



Computed tomography scan showing abdominal content (fat and part of the stomach) in the right hemithorax.

Lung Collapse Caused by Hiatal Hernia Secondary to Manual Abdominal Compression

To the Editor: Abdominal compression is a maneuver that is often applied in manually assisted coughing¹ to aid patients with mainly neuromuscular disease whose cough is inadequate for removing bronchial secretions.² We report the case of a woman who was tetraplegic secondary to transverse myelitis. Her caregivers provided manually assisted coughing for years but the maneuver was apparently related to the complication that required hospital admission.

A 33-year-old woman diagnosed with tetraplegia due to transverse myelitis at the age of 2 years also had severe kyphoscoliosis with restrictive respiratory defects. Her caregivers consistently applied abdominal compression as part of manually assisted coughing to facilitate the removal of bronchial secretions. She was brought to the emergency department with fever of less than 24 hours' duration, dyspnea, and difficulty in removing respiratory secretions. Physical examination revealed diminished vesicular sounds in the right hemithorax and rales related to bronchial secretions on the left. Arterial blood gas analysis showed an inspired oxygen fraction of 0.28, pH of 7.39, PaCO₂ of 43.7 mm Hg, PaO₂ of 68.3 mm Hg, bicarbonate ion concentration of 24.7 mmol/L, and arterial oxygen saturation of 93.4%. A chest radiograph showed severe kyphoscoliosis and opacities throughout the right lung that had not been present in a computed tomography (CT) scan 6 months earlier. With a diagnosis of right atelectasis possibly due to invasion by bronchial secretions and fever due to respiratory infection, antibiotic treatment with cefotaxime was started. On the respiratory medicine ward, treatment was complemented with respiratory physiotherapy and application of a mechanical cough-assist device. From the fifth day the patient showed improvement

but lung sounds were still diminished in the right hemithorax. A CT scan showed the right lung to be nearly fully collapsed, secondary to compression from a hiatal hernia, which contained abdominal fat and nearly the entire stomach (figure). Comparison of that scan and the one taken 6 months earlier showed that the hernia, which had previously been small, had enlarged considerably. The patient's caregivers were instructed to perform mechanical insufflation with a self-reinflating bag and thoracic compression to assist cough. Three weeks after discharge a chest radiograph showed that the right hemithorax had nearly cleared.

Normal abdominal pressure is between 15 and 20 mm Hg and reaches its maximum in circumstances like coughing (>100 mm Hg).³ Intense coughing has been associated with such complications as rupture of the diaphragm⁴ or traumatic abdominal hernia.⁵ Abdominal compression maneuvers also generate considerably increased abdominal pressures and in a patient with paralyzed abdominal muscles who has no defense against external compression the magnitude of pressure on the abdominal organs will certainly be even greater. In the case we report, repeated maneuvers on the paralyzed abdominal muscles were probably responsible for the thoracic progression of the hiatal hernia, which had been small a few months earlier. Furthermore, after the abdominal compression maneuvers were abandoned, the clinical picture resolved, supporting the hypothesis of a causal relationship. Therefore, we advise that such abdominal compression techniques to assist coughing should be avoided in patients known to have a hiatal hernia. Alternatives such as thoracic compression or mechanically assisted coughing should be used instead. Similarly, radiographs should be obtained periodically in patients without

hiatal hernia in whom abdominal compression is being used in order to detect such hernias early.

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