

Comparison of three cough-augmentation techniques in neuromuscular patients: mechanical insufflation combined with manually assisted cough, insufflation-exsufflation alone and insufflation-exsufflation combined with manually assisted cough

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PMID: 25171575 DOI: [10.1159/000364911](https://doi.org/10.1159/000364911)

Abstract

Background: Mechanical insufflation-exsufflation (MI-E), more commonly known as 'cough assist therapy', is a method which produces inspiratory and expiratory assistance to improve cough performances. However, other alternatives or combinations are possible.

Objective: The objective was to compare the effects of mechanical insufflation combined with manually assisted coughing (MAC), insufflation-exsufflation alone and insufflation-exsufflation combined with MAC in neuromuscular patients requiring cough assistance.

Methods: Eighteen neuromuscular patients with severe respiratory muscle dysfunction and peak cough flow (PCF) lower than 3 liters/s or maximal expiratory pressure (MEP) lower than +45 cm H₂O were studied. Patients were studied under three cough-assisted conditions, which were used in random order: insufflation by intermittent positive-pressure breathing (IPPB) combined with MAC, MI-E and MI-E + MAC.

Results: Overall, PCF was higher with IPPB + MAC than with MI-E + MAC or MI-E alone. Among the 12 patients who had higher PCF values with IPPB + MAC than with the two other techniques, 9 exhibited mask pressure swings during MI-E exsufflation, with a transient positive-pressure value due to the expiratory flow produced by the combined patient cough effort and MAC. Each of these 9 patients had higher PCF values (> 5 liters/s) than did the other 9 patients when using IPPB + MAC.

Conclusion: Our results indicate that adding the MI-E device to MAC is unhelpful in patients whose PCF with an insufflation technique and MAC exceeds 5 liters/s. This is because the expiratory flow produced by the patient's effort and MAC transitorily exceeds the vacuum capacity of the MI-E device, which therefore becomes a transient load against the PCF.

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