

Correction of Subluxation and Reduction of Dyspnoea in a 7 Year-Old Child Suffering From Chronic Cough and Asthma: A Case Report

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ABSTRACT

Objective: The chiropractic care of a patient with vertebral subluxations, dyspnoea, and severe asthma with chronic cough is described.

Clinical Features: A 6 year-old girl presented with three years of uncontrolled asthma that was trying to be managed with several different pharmaceuticals taken daily.

Intervention and Outcome: Contact-specific, high velocity, low-amplitude adjustments (Full Spine, and CBP mirror image) were applied to the sites of vertebral subluxations. No other adjuncts to care in the way of modalities were given. The patient experienced instant reduction in cough as reported by the patient's mother. In 30 days, no medication was being used.

Upon subsequent visits to the pediatrician, the patient also demonstrated a marked increase in lung volume.

Conclusion: The chiropractic care of a patient with vertebral subluxations, dyspnoea, and severe asthma with chronic cough produced marked resolution of the patient's symptoms, concomitant with an increase in lung volume and a reduction in the signs of subluxation findings.

Key Indexing Terms: *Subluxation, Peak Flow, Dyspnoea, Surface electromyography, Chiropractic, Asthma, Cough.*

Introduction

Asthma in children is very prevalent in the general population with nine million U.S. children under 18 being diagnosed with asthma. In 2005, an estimated 7.7% of people (22.2 million) currently had asthma.¹ Asthma rates among children in some parts of North America are four times higher than they were 20 years ago.²

In 2004, there were 14.7 million physician office visits and 1.8 million outpatient department visits due to asthma; and there were 1.9 million asthma-related visits to emergency departments in 2004. Sadly there are approximately 5,000 deaths from asthma annually.¹ Direct health care costs for asthma in the United States total more than \$11.5 billion annually; indirect costs (lost productivity) add another \$4.6 billion for a total of \$16.1 billion. Prescription drugs represented the largest single direct medical expenditure, over \$5 billion.¹ 12.8 million school days are missed annually due to asthma.¹

In this paper we will discuss the chiropractic management of a patient with subluxations, severe asthma and chronic cough, and briefly the economic impact chiropractic care had on this case.

One aspect of the evaluation of the patient is that her SEMG levels were high in the neck and in the T12 region. We will discuss the significance. Differential diagnostic considerations had been told to the patient, but subluxation was never one of them.

Case Report

A 7-year-old female entered our clinic with the chief complaint of chronic severe persistent asthma. The onset of the patient's symptoms began around 2 years of age. By the age of 4, she was diagnosed as having asthma. Her mother noted that almost anything from dust to cold drafts would trigger an asthmatic attack.

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At the onset of care the patient was using oral medication twice a day and three different inhalers four times per day each, for a total of 24 inhalations per day. There were more than ten other medications being used to manage the cough and fever. They are listed in her medical charts from the pediatrician as: Singulair, Claritin, Albuterol, Pulmicort, Tussi, Elidel, Nasonex, Xopenex, Pred Atrovent, Advair, Crantex, Zantac, PhenerganW/Codeine, Histenex, Tussionex, Tilade, and Theo 24 (200 mg). Even with this level of medication, the patient experienced daily attacks, almost constant wheezing and coughing, and a persistent tight and heavy chest. The patient was unable to engage in any physical activities.

The severity of her condition prompted emergency room treatment approximately five times per year. The patient's mother described countless hours of sleep lost each week due to her daughter's attacks. This affected both herself and the other children in the home, as well as extreme stress between biological father and mother as it was debated as to the best course of action for their daughter. The financial burden of the girl's condition cannot be overlooked as thousands of dollars had been spent on co-pay's in just a few short months from the CT, MRI, and x-rays. Instead of making other suggestions such as chiropractic, more medications were given, and increased dosages of inhalers were encouraged as a preventative. None of these were successful and her condition worsened. Concerned with the amount of medication that was given, the mother made an appointment with our office.

Chiropractic Examination

Upon examination, the patient presented with, a mildly increased but shallow respiratory rate with persistent inspiratory and expiratory wheezing. Her other vital signs, along with ear, nose and throat examinations, were unremarkable. Evidence of subluxation was found using palpation, surface electrode electromyography (sEMG) for muscle hypertonicity, and active and passive ROM. The sEMG signals were compared to published reference values with mild, moderate and severe elevations of muscle tension identified.³ Differences between one and two standard deviations indicate mild tension, two to three standard deviations indicate moderate tension, while three or more indicate severe tension.

In addition to the comparison with reference values, the amount of asymmetrical muscle activity was calculated, with mild, moderate, and severe asymmetries identified. Again, differences between one and two standard deviations indicate mild asymmetry, two to three standard deviations represent moderate asymmetry, while three or more indicate severe asymmetry.

Static sEMG Results

Readings up to one standard deviation above normal means were observed at: T6(L), T8(L), L1(L), L1(R), L3(R). Readings one to two standard deviations above normal means were observed at: T4(L), T8(R), T12(L), L3(L).

Readings two to three standard deviations above normal means were observed at: T1(R), T4(R), and T6(R). Readings more than three standard deviations above normal means were observed at: C1(L), C1(R), C3(L), C3(R), C5(L), C5(R), C7(L), C7(R), T1(L), T2(L), T2(R), T10(L), T10(R), T12(R).

Areas of significant asymmetry were noted at the following sites: T1(L), T4(R), T6(R), T12(R), L3(L). See Figure 1 and Table 1.

Figure 1 – Pre-sEMG

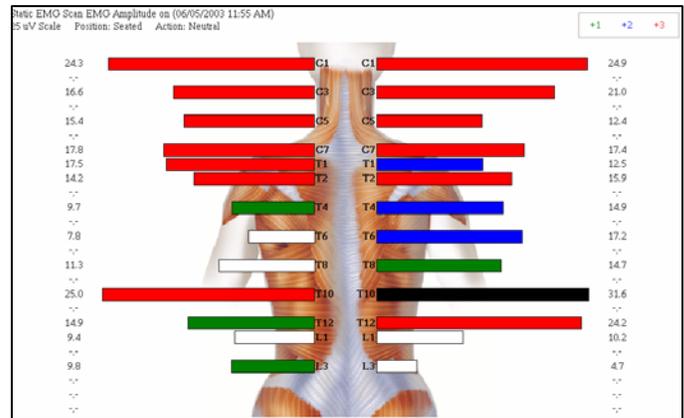


Table 1 – sEMG Values in Microvolts

| | Normals Left | Patient Left | % Diff | Normals Right | Patient Right | % Diff |
|-----|--------------|--------------|--------|---------------|---------------|--------|
| c1 | 3.8 | 24.3 | 639% | 3.9 | 24.9 | 638 |
| c3 | 4.4 | 16.6 | 372% | 4.3 | 21 | 488 |
| c5 | 4.2 | 15.4 | 366% | 4.1 | 12.4 | 307 |
| c7 | 4.8 | 17.8 | 370% | 4.6 | 17.4 | 378 |
| t1 | 4.9 | 17.5 | 357% | 4.9 | 12.5 | 255 |
| t2 | 5 | 14.2 | 284% | 5 | 15.9 | 318 |
| t4 | 0.5 | 9.7 | 15% | 6.4 | 14.9 | 232 |
| t6 | 8.4 | 7.8 | | 8.2 | 17.2 | 209 |
| t8 | 9.6 | 11.3 | 11% | 9.5 | 14.7 | 154 |
| t10 | 10 | 25 | 250% | 10 | 31.6 | 316 |
| t12 | 9.8 | 14.9 | 152% | 9.8 | 24.2 | 246 |
| l1 | 8.7 | 9.4 | 10% | 8.7 | 10.2 | 11 |
| l3 | 6.1 | 9.8 | 16% | 6.2 | 4.7 | 0 |
| l5 | 5.2 | 24.3 | 639% | 5.3 | 24.9 | 638 |
| s1 | 4.4 | | | 4.4 | | |

Palpatory examination was consistent with the sEMG and revealed significant palpatory hypertonicity and tenderness of the left C0-C4 paraspinal musculature. No decrease in ROM cervical active and passive ROMs was noted. Palpatory spinal joint examination revealed biomechanical abnormalities in the cervical and thoracic spine. The remainder of the patient's spinal evaluation consisted of posture analysis. She showed slight right head translation with left lateral flexion of the cervical spine. This produced a right lateral flexion of the thoracic spine as well. Gross neurological examination was also found to be unremarkable. With no history of trauma, consideration of the youth of the patient and further objective findings, the choice was made not to use radiographs.

Sufficient data existed for initial treatment and the plan was to take radiographs should the patient not respond. Her last peak flow measurement from the asthma specialist measured 95 liters/min. According to her height and weight, she was at 54% of normal (174 litres/min) Peak Expiratory Flow Rate.⁴ Her prior lung capacity test results are listed in Table 2.

Table 2

| | Pre Chiro Pre Med | Pre Chiro Post Med |
|-------|----------------------|-----------------------|
| FVC | 1.60 L | 1.67 L |
| FEV 1 | 1.41 L | 1.48 L |
| FEV 3 | 1.57 l | 1.48 L |

FVC - forced expiratory vital capacity; The volume change of the lung between a full inspiration to total lung capacity and a maximal expiration to residual volume.

FEV1 - forced expiratory volume in 1 second; The FEV1 is the volume exhaled during the first second of a forced expiratory maneuver started from the level of total lung capacity.

FEV3 - forced expiratory volume in 3 seconds; The FEV3 is the volume exhaled during the first 3 seconds of a forced expiratory maneuver started from the level of total lung capacity.

Pre Med: this means the test was done before the use of medication. In her case: Albuterol, a bronchial dilator.

Post Med: this means the test was done on the same day after the administering of the medication.

The above tests are contained in her medical records. She performed the tests within minutes of each other to see the effects of the medication on her breathing. As you can see, after she took the medication her lung tests improved. It should be noted these were taken two months prior to coming to our office.

Chiropractic Care

Adjustment of the T2-4 and T10-T12 segments was chosen due to aberrant biomechanics, patient sensitivity and sEMG scan. She was seen 2-3x per week for 3 weeks. Before care was rendered, the patient and her parents were advised that some soreness and or stiffness may occur as part of the normal response to neural reintegration. The patient was placed on a standard Lloyd 402 elevation table and an anterior (a-p) adjustment was performed.

The patient was then placed in a post-adjustment recuperation suite for 15 minutes. After the first adjustment the patient reported a noticeable reduction in her symptoms that evening, with the cough discontinuing. Following the next three weeks, she experienced no asthma attacks and no coughing. Wheezing, along with chest tightness and heaviness had subsided. Her mother noticed an increase in the patient's activity levels without the usual increase in symptoms. She also reported that she decreased her inhaler use.

By the end of the fourth week of care, the patient had reduced her inhaler use from 5-12 to 0 per day. The frequency of her attacks had diminished to zero. In addition to the parents, the teachers at school were surprised by the changes. From an initial activity level of only walking, she was now participating in swimming and running sports.

On re-evaluation the patient's mother noted an overall improvement in her condition. The examination revealed significant improvement in all of her initial findings. A full spine sEMG scan was performed at this time, noting a near total resolution of the patient's presenting neuro-myopathophysiology.

Follow-up Static sEMG Results

Readings one or more standard deviations below normal means were observed at: T8(L), T10(L), T10(R), T12(L), T12(R), and L1(L).

Readings up to one standard deviation above normal means were observed at: C1(L), C5(L), C5(R), C7(R), T1(L), T1(R), T2(L), T2(R), T4(L), T4(R), T6(L), T6(R), T8(R), L1(R), L3(L), L3(R), L5(L), L5(R).

Readings one to two standard deviations above normal means were observed at: C1(R), C7(L).

Readings two to three standard deviations above normal means were observed at: C3(L), C3(R).

Areas of significant asymmetry were noted at the following sites: C1(R), T4(L), T8(R), T10(R), T12(R), L1(R), L3(L). See Figure 2 and Table 3

Figure 2 - Post sEMG Scan

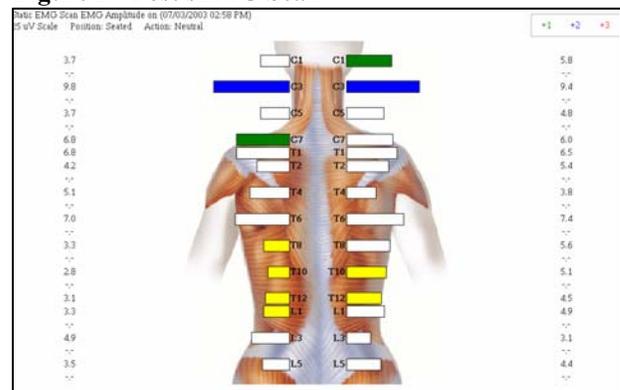


Table 3 – Post sEMG Values in Microvolts

| | Normals Left | Patient Left | % Diff | Normals Right | Patient Right | % Diff |
|-----|-----------------|-----------------|--------|------------------|------------------|-----------|
| c1 | 3.8 | 3.7 | 10 | 3.9 | 5.8 | 148 |
| c3 | 4.4 | 9.8 | 200 | 4.3 | 9.4 | 218 |
| c5 | 4.2 | 3.7 | 12 | 4.1 | 4.8 | 11 |
| c7 | 4.8 | 6.8 | 15 | 4.6 | 6 | 13 |
| t1 | 4.9 | 6.8 | 13 | 4.9 | 6.5 | 13 |
| t2 | 5 | 4.2 | 80 | 5 | 5.4 | 10 |
| t4 | 0.5 | 5.1 | 20 | 6.4 | 3.8 | 40 |
| t6 | 8.4 | 7 | 10 | 8.2 | 7.4 | 10 |
| t8 | 9.6 | 3.3 | 300 | 9.5 | 5.6 | 40 |
| t10 | 10 | 2.8 | 500 | 10 | 5.1 | 50 |
| t12 | 9.8 | 3.1 | 300 | 9.8 | 4.5 | 217 |
| l1 | 8.7 | 3.3 | 263 | 8.7 | 4.9 | 177 |
| l3 | 6.1 | 4.9 | 20 | 6.2 | 3.1 | 200 |
| l5 | 5.2 | 3.5 | 14 | 5.3 | 4.4 | 120 |
| s1 | 4.4 | | | 4.4 | | |

Three months following the start of care, her medical examination revealed a significant improvement in respiratory function. The physician was elated with her progress and credited the medication, despite the medication's failing to reduce symptoms nor increase function for over the last 3 weeks. When the mother explained they had stopped giving her several of the medications prescribed and that she was receiving chiropractic care, the pediatrician did not support their decision, forcing the parents to change pediatricians.

Upon her last visit to the pediatrician her peak flow measurement was now 165 L/min. She reported that the specialist didn't know how, but couldn't believe how much respiratory improvement had occurred with no medication. She had improved 74% and was now less than 5% below normal for her height and weight. See Table 4

Table 4

| | Pre Chiro | Pre Chiro | Post Chiro | Post Chiro |
|---------|-----------|-----------|------------|------------|
| | Pre Med | Post Med | Pre Med | Post Med |
| FVC | 1.60 L | 1.67 L | 1.67 L | 1.67 L |
| FEV 1.0 | 1.41 L | 1.48 L | 1.46 L | 1.49 L |
| FEV 3 | 1.57 L | 1.48 L | 1.67 L | 1.66 L |

FVC - forced expiratory vital capacity; The volume change of the lung between a full inspiration to total lung capacity and a maximal expiration to residual volume.

FEV1 - forced expiratory volume in 1 second; The FEV1 is the volume exhaled during the first second of a forced expiratory maneuver started from the level of total lung capacity.

FEV3 - forced expiratory volume in 3 seconds; The FEV3 is the volume exhaled during the first 3 seconds of a forced expiratory maneuver started from the level of total lung capacity.

Pre Med: this means the test was done before the use of medication. In her case: albuterol, a bronchial dilator.

Post Med: this means the test was done on the same day after the administering of the medication.

Important: These above tests are after 2 months of chiropractic care, where the patient was not taking any daily medications since starting chiropractic care. In an effort to see if higher lung volume test could be achieved, she was given an inhaler after the first test. Notice that her lung tests are actually better without the medication, on two out of three tests. The medications actually worsened her performance in one case. It would appear that at this point without medication and with subluxation-reduction, she was already functioning to her maximum potential. After the medication, she performed slightly worse.

Notice on the chart above that her lung capacity tests are actually better after chiropractic care, without the medication, and better on 2/3 tests after using an inhaler. It is thought that the reason medication is administered on the second trial is to see if she could do any better. In FEV3 she did slightly worse. However, she appears to be functioning to her maximum potential.

All of her initial examination findings had resolved. Paraspinal SEMG scans indicated that normal neurophysiology was returning and the patient was no longer suffering from significant dyspnea. Frequency of care was decreased at this time from weekly to once every 2 weeks. At this time, the patient was adjusted using Chiropractic Biophysics (CBP) mirror image technique, and when indicated via palpation of the T2 and T12 segments.

Over the next four weeks, the patient continued to improve. Her medical checkups noted a steady improvement in respiratory function. Within 10 months from the onset of care, the patient was no longer using any medication, only carrying Albuterol in the event of an emergency.

Discussion

The medical treatment of asthma remains largely pharmacological. Despite the increase in prescription drug usage, the prevalence of asthma increased 75% from 1980-1994.⁵ In fact, many drug's side effects include worsening of bronchio-spasms to the point of life threatening.⁵ Prescription drugs represent the largest single direct medical expenditure for asthma, over \$5 billion with costs rising. Total cost of asthma per year is 18 billion.⁶ Total cost of chiropractic care for this case was approximately \$750.00 and would have been considerably less if not for the initial frequency. Failure to include conservative approaches like chiropractic result in excessive ER visits and decreased quality of life both as a child and upon maturation into the work force in adult life.

It is suggested that objective means such as sEMG be used to document dyspneic children.⁷ It has been shown that dyspneic children show higher levels of sEMG readings in certain areas of the spine. Furthermore, higher sEMG readings throughout the spine can result in a separate condition known as dyspnea. This is evidenced by abnormal tonic muscle activity. Dyspnea refers to a reversible pathophysiologic state consisting of errors in energy expenditure, which are capable of producing functional disorders. It would appear that this description would fit the patient in this study. Sadly, not only did she have to deal with the asthma symptoms but the litany of pharmaceuticals. Dyspnea consists mainly of covert errors in action potential output from the motor and pre-motor areas of the cortex and the consequences of that output. Such neurophysiological reactions may result from responses to environmental events, bodily sensations, and emotions.⁸ The resulting aberrant muscle activity may be evaluated using surface electrode techniques. Typically, static sEMG with axial loading is used to evaluate innate responses to gravitational stress.⁹ Dyspnea may also be disclosed by postural analysis. Both sEMG and posture were used in this case.

In terms of why the adjustment was focused on the upper and lower thoracic region and not the upper cervical region or the mid-thoracic spine, research shows high sEMG readings at the diaphragm and intercostal muscle levels (T10-T12) correlated with a fall in forced expiratory volume.¹⁰ Also it has been documented that respiratory impedance increases during shoulder tension.¹¹ The proposed mechanism addresses the effort being used to elevate the shoulder girdle to make room for the air to fill the lungs. This is consistent with our sEMG findings, with the highest levels at the C7-T4 and T11-T12 region. Whether or not adjusting only at the T4 and T10-T12 levels is most effective remains unknown, but consistently this patient has neither been sick nor had an asthma attack in over 3 years. She is seen about 1-2x per month based upon objective indicators of vertebral subluxation.

Conclusion

We presented the chiropractic care of a patient with severe asthma and chronic cough. Perhaps this case will encourage future testing and screening for subluxations which could potentially cause dyspnea, resulting in a variety of symptoms that include asthma. In this particular case high-level sEMG readings were seen in the lower thoracic segments and upper trapezius muscle region. It is proposed that sEMG should be investigated as a potential screening tool for abnormal levels of stress secondary to subluxation.

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