Bronchodilator Efficacy Delivered Using an In-line Aerogen® Solo during High-flow Nasal Cannula Therapy Versus a Jet Nebulizer and Facemask


Background

HFNC therapy is increasingly used as a method of non-invasive respiratory support; however, there is a lack of controlled clinical data on the efficacy of aerosolized bronchodilator therapy delivered in this setting.

Objective

The aim of this study was to compare efficacy outcomes with an aerosolized bronchodilator delivered using the Aerogen Solo in-line with HFNC versus a standard jet nebulizer with facemask; for comparative purposes, outcomes were also assessed with HFNC therapy alone.

Materials and Methods

Design: Randomized, crossover study

- Adult patients with reversible obstructive lung disease (COPD/asthma)*
- N = 25
- Administered in a randomized order on 3 separate days across 1 week

Jet nebulizer with facemask (albuterol 2.5 mg)
- Flow rate 6 L/min
- Non-heated, non-humidified

HFNC + in-line Aerogen Solo (albuterol 2.5 mg)
- Flow rate 30 L/min
- 100% relative humidity at 37 °C

HFNC alone

*FEV/FVC ratio <70% and a positive bronchodilator reversibility test (FEV₁ increase of ≥12% and ≥200 mL following administration of inhaled albuterol).

 Outcome measures

- The primary endpoint was the relative improvement in FEV₁ with the Aerogen Solo versus a jet nebulizer and facemask.
- Bronchodilator efficacy was assessed using spirometry and plethysmography performed before and after each HFNC session.
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Relative increase in FEV₁ following administration of aerosolized bronchodilator therapy

<table>
<thead>
<tr>
<th>Drug delivery method</th>
<th>Relative increase in FEV₁ (%)</th>
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<tbody>
<tr>
<td>Jet nebulizer with facemask</td>
<td>18%</td>
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<tr>
<td>HFNC + in-line Aerogen Solo</td>
<td>16%</td>
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</tbody>
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Changes in FEV₁, and residual volume with the Aerogen Solo and jet nebulizer were well correlated.

Both delivery methods were well tolerated and had similar patient comfort ratings.

Per the authors, the results demonstrate that the Aerogen Solo delivers inhaled therapy “within the [HFNC] circuit with the same efficacy and tolerance [as standard facemask jet nebulization] avoiding cumbersome equipment switches.”

Bronchodilator efficacy was comparable with an in-line Aerogen Solo during HFNC therapy versus a jet nebulizer with facemask, with no interruption of HFNC therapy required with the Aerogen Solo.

FEV₁, forced expiratory volume in 1 second; HFNC, high-flow nasal cannula.