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Research Article

ROLE OF NON INVASIVE VENTILATION IN DEPARTMENT OF PULMANOLOGY AND ITS EFFECTIVENESS IN AECOPD (TYPE II) PATIENTS

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ABSTRACT
Non-invasive (NIV) is a therapeutic option for respiratory failure and has been used for a variety of acute and chronic conditions for age groups. The present study demonstrates the role of Non Invasive ventilation in Hypercapnic Respiratory Failure (in Type II) in acute exacerbation of COPD patients. The study suggests that the better monitoring of patient's clinical and ABG status after NIV administration improves the outcome in AECOPD patients.

Keywords: *NIV, AECOPD*

INTRODUCTION
Noninvasive ventilation (NIV) has emerged as a new and important tool in the treatment of acute respiratory failure (ARF). Patients with hypercapnic forms of ARF are more likely to benefit from NIV, but it may also benefit selected patients with hypoxic respiratory failure.
Patients with COPD are prone to exacerbations with progression of their disease. A significant number of COPD exacerbations are complicated by hypercapnic respiratory failure with significantly increased mortality and morbidity. Tracheal intubation and mechanical ventilation has so far been the standard modality for managing these patients; this method is associated with significant complications.
Many studies have been published on the role of NIV in treating severe episodes of acute respiratory failure in COPD patients. This has dramatically modified outcome in these patients. These well-conducted, randomized controlled trials have shown that when NIV is used in addition to standard medical therapy, it decreases rate of endotracheal intubation rate and mortality as compared to medical therapy alone. There are only two studies, which have not shown any benefit of NIV. These studies tended to include patients with mild respiratory failure, as reported by Keeman *et al.,* (2001) and Barbe *et al.,* (1996). NIV also shortens the length of ICU and hospital stay compared with medical therapy alone. Keenan et al (2003) also systematically analyzed the results of 15 studies and came to the same conclusions and in addition to this they also found that the benefits of NIV were not demonstrated in patients with mild exacerbation.
Most of the above mentioned studies excluded patients who required immediate intubation. However, Conti *et al.,* (2002) reported a prospective randomized controlled trial of NIV versus conventional mechanical ventilation in patients who had a mean pH of 7.2 and who failed medical treatment. In these patients, noninvasive ventilation was no worse than endotracheal intubation. The intubation rate in NIV group was 52%, which is higher than in other randomized controlled trials, which is not surprising because sicker patients who had failed medical treatment were included in the study. This trial illustrated that even at this stage; intubation was avoided by NIV in almost 50% patients. The patients who could be managed by noninvasive ventilation successfully required less hospital admission in the year after hospital discharge.
Squadron *et al.,* (2004) evaluated the effects of NIV in patients with COPD who were deemed to require intubation and compared the outcome with a matched set of patients who had earlier been ventilated invasively for COPD. Though 40 out of the 64 patients on NIV needed intubation, the mortality rate, duration of invasive ventilation, length of ICU and post ICU stay were not different between the two groups. Compared to those who needed intubation, patients who were successfully managed with NIV had decreased mortality rate and length of ICU and post ICU stay.

MATERIALS AND METHODS

This prospective study has been conducted to assess the efficacy of institution of NIV (BIPAP) in patients with acute exacerbation of COPD, whose condition did not improve with initial medical therapy.

All patients presenting with AECOPD (Acute Respiratory Failure Type II failure) are randomly entered into the study after they met the inclusion and exclusion criteria for Noninvasive ventilation.

The baseline clinical parameters are recorded and an ABG measurement was obtained in all patients following initial medical therapy.

NIV (BIPAP) was instituted to patients in Acute Respiratory Failure who are unresponsive to initial medical therapy. A portable Noninvasive Ventilator with monitor (BIPAP, RESPIRONICS R, NIPPY's and SERENA) has been used in the spontaneous mode using Full face mask or Nasal mask R (Respironics) depending on the patients status.

The initial trial parameters (in spontaneous mode) are 8 cmH2O of IPAP and 4 cmH2O of EPAP with oxygen flow rate of 1-2 L/minute. IPAP and EPAP parameters were titrated to optimize patient comfort.

Each patient has been continuously monitored for level of co-operation, mental status, Physical appearance, oxygen saturation, signs of air leakage around the mask and vital signs. Standard medical treatment including inhalational drugs, intravenous corticosteroids, xanthenes and whenever appropriate, antibiotics, furosemide or vasoactive agents are given in addition to BIPAP.

Once stable settings are achieved, a Post-trial ABG level was obtained in all patients at the onset of NIV after 20 minutes of institution of NIV and after 1 hour of BIPAP therapy to assess adequacy of Ventilation. If satisfactory degree of patient comfort, ventilation and oxygenation were not achieved by 1 hour, BIPAP was discontinued, the patient has been intubated and conventional mechanical ventilator support was provided.

NIV (BIPAP) has been given continuously for 1 hour and then depending on response, treatment with BIPAP was considered "Successful" if clinical and functional improvement had been achieved and "Failure" if patient was intubated and mechanically ventilated or inadvertent death occurred. Data has been analyzed by the "Paired t Test" using the "WindostatR" software.

RESULTS AND DISCUSSION

Table 1

Demographic data	**AECOPD = 26 (Type 2 Failure)**	**P Value**
Gender		NS
Male	19	
Female	7	
Age	52.40 ± 14.90	NS

It was found that there were no significant differences in Gender and Age, as reveals Table 1.

ABG Data

AECOPD Type 2 Respiratory Failure (n=26)

Parameters	**Base line**	**20 Minutes**	**1 Hour**
pH	7.24 ± 0.01	7.34 ± 0.01 (NS)	7.39 ± 003 (<0.05)
PaO2	84.45 ± 8.21	97.74 ± 7.03 (NS)	91.20 ± 6.28 (NS)
PaCO2	75.27 ± 4.29	60.15 ± 5.31 (<0.05)	47.42 ± 2.66 (<0.05)
SaO2	91.35 ± 1.26	95.00 ± 1.04 (NS)	95.30 ± 0.70 (<0.05)
FiO2	0.57 ± 0.13	0.35 ± 0.12 (NS)	0.32 ± 0.10 (NS)

In AECOPD (Type 2 Failure) patients, there was improvement in pH and PaCO2 at the end of 20 minutes, whereas, there was consistent and significant improvement at the end of 1 hour (7.39 ± 03) and (47.42 ± 2.66) respectively, as mentioned in Table 2. In AECOPD (Type 2 Failure) patients there was no significant improvement in PaO2 (91.20 ± 6.28) and marginal improvement in SaO2 (95.30 ± 0.70) at the end of 1 hour. In AECOPD (Type 2 Failure) patients there was only improvement in SaO2 (95.30 ± 0.70) at the end of 1 hour, as mentioned in Table.2.

Table 3

Intubation Rate	AECOPD Type 2 Failure (n=26)	P value
No. of Intubations	5 (19.23%)	NS

Intubation rate is found to be 19.23% in AECOPD (Type 2 Failure patients), as reveals in Table.3.

Table 4: Length of Stay

Length of Stay	AECOPD Type 2 Failure	P Value
LOS	7.14 ± 0.42	NS

Length of stay in days is shorter duration in AECOPD (Type 2 Failure) as mentioned in Table.4.

Table 5

Mortality	AECOPD (n=26) Type 2 Failure	P Value
No. of Deaths	2.(7.69%)	NS

Mortality (No. of deaths) in AECOPD (Type 2 Failure) is found to be (7.69%) as mentioned in Table 5.
The results of this study show that NIPPV can be utilized as an effective modality in the management of ARF due to diverse etiologies. Important advantages include patient comfort, maintenance of airway defenses, ability to eat and speak and avoiding complications of endo-tracheal intubation such as nosocomial pneumonia, injury to airways, aspiration and post-intubation laryngeal stenosis. The disadvantages of NIV include slow improvement of gases, the need for conscious, co-operative patient and decreased ability to clear bronchial secretion. Successful treatment with NIV is associated with an improvement in Ph, PaO2 and PaCO2 at 1 hour of treatment. If variables do not improve, intubation should be considered. This study provides strong evidence for the use of NIV (BIPAP) as a first line Intervention in patients with Acute Respiratory Failure irrespective of the Type and the Cause of Acute Respiratory Failure. Better monitoring of patient's clinical and ABG status after NIV administration improves the outcome in AECOPD. Early ABG sampling i.e. 20 minutes and one hour after NIV therapy does impact the clinical decision to streamline those who are successful in therapy can be continued the NIPPV and those who does not improve can be instituted for invasive support, so that adverse outcome by delaying mechanical ventilator can be averted. Early ABG samples do correlate well with definite outcome of the patient. Better outcome of NIV in AECOPD suggests Type II patients improve significantly in terms of respiratory acidosis, which substantiates the avoidance of mechanical ventilator and consequent complications. Apart from Hypoxemia other compounding factors in Non COPD, mechanical ventilator should be provided as the earliest in order to avoid high mortality rate in these group of patients. As the decision for invasive ventilator support was taken after one hour of NIV therapy, probably our study might have benefited in AECOPD / Non COPD in terms of better outcome in preventing mortality.

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