Non-invasive Ventilation in Adults: A Brief Update

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Abstract

The use of noninvasive ventilation and noninvasive continuous positive airway pressure by mask has increased substantially. The main indications are exacerbation of chronic obstructive pulmonary disease (COPD), cardiogenic pulmonary oedema, trauma, pulmonary infiltrates in immunocompromised patients, and weaning of previously intubated stable patients with COPD. In this mini-review article, we summarize the results of various studies in which noninvasive ventilation was applied and discuss the role and efficacy of noninvasive ventilation.

Keywords: Acute respiratory distress syndrome; Noninvasive ventilation; Respiratory failure

Background

Noninvasive ventilation (NIV) refers to positive pressure ventilation delivered through a noninvasive interface (nasal mask, facemask, or nasal plugs), and it is used in patients with chronic hypercapnic respiratory failure caused by chest wall deformity, neuromuscular disease, COPD, posttraumatic hypoxic respiratory failure, obesity hyperventilation syndrome, hypercapnic encephalopathy syndrome, non-hypercapnic respiratory failures or impaired central respiratory drive [1-5].

NIV has now become an integral tool in the management of both acute and chronic respiratory failure, in both the home setting, emergency room and in the intensive care unit [6-8].

The advantages of NIV over mechanical ventilation (MV) include the elimination of possible complications associated with endotracheal intubation, reduced incidence of infections related to MV, maintenance of speech and swallowing, greater comfort and flexibility of use to the patient as well as the preservation the defense mechanisms of the airway [9-11].

The consensus of the American Association of Respiratory Care endorses the use of NIV if 2 or more of the criteria are present (Table 1) [12-17].

The main types of ventilation modes for noninvasive support are shown in Table 2 [15-17].

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Table 1: Signs and symptoms of acute respiratory distress

<table>
<thead>
<tr>
<th>Indications</th>
<th>Gas exchange abnormalities</th>
</tr>
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<tbody>
<tr>
<td>Moderate to severe dyspnea ≥ 24</td>
<td>pH &lt; 7.35 with PaCO2 &gt; 45 mmHg</td>
</tr>
<tr>
<td>Signs of increased work of breathing, paradoxical breathing or the use of accessory muscles</td>
<td>Hypoxemia with Pa O2/FIO2 &lt; 200 mmHg</td>
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<table>
<thead>
<tr>
<th>Contraindications to NIV</th>
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<tbody>
<tr>
<td>Severe upper gastrointestinal bleeding and postoperative esophageal surgeries.</td>
<td>Unstable cardiac arrhythmia and hemodynamic instability</td>
</tr>
<tr>
<td>Severe Encephalopathy (GCS &lt; 10)</td>
<td>Organ failure</td>
</tr>
<tr>
<td>Respiratory or cardiac arrest</td>
<td>Upper airway obstruction</td>
</tr>
<tr>
<td>High risk for aspiration and inability to clear secretions</td>
<td>Inability to protect airway or cooperate</td>
</tr>
<tr>
<td>Trauma, defolmy, facial or neurological surgery</td>
<td>Severe psychomotor agitation and uncooperative patient.</td>
</tr>
<tr>
<td>Patient decline</td>
<td>Hypotensive shock</td>
</tr>
<tr>
<td>Unable to fit mask</td>
<td>Total upper airway obstruction</td>
</tr>
<tr>
<td>Related to the mask</td>
<td>Need for emergency intubation</td>
</tr>
</tbody>
</table>

Table 2: Complications of NIV

- Discomfort
- Claudophobia
- Edema or erythema
- Ulceration of the nose bridge
- Leaks

- Nasal congestion
- Local pain
- Nasal dryness and/or oral
- Conjunctivitis
- Gastric distension


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