

# REDUCTION OF CERVICAL DYSTONIA AFTER AN EXTENDED COURSE OF CHIROPRACTIC MANIPULATION: A CASE REPORT

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## ABSTRACT

**Objective:** The diminution of the signs and symptoms of cervical dystonia following an extended course of specific chiropractic manipulation is described.

**Clinical Features:** A 38-year-old man had gross anterior-lateral torticollis, focal dystonia of the head and neck, and radicularlike pains which failed to respond to physical therapy, medication, and injection.

**Interventions and Outcomes:** Two specific spinal manipulative technique systems unique to the chiropractic profession (Applied Biostructural Therapy [ABT] and Atlas Coccygeal Technique [ACT]) were applied to the patient. The patient's grading on a modified cervical dystonia scale dropped from a grade 16 to a grade 5 after an extended course of these specific chiropractic manipulative techniques.

**Conclusions:** The application of Advanced Biostructural Therapy and Atlas Coccygeal chiropractic techniques for management of cervical dystonia is presented. Substantial reduction in the cervical dystonia rating scale was observed with this approach, even after standard medical interventions had failed. (*J Manipulative Physiol Ther* 2004;27:421-6)

**Key Indexing Terms:** *Chiropractic; Cervical Dystonia; Torticollis; Chiropractic Manipulation; Movement Disorder; Alternative Medicine*

## INTRODUCTION

Cervical dystonia (CD) is a focal movement disorder of the head and neck with an uncertain etiology. While the exact cause of this condition is unknown, multiple abnormalities have been identified in patients with CD. Reports suggesting dysfunction in the vestibular system,<sup>1,2</sup> defects of sensory-motor integration,<sup>3</sup> and lesions in the brainstem<sup>4</sup> and cervical spinal cord<sup>5</sup> appear in the literature. There is growing evidence that CD is associated with dysfunction of the extrapyramidal system<sup>4,6,7</sup> and even an association between short leg<sup>8</sup> and CD has been described. It remains unclear, however, if these various abnormalities are part of the primary physiopathology of the disease or if they are merely epiphenomena.

Despite the idiopathic nature of CD and the diverse abnormalities observed in the condition, CD patients have a

rather well-characterized clinical presentation. Symptomatically, CD may be painful with a radicularlike or myelopathic-like presentation<sup>9,10</sup> or it may present as a relatively painless movement disorder. By far, the most striking aspect of the presentation is involuntary muscle activation that leads to gross postural distortion, motor tics, and twitches.<sup>4,11,12</sup>

In cervical dystonia, the observed involuntary motor activation is confined to the head and neck musculature and leads to postural distortions in one or any combination of sagittal, coronal, and/or axial planes resulting in the appearance of torticollis.<sup>12</sup> Unlike the torticollis seen in orthopedic patients, the torticollis of CD is not fixed and the patient has some ability to override the involuntary muscle activation that creates the abnormal posture.<sup>11</sup> Another characteristic finding in CD is the *geste antagonistique* (GA) phenomenon.<sup>11,13</sup> The GA phenomenon has also been described as "sensory tricks" that the CD patient employs to temporarily overcome involuntary muscle activation and abnormal posture.<sup>11</sup> Classically, the CD patient will pull on his chin or touch the top of his head in an attempt to override the involuntary muscle activation.<sup>11</sup> These involuntary motor activation patterns and resultant postural abnormalities are also more than cosmetic; they have been shown to produce profound degradation of quality of life in CD patients.<sup>9,14,15</sup>

Electromyography (EMG) studies of dystonic muscles have documented abnormal activation patterns and

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disintegration of motor control in CD patients.<sup>16-20</sup> It appears that a lead or trigger muscle can be identified.<sup>18,19</sup> This lead muscle then triggers abnormal involuntary activity in other synergistic and/or antagonistic muscles.<sup>18</sup> The abnormal muscle activity seen in CD also has several other interesting characteristics. The EMG activity does not always correlate with the expected increase in muscle activity that would clinically explain the patient's posture.<sup>16</sup> The abnormal motor activation appears to be a plastic phenomenon with patterns of activity changing even for a specific posture.<sup>17</sup> The abnormal motor activation patterns differ in the same patient and between patients for a given postural distortion.<sup>16,17</sup> Studies suggest that the muscle activation patterns seen in CD cannot be duplicated through voluntary muscle contractions.<sup>21</sup> Recent studies of central motor activation in CD patients using motor evoked potentials (MEPs) suggest abnormalities in central activation of muscles above and beyond those abnormalities documented in peripheral motor activation,<sup>3</sup> indicating a central nervous system component of the disorder.

Virtually all current treatments of CD are palliative.<sup>11,22,23</sup> With the exact cause of the condition unknown, it is not surprising that CD has proven to be refractory to most types of treatment. CD is definitely not a self-limited condition; one study suggests that spontaneous recovery was seen in only 12% of CD patients.<sup>24</sup> Conservative treatments requiring months or even years are not uncommon.<sup>25</sup>

Neuromuscular blockade using botulism toxin is emerging as the most viable conservative treatment option.<sup>22,26-28</sup> Unfortunately, like other treatments of CD, this is palliative and must be repeated, as the blockade wears off in several weeks to months.<sup>11,26</sup> Failure of adequate palliation after 1 to 2 years of conservative care is considered an indication for surgical interventions.<sup>25</sup> Current surgical procedures include muscle denervation<sup>22,25,27</sup> and, more recently, deep brain stimulation similar to those procedures used for Parkinson disease.<sup>6,7,22</sup> It is estimated that cervical dystonia affects 60,000 to 90,000 patients in the United States.<sup>11</sup>

## CASE REPORT

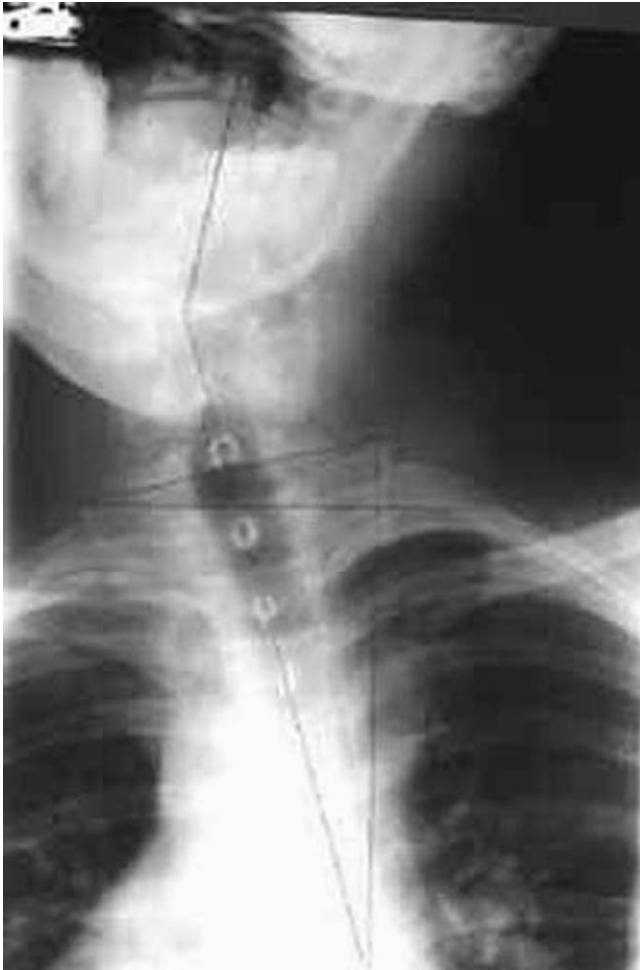
A case of reduced cervical dystonia following an extended course of specific chiropractic manipulative therapy (CMT) is reported. The manipulative techniques employed, Atlas Coccygeal Technique (ACT) and Applied Biostructural Therapy (ABT), are unique to the chiropractic profession.<sup>29,30</sup> The techniques employed were chosen because in the case of ACT, they purport to reduce coronal plane distortion and axial plane rotations of the head and neck,<sup>29</sup> and in the case of ABT, they purport to reduce anterior head translations.<sup>30</sup> These were the predominant presenting postural distortions of this case of CD (see Figs 1, 2, and 3) and they form the basis of at least 1 system designed to rate the severity of CD.<sup>12</sup>

The patient was a 38-year-old man. He had gross anterior lateral cervical torticollis. He could, with great difficulty, attain a neutral posture and retain it for several seconds. He had obvious involuntary motor activation that would "snap" his head back to the distorted position. He utilized the commonly described hand-to-chin and hand-to-top-of-head *gestes* to interrupt his involuntary muscle activity. He had received several courses of physical therapy and had a course of nerve injections that he believed made him worse. He was developing radicular pain patterns in his right arm. Documentation of the severity of his postural distortion was based on a modification of a postural rating scale that has been proven to be a reliable method to grade CD in clinical practice.<sup>12</sup> The Cervical Dystonia Severity Scale (CDSS) method utilizes a protractor and wall chart to grade the severity of the patient's head deviation from neutral in each of 3 planes of motion (axial, coronal, and sagittal).<sup>3</sup> The severity of the cervical dystonia is then scored in 5° intervals: mild or grade 1 = 1° to 5° of total deviation. The grades are increased in 5° increments. The most severe rating is grade 18, measuring between 86° to 90° of total distortion.<sup>3</sup>

In the case presented here, a combination of an arthrodiagonal protractor,<sup>31</sup> radiographs, and a computed tomography (CT) scan were used to obtain the baseline dystonic posture. The degree of lateral flexion in this patient can be seen in Figures 1 and 2. This measured 30° from the horizontal. The degree of rotational subluxation of the atlanto-axial complex can be seen on the CT image of the spine (Fig 3). The degree of axial rotation measured using an arthrodiagonal protractor was determined to be 15° to the left of midline. This tool also allowed for the measurement of the excursion and oscillations of the patient's head that were due to involuntary muscle contractions. They ranged from 5° to 15° and did not appear to have a set rhythm. The measure of forward flexion of the head and neck was derived by averaging the measures obtained from a lateral radiograph and the arthrodiagonal protractor. I chose to average these 2 measurements because the extreme distortion of the patient's head posture made accurate measurement in the sagittal plane difficult. Averaging the measures derived from the lateral radiograph and arthrodiagonal protractor yielded an anterograde distortion of 30°. The baseline total distortion in this patient was determined by adding the displacements measured in the axial, coronal, and sagittal planes. The total pretreatment distortion was 75°. Using the criteria of the CDSS, this would indicate a pretreatment cervical dystonia grade of 16.

## INTERVENTION AND OUTCOME

An abbreviated description of the chiropractic protocols of Advanced Biostructural Therapy and Atlas Coccygeal Technique is presented. A more detailed description of the methods can be found in Pratt<sup>29</sup> and Jutkowitz.<sup>30</sup>



**Fig 1.** AP radiograph showing lateral deviation of the patient's head and neck.

The Applied Biostructural Therapy approach to correcting head forward posture involves adjusting or manipulating the first rib and thoracic spine from an anterior to posterior direction.<sup>30</sup> These maneuvers are traditionally performed with the patient standing. However, they were modified in this case and performed with the patient supine on an adjusting table. The modification of the first rib adjustment consisted of placing the patient supine on an adjusting table equipped with an upper thoracic drop mechanism. The medial aspect of the first rib was palpated with the thumb. The thumb remained in contact with the first rib. The pisiform area of the opposite hand was placed over the palpating thumb. A thrust was directed inferiorly to superiorly and anteriorly to posteriorly. The thrust was high velocity and low amplitude and delivered with enough energy to cause the drop mechanism of the table to release. This manipulative procedure was repeated 3 times each visit (a number of repetitions arbitrarily determined by the author) on both the right and left first rib. It is my experience that this maneuver causes a rapid reduction of



**Fig 2.** APOM radiograph showing lateral deviation of the upper cervical spine.

abnormal head forward resting posture. Since the patient exhibited a gross anterior-lateral torticollis, I believed that the first rib maneuver would be an ideal manipulation to attempt to reduce the anterior distortion of the patient's head and neck. This maneuver was applied to the patient on each office visit over a course of 7 months and 54 manipulative sessions. Manipulation of the thoracic spine from anterior to posterior is also a major component of the ABT protocol. This manipulation is not materially different from other commonly employed extension-type manipulations of the upper thoracic spine.

The Atlas Coccygeal Technique is derived from the work of Grostic upper cervical technique system.<sup>29</sup> However, rather than relying on radiographs to determine the distortion of the skull-atlas-cervical spine complex, the ACT protocol uses postural assessment. Abnormal relationships between the occiput, atlas, and axis are believed to translate into postural distortions in the coronal and transverse body planes. Gross postural distortion is used as an indicator to determine the line of drive of the upper cervical adjustment. The theory of application is to "reduce" upper cervical subluxations that produce lateral



**Fig 3.** CT scan at the atlanto-axial complex. Note the rotational subluxation in the neutral head posture.

flexion and rotational deformities in the patient's head and neck posture.

Based on this case presentation, the Atlas Coccygeal Technique adjustment was deemed by me to be an appropriate procedure with which to attempt to reverse the patient's postural distortions.

The ACT adjustment consists of placing the patient in a side posture or decubitus position. The manipulation requires a specialized adjusting table equipped with a cervical drop mechanism. The side of the lateral flexion distortion is placed superiorly on the cervical drop mechanism. Here, the patient's left side was placed down against the table (left decubitus position). The drop mechanism of the adjusting table was lowered slightly to prestress the patient's head and neck into a neutral position (no left or right lateral flexion). The region of the right mastoid process of the skull was palpated with the author's left thumb. The mastoid process served as a landmark with which to identify (and remain in contact with) the transverse process of the C1 vertebra. Contact with the transverse process was maintained while the pisiform region of the doctor's opposite hand was placed in contact with the palpating thumb. I stood in front of the patient while performing the manipulation. The purpose of this position was to introduce an anterior to posterior vector on the right atlas transverse process (TP). This was introduced in an attempt to reduce both the rotational component of the upper cervical misalignment (head rotation in the transverse plane) and the lateral flexion of the head on the neck. The main component of the thrust was delivered with a line of drive superior to inferior (right atlas TP toward the left atlas TP). The amplitude of the adjustment was sufficient enough to cause the cervical drop



**Fig 4.** Reduction of torticollis after extended chiropractic treatment.

mechanism of the table to release. This procedure was repeated 3 times.

To summarize, the anterior thoracic and first rib adjustments of ABT techniques were applied for the purpose of reducing the anterior component of the patient's dystonic posture and the side posture upper cervical drop adjustments of ACT were applied to reduce the lateral flexion and rotational postural deformities seen in this case.

These techniques were applied 3 to 5 times per week for the first several months. Initially, there was no observable or

objective change in the patient's dystonic posture. The patient did feel subjective improvement. Based on this reported subjective improvement, the treatment regimen was continued. I did not see visible improvement in the patient's posture until after 3 months of care. The patient and his family, however, reported substantial improvements several hours after the adjustments. These reports started in the first month of care.

The intensity of this treatment regimen continued over the next few months. A measurable reduction in the patient's postural distortion became apparent. A subjective improvement in involuntary muscle activation also appeared to develop. Unfortunately, there was no adequate method available to attempt to document this change in motor activity. The change in the patient's total spinal distortion was from 75° pretreatment to 25° degrees after specific chiropractic manipulative procedures (see Figure 4). Using the CDSS scale, this case demonstrated a drop in cervical dystonia from grade 16 to grade 5 following a course of chiropractic manipulation.

## DISCUSSION

As with all single case studies, there are numerous limitations. Two obvious explanations for the substantial improvement seen in this patient include spontaneous recovery or a therapeutic response to the chiropractic manipulation described above. Spontaneous recovery in CD is unlikely, since it occurs in as little as 12% of the cases studied objectively. The fact that CD is resistant to most forms of intervention suggest that the treatment rendered influenced the clinical course seen in this case. This leaves open the possibility that CD in at least some cases may respond to CMT. As stated above, CD patients have abnormalities in vestibular, sensory-motor integrations, central motor activations, and/or extrapyramidal system function. Some studies suggest that CMT can have a positive clinical effect in vestibular dysfunction.<sup>32,33</sup> While vestibular dysfunction has been reported in some patients with CD, this case had no objective testing prior to manipulative intervention. So, it is impossible to know if vestibular dysfunction and its modification through CMT played a role in the reduction of dystonia seen in this case. Another study suggests that CMT can restore proprioceptive function in cervical spine.<sup>34</sup> This would seemingly be beneficial in patients suffering from movement disorders and involuntary abnormal cervical postures. Motor-evoked potential (MEP) studies have been used to demonstrate abnormal central motor function in CD patients. Recently, a motor-evoked potential study has demonstrated that CMT can alter central motor drive.<sup>35</sup> However, this study demonstrated facilitation rather than inhibition of central motor activity in normal subjects.<sup>35</sup> One would expect that facilitation of central motor function would exacerbate the central motor hyper-

activity measured in CD patients. A study investigating the affects of CMT on MEPs in CD patients might determine if CMT inhibits rather than facilitates central motor activity in these patients. The extrapyramidal system may be implicated in cervical dystonia. Parkinson disease is a common condition associated with dysfunction in the extrapyramidal system. Elster<sup>36</sup> recently published a case report of Parkinson disease that improved following a course of upper cervical chiropractic manipulation. The techniques used in the present case were very similar to the chiropractic techniques employed by Elster.<sup>36</sup> The mechanism for the observed improvement in her study is likewise unknown, suggesting the need for much more research in this area. Given the lack of an adequate treatment for CD, its profound affect on quality of life, and the substantial improvement seen in this case, collaborative research in a more controlled environment seems warranted. What cannot be appreciated in static radiographs are the waves of involuntary muscle contractions and the uncontrollable oscillations in the head and neck musculature. Technology that time-locks EMG activity to video recordings of the patient's dystonia has been developed, but it is not readily available outside specialized movement disorder centers.<sup>17,18</sup>

Does chiropractic manipulative therapy alter the abnormal muscle patterns in CD patients? This question can only be answered by conducting controlled trials and utilizing technology that is available to document not only the static postural changes seen in this case but also the dynamic and physiological video-link EMG data that documents the true physiopathology of CD. It is also unclear if the improvement seen in this patient was due to the specific type of chiropractic manipulation employed or if similar results could have been obtained using more traditional manipulative techniques.

## CONCLUSION

A case is presented that exhibited substantial improvement of cervical dystonia following specific chiropractic manipulation. Possible explanations for this observed therapeutic response are offered, and the need for future research of less traditional chiropractic techniques in general and in cases of cervical dystonia is suggested.

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