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Mechanical Ventilation in Chronic Obstructive Pulmonary Disease Patients, Noninvasive *vs*. Invasive Method (Randomized Prospective Study)

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A B S T R A C T

Acute respiratory failure due to chronic obstructive pulmonary disease (COPD) presents an increasing problem throughout the world. The aim of this study was to compare invasive and non-invasive mechanical ventilation (MV) for patients with COPD. A prospective, randomized trial was performed in a multidisciplinary intensive care unit for the period of 36 months and included 156 patients with COPD. MV procedure was performed using standard methods, and was applied as either invasive MV (IMV) or noninvasive MV (NIMV). Patients were randomized in two groups for application of MV using closed, nontransparent envelops. Comparison was made based on patient characteristics, objective parameters on admission and 1h, 4h, 24h, and 48h after admission and based on treatment outcome. We have confirmed that NIMV method is superior to IMV for patients with COPD. MV duration NIMV:IMV was 94:172 hours, p<0.001, time spent in Intensive Care Unit 120:223 hours, p<0.001. Ventilator associated pneumonia 5(6%):29(37%), p<0.001. The advantage of NIMV in COPD patients, especially in the early stages was confirmed.

Key words: *COPD, mechanical ventilation, noninvasive ventilation, Intensive Care Unit*

Introduction

Mechanical ventilation (MV) is mainly reserved for late stages of Chronic obstructive pulmonary disease (COPD) or in patients with rapid clinical deterioration[1,2]. Applying the standard invasive mechanical ventilation (IMV) means confronting the patient with the sideefects and complications following endotracheal intubation, including high ratio of Ventilator Associated Pneumonia (VAP) and difficult weaning[3,4]. Furthermore, tracheal injury caused by the endotracheal tube producing ulceration, oedema and haemorrhage are also frequently observed during prolonged IMV[5]. Noninvasive mechanical ventilation (NIMV) is increasingly been used as an alternative to conventional IMV through an endotracheal tube, but mostly in the early stages of acute respiratory failure (ARF), and in patients with a low Acute Physiology and Chronic Health Evaluation II (APACHE II) and Kelly – Matthay score[6–8]. It offers some advantages over IMV, including improvied patient comfort and maintained airway defence mechanisms, speech and swallowing without the use of an endotracheal tube[9,10]. Unfortunately, potential complications like damage to the facial and nasal skin, higher incidence of gastric distension with aspiration risk, sleeping disorders and conjuctivitis can occure during the course of NIMV[11]. Furthermore, conditions like coma, schock and cardiorespiratory arrest, swallowing disorders mental immaturity, face deformations and unstabile respiratory centre present absolute contraindications for this MV method. There are still many disagreements and dillemmas on when and how to apply NIMV. Advantage of either MV method has not yet been confirmed by neither clinical nor laboratory

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parameters. Based on all of the above, the goal of our study was to determine the relationship and influence of objective parameters of pulmonary mechanics and biochemistry on the choice of MV method and tretment outcome in patients with COPD. Furthermore, to confirm the advantage of the specific MV method in COPD patients based on the treatment outcome of the specific MV method – MV duration, time spent in Intensive Care Unit (ICU) and incidence of VAP.

Patients and Methods

A prospective randomized trial was carried out in our ICU at General Hospital »Dr. Josip Benčević« in Slavonski Brod, Croatia during 36 months. The study included 156 patients with COPD that fulfilled the inclusion and didn't have the exclusion criteria, that were as follows – expected MV duration shorter than 24h, use of MV on admission to the ICU, patients in coma and those who had cardio-respiratory arrest within 5 days, patients in shock, patients with unstable respiratory centre, those scheduled for organ donation and patients that were admitted to the ICU because of the ARF due to COPD within 3 months.

These patients were than randomized for either NIMV or IMV using closed, nontransparent envelops each containing information on one of the methods investigated. After a patient was included in the study, a third party not involved in the study was asked to choose one of the envelopes. Depending on the information in the chosen envelope, the patient was allocated to either NIMV or IMV method.

Following patient data were collected on admission: sex, age, comorbidities (hypertension, diabetes mellitus, and congestive heart disease) and previous use of MV.

Severity of illness was assessed using APACHE II score both on admission and during MV procedure. In APACHE II score, value of 20 is set as statisticaly important for survival rate, because if APACHE II score is under 20 mortality rate is about 20%, and above 20 mortality rate rises to 40% and more[12].

Objective patient data were measured and recorded on admission to the ICU, 1h, 4h, 24h and 48h after admission. After that, every 24h of ICU stay, and if necessary more often than that. Following objective data were measured and recorded during MV procedure: respiratory rate (RR), tidal volume (Vt), arterial blood oxygen saturation ($SatO_2$), negative logarithm of H^+ concentration (pH), partial pressure of arterial oxygen (PaO_2), partial pressure of arterial carbon dioxide ($PaCO_2$) and bicarbonate blood level, arterial oxygen tension/inspiratory oxygen fraction (PaO_2/FiO_2 ratio), RR/Vt ratio, maximal inspiratory pressure (Pimax), plato inspiratory pressure (Pplato), airway resistance (R) and static pulmonary compliance (Cst).

Following objective parameters were used as indications for the application of one of MV methods: worsening of clinical status, spontaneous RR>30/min, spontaneous Vt<5 ml/kg, PaO_2<60 mmHg, $PaCO_2$>55 mmHg, pH<7.30, $SatO_2$<88%, PaO_2/FiO_2<200, RR/Vt>100, restless patient.

During the research, following data were also collected for each MV method: total MV duration, length of ICU stay, success of MV, need for tracheotomy, incidence of VAP and ICU mortality.

Furthermore, in NIMV patients, need for intubation was recorded, but since all patients in IMV group are intubated, this parameter was not statistically evaluated.

Need for tracheostomy was assesed using evidence-based guidelines for weaning and discontinuing ventilatory support which recomend to consider a tracheostomy for patients after an initial period of stabilization on the ventilator when it becomes apparent that the patient will require prolonged ventilatory assistance. Acording to these guidelines, a tracheostomy should than be performed for the following patients: those requiring high levels of sedation to tolerate translaringeal tubes, those with marginal respiratory mechanics in whom a tracheostomy tube having lover resistance might reduce the risk of muscle overload, those who may develop psychological benefit from the ability to eat orally, communicate by articulated speech, and experience enhanced mobility, and those in whom enhanced mobility may assist physical therapy efforts.

VAP was identified based on the algorithm of clinical pulmonary infection score (CPIS). This algorithm consists of 6 parameters: radiographic image showing new infiltration, body temperature >38.5°C, leukocytosis over 10000 $(mm^3)^{-1}$, purulent tracheal secretion, respiratory index PaO_2/FiO_2<200 and absence of other infection source.

NIMV and IMV were compared based on the statistically determined difference in objective parameters and MV treatment outcome. Based on these results the advantage of one of the methods was established. During ICU stay, patients received all necessary treatment required by their condition. All laboratory and clinical parameters were evaluated and corrected if necessary. Enteric nutrition was preferred to parenteral whenever possible, applied through nasogastric tube or peroraly. For patients with a nasogastric tube, a seal connector in the dome of the mask was used to minimize air leakage. Disconnection from NIMV was allowed for less than 1h to permit eating, drinking and expectoration. During these intervals, oxygen supplementation was delivered via a nasal canula to keep oxygen saturation at 90% as measured by pulse-oximetry.

IMV protocol

Patient with respiratory insufficiency, who had IMV applied, was orotrachealy intubated. During IMV patients received the lowest respiratory support level that secured $SatO_2$>90% with $FiO_2 \leq 0.6$, satisfying CO_2 elimination ($PaCO_2 \leq 45$ mmHg) and stabile hemodynamic patient condition. Weaning process was conducted using pressure support ventilation (PSV). Initial positive pres-

sure support was 18 cmH_2O. This support was than reduced by 2–4 cmH_2O depending on the patients clinical status and values of the measured parameters of pulmonary mechanics, biochemistry and circulation. Patients were extubated at pressure support of 5 cmH_2O which was necessary to overcome increased airway resistance (existing due to lowering airway diameter by an endotracheal tube). After weaning process was concluded, continuous patient monitoring was performed, side effects and complications as well as need for further MV were observed and evaluated. Patients were continuously monitored until they were either dismissed from ICU, or death occurred.

NIMV protocol

Patient's head-pad was raised to 45°, necessary equipment was prepared next to patient's head and the procedure that follows was explained. Appropriate facemask was chosen and connected to the ventilator. Ventilator parameters were set to: continuous positive air pressure (CPAP) to 0 cmH_2O, PSV 10 cmH_2O and FiO_2 was adjusted to reach $SatO_2$>90%. The nose was protected using strapping to prevent skin damage. Patient was calmed down and the mask was held gently applied to the patient's face simultaneously trying to harmonize patient's respiration with the ventilator. Next step was to secure the firm mask positioning using head stripes. Ventilator was than set to CPAP 3–5 cmH_2O and PSV 10–25 cmH_2O in order to reach Vt>5 ml/kg and RR<30/min. After that, the alarms on the ventilator and respiratory support level were set. Right communication with the patient was ensured, and the patient was explained how to signalize if in need of help or in case of complications occurrence.

According to patient's state development, clinical status and objective parameters, ventilatory support level was reduced until MV could be discontinuated. NIMV failure was defined as mandatory need for endotracheal intubation. This was performed in the case of respiratory arrest, loss of consciousness, severe psychomotorical agitation that requires sedation, hemodynamic instability, failure to reach $SatO_2$>90% with FiO_2≤0.6 and $PaCO_2$>60 mmHg. For both methods MV was considered to be successful if the patient remained in spontaneous respiration for at least 48 h after the withdrawal of MV.

In all patients included in the research, MV was administered by use of Evita Drager dura 2 ventilators (Dräger, Lubeck, Germany), with software option for NIMV and Puritan Bennet 7200 ventilators (Puritan Bennet, Carlsbad, CA, USA). Nasal and facemasks were applied for NIMV (Respironics Inc, Herrsching, Germany). Parameters of pulmonary mechanics were directly measured on the ventilator. For patients with spontaneous breathing, tidal volume and respiratory frequency were measured using Spiro meter (Ohmeda Biox, Louisville, CO, USA), a maximal inspiratory pressure, using manometer (Ohmeda Biox). Arterial blood gas analysis was performed on Ciba Corning Blood Gas Machine (Ciba Corning, Halsted, England). Cardio-respiratory functions were continuously monitored using Datex monitors (Datex Ohmeda, Helsinki, Finland), and ventilation and oxygenation using Datex Engstrom AS3 and CS3 Compact (Datex Ohmeda, Helsinki, Finland).

Statistical analysis

Qualitative and numerical data were analyzed with descriptive statistic parameters: median, minimum value, maximum value, interquartile (IQ) range. Frequency tables were used to present qualitative data. Contingency tables with χ^2-test were employed for comparison of two independent for qualitative variables. In case of small sample size, Fishers exact test was used. Mann-Whitney test was employed for the comparison of two independent groups on numerical data. Normality of distribution was tested by the Kolmogorow-Smirnov test. $p<0.01$ was considered statistically significant. The statistical analysis was performed using the SPSS statistical software package for Windows (Release 9.0, Standard version, SPSS Inc., Chicago, IL, USA). The study aimed to recruit 156 patients divided in two groups to ensure the detection of a 20% difference between the choices of MV method of the two groups with a power of 80%.

The study was carried out in line with ethical principles and was approved by the Hospital Ethics Committee.

No author has a conflict of interest in regard of devices discussed in this publication. Support was provided from institutional and departmental sources.

Results

The results of the study are presented through one figure and four tables.

A flow chart shows flow of patients through the study (Figure 1).

The results of this research have shown that both NIMV and IMV are suitable methods for securing respiratory support for COPD patients with ARF. Comparison of NIMV and IMV for patients with COPD based on study population characteristics is presented (Table 1).

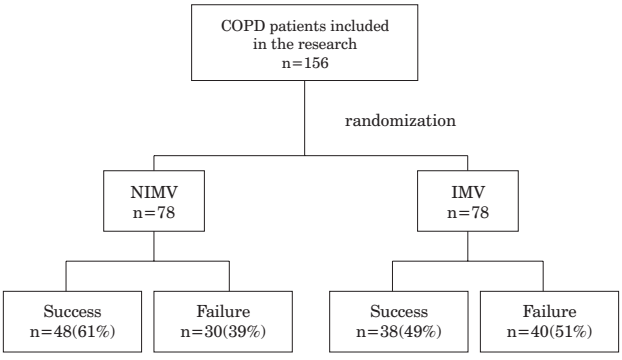

Fig. 1. Flow of patients through the study, ICU – Intensive Care Unit, IMV – Invasive Mechanical Ventilation, NIMV- Noninvasive Mechanical Ventilation, COPD – Chronic Obstructive Pulmonary Disease, VAP – Ventilator Associated Pneumonia, n – number of patients.

TABLE 1
COMPARISON OF NIMV AND IMV FOR PATIENTS WITH COPD BASED ON STUDY POPULATION CHARACTERISTICS

Study population characteristics		MV method		p
		NIMV n=78	IMV n=78	
Age (years)		58; 13	54; 12	0.805
Median; IQ range (min-max)		(35–82)	(38–78)	
APACHE II		24; 4	23; 3	0.687
Median; IQ range (min-max)		(18–34)	(18–34)	
Sex n (%)	Male	53 (68)	50 (64)	0.608
	Female	25 (32)	28 (36)	0.656
Co-morbidities n (%)	Hypertension	31 (40)	29 (37)	0.654
	Diabetes Mellitus	10 (13)	12 (15)	0.636
	Heart disease	25 (33)	22 (28)	0.490
Prior MV application n (%)		29 (37)	33 (42)	0.505

APACHE – Acute Physiology and Chronic Health Evaluation, MV – mechanical ventilation, NIMV – noninvasive mechanical ventilation, IMV – invasive mechanical ventilation, n – number of patients, p – statistical difference between groups

Furthermore, comparison of NIMV and IMV based on parameters of pulmonary mechanics is presented (Table 2). Comparing NIMV vs. IMV based on the parameters of pulmonary mechanics during the first 48h, an increase in Vt and a decrease in respiratory frequency were observed in the NIMV group, and in IMV group, these parameters were preset and constant ($p<0.001$). Pimax values were high in both groups but significantly lower in NIMV group (28–19:45–28, $p<0.001$). Also, airway resistance was significantly lower in NIMV group (16–10:23–16 cmH_2O, $p<0.001$), and Cst was higher (0.031–0.037:0.021–0.026), $p=0.100$–0.057) with statistically significant improvement in the first 48h in both groups. Airway resistance was significantly higher in IMV group because all patients were intubated. Comparison of NIMV and IMV based on pulmonary biochemistry parameters (Table 3). Comparing NIMV *vs*. IMV group based on the parameters of pulmonary biochemistry during the first 48h, pH value improvement was observed in both groups (7.26–7.37; 7.28–7.37, $p=0.216$–0.456). A significant improvement was also observed in PaO_2 values in both groups without statistically significant difference in favour of either group (68–84:70–90, $p=0.325$–$0–245$). Similar results were in values of $PaCO_2$ (77–52:70–48, $p=0.047$–0.248). Also, an improvement in $SatO_2$ in the first 48h was recorded,

TABLE 2
COMPARISON OF NIMV AND IMV BASED ON PARAMETERS OF PULMONARY MECHANICS

Parameters of pulmonary mechanics		Vt (mL)	RR ($nmin^{-1}$)	RR/Vt ($n\ min^{-1}\ L^{-1}$)	Pimax (mmHg)	Pplato (mmHg)	R ($cmH_2O\ L^{-1}\ s^{-1}$)	Cst ($L\ cmH_2O^{-1}$)
1h	NIMV	320(55)	25(11)	80(39)	28(11)	23(7)	16(5)	0.031(0.015)
	IMV	500(70)	13(1)	26(6)	45(12)	40(7)	23(7)	0.021(0.005)
	p	<0.001	<0.001	<0.001	<0.001	<0.001	0.003	0.100
4h	NIMV	340(50)	22(10)	64(40)	25(8)	20(6)	12(4)	0.034(0.018)
	IMV	500(70)	13(1)	26(6)	37(13)	32(11)	19(5)	0.026(0.008)
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.078
24h	NIMV	380(70)	19(11)	49(42)	25(7)	22(5)	10(3)	0.037(0.014)
	IMV	480(90)	10(2)	21(10)	35(9)	33(7)	17(8)	0.026(0.008)
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.093
48h	NIMV	420(80)	15(11)	35(30)	19(7)	17(4)	10(3)	0.037(0.014)
	IMV	480(60)	10(2)	21(8)	28(9)	25(9)	16(5)	0.026(0.010)
	p	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.057

– all data are presented as median (IQ range)
p – statistical difference between groups, Vt – tidal volume, RR – respiratory rate, Pimax – maximal inspiratory pressure, Pplato – plato pressure, R – airway resistance, Cst – static pulmonary compliance, NIMV – noninvasive mechanical ventilation, IMV – invasive mechanical ventilation

TABLE 3
COMPARISON OF NIMV AND IMV BASED ON PULMONARY BIOCHEMISTRY PARAMETERS

Parameters of pulmonary biochemistry	pH	PaO_2 (cmH_2O)	$PaCO_2$ (cmH_2O)	PaO_2/FiO_2	Bicarbonates (mmol L^{-1})	$SatO_2$ (%)	
0h	NIMV	7.21(0.09)	66 (15)	84 (18)	110 (50)	27 (7)	80 (9)
	IMV	7.22(0.07)	66 (12)	83 (16)	109 (48)	28 (9)	79 (9)
	p	0.778	0.910	0.687	0.890	0.980	0.875
1h	NIMV	7.26(0.08)	68 (13)	77 (13)	113 (45)	27 (7)	84 (7)
	IMV	7.28(0.08)	70 (15)	70 (14)	116 (31)	28 (9)	88 (8)
	p	0.216	0.325	0.047	0.317	0.868	0.134
4h	NIMV	7.29(0.08)	72 (13)	69 (17)	144 (64)	28 (8)	88 (7)
	IMV	7.35(0.11)	80 (12)	55 (14)	160 (45)	26 (10)	90 (3)
	p	0.023	0.156	<0.001	0.021	0.555	0.228
24h	NIMV	7.35(0.10)	80 (12)	60 (18)	200 (66)	27 (6)	91 (7)
	IMV	7.38(0.06)	85 (15)	52 (11)	212 (57)	26 (9)	93 (3)
	p	0.120	0.234	0.015	0.043	0.899	0.285
48h	NIMV	7.37(0.09)	84 (11)	52 (10)	210 (98)	25 (5)	92 (7)
	IMV	7.37(0.05)	90 (13)	48 (9)	225 (68)	26 (6)	94 (3)
	p	0.456	0.245	0.248	0.003	0.911	0.261

– all data are presented as median (IQ range)
pH – negative logarithm of H^+ concentration, PaO_2 – partial arterial oxygen pressure, $PaCO_2$ – partial arterial carbon dioxide pressure, FiO_2 – fraction of inspired oxygen, $SatO_2$ – arterial oxygen saturation, NIMV – noninvasive mechanical ventilation, IMV – invasive mechanical ventilation, p – statistical difference between groups

without statistically significant difference in favour of either group (84–92:88–94, p=0.134–0.261). There was no statistical difference in bicarbonate values.

Moreover, comparison of NIMV and IMV for patients with COPD based on treatment outcome is presented (Table 4). In our research, statistically significant advantage in favour of NIMV was in MV duration – median 94:172 h (p<0.001), time spent in ICU – median 120:223 h (p<0.001). VAP was recorded in only 5(6%) patients in NIMV group and in 29(37%) patients with IMV (p<0.001). Furthermore, 5(6%) patients in NIMV group needed tracheotomy, vs. 27(35%) patients in IMV group (p<0.001). Despite these differences, no statistically significant difference in procedure success between NIMV and IMV group was recorded (p=0.925). Although the IMV group had faster correction of parameters of pulmonary biochemistry, they had longer MV duration and total ICU stay, mostly because of the prolonged weaning procedures.

Discussion

We found that NIMV significantly reduces the need for endotracheal intubation and shortens the duration of

TABLE 4
COMPARISON OF NIMV AND IMV FOR PATIENTS WITH COPD BASED ON TREATMENT OUTCOME

MV treatment outcome	MV method		p
	NIMV n=78	IMV n=78	
MV duration (hours) Median IQ range (min-max)	94; 26 (55–211)	172; 50 (105–425)	<0.001
Time spent in ICU (hours) Median IQ range (min-max)	120; 22 (86–280)	223; 60 (144–576)	<0.001
Successful treatment n (%)	48 (61)	38 (49)	0.316
VAP n (%)	5 (6)	29 (37)	<0.001
Tracheotomy n (%)	5 (6)	27 (35)	<0.001
ICU-mortality n (%)	4 (5)	5 (6)	0.925

MV – mechanical ventilation, NIMV – noninvasive mechanical ventilation, IMV – invasive mechanical ventilation, VAP – ventilator associated pneumonia, ICU – Intensive Care Unit, n – number of patients, p – statistical difference between groups

MV support. Furthermore, it reduces the time spent in the ICU, leading to cost reduction and increased number of ICU beds available for other patients. This is particulary important for multidisciplinary ICUs like ours, since it is, for example, the only fully equipped ICU in our hospital and always has a shortage of beds.

Kramer et al.[13] in their research in 1995 reported that a success ratio of 74% when using NIMV in COPD patients with fast blood gas exchange improvement and the posibility to avoid endotracheal intubation. Therefore, they reported this method as a method of choice in COPD patients.

Brochard et al.[14] in a multicentric study from 1995, conducted on 85 COPD patients with ARF (pH 7.27±0.1, $PaCO_2$ 70±12 cmH_2O), report rapid improvement in PaO_2, and slower correction of $PaCO_2$. Patients randomized for NIMV had significantly lower intubation ratio. They reported lower complications ratio (14%:45%, $p<0.001$) and reduced mortality rate with NIMV (9%:29%, $p=0.02$), as well as shorter hospital treatment duration (23±17:35±33 days, $p=0.02$). Even so, they questioned the NIMVs' ability to replace IMV in patients with COPD because only 29% of such patients are suitable for NIMV. They therefore concluded that NIMV can only be researched as an alternative procedure to IMV, and not as a comparable and competitive method.

Futhermore, in the same year, Jones et al.[15] reported that NIMV is suitable as a first line intervention in carefully chosen patients with COPD facing ARF. They reported that COPD patients with pneumonia and congestive heart failure are not suitable for this MV method.

In 1998., Guerin et al.[16] reported that 39% of patients with COPD that had NIMV applied eventually had to be endotracheally intubated which was similar to the results of Brochard et al.

Robino et al.[17] in their study in 2003 researched the success of NIMV in opposite of patients with decompensated chronic obstructive and restrictive pulmonary diseases. The research was conducted on 64 patients with COPD and 20 with chronic restrictive pulmonary disease. In the group of patients with chronic restrictive pulmonary disease, number of patients with successful NIMV was smaller compared to COPD group, and need for endotracheal intubation was higher (67:35%, $p=0.01$). After 12h of NIMV application, similar results were observed for respiratory frequency, minute volume and arterial blood gases. pH and $PaCO_2$ improvement after 12h was better in COPD patients and they report this a predictor of success, but that isn't the case with restrictive pulmonary disease patients. Success of NIMV in ARF is therefore lower in chronic restrictive pulmonary diseases.

The incidence of VAP in our study was significantly lower in the NIMV group which is consistent with the recently published paper by Scala et al.[18], although these authors only included patients with moderate to severe hypercapnic encephalopathy, defined by the Kelly score of 3 or higher. Opposite to the study of Scala et al., the results in our study also showed a reduced need for tracheostomy in favour of NIMV group, which was mainly related to the higher initial success rate with NIMV and reduced MV duration.

Similar results presented Keenan et al.[19] in their study in 2003. They confirmed the advantage of NIMV as a method that, compared to IMV in patients with acute exacerbation of COPD, reduces the need for endotracheal intubation to 28%, reduces mortality rate from 15% to 10% and MV duration from 6.83 to 4.57 days.

Opposite to these results, Squdrone et al.[20] in their research from 2004, had high failure ratio with NIMV applied in acute exacerbations of COPD. They had to intubate 40 of 64 patients. MV duration, mortality rate and treatment duration were similar in both groups. When NIMV was successful, complication incidence and mortality rate were lower and treatment duration was shorter, but NIMV procedure overall had high failure ratio, and those patients, who failed NIMV had worse end-outcome results than patients who were treated with IMV from the beginning.

ICU mortality rates were similar in both groups. This shows that although NIMV offers many advantages in COPD patients requiring ventilatory support, mortality rates are also dependent on other factors including age, APACHE II score on ICU admission, concomitant diseases etc.

Our study has several limitations. Although it includes a large number of COPD patients, we must point out that some of the patients were admitted more than once, but were included in the study if at least 3 months had passed since last admission. In such cases, patients were considered as »new« and were enrolled in the study. Furthermore, our study lacks the follow-up on patients after they were discharged from the ICU and therefore we could not record the in-hospital mortality rates. Finally, NIMV has not yet become an extensive part of routine practice in our hospital, although the number of physicians using it is increasing.

In conclusion, we can say that the advantage of NIMV in COPD patients, especially in the early stages was confirmed.

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USPOREDBA NEINVAZIVNE I INVAZIVNE UMJETNE VENTILACIJE KOD BOLESNIKA S KRONIČNOM OPSTRUKTIVNOM PLUĆNOM BOLESTI; PROSPEKTIVNA RANDOMIZIRANA STUDIJA

S A Ž E T A K

Akutno respiratorno zatajenje uzrokovano kroničnom opstruktivnom plućnom bolesti (KOPB) predstavlja rastući problem širom svijeta. Cilj ove studije bila je usporedba invazivne i neinvazivne umjetne ventilacije (UV) kod bolesnika sa KOPB. Ova prospektivna, randomizirana studija je trajala 36 mjeseci i provedena je u multidisciplinarnoj jedinici intenzivnog liječenja. Uključivala je 156 bolesnika sa KOPB. UV je provođena primjenom standardnih metoda, a primjenjivana je kao invazivna UV (IUV) ili neinvazivna UV (NIUV). Bolesnici su randomizirani u dvije skupine za primjenu UV korištenjem zatvorenih, neprozirnih omotnica. Usporedba je provedena na osnovi karakteristika bolesnika, objektivnih parametara kod prijema, 1h, 4h, 24h i 48h nakon prijema te na osnovi parametara ishoda liječenja. Istraživanje je potvrdilo prednost NIUV u odnosu na IUV kod bolesnika sa KOPB. Trajanje UV NIUV:IUV bilo je 94:172h, $p<0,001$, vrijeme provedeno u jedinici intenzivnog liječenja 120:223h, $p<0,001$. Pojavnost ventilator udružene pneumonije bila je 5(6%):29(37%), $p<0,001$. Potvrđena je prednost NIUV kod KOPB bolesnika, osobito u ranijim stadijima bolesti.