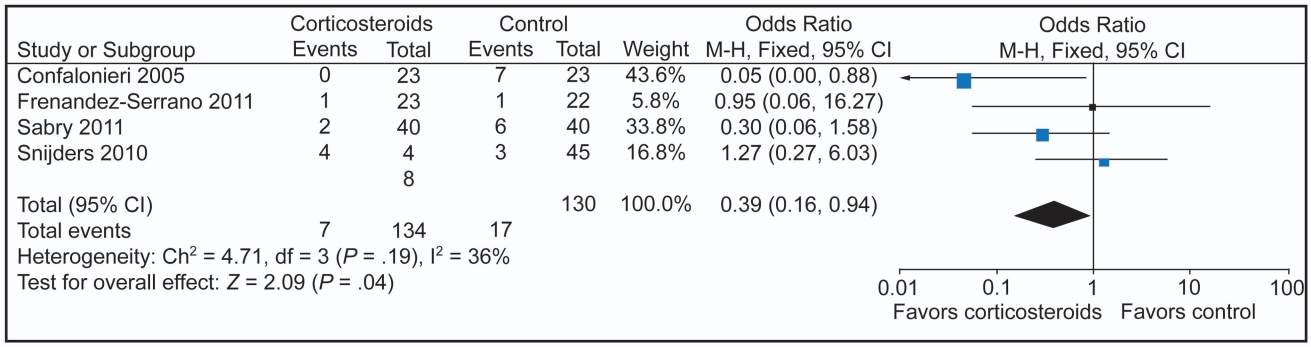

Fig. 1. Correlation between mortality and corticosteroid treatment using the odds ratio.

a 0.5 zero-cell correction produces great bias, whereas the Peto method needs no correction. Therefore, mortality was analyzed using the Peto method to calculate the OR and 95% CI in our meta-analysis. Even if the OR was used, the *P* value from the heterogeneity test was .19 (I^2 = 36%), and the fixed-effects model could be used. A significant difference still existed between the corticosteroid and control groups (OR = 0.39, 95% CI 0.16–0.94) (Fig. 1).

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The authors have disclosed no conflicts of interest.

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Expiratory Rib Cage Compressions to Improve Secretion Clearance During Mechanical Ventilation: Not Only a Matter of Squeezing the Chest

To the Editor:

We read with interest the manuscript by Guimarães et al,[1] who assessed in humans the pulmonary effects of manual rib cage compressions (MRCCs). The authors found a mild increase in the amount of cleared airway secretions with the use of MRCCs and no effects on respiratory mechanics. Some of their results are in line with previous evidence from clinical[2] and laboratory[3-5] studies; nevertheless, we would like to comment on a few critical methodological aspects of previous works.

First, there is a lack of consistency in the applied methods in previous studies. Unoki et al[2-4] applied gentle and gradual rib cage compressions during the expiratory phase and demonstrated marginal effects on mucus clearance and respiratory mechanics, as in the study by Guimarães et al.[1] Conversely, in our previous study,[5] we applied two different techniques (Fig. 1): (1) soft MRCCs to prolong the late expiratory phase through gentle and gradual chest compressions; and 2) hard MRCCs consisting of brief and strong compressions synchronized with the early expiratory phase to increase peak expiratory flow. Interestingly, soft MRCCs did not influence mucus clearance and worsened the static lung elastance. Conversely, hard MRCCs significantly improved mucus clearance and did not cause any deleterious pulmonary effect. Unfortunately, in the study by Guimarães et al, the applied technique is not fully elucidated. The significant increase in peak expiratory flow (> 16 L/min) indicates that they used a technique comparable to hard MRCCs. Nonetheless, given the expiratory flow limitation found in a limited number of subjects, it is possible that compressions were applied throughout the expiratory phase. Our previous investigation clearly demonstrated that the beneficial effects of MRCCs may vary based on the applied forces, synchronization with the expiratory phase, and the time of application.[5] In particular, it seems that very brief compressions synchronized with the early expiratory phase could be the best option to improve mucus clearance during controlled mechanical ventilation.

Second, Guimarães et al[1] suggested that the expiratory flow limitation found in their study was probably due to the increased transmural pressure associated with the compressions, which ultimately led to peripheral airway collapse. In our study, we found a significant increase in static elastance, likely related to a decrease in expiratory lung volume, as corroborated by the significant loss of PEEP (~3 cm H_2O) (see Fig. 1). However, this was associated with prolonged compressions only up to the late expiratory phase. Another possible explanation for the findings of Guimarães et al is that the subjects were not fully sedated (3 subjects were not sedated, and 16 presented a Ramsay Sedation Scale score of 2–4). Consequently, the subjects might have modulated the expiratory flow and opposed the thoracic compressions. Thus, uncertainty exists as to the feasibility of the technique in lightly sedated patients

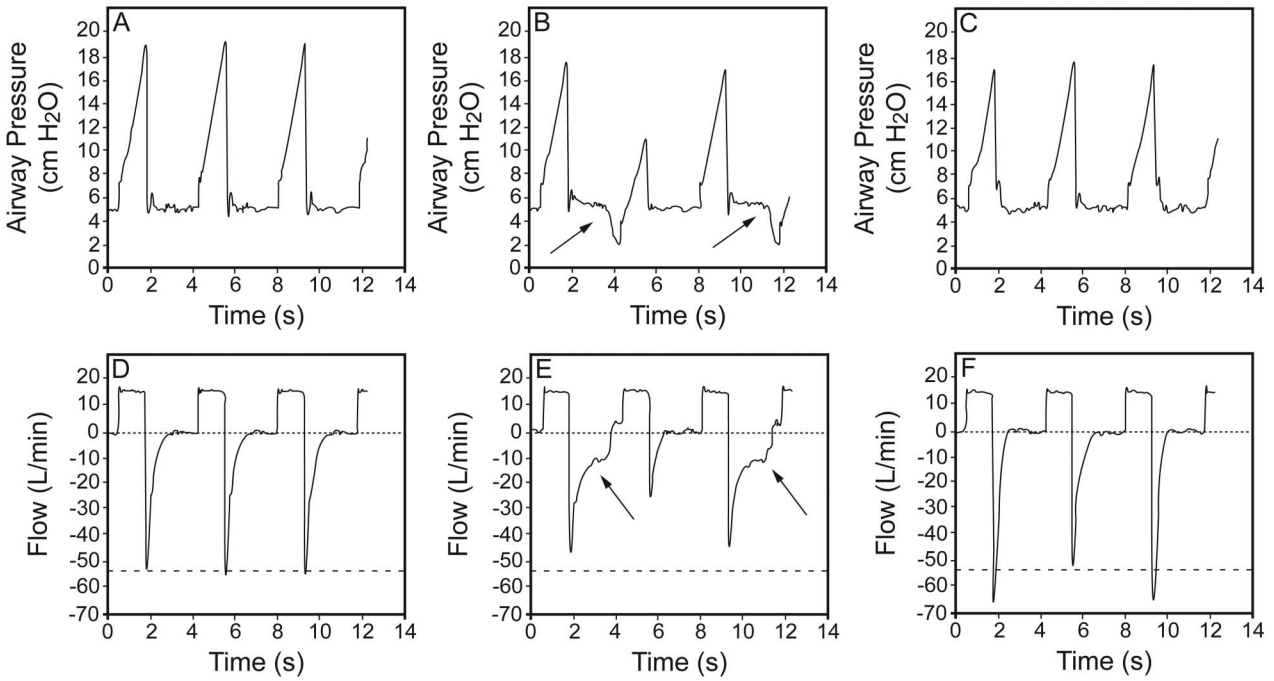

Fig. 1. A and D: Flow and pressure waveforms during no treatment. B and E: Soft manual rib cage compressions (MRCCs) prolong the late expiratory phase (arrows in E), leading to a decrease in PEEP (arrows in B). C and F: Hard MRCCs synchronized with the early expiratory phase increase the no-intervention peak expiratory flows (dotted line), with no effects on PEEP.

on volume controlled continuous mandatory ventilation. Nevertheless, this evidence further supports the use of hard MRCCs rather than a long squeeze of the rib cage. Indeed, a hard MRCC replicates a brief cough and could be safely applied to patients with low PEEP levels or who are not deeply sedated.

To date, scientific evidence on the efficacy and safety of MRCCs during invasive mechanical ventilation is scant, yet the study by Guimarães et al[1] and previous studies demonstrate that critical factors (ie, studied population, mode of mechanical ventilation, time of application, expiratory phase synchronization) should be considered when applying this technique. Additional clinical studies are needed to elucidate the role of this physiotherapy technique in the ICU.

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The authors have disclosed no conflicts of interest.

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