A Lungful of Air Goes a Long Way

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In this issue of *Respiration*, Ergün et al. [1] report the effect of 2-hour daily nasal intermittent positive pressure ventilation (NIPPV) applied for 14 days in 12 patients with chronic respiratory failure secondary to restrictive thoracic disease. Restriction was either caused by kyphoscoliosis (6 patients) or posttuberculous changes. After 14 days, NIPPV had improved forced vital capacity (FVC), 6-min walking distance, ATS dyspnea score and PaCO₂; in addition, inspiratory electrical activity of the diaphragm, assessed by surface EMG, had decreased in 4 patients.

NIPPV has already been shown to improve respiratory failure secondary to restrictive thoracic disease [2–4], but the short-term effects that the authors found 30 min after the last 2-hour period of NIPPV are nevertheless remarkable. It is indeed notable that such a short course of NIPPV results in any measurable improvement of respiratory function, even though the cause of the improvement remains speculative. The fact that such an increase in FVC was not found in such a consistent manner in previous studies [5, 6] may have resulted from an increase in static lung volumes through reversion of atelectasis, as the authors discuss in the manuscript. The assisted inflation may increase compliance by altering the volume history of the lungs. Thus, the pressure-volume relationship of the lungs may have shifted to the left after assisted inflation, and the work of breathing may have decreased accordingly [7]. A recruitment maneuver that improves lung compliance (such as an assisted inspiration) may considerably decrease the work of breathing in patients with restrictive

thoracic disease, since their dynamic lung compliance is about one half of normal and their respective work of breathing is at least 5 times greater than normal [8]. The longer walking distance after NIPPV may have resulted from the improved pressure-volume relationship of the lungs, allowing higher ventilation with less energy expenditure of the respiratory muscles. Since fatigued respiratory muscles are known to require much longer than 2 h to recover [9], the observed decrease in electrical activity of the diaphragm results from the decreased effort of the respiratory muscles rather than from muscle rest. Respiratory muscle function may also have improved by a mechanism other than resting; if lung volumes are low, the respiratory muscle function may be compromised by a disadvantageous length-tension relationship of the muscle fibers that immediately improves after a recruitment maneuver [10]. For patients with chronic respiratory failure due to restrictive thoracic disease, a short course of daily noninvasive ventilation appears to be beneficial for whatever cause. Still, measurements should be repeated after an even shorter period of assisted ventilation in order to determine whether the observed beneficial effects are rather due to recovery of fatigued respiratory muscles or to improved elastic properties of the respiratory system. If the improved elastic properties of the respiratory system cause the benefit, the improvement should be reproducible after a few assisted breaths. However, if muscle recovery causes the beneficial effects, a couple of assisted breaths will not suffice to improve respiratory function.

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