Somatic dysfunction associated with pulmonary disease

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A review of the osteopathic literature on respiratory disease revealed that the majority of palpatory findings of somatic dysfunction associated with pulmonary disease occurred within the spinal area of T2-7. Forty patients with diagnosed pulmonary disease were selected for the present study. For each patient, a musculoskeletal palpatory examination was conducted, with the patient in both the seated and supine positions. All patients showed evidence of somatic dysfunction in the pulmonary reflex area of T2-7. Viscerosomatic reflexes were observed to be characterized by findings of somatic dysfunction, involving two or more adjacent spinal segments, deep-muscle splinting, and resistance to a compression motion test.

A definitive description of the incidence, location, and characteristics of somatic dysfunction found in patients with respiratory disease has yet to be written. Based upon palpatory examination, reports[1-21] in the osteopathic literature have identified the specific spinal segments associated with pulmonary disease (Table 1). Yet, few observers have noted what specific tests they have used, nor have they described the results of the palpatory tests in terms of tissue texture change, asymmetry of positional relationships, or disturbances in segmental spinal joint motion. The characteristics of tissue texture changes are seldom noted. For example, are they unilateral or bilateral, and what area is involved? What tissues (skin, subcutaneous tissue, superficial or deep muscle, or fascia) are involved? What is the intensity of the reaction, and are the findings characteristic of an acute or chronic disease process? The majority of the findings reported in Table 1 fall within the area T2-7, which is the autonomic nerve supply for the lungs.[22] Bonica[22] hypothesized that the somatic manifestations of respiratory disease are effected through the autonomic nervous system by a viscerosomatic reflex.

Long[23] reported palpatory findings in 53 uncomplicated cases of disease of the bronchi and lungs. Palpatory examinations were carried out by the members of the technique department of the Philadelphia College of Osteopathic Medicine. Restricted spinal motion, abnormal position, and muscular contraction were observed, and the percentage of segmental incidence of each of these factors was presented in graphic form. The graphed findings showed peak incidences at C2 and at T1-7.

Deming and Kruener,[6] reporting on a continuation of the Philadelphia study, observed a combination of restricted motion and contracted musculature that was predominant in the upper three cervical and upper nine thoracic spinal segments in 52 cases of respiratory disease involving the larynx, trachea, bronchi, and lungs.

Findings in 51 cases of bronchitis, which were part of a double-blind, controlled study of the palpatory examination of hospital patients, were described by Kelso.[24] Students made the examinations without knowledge of the patients' conditions. Regional limitation of motion, paravertebral muscle tension, and tenderness on digital pressure at the interspinous area, lateral transverse process, and costovertebral junction were tested. There appeared to be a higher incidence of tenderness in the upper cervical and upper thoracic spine bilaterally. Segmental localization of muscle tension was not as specific.

Another blind study of 10 cases of respiratory disease, which also utilized osteopathic students, was reported by Nicholas.[25] Increased incidence of paravertebral muscle tension was observed at C4-7 and T2-9 bilaterally.

Miller[26] conducted a study to determine the incidence of musculoskeletal findings in chronic obstructive pulmonary disease (COPD). The palpa-

TABLE 1. SPECIFIC SPINAL SEGMENTS ASSOCIATED WITH PULMONARY DISEASE.

Observer	Findings	Remarks
Bolton[1]	C3,4, T4-9	Chronic pulmonary disease
Burns[2,3]	T1-3	Asthma
	T3-5	27 cases asthma
	T2-7	Lung disease
	T7-10	Tuberculosis
	T8-10	19 cases laryngeal tuberculosis
	T8-11	15 cases upper lobe tuberculosis
	T6-10	38 cases middle and lower lobe tuberculosis
Bush[4]	Ribs 5-8 (right)	Asthma
Crane[5]	T3,4	Lobar pneumonia
Deming and Kruener[6]	C2-4, T1-6	183 cases of disorder of the respiratory tract
Facto[7]	C2,3, T3,6	1 case bronchitis
Goode[8]	Rib 5	Asthma
Grainger[9]	T3,4	Lobar pneumonia
Gravett[10]	C5,6, rib 1, clavicle	Acute and chronic bronchitis
Hoag[11]	Upper thoracic area, especially T1-6	Chronic lung disease
Howell[12,13]	Right costotransverse articulation of T3, left costotransverse articulation of T2	Chronic obstructive lung disease
	Extreme restricted mobility of thoracic spine, most pronounced at T4-5	1 case pulmonary disease
Keene[14]	T2-5, T6 ribs 1,2 depressed	1 case tuberculosis
	T4,5 (right), ribs 4,5 depressed (right)	1 case tuberculosis
	T2 (right), T6-7 (left), rib 2	1 case tuberculosis
Kline[15]	T2-8	Respiratory infections
Koch[16]	Cervical area, upper thoracic spine	Asthma
Magoun[17]	T2-4	Bronchi and lungs
McWilliams[18]	C6,7, T3,4, sacrum	Asthma
Wilson[19,20]	T4,5	20 cases asthma
	Occiput, T4,5, ribs 4,5 bilaterally	Asthma
Wilson [21]	Rib 5 (left)	1 case asthma

tory examination tested skin drag, red reaction, sidebending, and hypermobility. The incidence of spinal findings was plotted in 44 cases of COPD, with the greatest number of findings seen at T1-9. A group of patients without COPD did not have comparable changes.

Observations of the musculoskeletal findings in 15 patients with primary diagnosis of respiratory disease were reported by Beal and Dvorak.[27] These cases were part of a blind study of patients who were examined without the examiners' knowledge of the diagnoses. The findings, which were based upon tissue texture, position, and decreased motion as ascertained by a compression test, showed a predominance at the level of T1-3.

The present study was undertaken to identify evidence of somatic dysfunction in patients with respiratory disease to establish its incidence and location, and to ascertain its relationship to pulmonary disease.

Methods

Forty patients (24 men, 16 women) were selected from the pulmonary service of Lansing General Hospital, Lansing, Michigan. The men ranged in age from 32 to 87, with a mean age of 62.4. The women ranged in age from 31 to 75, with a mean age of 60.4. There was only one left-handed subject. The diagnosis and data to substantiate the diagnosis were taken from the hospital record after examination of the patient. An osteopathic structural examination was conducted with the patient in the seated and supine positions. Palpatory findings of tissue texture (skin, subcutaneous tissue, and superficial and deep muscle) were identified. The transverse processes and ribs were palpated

for relative symmetry of position. Segmental spinal mobility was examined by a compression springing test applied to the transverse processes. Rib motion was tested by passive palpation during the normal respiratory cycle.

The findings from the structural examination were recorded on a chart. The intensity of the findings were rated on a scale of 0-3, as follows: 0 indicated insignificant findings; 1, a moderate response; 2, marked findings; and 3, very marked findings.

Results

The patients in this study had several diagnoses in addition to COPD. (Table 2 presents the respiratory diagnoses of the 40 patients.) Twenty patients reported a history of back problems or injury during their lifetime. Ten of these were related to the thoracic or cervical spine, or the rib cage.

Thirteen patients had postural problems: Six had scoliosis; four, thoracic kyphosis; two, combined scoliosis and kyphosis; and one, a flattened lumbar spine. The palpatory findings included all areas of the spine, but they were found primarily in the upper thoracic region. A composite picture of all the findings is presented as Figure 1. The findings were left-sided in 17 cases, right-sided in 14, and bilateral in 9. X-ray or physical findings were consistent with the side of the palpatory findings in 17 cases.

At least one spinal segment was rated at +2 intensity in 26 patients. Thirteen of these patients were identified in the hospital record as having severe manifestations of respiratory disease in addition to COPD. These included a case of carcinoma of the lung, acute respiratory failure, and pulmonary embolus.

Spinal palpatory findings in the lower thoracic spine were elicited in several patients. In some instances, these findings had similar characteristics to those of a viscerosomatic reflex, that is, two adjacent segments of somatic dysfunction, deep-muscle splinting, and resistance to the compression motion test, yet the patient's history did not reveal any particular organ dysfunction. However, characteristic viscerosomatic reflex findings were observed in patients with cholelithiasis, gastritis and cholecystitis, ulcerative colitis, and a hysterectomy.

Discussion

This study was undertaken to provide information about the incidence and location of somatic dysfunction associated with pulmonary disease. The osteopathic literature does not provide a definitive description of the manifestations of the somatic response to respiratory disease. Such information should be helpful to the clinician in diagnosis and prognosis, as well as to those who are doing research on the effects of osteopathic manipulative treatment in pulmonary disease.

All patients in the present study showed some areas of somatic dysfunction, predominantly in the upper thoracic spine within the T2-7 range of the autonomic nerve supply to the lungs. These findings correlated with those reported in the osteopathic literature on respiratory disease.[1-21] The characteristic changes associated with a viscerosomatic reflex are recorded in the T2-7 areas. Other areas of involvement were the upper cervical spine and lumbosacral spine. Scoliotic patterns, which are not a part of a viscerosomatic reflex, accounted for some of the lower thoracic spine involvement (Fig. 1).

A +2 intensity of the palpatory findings was found in 13 patients with an increase in the severity of their disease. However, in another group of 13 patients who also had at least one spinal segment of +2 intensity, a corresponding severity of disease was not noted. The criteria for the clinical assessment of severity were not always defined in the hospital record. In some instances, the clinical assessment was confirmed by roentgenography or by pulmonary function tests.

A correlation between physical findings and the palpatory examination was difficult to make in some cases in which hospital charts did not record x-ray findings or other examination data. In other cases, lung x-rays were reported as normal. However, 17 patients did have a physical or x-ray finding that correlated with the sidedness of the palpatory findings.

Clinical prognosis and research both require palpatory examinations that are simple to apply

TABLE 2. RESPIRATORY DIAGNOSES IN 40 PATIENTS.

Diagnosis	No. of patients
COPD alone	15
COPD with Asthma	4
Emphysema	4
Bronchitis	2
Emphysema and bronchial asthma	2
Pulmonary embolus	1
Bronchitis and acute respiratory failure	1
Emphysema and chronic bronchitis	1
Bronchial asthma	6
Asthmatic bronchitis with emphysema	2
Carcinoma of the lung	1
Pulmonary tuberculosis	1

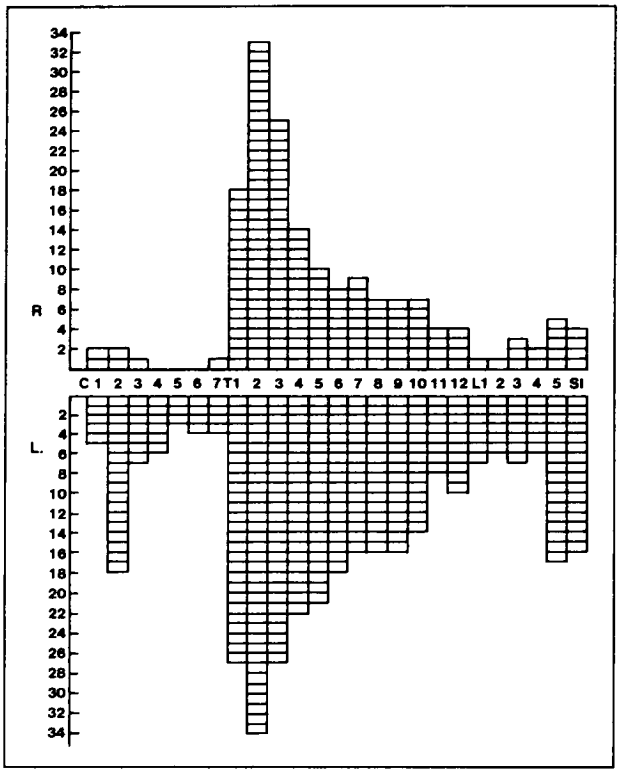

Fig. 1. *Somatic dysfunction in 40 cases of pulmonary disease.*

and give reliable results. The present study utilized tests of tissue texture, bone position, and joint motion to identify areas of somatic dysfunction. The examination method was used previously by one of us (MCB)[28] in the examination of patients with cardiac disease. Questions can be raised as to whether the particular palpatory tests selected gave the best information to evaluate the somatic aspects of pulmonary disease. Are there other tests that would more accurately appraise the patient's condition (such as the rigidity or compressibility of the rib cage)? What tests correlate best with the objective measures of pulmonary function? The specific criteria to evaluate respiratory disease will evolve only from further study of pulmonary examinations and comparison of them with objective tests of pulmonary function.

There were more patients with left-sided than right-sided findings in this series. Yet, there was only one left-handed patient, which would appear to obviate any apparent influence of handedness in the findings observed.

The fact that the majority of the patients showed unilateral findings is difficult to reconcile when they had diagnoses of pulmonary disease such as asthma, bronchitis, and emphysema, which are presumed to affect both lungs. One can speculate that the disease process was initially greater in one lung than the other, or that there may have been a combination of somatic tissue change and pulmonary disease, which would direct the peripheral and autonomic motor stimulus to one side. It has been suggested that the palpatory examination focused on the evident soft tissue changes on one side in contrast to the lesser manifestations on the opposite side. Yet 9 patients showed bilateral findings. These findings were not always at the same segmental level on opposite sides in the same patient.

What constitutes an adequate stimulus for the development of a viscerosomatic reflex in respiratory disease? An acute attack of asthma, with the associated anxiety, appears to be an adequate stimulus, in contrast to the slower progressive disease state of emphysema. What mechanism maintains somatic changes in some patients with COPD, while other patients with apparent limited respiratory capacity show minimal evidence of somatic dysfunction? These questions, along with others on the effectiveness of manipulative treatment in COPD, have been raised by osteopathic physicians. Although studies of the effectiveness of osteopathic manipulative treatment have been attempted, the immediate or long-range benefits of manipulative therapy in pulmonary disease are unknown at present.

Patients in this study had chronic obstructive lung disease. Although they were in the hospital for severe exacerbations of their problem, they did not exhibit acute signs of somatic dysfunction, such as increased skin temperature or edema of the subcutaneous tissues except in a few instances where it was superimposed upon findings associated with a chronic disease state. Acute findings appeared more generalized in patients with pulmonary disease, as opposed to the more localized area of somatic dysfunction in acute cardiac disease, as found in a previous study.[28] There is a need for further description of the manifestations of the acute stages of pulmonary disease and the transition to the chronic stage.

Summary

This study was conducted to further define the location and characteristics of somatic dysfunction associated with respiratory disease. Forty patients with a diagnosis of pulmonary disease were examined for palpatory evidence of musculoskeletal dysfunction. Somatic dysfunction was observed in all the patients in the area T2-7, which is associated with the autonomic nerve supply to the lungs. This agrees with findings reported in an extensive

cross-section of the osteopathic literature.

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