Studies of rib cage and abdominal displacement in patients with COPD indicate evidence of abnormal VMR. The factors responsible for these changes and its potential importance remain unknown. To answer both questions we evaluated VMR in 39 patients (26 men, 13 women) with airflow obstruction (FEV₁ range, 0.32-1.54 L). Pleural (Ppl) and gastric (Pg) pressure were continuously recorded during tidal breathing and VMR determined by the slope of the line obtained from Ppl-Pg plots (Am Rev Respir Dis 1988; 137:1401). Negative slopes (−SL) indicate increased diaphragmatic contribution, while positive slopes (+SL) indicate increased contribution by inspiratory muscles of the rib cage. Pearson's correlation and multiple regression analysis were used to correlate the slope to other factors that influence respiratory function: age, sex, lung volumes (FRC), degree of obstruction (FEV₁), nutrition (weight, weight/height, albumin), and blood gases. The results showed a correlation between a more positive slope and higher FRC (r = .66; p = .0001) and lower FEV₁ (r = .53; p = .0006). The correlation was also significant with Pdi (max) (r = −.45; p = .0039). VMR did not correlate with age, sex, weight, height/weight/albumin, or blood gases. Partitioning of respiratory pressures showed that with decreasing FEV₁, there was progressive increase in expiratory Ppl (r = .59; p = .0001) but not Pg.

We conclude that with progressive airflow obstruction and hyperinflation the inspiratory muscles of the rib cage increase their contribution to ventilation and in the most severe cases become the most important ventilatory muscles. As airflow obstruction worsens, the rib cage muscles actively partake in expiration. The increased work of these muscles in progressive COPD may lead to their fatigue in chronic respiratory failure. Therapeutic strategies should be aimed at improving the function of rib cage muscles in the most severe COPD cases.

The Determinants of Arterial CO₂ Tension during Weaning from Mechanical Ventilation

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A cute respiratory acidosis is a late manifestation of respiratory pump failure, which is usually preceded by dyspnea, tachypnea, and dyscoordinate chest wall movements. We tested the hypothesis that patients who are unable to complete a 1-h T piece weaning trial because of intense dyspnea or sustained tachypnea (>30 breaths/min) retain CO₂ relative to a CO₂ setpoint of the respiratory controller before acidosis is manifested. The CO₂ recruitment threshold (Pco₂RT) is a measure of the setpoint of the mechanically unloaded respiratory system. Pco₂RT is defined as the lowest PaCO₂ at which the supplementation of CO₂ to the inspired gas induced phasic respiratory muscle activity during controlled mechanical ventilation. Pco₂RT was measured in 16 patients and compared to the PaCO₂ at

Factors Determining the Pattern of Ventilatory Muscle Recruitment (VMR) in Patients with Chronic Obstructive Pulmonary Disease (COPD)*

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