



Maneuvers and strategies in respiratory physical therapy: time to revisit the evidence

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Respiratory physical therapy has always sought to prove the efficiency of techniques,⁽¹⁻³⁾ such as chest vibration/percussion and changes in inspiratory/expiratory flow, in bronchial hygiene. However, this has failed to be proven because of methodological differences among the studies and the fact that these techniques depend on being properly performed by the physical therapist, as well as, in many cases, on the collaboration of the patients.⁽⁴⁾

We believe that studies that corroborate the use of bronchial hygiene techniques are important, since they are necessary to prevent atelectasis and pulmonary infections, as well as to reduce the length of hospital stay. In this context, Chicayban et al.,⁽⁵⁾ in the present issue of the *Jornal Brasileiro de Pneumologia*, contemplate us with a study comparing two bronchial hygiene techniques that can be used in clinical practice.

Postural drainage, tapotement and chest vibration, acceleration of expiratory flow, positive end-expiratory pressure-zero end-expiratory pressure maneuvers,⁽⁶⁾ bag squeezing,⁽⁷⁾ and manual hyperinflation performed with an artificial manual breathing unit (AMBU) are among the most frequently studied techniques. Bag squeezing and manual hyperinflation, when compared with the stimulation of cough or tracheal aspiration without the prior use of physical therapy maneuvers, have so far been shown not to be effectively capable of demonstrating an increase in the mobilization and in the amount of fluid.⁽⁸⁾

Cough depends on inspiratory and expiratory muscles being preserved; however, after prolonged ICU stays and use of mechanical ventilation, in addition to the evolution of various diseases, these muscles might become impaired and end up compromising effective coughing.⁽⁸⁾ In this context, maneuvers that improve the patient's ability to perform deep and sustained inhalations are very important to make coughing more effective, revert possible areas of atelectasis, and prevent other pulmonary complications due to accumulation of secretions.⁽⁸⁾

A recent study⁽⁹⁾ evaluated the major bronchial hygiene techniques used by physical therapists: vibrocompression, hyperinflation, postural drainage, tracheal aspiration, and motor physical therapy. The authors found that the most frequent reason for using one or the other maneuver was the personal experience of the professional (not scientific evidence), which demonstrates the need for further studies on this topic because techniques/maneuvers have always been used and recommended

in the routine of such professionals.⁽⁸⁾ Based on these findings, interventions were started to help improve or simulate the physiological mechanisms of fluid clearance.

Breath stacking techniques, which include voluntary and involuntary breath stacking, have the physiological principle of increasing lung volume and elastic recoil. These techniques are intended to reexpand collapsed areas and assist coughing, which are mechanisms that can be impaired in various diseases. For this reason, we believe that the study by Chicayban et al.⁽⁵⁾ is valuable because it scientifically supports physical therapy approach using viable, comprehensive resources in clinical practice. In addition, breath stacking techniques have demonstrated a solid scientific basis as to their effectiveness.⁽⁹⁻¹³⁾ These techniques have been well-established in the treatment of neuromuscular diseases and, in practice, are aided by AMBU, which increases inspiratory volume above three liters. This acts on lung elastic recoil, and it makes coughing more effective during forced expiration, whether associated with thoracoabdominal restriction or not. The major function of involuntary breath stacking is not related to mobilizing fluid, as is observed in conventional maneuvers. In fact, it simulates cough mechanisms, increases PEF and peak cough flow, carrying fluid to the upper airways. Therefore, it is a technique that should be applied and studied in other diseases, besides neuromuscular diseases.⁽¹²⁾ The voluntary breath stacking technique has good results in terms of improving oxygenation in patients with atelectasis.⁽¹⁴⁾ However, the effects of this technique on respiratory mechanics in patients with severely impaired lung function should be further evaluated to contribute to decision-making in clinical practice. It is of note that voluntary breath stacking depends more on the muscle contraction of the patient to generate tidal volume, whereas involuntary breath stacking relies on the volume generated by AMBU (bag-valve-mask).

Although both techniques can be used easily and independently,⁽⁵⁾ involuntary breath stacking appeared to be more effective in generating inspiratory volume and increasing static compliance when compared with voluntary breath stacking. In the study by Chicayban et al.,⁽⁵⁾ 85% of the patients needed fluid aspiration due to coughing during the performance of involuntary breath stacking. Because this increases elastic recoil, we can strategically think that there was an effect of "sudden decompression" that, when associated with more vigorous

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expiratory efforts, could generate a more productive and effective cough, carrying secretions more easily, which was well discussed and demonstrated by the authors.⁽⁵⁾

Regarding the safety of the maneuvers,⁽⁵⁾ these were repeated in 4-5 consecutive cycles, which seemed not to cause adverse effects, such as hemodynamic instability, patient discomfort, or increased airway resistance. This corroborates the studies by Sarmiento et al.⁽¹³⁾ and Naue et al.,⁽¹⁵⁾ who compared different bronchial hygiene techniques, combined and isolated, and concluded that the techniques were safe and that, when combined, they appeared to be more efficient in reducing the frequency of aspiration and the duration of mechanical ventilation.

Although the authors⁽⁵⁾ do not mention the level of awareness and cooperation of the patients at the time that interventions were performed, we believe that more cooperative patients can benefit more from such maneuvers, especially when they receive orientation on how to perform the maneuvers themselves after hospital discharge.

In conclusion, we found that both techniques promote bronchial hygiene by increasing inspiratory volume, inspiratory capacity, and complacency, favoring a greater peak cough flow. The study by Chicayban et al.⁽⁵⁾ helps support the use of reexpansion techniques based on evidence and applicability in an attempt to supply the absence of well-evidenced studies with proper methodology on this topic.

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