cardial biopsy did not show inflammatory infiltration or necro-
tizing 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 bacteriologic study findings were negative for
Coxackie B, echovirus, and adenovirus with two consecutive
serology studies at 3-week intervals. Diphtheria, tetanus,
polio virus 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 echocardiog-
raphy and laboratory findings.

**DISCUSSION**

To our knowledge, this is the first case of myopericar-
ditis in a young adult after diphtheria, tetanus, polio
vaccination. Cardiovascular complications due to vaccina-
tion 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 and
influenza 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. One prospective Finish study found
ECG changes suggesting myocarditis although asympto-
antic 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 symp-
toms for diphtheria, tetanus, or poliovirus; and the favor-
able 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 rel-
ated 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 myoperi-
carditis. No alternative etiology has been found in our
investigation. Hypersensitivity myocarditis is usually a
retrospective and circumstantial diagnosis. Histologic find-
ings 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***

Martha C. Hawes, PhD; and William J. Brooks, DO

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 psychologi-
cal 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.

(CHEST 2001; 120:672–674)

**Key words:** hypothyroidism; idiopathic scoliosis; manipu-
lative medicine; mitral valve prolapse; pectus excavatum

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

The most serious complication of thoracic scoliosis,
comprised cardiopulmonary function due to re-
duced chest wall expansion, can be fatal when curvatures
are severe and is present even in mild idiopathic scoliosis
(IS). 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. Traction was used to achieve improved pulmonary function in a middle-aged patient with severe scoliosis due to infantile poliomyelitis. 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 decensation 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 associated with an increase in the mean (± 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. A chest expansion capacity of < 3.8 cm in IS patients is strongly correlated with diminished VC. Pulmonary symptoms characteristic of IS can be duplicated in control subjects by inhibiting chest expansion with corsets or taping. Reduced VC is associated with increased susceptibility to respiratory infection.

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. 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.
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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.

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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