

The use of non-invasive ventilation to treat acute respiratory failure in long term care setting: clinical experience in elderly patient

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Conflict of interest

The Authors declare no conflict of interest

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Background. Nowadays older patients with acute respiratory failure (ARF) leading to a severe respiratory acidosis are frequently ventilated using a non-invasive approach in intensive care unit (ICU). Current guidelines suggest that patients with more severe acidosis should be managed in a higher dependency area. However, the use of non-invasive ventilation (NIV) is effective and safe in treating ARF in general wards in elderly.

Case report. A 82 years old male patient was admitted to a long term care facility due to a severe chronic obstructive pulmonary disease (COPD). Three days after the admission, he suffered of severe acute exacerbation of COPD leading to hypercapnic coma. NIV in Bi-PAP mode and standard medical therapy was started, taking into consideration the do-not-intubate order of the patient. His state of consciousness improved after 48 hours of NIV with decreasing of PaCO₂ values and the patient was progressively weaned from the ventilator.

Conclusions. NIV should be considered a successful approach even in unusual setting of long term facility. The choice of use NIV should be taken by multidisciplinary medical staff in a setting where nurses and medical team are trained in NIV protocol, in order to reduce ICU admission, intubation rates and mortality.

Key words: elderly, non-invasive ventilation, hypercapnic coma, long term care facility

CASE DESCRIPTION AND DISCUSSION

Here we report the case of a 82-years old male in hypercapnic coma treated successfully with non-invasive ventilation (NIV) in a long-term care facility. The patient was admitted because of a severe chronic obstructive pulmonary disease (COPD). In the two previous years, due to acute exacerbation of COPD he suffered of several severe episodes of acute respiratory failure (ARF) that required NIV and in one case tracheal intubation in Intensive Care Unit (ICU). His medical history included mild cognitive impairment without behavioral symptoms (Mini mental status examination: 25/30), ischemic heart disease, arterial hypertension, and benign hypertrophy prostate.

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Table I. Evolution of arterial blood gas values at the admission and during NIV.

	FiO ₂ (%)	pH	pO ₂ (mmHg)	pCO ₂ (mmHg)	SpO ₂ (%)	HCO ₃ (mmol/l)
Admission	28	7.41	84	66	98.7	36.2
Start NIV	28	7.33	64	92	90	39.2
1 hour	28	7.36	49	86	90	39.6
6 hours	28	7.36	64	97	94	43.7
1 day	36	7.41	49	77	89	40.3
3 days	32	7.23	66	131	96	41.3
5 days	32	7.38	72	95	97	45.5
10 days	30	7.5	92	48	100	39.6
72 hours without NIV	26	7.43	53	57	94	33.8

At the admission in the long-term unit, the patient was alert, responsive and partially oriented. His Glasgow Coma Score (GCS) was 15. His arterial blood gases (ABG) tests are reported in Table I. On the third day, there was a rapidly worsening of his respiratory status. ABG showed slight respiratory acidosis (pH = 7.33) with severe hypercapnia (pCO₂ = 92 mmHg). NIV via facial mask was started using Bi-PAP mode: IPAP was 20 mmH₂O and EPAP was 6 mmH₂O. The time of inspiration was 1.5 sec, respiratory rate was set at 16 breath/min and FiO₂ was adjusted to maintain a SaO₂ > 90%. After one hour of ventilation, ABG revealed a slight improvement in pH and pCO₂. IPAP level was raised at 22 mmH₂O and standard medical therapy was started, including steroids iv and empirical antibiotic therapy with ceftriaxone.

The patient showed a moderate rejection to NIV due principally to facial mask discomfort and it was not possible to maintain proper ventilation. He became progressively agitated and confused, but no specific treatment was taken into consideration because of the lack of experience in sedation during NIV. His state of consciousness progressively worsened, until coma. His GCS was 5, with a severe respiratory acidosis (pH = 7.23) and hypercapnia (PaCO₂ = 131 mmHg) at ABG. At this moment, invasive treatment should be started, but his relatives had refused intubation, respecting the patient's will. In front of this do-not-intubate (DNI) order, NIV was continued although the comatose state and after 48 hours of NIV his state of consciousness improved with decreasing of PaCO₂ values. Regular pressure relief and skin-protective strategies were adopted to reduce patient's discomfort and improve NIV's effectiveness. The blood gas parameter remained acceptable and stable over time and the patient was progressively weaned from the ventilator.

Our aim is to support the possibility to apply NIV with success in a non-intensive setting. Nowadays older

patients with ARF leading to a severe respiratory acidosis are frequently ventilated using a non-invasive approach in ICU^{1,2}. However, the use of NIV on general wards has been investigated and in literature it is reported that NIV is effective and safe in treating ARF in a non-ICU setting in elderly followed by a multidisciplinary staff with appropriate experience³⁻⁶. Although current guidelines suggest that patients with more severe acidosis should be managed in a higher dependency area¹, this case demonstrates that NIV should be considered a successful approach even in long term facility. In this setting the familiarity with the non invasive technique could define its success and the medical staff and nurses should be trained in NIV protocol to achieve the goal. In this contest, it could be possible to reduce ICU admission, intubation rates and mortality.

Furthermore, in presence of poor toleration to ventilation and comatose state, patients should be considered for intubation in ICU setting^{1,2}. However, the decision to stop or continue NIV is not based on an objective physiological variable, but only on the patient's will and a review underlined the importance of NIV as the primary treatment when intubation is not wanted by the patient⁷. In this case of hypercapnic coma, the choice to continue NIV was supported by previous reports demonstrating that cautious application of NIV can be attempted in comatose patient by an experienced team^{8,9}.

This case report showed that old patient affected by ARF and with DNI order could be treated successfully with NIV in an unusual setting of long term care facility, avoiding ICU admissions. The choice of NIV should be considered by a multidisciplinary medical staff in a setting where nurses and medical team are trained in NIV protocol.

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