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CASE REPORT

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NIV support bronchoscopy by tracheostomy after decannulation failure: avoid new tracheostomy—case report and review analysis

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Abstract

Background Decannulation is an essential step in liberating tracheostomised patients from mechanical ventilation. There is a paucity of literature on tracheostomy decannulation methods and procedures, leaving the decision to expert opinion and institutional guidelines. Failure to decannulate may result from several reasons, such as severe dysphagia, retention of copious secretions requiring invasive airway clearing techniques, or tracheal stenosis. Meanwhile, the combined use of either non-invasive ventilation during bronchoscopy has been reported as a successful strategy in different diagnostic and therapeutic clinical conditions.

Case presentation We describe a patient admitted to the intensive care unit due to respiratory failure after a decannulation process and the use of non-invasive ventilation as rescue therapy during urgent flexible bronchoscopy to support this procedure and control acute hypercapnic respiratory failure and avoid recannulation process.

Conclusions This case presents the rationale approach of using non-invasive ventilation during bronchoscopy to avoid decannulation failure by accumulation of secretions during this procedure.

Keywords Non-invasive ventilation, Hypercapnic respiratory failure, Tracheostomy decannulation, Flexiblebronchoscopy

Background

Decannulation describes the process of tracheostomy tube removal once the need for the tube has resolved. There are many advantages to decannulation, including improved vocal cord and swallowing function. Discharging patients home or to another care facility is an easier process if the patient or their caregivers do not need to learn how to manage a tracheostomy tube. In addition, decannulation improves patient comfort and perceived physical appearance [1].

Prolonged tracheostomy tube placement may lead to increased risk of late complications, including tracheal stenosis, bleeding, fistulas, infections, accidental dislodgement and mechanical problems with cuff, aspiration, and pulmonary complications [2].

Although tracheostomy decannulation represents one of the most important problems in the clinical and home care management of patients who undergo tracheostomy, there is no universally accepted protocol for it [3].

Currently, the practice of tracheostomy decannulation mainly relies on expert opinion and institutional protocols [4].

Only a few studies have focused on decannulation procedures in prolonged ventilated patients, reporting failure rates between 5% and 65% with considerable heterogeneity in patient characteristics [5–8].

Assessment for readiness for decannulation among different studies variably involved assessment of clinical

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stability (absence of fever, no sepsis, or active infection, absence of distress and hemodynamic stability, PaCO2 less than 60 mmHg, no delirium or other psychiatric disorders), airway patency, swallowing assessment, adequate cough and clearance of secretions in addition to level of consciousness (Glasgow Coma Scale (GCS) at 8 or above) [2].

So far, the literature provides little information regarding the role of NIV in decannulating prolonged ventilated patients with tracheostomies. While most articles report the percentage of patients who had NIV following prolonged ventilation, they rarely provide details regarding the decannulation protocol or the intensity and duration of NIV [9].

German guidelines on prolonged weaning recommend a strategy of decannulation followed by the employment of (long-term) non-invasive ventilation (NIV) in weaning failure patients with low/medium dependence on ventilators (< 8–16 h per day). This approach argues that NIV is equally effective at unloading respiratory muscles and defending alveolar ventilation as invasive mechanical ventilation. These patients were started on NIV immediately after decannulation, with intensity and daily application matching their tracheostomy ventilator settings and ventilation times [10].

A systematic approach to patient evaluation, along with judicious use of airway endoscopy, can help identify barriers to decannulation. Fiberoptic bronchoscopy allows direct visualization and assessment of the whole upper airway including larynx and trachea above and below the stoma. Assessment of the anatomical, as well as the physiological status of the upper airway, helps in decannulation as well as post-decannulation care by detecting correctable causes at an early stage. Bronchoscopy is, thus, an invaluable tool in difficult cases of tracheostomy decannulation [11].

A strong rationale supports the combined use of flexible bronchoscopy and NIV in acute respiratory failure patients as the pitfalls of each of the single procedure is offset by the physiologic effects of the other one [12, 13].

Flexible bronchoscopy-induced cardiopulmonary complications may be prevented by the favorable effects of NIV in supporting and unloading respiratory muscles, correcting hypoxemia and hypercapnia, improving heart performance. Conversely, the risk of NIV failure due to the excessive burden of accumulated secretions may be prevented by the capability of flexible bronchoscopy of clearing the airways under NIV [13].

Case presentation

Male patient, 56 years old, who was diagnosed with severe multiple sclerosis, necessitating prolonged mechanical ventilation via tracheostomy for 5 years by volume control ventilation (BreasVentilator) complained of recurrent hospital admission for airway infections and wound tracheostoma infections.

After assuring clinical stabilization and upon patient's approval, the patient was decannulated. But due to weak cough reflex and accumulation of secretions, the patient started to be distressed and developed a progressive picture of hypercapnic respiratory failure over the following 12 h (pH:7.28/$PaCO_2$:67/HCO3:28) requiring urgent flexible bronchoscopy. The patient refused recannulation. So, non-invasive ventilation was used as an aid to the bronchoscopy procedure. The patient was put on non-invasive ventilation with BIPAP mode using V60 Philips Respironics and through Facemask. The settings were IPAP/17 cmH2O and EPAP/7 cmH2O to achieve a tidal volume of > 6 ml/kg.

The bronchoscopy was performed with successful removal of secretions and without any complications. The patient remained on non-invasive mechanical ventilation with clinical improvement and successful closure of the tracheostomy on the 4th day of the procedure without any incident. Later on, the patient was discharged on non-invasive ventilation home care.

Conclusions

A flexible bronchoscopy through tracheostomy with non-invasive ventilation support in patients with decannulation failure for secretions is feasible and safe and explores the permeability of tracheostomy.

To our knowledge, no studies have been published examining the safety of bronchoscopy in patients with tracheostomies.

Further clinical trials need to incorporate the early use of NIV approach to support bronchoscopy in decannulation failure by secretions mainly in prolonged ventilated patients.

Abbreviations

NIV	Non-invasive ventilation
IPAP	Inspiratory positive airway pressure
EPAP	Expiratory positive airway pressure
GCS	Glasgow Coma Scale

Authors' contributions

Hadeel have participated at writing the case. Mostafa have participated at writing the case and review of literature. Antonio did the FOB and suggested the review of literature. All authors read and approved the final manuscript.

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Declarations

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Competing interests
The authors declare that they have no competing interests.

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