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High flow conditioned oxygen therapy for prevention of reintubation in critically ill patients at high risk for extubation failure: a multicenter randomised controlled trial

G Hernandez[1*], C Vaquero[2], P Gonzalez[3], L Colinas[1], S Garcia[2], A Canabal[1], A Villasclaras[2], R Cuena[4], R Fernandez[5,6]

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Introduction

Critically ill mechanically ventilated patients are usually stratified in two levels according to the risk for reintubation. In low-risk patients high flow conditioned oxygen therapy (HFO) may reduce reintubation, whereas in high-risk patients non-invasive mechanical ventilation (NIMV) to prevent reintubation is gaining acceptance. However, data on the efficacy or safety of HFO in high-risk patients are lacking.

Objectives

We hypothesized that HFO is an appropriate alternative to NIMV in preventing reintubation in high risk patients. The primary outcome was all-causes and respiratory-related reintubation rate within 72 hours.

Methods

In this multicenter, randomized, noninferiority trial, we recruited 603 critically ill patients at high-risk for reintubation to be treated after extubation with either HFO (n = 290) or NIMV (n = 313). High-risk for reintubation was defined as the presence of at least any of the following criteria: >65 years, cardiac failure, moderate-to-severe COPD, APACHE II >12 points at extubation day, body mass index >30, airway patency problems, inadequate secretions management, not simple weaning, ≥2 comorbidities, and prolonged mechanical ventilation. NIMV as a rescue therapy was not allowed in the HFO group. Noninferiority was determined as a < 6% absolute difference in the risk of the primary outcome.

Results

Respiratory-related reintubations occurred in 49 (16.9%) HFO patients and in 50 (16%) NIMV patients (risk difference 0.9%; upper limit of the unilateral 95%CI 5.9). All-causes reintubation occurred in 67 (23.1%) HFO patients and in 60 (19.2%) NIMV patients (risk difference 3.9%; upper limit of the unilateral 95%CI 9.4%).

Conclusions

In critically ill patients at high risk, HFO was noninferior to NIMV in preventing respiratory-related reintubation, but not all-causes reintubation. The study was registered at ClinicalTrials.gov (Identifier: NCT01191489).

Authors' details
[1]Complejo Hospitalario de Toledo, Intensive Care Medicine, Toledo, Spain. [2]Hospital Universitario Ramon y Cajal, Intensive Care Medicine, Madrid, Spain. [3]Hospital Universitario Infanta Sofia, Intensive Care Medicine, San Sebastian de los Reyes, Spain. [4]Medical Council, Research Unit, Toledo, Spain. [5]Hospital Sant Joan de Deu-Fundació Althaia, Intensive Care Medicine, Manresa, Spain. [6]Universitat Internacional de Catalunya. CIBERES, Manresa, Spain.

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[1]Complejo Hospitalario de Toledo, Intensive Care Medicine, Toledo, Spain
Full list of author information is available at the end of the article