Estimation of the role of noninvasive positive pressure ventilation (NPPV) and invasive positive pressure ventilation (IPPV) in patients with mild to moderate ARDS, caused by community acquired pneumonia

Yamakova Y.¹, Ilieva V.¹, Petkov R.², Dimitrov Y.¹, Velev B.¹

1University Hospital of Pulmonary Diseases 'St. Sofia', Medical University, Dept of Anaesthesiology & Intensive Care, Sofia, Bulgaria,
2University Hospital of Pulmonary Diseases 'St. Sofia', Medical University, First Therapeutic Clinic, Sofia, Bulgaria

Background: The effectiveness of non-invasive positive pressure ventilation (NPPV) in acute hypoxaemic respiratory failure varies widely because of it's heterogeneous etiology. There is not enough evidence to support the superiority of NPPV in comparison to IPPV. But it is established that NPPV in adults with acute respiratory distress syndrome (ARDS) improves the oxygenation, reduces the work of breathing and decreases the incidence of ventilator-associated pneumonia.

Aim: The goal of our study is to estimate the value of NPPV in patients with caused by community acquired pneumonia (CAP) mild to moderate ARDS.

Materials and Methods: We observed 55 patients with mild to moderate ARDS, caused by CAP, and separated them in two groups:

- prospective NPPV group (n=33) from 01.01.2015 to 01.12.2016
- retrospective IPPV group (n=22) from 01.01.2014 to 01.01.2015.

Primary **NPPV settings:** S/T mode, IPAP assuring VT = 6-7 ml/kg, EPAP = 6 cmH₂O, back up rate = 20-28/min, FiO₂ = 0.6-1.0.

The primary **INVASIVE VENTILATION settings:** BIPAP mode, Pinsp assuring VT= 6-7 ml/kg, PEEP = 6 cmH₂O, RR = 20-28/min, FiO₂ = 0.6 to 1.0.

We took blood samples on admission, at the 1st and 24th hour after initiation of ventilation and after every change in the settings.

Statistical data processing was done with SPSS 17. We used a non-parametric analysis - Wilcoxon Ranks Test.

Table 1: The patients’ characteristics on admission – demographics, blood-gas analysis and the onset of ventilation

Patient characteristics	NPPV group n = 33	IPPV group n= 22	p
Age (years)	54.33 ± 15.35	58.23 ± 18.2	NS
SAPS II	37.9 ± 18.47	30.9 ± 10.34	NS
GCS	14.57 ± 1	14.5 ± 1	NS
HR (beats/min)	107.38 ± 21.22	105.4 ± 25.2	NS
RR (breaths/min)	31.44 ± 6,11	29.55 ± 3.9	NS
PaO ₂ /FiO ₂	135.02 ± 32.44	127.5 ± 23.73	NS
PaCO ₂	32.59 ± 5.96	39.63 ± 12.88	<.05
Onset of ventilation (min)	46.5 ± 12	190.5 ± 50	<.000

The mean values of the pressures with their standard deviations are:

NPPV group	IPPV group
EPAP = 6.19 ± 0.98 cmH ₂ O	PEEP = 8.9 ± 2.64 cmH ₂ O
IPAP= 12.95 ± 3.19 cmH ₂ O	Pisp= 29.2 ± 6.8 cmH ₂ O
FiO ₂ 0,61 ± 0,12	FiO ₂ = 0,8 ± 1,1

Table 2: Comparison of monitored parameters in the two groups

Variable	NPPV group	IPPV group	p
PaO ₂ /FiO ₂ on admission	135.02 ± 32.44	127.5 ± 23.73	NS
PaO ₂ /FiO ₂ after 1h	148.99 ± 48.6	73.35 ± 19.5	<0.001
PaO ₂ /FiO ₂ after 24h	157.74 ± 68.97	81.82 ± 32.2	<0.001
ICU length of stay (days)	7.4 ± 4.1	13.7 ± 3.2	<0.05
Duration of ventilation (days)	4.09 ± 2.7	10.07 ± 2.8	<0.05
Mortality (%)	4.5%	59.1%	<0.001

Conclusion: In mild to moderate ARDS caused by severe CAP without signs of shock and multi-organ failure early application of NPPV lowers the frequency of intubation, the complications, associated with invasive ventilation, and the overall mortality.

Results: