COUGH-VARIANT ASTHMA: RESPONSIVE TO INTEGRATIVE MANAGEMENT AND POSTURAL RESTORATION

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INTRODUCTION

In this case, we describe a 22-year-old man who has struggled with a diagnosis of asthma and cough for seven years. Although his conventional care has been exemplary, his quality of life is lacking, and he is plagued by persistent cough, limitation of his physical activities, poor sleep, and adverse effects of his maintenance medications. His response to integrative management and postural restoration using the Postural Restoration Institute (PRI) manual and nonmanual techniques and the reestablishment of a "zone of apposition" with improved diaphragm mechanics has been remarkably effective.

Asthma has many levels of severity and affects all age groups. Substantial strides have been made in asthma management, yet it continues to plague millions and adversely affect their daily function. It is a common reason for office visits, emergent outpatient treatment, hospitalization, and untimely death.[1]

Conventional management of asthma is extensively cataloged in the literature and currently includes the use of β_2 agonists, systemic and inhaled steroids, leukotriene modifiers, and most recently IgE-binding inhibitors.[2] Status is monitored with subjective symptoms and peak flows and frequency of office visits, emergent visits, and hospitalizations. An integrative medicine approach to asthma often includes nutritional manipulation and supplementation, botanicals, acupuncture, and mind-body techniques such as self-hypnosis, relaxation techniques, and Buteyko breathing.[3] The use of manual therapy techniques including chiropractic and osteopathic manipulation and postural realignment strategies can also be helpful in many cases

CASE PRESENTATION

A 22-year-old male presented for integrative medicine consultation regarding his seven-year history of asthma, cough, and recurrent sinusitis. He began having issues with frequent infections and asthma at age 15 years. The patient reported that the asthma seemed to have started after an October storm that damaged many trees around his home. Over several weeks, he and his father cleared the trees and branches that were damaged. He also slept on an unheated floor near a working fireplace during this time. Subsequently, he began to have cough, sinus infections, bronchitis, and associated wheezing. He missed 100 days of school during the remainder of the academic year. At times, it was unclear whether he experienced laryngospasm or reactive airway episodes.

The patient had extensive workup, including consultation with an allergist, a pulmonologist, a local immunologist, and, ultimately, a regional asthma center. He was diagnosed with immune deficiency of uncertain etiology and treated with intravenous immunoglobulin monthly for two-and-a-half years. During that time, he was tested for allergies but was always negative. It was thought that allergies did exist, but that his immunocompromised state masked them during testing. An allergist also noted in the record that, "He was sent to [a regional asthma center] for an evaluation. To my knowledge, the exact diagnosis was never totally agreed upon, although he was given a diagnosis of asthma." Symptoms were of such frequency and severity that he was forced to drop out of college.

Significant Past Medical History

The patient was born slightly premature at 35 weeks gestation He had some respiratory issues early in life but never required mechanical ventilation. He reports a childhood history of frequent strep throat but no pneumonia. At age 10 years, he was diagnosed with intermittent exercise-induced bronchospasm. He had three sets of myringotomy tubes and tonsillectomy as a child. He had sinus surgery at age 19 years.

At the time of presentation, he was on standard asthma treatment with frequent steroid bursts and frequent antibiotic courses. His medications at the time of our initial meeting included fluticasone/salmeterol inhaler, guaifenesin, ipratropium bromide/xylocaine nebulizers, albuterol nebulizers, montelukast, cetirizine, almotriptan, olmesartan, and verapamil.

The patient noted frequent cough and was unable to lie flat at night because of the cough. He related that his cough was worse when the weather was humid and whenever he got a sinus infection, which was frequently. He was also frustrated with his low level of physical activity because of respiratory symptoms in that he had previously been active in football, running, and cycling. When questioned about his peak flow parameters, he was vague.

Initial integrative medicine recommendations for this patient included probiotics, an antiinflammatory diet, quercetin, licorice, boswellia, nasal saline irrigation, and medical acupuncture directed to Lung shu and mu points plus Tai Yin/Yang Ming Lung tonification. He was also treated with spleen-stomach distinct meridian and facial sinus points. With these interventions, the patient showed some improvement with less frequent and less severe exacerbations. His case was then presented through the Program in Integrative Medicine Associate Fellowship at the University of Arizona for discussion by faculty and fellows. Included in the recommendations of this group was the suggestion by osteopathic faculty that chest and breathing mechanics should be evaluated.

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Examination following this consultation did in fact show very limited chest and diaphragm excursion. Lacking a practicing osteopath in our community, the patient was referred to another of the authors for Postural Restoration Institute evaluation and treatment of respiratory and postural mechanic dysfunction. Thoracic mechanics as related to diaphragmatic activity, rib cage and sacral-iliac position, and compensatory patterned postural pathomechanics were addressed by these physical therapists.

Evaluation

Postural analysis in this patient revealed increased lumbar lordosis, elevated rib cage with barrel chest, bilaterally rounded shoulders, and forward head posture. An evaluation by a physical therapist certified through the Postural Restoration Institute revealed that the patient demonstrated increased chest wall tightness and lumbo-pelvic instability. This was demonstrated by the patient's inability to perform the following: upper extremity horizontal abduction, full shoulder flexion, cervical rotation and extension, and thoraco-lumbar flexion. Furthermore, the patient elicited a cough and limited apical expansion with gentle pressure placed on his lower rib cage in an attempt to passively lower his rib cage.

Treatment Overview

The patient was prescribed a home exercise program to address his anterior chest wall tightness, increased lumbar lordosis, and breathing mechanics in an attempt to restore his zone of apposition. The cylindrical aspect of the diaphragm that apposes the inner aspect of the lower mediastinal (chest) wall constitutes the zone of apposition. Its region extends from the diaphragm's caudal insertion near the costal margin, cephalad to the costophrenic angle, at which the fibers break away from the rib cage to form the free diaphragmatic dome.[4,5] The area of apposition of diaphragm to rib cage has a cephalad extreme at the beginning of dullness by percussion and a caudal extreme just above the costal margin.[4] For many of us, the cephalad extreme begins immediately below T8 or below the cephalad aspect of the diaphragm's dome. The zone of apposition, for the most part, is not influenced by the height of diaphragm dome but rather by the orientation of the rib cage. Individuals with elevated anterior, externally rotated ribs will have a decrease in their zone of apposition on one side or both sides of their thoraco-abdominal, depending on their pattern of diaphragm opposition, abdominal weakness, and use. Instructions in the following exercises to address the aforementioned findings were also given: pectoral stretching, hamstring strengthening, balloon blowing, and abdominal oblique strengthening. The patient had a difficult time performing the abdominal oblique exercise secondary to triggering a cough and increasing his chest wall tightness and anxiety.

Approximately one week later, the patient was seen in the clinic, at which time he reported that the balloon exercise was getting easier and less coughing was present. Manual restorative techniques were used to stretch passively his anterior, lateral chest wall (pectoral stretching) and passively internally to rotate his lower ribs to restore his zone of apposition. During these manual restorative techniques, it was quite common for a cough reflex to take place. Bimonthly treatment continued to consist of manual restorative techniques as described by the Postural Restoration Institute and progression of home exercise program to increase left abdominal oblique strength and right apical chest wall expansion. Approximately two months after the initial visit, the patient was administered a spirometer assessment, which he was unable to perform secondary to eliciting a cough upon forceful expiration. Following approximately 16 weeks of treatment, another spirometer assessment was administered with patient tolerance. Readings prior to manual restorative techniques were as follows: 2,900 cc, 1,800 cc, and 1,500 cc, respectively, reflective of abdominal contraction upon forced exhalation and limited chest wall expansion upon inspiration, resulting in decreasing forced expiratory volume in this particular session. After manual treatment in the same session, the patient demonstrated the following readings: 2,900 cc, 2,700cc, and 3,200 cc, respectively. These expiratory values after one session of manual work to "open" his anterior chest wall and lateral mediastinum, increased more than likely because of less tangential resistance of soft tissue tightness after thoracic recoil or at the end of exhalation.

DISCUSSION

This case demonstrates the benefits of combined evaluation and management using integrative perspectives. Significant clinical improvement was achieved for this patient through the use of diet and nutrition, botanical compounds, acupuncture, and treatment of respiratory and postural mechanical dysfunction. In cases such as this, the diaphragm's mechanical action and respiratory advantage depend on its relationship and anatomic arrangement with the rib cage.[4,6]

The area of apposition of diaphragm to rib cage makes up a substantial but variable fraction of the total surface area of the rib cage. It accounts for more than half of the total surface at residual volume and decreases to zero at total lung capacity.[4] During quiet breathing in the upright posture, it represents one fourth to one third of the total surface area of the rib cage.[4] The zone of apposition has anatomic importance because it is controlled by the abdominal and oblique muscles and directs diaphragmatic tension. Accessory respiratory muscle overuse, chest wall mobility, and lung hyperinflation are all influenced by diaphragm and zone of apposition resting positions at the end of exhalation.[7]

As the patient's passive zone of apposition resting position improved through PRI manual assistance, his forced expiration volume decreased from 2,900 cc to 1,500 cc, suggesting limitation of inspiratory expansion of the mediastinum secondary to restrictive expiratory-oriented intercostals, subcostals, and thoracic sterni muscle. After establishing chest wall flexibility through PRI manual techniques, his forced expiration volume returned to 2,900 to 3,200 cc without losing his active zone of apposition, reflecting an improvement in diaphragmatic respiration versus cervical accessory overuse upon respiration.

Individuals who have high degrees of hyperinflation can have diaphragms that become flattened such that they run parallel to the rib cage in the zone of apposition running transversely inward across the costal margins. Contracting of these muscles can result in a net reduction in the transverse diameter of the rib cage. These patients generally utilize muscles of inspiration and rely on lifting the anterior chest wall with the neck muscles, more specifically, the sternocleidomastoid muscles and mastoid muscles, for rib cage expansion.[8]

At this juncture of management, the patient has achieved substantial functional improvement. Goals continue to include further reduction of his pharmaceuticals and improved physical activity and exercise tolerance, with complete sustained resolution of his cough. He will have continued PRI therapy sessions and home exercise as well as acupuncture and integrative follow-up until these goals are maximized.

Given the potentially important role that postural alignment and chest mechanics often have on breathing patterns–as they certainly did in this case–practitioners should consider incorporating an osteopathic or postural assessment and treatment component into the care of patients with asthma, particularly those in whom the condition causes a significant compromise in quality of life.

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