

Bronchoscopy during non-invasive ventilation in a patient with acute respiratory distress syndrome

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ABSTRACT

A 72-year-old man was transferred to our hospital for refractory severe acute respiratory syndrome. On arrival, he was intubated and mechanically ventilated. Furthermore, he required veno-venous extracorporeal membrane oxygenation. Two days later, he was extubated and supported with periods of non-invasive ventilation (NIV), with a new mask. Because of large amounts of bronchial secretions that he was not able to expectorate, flexible fiberoptic bronchoscopy (FFB) was performed to remove the secretions, without interrupting NIV support. During the procedure, the patient remained hemodynamically stable, breathing spontaneously and with just a mild reduction in oxygen saturation (SpO₂) (97.9% vs. 96.8%). This case report highlights the possibility of performing upper endoscopic procedures, such as FFB, during non-invasive ventilation in patients in whom this respiratory support is required and its interruption may be harmful.

Key words: non-invasive ventilation, acute respiratory distress syndrome, flexible fiberoptic bronchoscopy, intensive care unit.

INTRODUCTION

Non-invasive ventilation (NIV) is commonly used in the early phases of acute respiratory distress syndrome (ARDS) or as an adjunct of “awake” veno-venous extracorporeal membrane oxygenation (VV-ECMO), as it improves oxygenation and might reduce the adverse events of intuba-

tion and invasive mechanical ventilation. (1-4)

Flexible fiberoptic bronchoscopy (FFB) is an essential diagnostic and therapeutic tool for the management of patients with respiratory diseases, particularly in critically ill patients in the intensive care unit (ICU). (5) Performing FFB in NIV patients is challenging because bronchoscopy requires access to the patient’s mouth or nose and eventually abrupt discontinuation of positive airway pressure. A new commercially available mask for NIV has been designed to allow the performance of fiberoptic bronchoscopy or other upper endoscopic procedures (e.g. gastroscopy or transesophageal echocardiography) during NIV. (6)

In this case report we describe the feasibility of diagnostic FFB during NIV in a critically ill patient, with severe ARDS. Signed consent for publication of this case report was obtained from the patient’s wife after authorization from the patient, who was unable to sign.

CASE PRESENTATION

A 72 year old man was transferred to our ICU for refractory ARDS and was implanted with VV-ECMO. Two days later, the patient was extubated and supported with supplemental oxygen via a Venturi mask and periods of continuous positive airway pressure or pressure supported ventilation (PSV) via a face mask, while on ECMO. However, he had large amounts of secretions which he was not able to clear, thus bronchoscopy was deemed necessary. Propofol was administered and the

patient was connected to the ventilator in PSV via a recently commercialized NIV mask (“Janus”, Biomedical S.r.l., Florence, Italy) which allowed FFB to be performed to remove bronchial secretions without interruption of NIV. Janus is a new full face mask for NIV made up of two halves joined at the top and divisible at the bottom. A central port in the lower part of the mask allows the insertion of the endoscopic probe through either the mouth or the nose. Air leakage around the probe is limited thanks to soft sheets. Moreover, a central sliding hinge allows the mask to open so it can be easily positioned around an already inserted probe (figures 1,2). The arterial blood gas analysis before bronchoscopy showed pH 7.42, pO₂ 122 mmHg, pCO₂ 35 mmHg, base excess -1.6 mmol/L, SO₂ 97.9% and pO₂/FiO₂ 152.5 while during bronchoscopy pH was 7.38, pO₂ 98 mmHg, pCO₂ 37 mmHg, base excess -2.9 mmol/L, SO₂ 96.8% and pO₂/FiO₂ 98. During the procedure, the patient remained hemodynamically stable and always breathed spontaneously, although sedated.

The patient had prolonged VV-ECMO support, without barotrauma complications, and left the ICU breathing spontaneously and without invasive support, two months after the procedure.

DISCUSSION

This is the first description of the use of the Janus mask for performing flexible fiberoptic bronchoscopy in an ICU setting in a patient with severe ARDS, under sedation, without interrupting NIV support during

the procedure.

Performance of FFB or other procedures (e.g. upper gastrointestinal endoscopies, transesophageal echocardiography) in patients requiring NIV is critical as it might precipitate respiratory failure and need for intubation. These procedures usually require interruption of NIV and therefore may cause hypoxemia and alveolar derecruitment, especially if sedation is administered.

This new device might reduce this phenomenon, though not completely as a minor air leak around the probe is expected. (7) Further applications and evaluations are needed to recommend its use routinely during FFB in critically ill patients.

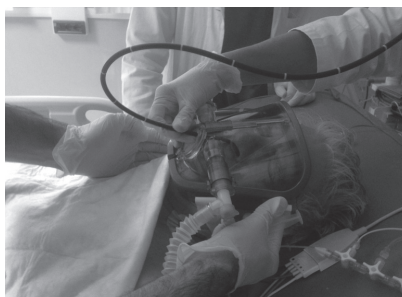


Figure 1. Insertion of the bronchoscope's probe through the Janus mask's dedicated hole.



Figure 2. Flexible fiberoptic bronchoscopy execution during non-invasive ventilation.

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