Integrating Osteopathic Evaluation and Treatment in a Case Report of Acute Chest Pain

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CASE REPORT

Abstract

Chest pain is an emergent presentation associated with a wide differential diagnosis including cardiac, pulmonary, gastrointestinal, and musculoskeletal origins. The evaluation of acute chest pain can be costly and can be a financial burden on the health care system. Integrating osteopathic diagnosis and treatment can assist with identifying and alleviating potential musculoskeletal sources of pain. This case illustrates how applying osteopathic manipulative medicine (OMM) benefited a 61-year-old woman presenting with anterior chest wall pain.

Patient response to OMM can assist physicians with better managing acute chest wall pain syndromes. Improved musculoskeletal education can potentially improve medical management of chest pain of musculoskeletal origin.

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Case report

History

A 61-year old woman with a medical history of hypertension presented to the office with a chief complaint of left-sided chest pain. Three days prior to the office visit, the patient began to experience new onset left-sided chest pain. The pain was intermittent, 7/10 on a pain scale, exacerbated with activity, associated with shortness of breath, radiated to the left side of the neck and face, and was accompanied by palpitations. She denied dizziness, nausea, and diaphoresis.

The patient first saw her internist emergently and was referred to a cardiologist. Her cardiac work-up included an electrocardiogram, an echocardiogram, bloodwork, chest x-ray, chest computed tomography (CT) scan and a cardiac catherization. All results were negative. She also was referred to a pulmonologist. Pulmonary function tests were normal, and the pulmonologist started her on a course of tapering steroids, which resulted in no pain relief. The patient was scheduled to travel abroad within a week's time and was concerned to travel due to her pain. Approximately 1 year prior, she was treated with OMM for left-sided upper back, neck and shoulder pain following a motor vehicle accident. Prior to the current complaints, she had significant alleviation of her pain with the OMM treatment.

Medical history included 10 years of hypertension. The patient denies any family history of coronary artery disease or myocardial infarction. Her father and grandfather had hypertension and hyperlipidemia. While she denied smoking, alcohol use, or illicit drug use, she reported drinking 1 cup of caffeinated coffee daily. Medications included atenolol (50 mg once a day), multivitamins, and calcium supplements. She worked as an office administrative assistant, and she stated that she exercises regularly and stays physically active.

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Review of Systems

The patient reported left-sided chest pain, palpitations, shortness of breath, neck and back pain. She denied any acute weight changes, fatigue, weakness, abdominal pain, reflux, nausea, diarrhea, constipation, frequency, urgency, or dysuria.

Physical Examination

On physical examination, the patient's blood pressure was 115/75 mm Hg, heart rate was 84 beats per minute, respiratory rate was 12 breaths per minute, oxygen saturation was 99% on room air, and body mass index was 18.7. The patient appeared well nourished and had a normal gait.

Examination of head, ears, eyes, nose, and throat revealed no irregularities. Neck rotation to the left was decreased due to pain.

Cardiovascular examination was unremarkable: no murmurs, clear lung fields, no wheezing, and good respiratory excursion. The patient's abdomen was soft, non-tender, non-distended with no palpable masses, and normal bowel sounds auscultated in all 4 quadrants. Examination of the chest wall revealed mild distress with movements of the patient's left arm. Pain was reproduced with palpation of the anterior chest wall over ribs 3-4 along the left midclavicular line.

Neurological examination also was unremarkable: no focal neurologic deficits, no tremors or fasciculations noted, CN2-12 grossly intact, motor strength 5/5 bilaterally. Sensory exam was normal, and reflexes were +2/4 lower extremities bilaterally symmetrical.

Osteopathic structural examination revealed occiptoatlantal joint flexed, sidebent right, rotated left; C3 flexed, rotated and sidebent left; C7 extended, rotated and sidebent left;, thoracic inlet restriction; an exhalation dysfunction of the left ribs 3-5; anterior rib 3 tenderpoint; a sternal restriction to superior, clockwise, and left lateral glide; anterior diaphragm restriction; left trapezius and left scalene muscle hypertonicity and tenderness; left shoulder restriction to abduction and external rotation; T3 flexed, rotated and sidebent left; T7 extended, rotated and sidebent left; L1 flexed, rotated and sidebent left; bilateral psoas spasms and increased paravertebral muscle spasms from T1-T8 on the left.

Assessment

The patient was a 61-year old woman with musculoskeletal left anterior chest wall pain and significant somatic dysfunctions (SD) of the cervical, thoracic, upper extremity, and ribs, which were contributing to the chest wall pain.

Treatment

Osteopathic manipulative treatment was applied to address the noted somatic dysfunctions. Suboccipital release and myofascial release (MFR) were applied to the head, cervical, and thoracic regions. Counterstrain (CS) was utilized to treat the rib 3 tenderpoint. Muscle energy technique (MET) was applied to treat the rib exhalation dysfunctions, balanced ligamentous tension (BLT) to the restricted sternum, and doming of the diaphragm to facilitate excursion. Muscle hypertonicity of the upper thoracic cage and shoulder girdle musculature was treated using an MFR technique that utilized the arm as a lever to affect those fascial restrictions. Segmental dysfunction of the head and spine were treated using BLT. The thoracic cage was treated with thoracic inlet MFR and bilateral rib raising. The bilateral psoas muscle spasm was treated with facilitated positional release (FPR). Abdominal diaphragm doming was also performed.

Sacral and innominate and lower extremity diagnosis and treatment was not performed due to time constraints.

Response to treatment

Immediately after the treatment, the patient noted improvement of the chest pain to 2-3/10 pain. The patient returned for a follow-up visit 4 days later, and she reported no longer having pain or palpitations and having a marked improvement in breathing.

Approximately 3 weeks after her last visit, the patient returned to the office and noted that she no longer had chest pain but had residual chronic left neck and back pain. She denied taking any pain medication or steroids during that time.

Discussion

Acute chest pain is an emergent presentation. Physicians tend to focus their clinical evaluation and decisions on eliminating life threatening conditions based on standard medical care. While important causative factors must be ruled out, the most common cause of chest pain is of musculoskeletal origin.[1] The emphasis on the diagnosis and exclusion of cardiac and pulmonary conditions of lower frequency necessitate a disproportionate use of resources. As seen in this case, all of the patient's procedures and tests cost approximately $6500. (Based on national average costs: electrocardiogram $75, echocardiogram $1400, bloodwork cardiac enzymes $120, chest x-ray $350, chest computed tomography scan $1000, and cardiac catherization $3800.)

The battery of tests that patients undergo can also result in false positives and can increase risks. Overall, the health care cost of

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chest pain evaluation is a significant financial burden. In fact, acute chest pain accounts for over 6 million emergency department visits and costs more than $10 billion per year in the United States.[2]

The serious nature of cardiac and pulmonary diseases justifies a proportional response in ruling them out as causes of chest pain. However, because the majority of chest pain presentations are of musculoskeletal origin, perhaps what is truly called for is an improved training and a greater level of proficiency in diagnosing musculoskeletal sources of chest wall pain. Preclinical and clinical medical education has been found to be lacking in musculoskeletal education.[3,4] This is a potential opportunity for osteopathic medicine to fill this void and demonstrate the benefits of appropriate musculoskeletal examination and treatment. Musculoskeletal evaluation and treatment could be carried out concurrently with some of the standard tests (eg, EKG, cardiac enzymes, troponins, etc.) that are performed in the emergency department setting.

As this case illustrates, performing an osteopathic structural exam and applying osteopathic manipulative treatment can be useful in the diagnosis and treatment of musculoskeletal chest wall pain. Somatic dysfunctions of the thoracic cage and musculoskeletal structures affect rib cage mobility and can potentially contribute to chest pain.[5]

Five Models of Osteopathic Care

When applying osteopathic manipulative medicine to any patient, it can be useful to utilize the 5 models of osteopathic care to address somatic dysfunction to promote health and optimize healing.

Following a biomechanical approach, restrictions of the thoracic cage and upper extremities were treated with osteopathic techniques to decrease muscle spasms and improve joint mobility.[6] CS to the rib tenderpoint targeted hypertonic intercostal muscles that could contribute to the exhalation dysfunction. Rib 3 on the left was the key rib of the group dysfunction. Treatment of rib 3 dysfunction with MET was performed first, followed by BLT of the thoracic spine to remove thoracic cage biomechanical restrictions and restore proper motion and function. Treatment of the left upper extremity with MFR addressed musculoskeletal hypertonicity of the pectoralis muscles and other muscles connecting from the shoulder girdle to the cervical and thoracic region that contributed to the patient's cervical and back pain. Studies have shown that treating thoracic cage restrictions can reduce pain and improve pulmonary function.[7-9] Applying osteopathic treatments following the biomechanical model potentially improved thoracic cage compliance and decrease work of breathing.

Following the circulatory-respiratory model of treatment, the thoracic inlet release, rib raising, and abdominal diaphragm technique were applied to enhance lymphatic drainage and to promote inflammation clearance. These treatments were utilized to remove any restrictions that would potentially reduce proper circulation and lymphatic drainage. Studies have shown that impaired lymphatic circulation directly affects disease processes through decreased clearance of inflammatory mediators.[10] The goals of osteopathic manipulative treatment included improving the circulation and delivery of medications to the region, thus improving the effectiveness of the oral steroids. One key region of focus was the treatment of the psoas muscle spasm.

Evaluation and treatment of the psoas muscle is important due to its effect on diaphragmatic movement. The psoas muscle attaches to the lumbar spine, and its fascia connects into the 12th rib and arcuate ligaments. Spasm of the psoas muscle can restrict the lumbar spine where the diaphragm anchors through the posterior arcuate ligaments. Treating the psoas and thoracic and lumbar paraspinal muscles is paramount to improve thoracic cage excursion, as movement of lymph is dependent upon the diaphragm to be able to create pressure changes in the thoracic cage with respiration.[6]

Following the neurologic model, treatment of the suboccipital region and the thoracic spine helped to address any autonomic imbalance that might have contributed to the patient's pain and palpitations. Prior publications have demonstrated the effects of osteopathic manipulation on the autonomic nervous system, specifically to the heart.[11,12]

The pain relief the patient immediately obtained from the osteopathic treatment served diagnostic as well as therapeutic purposes. She expressed significant relief with the resolution of her pain and the confirmation of her pain being of musculoskeletal etiology alleviated her concerns and allowed her to continue her activities as planned. This demonstrates the effect of osteopathic treatment on the behavioral model, as the treatment was able to immediately reduce the patient's pain, anxiety, and stress. Patients suffering from noncardiac chest pain have been found to have increased anxiety, somatic symptoms, and exaggerated sense of bodily sensations compared to healthy controls.[13,14] It is of utmost importance for physicians to consider the whole person, body, mind, and spirit when evaluating and treating patients with chest pain.

Lastly, the metabolic-energy model focuses on the body's ability to maintain a balance between energy production, distribution, and expenditure.[6] OMT in this case helped to address somatic dysfunctions that increased the amount of work the patient's body needed

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to overcome and thus decrease overall allostatic load. Allostasis is the adaptation to stressful challenges that activates our neuroendocrine-immune system. Prolonged increased allostatic load can lead to disease and pain.[15,16] In this case, treatment of musculoskeletal dysfunction potentially decreased the amount of energy expenditure, decreased pain, and improved medication delivery and removal of metabolic byproducts in the region.[6]

Conclusion

This case exemplifies the value of integrating an osteopathic approach and treatment in the case of chest pain. Cardiac, pulmonary, gastrointestinal, and other potential life-threatening etiologies of chest pain must be investigated and ruled out. This case illustrates the potential benefits of integrating osteopathic principles and practice in the evaluation and treatment of chest pain presentations.

Although the patient's results were positive, further studies establishing the efficacy of OMM in the diagnosis and treatment of chest wall pain are in need. This case supports the overall need for improved musculoskeletal evaluation and training in medical education. Integrating lectures and hands-on workshops across allopathic and osteopathic training programs can potentially improve physician evaluation and approach to musculoskeletal chest pain.

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