Improved Chest Expansion in Idiopathic Scoliosis After Intensive, Multiple-Modality, Nonsurgical Treatment in an Adult

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cardial biopsy did not show inflammatory infiltration or necrotizing myocarditis, but arteriolar smooth muscle contraction was prominent with increased permeability demonstrated by interstitial edema and diapedesis of erythrocytes (Fig 1). Immunofluorescence showed intravascular fibrinogen and C3 deposits.

Virologic and bacterial study findings were negative for Coxsackie B, echovirus, and adenovirus with two consecutive serology studies at 3-week intervals. Diphtheria, tetanus, poliovirus vaccination showed an excellent protection with high level of antibodies. Immunologic study findings were negative (antinuclear, anti-DNA, antimitochondria antibodies, rheumatoid factor).

The patient course was uneventful with aspirin treatment (3 g/d); apyrexia and relief of chest pain were obtained within 24 h. The patient was discharged at day 5 and prescribed aspirin treatment for 1 month. Three months later, the patient was totally free of symptoms and had persistent normal echocardiography and laboratory findings.

Discussion

To our knowledge, this is the first case of myopericarditis in a young adult after diphtheria, tetanus, polio vaccination. Cardiovascular complications due to vaccination are rare. Myocarditis after smallpox, *Salmonella typhi*, or paratyphi A and B vaccinations have been reported in the 1950s and 1960s. Pericarditis after hepatitis B[1] and influenza[2,3] vaccinations have been reported more recently (seven cases). Only one case of myocarditis in a young child after diphtheria, tetanus, pertussis vaccination has been reported.[3] One prospective Finish study[4] found ECG changes suggesting myocarditis although asymptomatic in 3% of young adults after vaccination against diphtheria and smallpox.

In the present case report, two mechanisms can be discussed. Myopericarditis may be due to an infective cause. Against that hypothesis are the time from the initial exposure to the vaccine; the absence of associated symptoms for diphtheria, tetanus, or poliovirus; and the favorable course within few days. The negative viral and bacterial serology findings during the acute phase and convalescence also do not support this hypothesis.

In favor of hypersensitivity are myopericarditis related to an immune complex-mediated pathogenic mechanism; the occurrence of early fever, arthralgias, and chest pain after vaccination and clinical outcome; and the laboratory and histology findings. Repeated antigen injection is a well-established technique for inducing immune complex.

However, there is no definite evidence to support a causal link between the administration of vaccine and myopericarditis. For ethical reasons, we did not perform a provocation test, which could ascertain the causal relation between the vaccination and the occurrence of myopericarditis. No alternative etiology has been found in our investigation. Hypersensitivity myocarditis[5–7] is usually a retrospective and circumstantial diagnosis. Histologic findings usually show diffuse interstitial infiltrates rich in eosinophils; the diagnostic accuracy of endomyocardial biopsy remains poor.

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Improved Chest Expansion in Idiopathic Scoliosis After Intensive, Multiple-Modality, Nonsurgical Treatment in an Adult*

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This case report documents a substantial increase in chest wall expansion in a middle-aged woman with stable right thoracic spinal curvature due to idiopathic scoliosis. Treatment involved intensive psychological and mobilization therapies, including comprehensive manipulative medicine treatments and daily manual traction. Over an 8-year period, a 6-cm increase in resting chest circumference (in the absence of weight gain) and a 7.5-cm increase in chest expansion were correlated with a substantial reduction of incidence of respiratory infections.

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Key words: hypothyroidism; idiopathic scoliosis; manipulative medicine; mitral valve prolapse; pectus excavatum

Abbreviations: CMM = comprehensive manipulative medicine; IS = idiopathic scoliosis; VC = vital capacity

The most serious complication of thoracic scoliosis, compromised cardiopulmonary function due to reduced chest wall expansion, can be fatal when curvatures are severe and is present even in mild idiopathic scoliosis (IS).[1,2] Chest expansion increases of > 1 cm, and im-

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proved vital capacity (VC), have been achieved in children and young adults with IS during a 6-week hospitalization regime using physical therapies.[3] Traction was used to achieve improved pulmonary function in a middle aged patient with severe scoliosis due to infantile poliomyelitis.[4] In the current study, the use of physical methods including comprehensive manipulative medicine (CMM) and daily manual traction was correlated with a progressive increase in chest expansion, a stable improvement in torso morphology, and a reduced incidence of respiratory infections.

Case Report

The patient was a 48-year-old woman in whom a prominent rib hump, scapular and torso asymmetry, thoracic lordosis, and forward rotation of the right shoulder were detected at age 11 years. Radiographic analysis revealed a right thoracic curvature of 43° with lesser curvatures in the cervical and lumbar spine. Pectus excavatum and mitral valve prolapse also were present. An orthopedic surgeon recommended spinal fusion, which was declined. Daily torso strengthening and conditioning exercises were carried out through February 1992. Hypothyroidism was diagnosed in 1971 and was treated with thyroid extract (3 grains daily). The patient described a chronic susceptibility, from infancy through April 1992, to upper and lower respiratory tract infections, averaging four or more a year, each lasting up to 6 weeks, commonly with temperatures $> 102°$ F and requiring medical intervention.

Methods and Results

In February 1992, the patient suffered psychological decompensation with emergent incapacitating multiregional physical pain and began outpatient psychological therapy (therapists Diane Breier, MSW, and Nancy Skocy, MSW; Tucson, AZ), which continued through September 1994. No psychopharmacologic or analgesic medications were employed. All strengthening and conditioning exercises were discontinued in February 1992. In April 1992 a spontaneous reduction in the forward rotation of the right shoulder occurred (not shown). From January 1993, one of the authors (WJB) provided instruction, support, and evaluation of posture and movement. Sustained pressure applied directly to muscle spasms, or manual traction to stretch the torso, was used by the patient to relieve pain as needed (≥ 4 h daily through 1997). These methods were supplemented with massage therapy monthly in 1993 and 1994.

CMM was performed by one of the authors (WJB) on four occasions during the period 1993 to 1998 and on seven occasions in 1999 to 2000. Manipulative interventions were dictated by a diagnostic methodology employing a systems analysis of whole-body biomechanics (posture and movement). Specifically, techniques and dosages were applied to the proportionately most severe deficiencies of available motion (W. J. Brooks, DO; unpublished data; 2001). Techniques employed included thrusting, muscle energy, articulation, myofascial release, and counterstrain.

Chest expansion increased from 2.5 to 10 cm (Fig 1), with 33% of the change occurring in correlation with intensive CMM in 1999 to 2000 (Fig 1, arrow). This change was

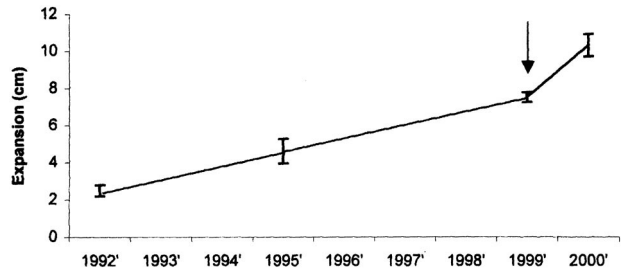

Figure 1. Increase in chest expansion, 1992 to 2000. The values for chest expansion are derived by subtracting the circumference (measured just below the breasts) during maximum exhalation from the circumference during maximum inhalation, and represent the means and SDs from the number of measurements taken by the patient at different times of the day over several days (1992, 10 measurements; 1995, 7 measurements; 1999, 20 measurements; and 2000, 29 measurements). Hip circumference (107 ± 0.5 cm) and weight (133 ± 3 lb) were stable during the test period. The arrow denotes the beginning of a year of intensive manipulative treatments.

associated with an increase in the mean ($\pm$ SD) resting circumference of the chest from 76 ± 0.5 to 82 ± 0.3 cm, together with stable changes in the morphology of the upper back (Fig 2, *top left*, *A*, and *top right*, *B*), the anterior chest (Fig 2, *middle left*, *C*, and *middle right*, *D*), and thoracic lordosis (Fig 2, *bottom left*, *E*, and *bottom right*, *F*). Radiographically, the thoracic curvature remained moderately severe (not shown). In November 1992, the signs and symptoms of hypothyroidism normalized, and thyroid medication was discontinued. Between 1992 and 2000, the patient experienced four respiratory infections, all of which resolved in 3 to 5 days. Daily severe pain continued through 1997, then decreased progressively to current levels of two to three episodes per month.

Discussion

When compared with control subjects, patients with IS exhibit a significantly smaller mean chest circumference and restricted chest mobility.[2,3,5] A chest expansion capacity of < 3.8 cm in IS patients is strongly correlated with diminished VC.[5] Pulmonary symptoms characteristic of IS can be duplicated in control subjects by inhibiting chest expansion with corsets or taping.[1] Reduced VC is associated with increased susceptibility to respiratory infection.[6]

In the current report, the achievement of a significant increase in chest expansion in correlation with the near-elimination of respiratory illness is consistent with a previous study showing that even in middle age, functional defects associated with thoracic scoliosis can be reversed measurably using physical methods.[4] The increased rate of improvement during the last year of the study suggests that CMM played a significant role in improving chest wall expansion. Mechanisms of improved chest wall expansion probably include altered muscle tonus through neuroreflexive mechanisms (*ie*, CMM) and plastic tissue changes from directly applied forces (*ie*, CMM, manual traction, and deep massage) and, over time, self-stretching through deeper breathing. The relief of pain was temporally correlated as an effect, rather than the cause, of the gradually improved physiology.

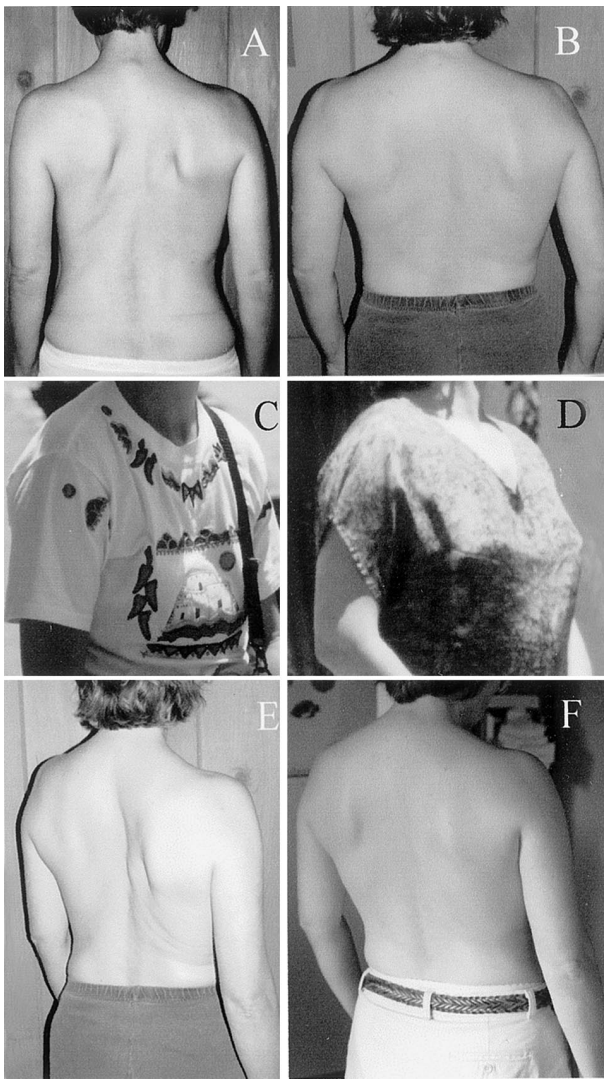

FIGURE 2. Stable morphologic changes occurring in correlation with increased chest expansion. The photographs are of the patient's back while in a relaxed standing position and show an apparent increase in the breadth of the upper back in January 1993 (*top left*, *A*) and November 1995 (*top right*, *B*). Casual photographs show morphologic changes in the anterior chest in July 1995 (*middle left*, *C*) and July 1998 (*middle right*, *D*). Photographs of the patient's back while in a relaxed standing position in November 1995 (*bottom left*, *E*) and November 1999 (*bottom right*, *F*) show a visual improvement in the appearance of thoracic lordosis.

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TB or Not TB*

Cavitary Bronchiolitis Obliterans Organizing Pneumonia Mimicking Pulmonary Tuberculosis

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Two patients with subacute symptoms and signs compatible with pulmonary tuberculosis (TB) had right upper lobe cavitary infiltrates shown on chest radiography. In both patients, purified protein derivative and microbiologic testing excluded TB, and tissue examination yielded typical histologic changes of bronchiolitis obliterans organizing pneumonia (BOOP). Glucocorticoid therapy led to clinical and radiologic resolution. Though probably rare in this situation, BOOP should be considered in the differential diagnosis of patients presenting with clinical and radiologic features of pulmonary TB.

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Key words: bronchiolitis obliterans organizing pneumonia; radiography, thoracic; tuberculosis, pulmonary

Abbreviations: ANCA = antineutrophil cytoplasmic antibody; BOOP = bronchiolitis obliterans organizing pneumonia; ESR = erythrocyte sedimentation rate; TB = tuberculosis

Patients with bronchiolitis obliterans organizing pneumonia (BOOP) present with clinical and radiologic manifestations that are not specific to this entity. Depending on the clinicoradiologic presentation, a number of other diseases may have to be considered in the differential diagnosis of BOOP. Tuberculosis (TB), however, is not usually included in this differential diagnosis. We describe two patients who presented with clinical and radiologic features suggestive of pulmonary TB but turned out to have BOOP instead.

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