-motor symptoms of this disease. Few studies have also shown increase in prevalence of restless leg syndrome (RLS) in patients with PD.^{12,13}

In this particular case, we evaluated and managed an idiopathic case of Parkinson's disease which is the most common form of Parkinsonism. It is a group of movement disorders that have similar features and symptoms than PD with unknown etiology.¹⁴

The initial conventional therapy is the prescription of drugs such as Azilect, Levodopa and Artane. Controlled studies related with idiopathic Parkinson's medication such as Azilect noted that the most commonly observed adverse reactions were $\geq 3\%$ greater than the incidence in the placebo-treated patients and included flu syndrome, arthralgia, depression, and dyspepsia.¹⁵

Other medications such as Artane have side effects, such as dryness of the mouth, blurred vision, dizziness, mild nausea or nervousness, that will be experienced by 30 to 50 percent of all patients.¹⁶ In conclusion, the use of the medication seems to be at an experimental stage and do not represent a cure for this particular condition.

Case Report

Patient History

The patient is a 63-year-old male Pastoral Counselor complaining of resting tremors of the right hand, anxiety and middle back pain. Both of his complaints started about a year and a half prior following a severe case of the flu that lasted 2-3 weeks where he lost 15 pounds and never sought care for it. He presents as a frail white male with low tone of voice and reduced facial expressions.

He describes his middle back pain (T11-12 area) as a stabbing pain of 5/10 when bending forward, driving and/or standing for more than 20 minutes. The chief complaint of right hand tremor associated with middle back pain and anxiety was diagnosed by a neurologist as Idiopathic Parkinson's disease following an MRI study of the brain presenting as normal. The neurologist prescribed Azilect 1 mg/day (Rasagiline mesylate) and Artane (trihexyphenidyl HCl, USP) which are indicated for the initial treatment of idiopathic Parkinson's disease.

The Pastoral Counselor stated that he also works as a marriage counselor which increases his daily stress level to 8/10 on a daily stress level scale. He also has been experiencing restless leg syndrome at least twice a week for the past two years with poor quality of sleep. Various previous conditions have been noted in his past medical history such as recurrent sinus infections since 1960, melanoma on the back of his right shoulder in 1975, IBS in 1981, neck and right shoulder pain in

1990, lower back pain in 2000, took lexapro, (escitalopram oxalate) antidepressant medication in 2005 for a year period, and left inguinal hernia surgery in February 2010.

Chiropractic Examination

Significant findings during the patient's physical examination are reported as follows. In a prone position, patient presented with postural imbalance of left short leg discrepancy at $\frac{1}{2}$ inch and in a supine position a right short leg at $\frac{1}{2}$ inch. The weight bearing postural assessment of the patient revealed an abnormal severe anterior head translation at 2 inches (using external auditory meatus and middle of the deltoid as reference points), right head rotation at $\frac{1}{2}$ inch and right head tilt at $\frac{1}{4}$ inch.

The patient also presented with a left high shoulder at $\frac{1}{4}$ inch and left high Ilium at $\frac{1}{4}$ inch. Active range of motion of the cervical spine showed severe restriction on left lateral flexion at 10/40 degrees and right lateral flexion at 20/40 degrees using an inclinometer. Passive range of motion revealed similar restrictions upon left and right lateral flexion of the head without pain. Upon palpation, taut and tender fibers were found at C1, C2, C4, T7, and at the sacrum area.

Lumbar paraspinal and left quadratus lumborum muscles also presented with taut fibers and tenderness. Visceral examination revealed abnormal "finger rub" test with no hearing past two feet. Orthopedic and neurological examinations showed normal reflexes, normal dorsal column examination such as Romberg's test and normal cerebellar motor functions. Upon testing, no pain was found from the area of middle back pain (T11-12).

The presence of vertebral misalignment in the upper cervical spine regions was confirmed by the findings on digital cervical X-ray, motion palpation, range of motion, and static palpation. Instrumentation using Tytron thermography determined severe temperature asymmetry at the level of the C-1 (Left paraspinal region > Right by 0.83 Celsius), C-2 (Left paraspinal region > Right by 0.75 Celsius) and left mastoid fossa greater by 0.72 Celsius on December 04, 2010.

Temperature asymmetry suggests aberrant function of the sympathetic nervous system innervating the skin vascular beds when temperature asymmetry is greater than 0.5 Celsius.¹⁷ As described by Brown et al., all thermographic data were obtained using the TyTron C-3000. Thermographic data were recorded on each visit prior to any handling or other clinical data taking. Thermographs were done with the patient seated. The instrument was used to scan from C-7 to base of the skull and taking right and left mastoid fossa temperatures. (Brief light contact directly on the skin in the mastoid fossa holding the instrument at a slightly anterior-inferior angle to the fossa.)¹⁸

Digital x-ray films were taken of the patient's lumbar spine, including T-11 and T-12 area, of antero-posterior and lateral views. Lateral L-5 spot shot and pelvis views were also taken to rule out any pathology. Cervical views were also used including antero-posterior, antero-posterior with open mouth (APOM) and lateral films. A vertex view using head clamps to maintain head in proper alignment was also included in the

series. X-ray films were taken after establishing a similar pattern of paraspinal thermography (pattern with greater than 0.5 Celsius asymmetries at C-1 level) recorded on computer over a 2 week period. Osseous and soft tissues of the lumbar spine and pelvis were unremarkable. X-ray examination of the cervical spine showed secondary intervertebral (osteo) chondrosis including osteophytosis at C-5 and C-7. Uncovertebral arthrosis (degenerative joint disease of the uncovertebral joint) was observed at C-5 to C-7. Between C-4 and C-5, an intercalary bone was seen which corresponds to ossification of the intervertebral disc interposed between two intervertebral bodies.

Using HIO Knee Chest protocol, all cervical views were then analyzed. The lateral film showed a military neck at 0 degrees between C-2 and C-7, which is usually represented as a smooth lordotic curvature. We noticed an adaptative change in the curvature at the level of C-1 vertebra to allow neck extension. A line was drawn on the digital film, originating from the center of the Atlas' (C-1) anterior arch, to the midline of the posterior arch at its most narrow portion. We then drew a horizontal line intersecting with the center of the Atlas' anterior arch and measured an angle of 19.5 degrees.

A cervical gravity line was added through the apex of the odontoid process, showing anterior head translation. On the APOM view, we drew a dot at the base of the odontoid process of the Axis (C-2), corresponding to the center of the foramen magnum. Using computerized technology, we drew a circle using the above dot as the center of rotation. To determine the diameter, we used the left most-lateral aspect of the Atlas' lateral mass, where the junction of its posterior arch superimposes its lateral mass.

Left Atlas translation was indicated by a 3.46 mm gap between that circle and the right most-lateral aspect of the right Atlas' lateral mass. On the vertex view, we measured the amount of C-1 rotation by drawing a line crossing the center of both transverse foramen at the level of atlas, and another line intersecting it that passes in the center of the clivus and the nasal septum cartilage. This resulted in 5.8 degrees of anterior rotation of the Atlas' left lateral mass.

The above measurements give us a three dimensional description of an Atlas misalignment, known as AS+LA. Normally the superiority of the Atlas' anterior arch relative to its posterior arch is maintained between 8 to 10 degrees, but with this patient, it was 19.5 degrees. The third letter of this listing, L, represents left laterality of the Atlas on the APOM view, and the fourth letter, A, represents left lateral mass anteriority of the Atlas vertebra on the vertex view.

Chiropractic Care

The patient was examined and cared for utilizing Knee Chest protocol based on the original upper cervical chiropractic research performed by Dr. B.J. Palmer seventy years ago and a recent description of the technique's application conducted by Dr. Micheal U. Kale.^{19,20} It includes the use of pre and post paraspinal thermal imaging following adjustment, (paraspinal repetitive scans contained static thermal asymmetry of 0.5°C or higher at the level of C1-C2, which indicates neuropathophysiology originating from the upper cervical

spine), upper cervical radiographic analysis (Left C-1 translation is hypothesized that the medulla and spine are disfigured and/or torque such that it creates distortion of the spinal cord.)²⁰ Knee chest adjusting procedures (only done if the patient presented with a pattern of temperature asymmetry showing a warmer left side at C-1 greater than 0.5 Celsius), and post-adjustment recuperation (10-15 minutes to allow the body to assimilate new biomechanical information sent by mechanoreceptors).

The adjustment positioning requires the use of a special table, where the patient is on his knees and bends forward to apply his chest on the table. To accomplish a three dimensional correction of the subluxation, we have the patient's head rotated to the left in order to contact the posterior, inferior and lateral aspect of Atlas' posterior arch. By inducing a high velocity, low amplitude force in a clockwise manner, we theorize the reduction of Atlas' inclination of 19.5 degrees.

At the same time, we induced a vector coming from anterior-posterior and from left to right taking care of the other component of the initial misalignment. He presented initially with a right short leg at ½ inch in a supine position and a warmer left mastoid fossa at 0.96 Celsius compared to his right side. After the manual adjustment, his leg balanced in a supine position. Following this adjustment, the patient noted a decrease in resting tremor amplitude for a day period and a few episodes of epigastric pain with no known cause. After a week under care, the patient came in with subjective increase in energy following his previous adjustment. By the end of the second week of care, he reported greater range of motion in his neck and higher level of energy, allowing him to complete his week of work and participating in extra activities on that weekend.

About a week or so later the patient noted the absence of middle back pain for 3-4 days. The following week, he presented with middle back pain only if direct pressure. Temperature asymmetry lowered at the left mastoid fossa to 0.58 Celsius. A week later he was reassessed and noted significant changes concerning his thermographic analysis, posture, active range of motion (aROM) and quality of life.

After a month of corrective care two visits per week, his right short leg of ½ inch reduced to ¼ inch and absence of middle back pain since 2 weeks while bending forward, sitting and/or standing for at least an hour period. Postural analysis revealed improvement from 2 inches of anterior head carriage to one inch, right head tilt from ½ inch to ¼ inch, balanced hips and shoulders in a standing position.

Also his aROM of right lateral flexion went from 20 degrees to 30 degrees and left lateral flexion from 10 degrees to 20 degrees, using an inclinometer. QVAS of middle back pain improved from 3,5,0,8 to 0,6,0,8 (50%) on one and a half months later and to 0,2,0,2 (80%) about 2 ½ months later., see Table 1. SF-36 went from 36 PCS, 47 MCS initially to 47 PCS, 52 MCS about a month and a half later, see Table 2. We also requested the patient to fill out at home with his wife two PDQ-39 questionnaires, one describing perception of his condition after care and one describing it at the beginning, see Table 3.

Discussion

Parkinson's symptoms have important adverse impacts on patient's lives. With PD, patients not only experience functional impairment, but the disease also affects their emotional and social life.^{22,23} There are some instruments available that measure the severity of PD, but they do not focus on the patient's subjective experience of the illness.²²⁻²⁴ In order to quantify and qualify the profile of this patient we assessed the patient's subjective experience with SF-36 and PDQ-39.

We found great support for the responsiveness following 4 weeks of care from those questionnaires, on both external criterion variables, including the variable on difficulties of day-to-day activities. There were significant improvements after 4 weeks of care, indicating a role for upper cervical alignment in patients with Parkinson symptoms, including depression, quality of life and/or bodily function, see Tables 1-3. More than a million Americans suffer from this chronic and progressive disease and not only does it affect the person, but their entire family.

The medical and chiropractic literature is expanding to demonstrate the relationship between proper bony alignment of the cervical spine and proper nervous system communication with the body. Atlas subluxation (meaning a misalignment affecting the nervous system) can be associated with infection, trauma and unguarded movement²⁵⁻²⁸ Various theories have been proposed to explain the effects of specific chiropractic adjustment; a combination of those theories seems to explain the major changes seen in this patient after receiving care.

The upper cervical region is uniquely developed with poor biomechanical stability to allow great range of motion in the cervical spine along with the greatest concentration of spinal mechanoreceptors. The Atlas relies solely upon soft tissue (muscles and ligaments) to maintain alignment; therefore, the Atlas is uniquely vulnerable to displacement.²⁸ Other studies have shown a correlation between improper cervical spine alignments causing decrease in cerebral blood flow. Anatomical abnormalities of the cervical spine at the level of the Atlas vertebra have been shown to be associated with relative ischemia of the brainstem circulation.²⁸

Unlike other vertebrae, which interlock one to the next, displacement of C-1 may be pain free and thus, remain undiagnosed and untreated, whereas health-related consequences are attributed to other aetiologies.²⁸ This relative ischemia of the brainstem has been associated with various types of health concerns, but never specifically to one condition in particular. We theorize that the misalignments found in this case study could induce over time Parkinson related symptoms.

An additional theory concerning the nourishment of the brain is related to cerebrospinal fluid.²⁹ Johanson et al. describe the cerebrospinal fluid (CSF) production, flow and importance in great detail. It is called the third circulation of the brain and it is the least understood. CSF production and flow is critical to brain nourishment, cushioning and protection. In terms of protection CSF is important to brain support to prevent the

brain from sinking in the cranial vault. Conversely, excess CSF volume compresses the brain. It comes from arterial blood that has been filtered through the blood brain barrier (BBB) to the point where it is mostly water and glucose to feed the nerve cells. About sixty percent of the CSF produced in the brain ends up in the spinal cord. Eventually most of the CSF in the spinal cord makes its way back up through the subarachnoid space of the cord and into the subarachnoid space of the brain.

From there it travels up to the superior sagittal sinus and arachnoid granulations to exit the brain along with venous blood. The CSF that leaves the brain on its way down to the cord, however, must first pass through the upper cervical spine. The subarachnoid space is delimited by the arachnoid mater, which is firmly attached by the denticulate ligaments to the dura mater in the spinal cord, and to the pia mater that covers the spinal cord.³⁰ Likewise, on its return trip back to the brain, it must again pass through the neural canal of the upper cervical spine. Therefore, the upper cervical spine is an important link in the flow of CSF between the subarachnoid space of the brain and the cord.

The Journal of Bone and Joint Surgery has reported that at the extreme of physiological axial rotation (47°) the spinal canal is reduced to 61% and also stated that any rotation is likely to cause cord compression.³¹ Even though it is considered safe to rotate the Atlas to 47 degrees, the study did not mention its effect on the CSF flow or the effect of upper cervical misalignment to the spinal cord over an extended period of time. In this case study, the patient presented with severe anterior head carriage, atlas rotational misalignment and lateral displacement. We propose that further MRI study in a standing position should be done on these patients to determine the arterial blood flow and CSF flow, demonstrating the irrigation to the brainstem area and to the substantia nigra, pre and post chiropractic adjustment.

Conclusion

We conclude that Atlas re-alignment was associated with the reduction of Parkinsonian symptoms including various motor and non-motor conditions. We also recognize the correlation between proper bodily functions and overall health improvement.

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Table 1 - Quadruple Visual Analogue Scale -- (QVAS) : Results from middle back pain

QVAS	Initial	1.5 months later	2.5 months later
Current pain	5	0	0
Average pain	5	6	2
Pain level at its best	0	0	0
Percentage of awake hours is your pain at its best		50%	80%
Pain level at its worst	8	8	2

Source : Provided by the patient during the initial visit and reassessments

Table 2 - Health Survey Questionnaire -- (SF-36) : Scales and results for each item

SF-36	Initial 12/4/2010	Follow-up After 2 Months
PCS	36	47
MCS	47	52
General health	37%	37%
Bodily Pain	41%	62%
Physical functioning	90%	95%
Mental health	64%	72%

The higher the percentage, the better the domain score.

Table 3 - Parkinson's Disease Questionnaire -- (PDQ-39): Raw Score and Percent Rating of Disease Progression

PDQ-39	Pre	Post
Mobility	7 (5%)	2 (5%)
Activities of daily living	4 (17%)	8 (33%)
Emotional well-being	54 (17%)	20 (83%)
Stigma	37 (5%)	18 (75%)
Social support	0%	0%
Cognitive impairment	18 (75%)	6 (25%)
Communication	0%	0%
Bodily discomfort	58 (33%)	41 (67%)

*The lower the percentage, the better the outcome

Figure 1. Lateral cervical view -- AS+; 19,5 degrees angulation



Figure 2. APOM View Initial -- Left Atlas translation by 3.46 mm

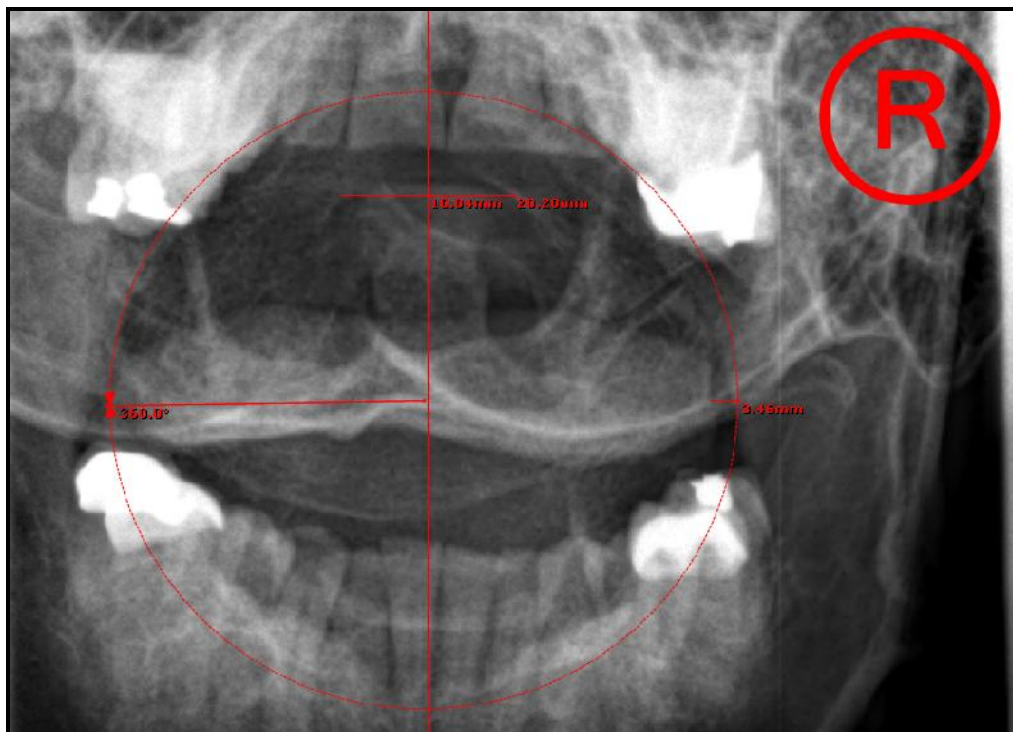


Figure 3. APOM view Post – 2 Months Later -- Left Atlas translation by 2.1 mm

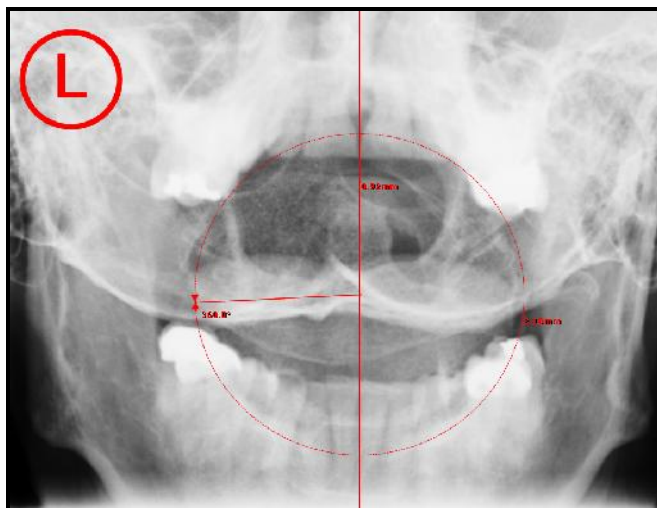


Figure 4. Vertex View Initial -- Anteriority of left C-1 lateral mass by 5.8 degrees

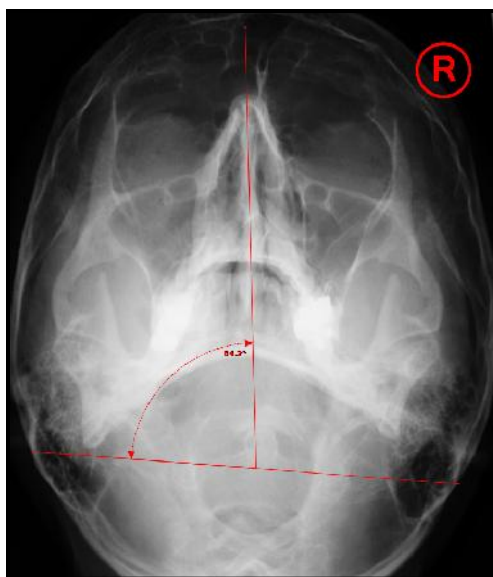


Figure 5. Vertex View Post – 2 Months later -- Anteriority of left C-1 lateral mass by 5.2 degrees

