
Non-invasive positive pressure ventilation for a severe legionella pneumonia case

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ÖZET

Ciddi lejyonella pnömonisi olgusunda noninvaziv pozitif basınçlı ventilasyon kullanımı

Lejyonella pnömonisi ciddi bir klinik seyirle gider ve yoğun bakımda izlemi gerekebilir. İzlem sırasında mekanik ventilasyon ihtiyacının olması prognozu etkileyen faktörlerden biridir. Mekanik ventilasyon tedavisi gereken hastalarda mortalite yüksektir. Noninvaziv pozitif basınçlı ventilasyon (NPPV) endotrakeal entübasyona gerek kalmadan mekanik ventilasyonu sağlayan ve ventilatörle ilişkili pnömoni sıklığını azaltan bir ventilasyon biçimidir. NPPV, toplum kökenli pnömonide gelişen hipoksemi-nin tedavisinde kullanılabilir. Sunulan olgu, lejyonella pnömonisi nedeniyle yoğun bakıma kabul edilmiş ve hipoksemik so-lunum yetmezliği NPPV ile başarıyla tedavi edilmiştir.

Anahtar Kelimeler: Lejyoner hastalığı, solunum yetmezliği, noninvaziv pozitif basınçlı ventilasyon.

SUMMARY

Non-invasive positive pressure ventilation for a severe legionella pneumonia case

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Legionella pneumonia has a serious clinical course and requires treatment at intensive care unit. The need for mechanical ventilation is one of the determinants of prognosis. Mortality rate is higher in patients treated with mechanical ventilation. Non-invasive positive pressure ventilation (NPPV) provides mechanical ventilation without endotracheal intubation and

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decreases the incidence of ventilator associated pneumonia. It is a treatment modality for patients with hypoxia due to community acquired pneumonia. The present case was admitted to intensive care unit with a diagnosis of legionella pneumonia, and his hypoxemic respiratory failure was successfully treated with NPPV.

Key Words: Legionnaires disease, respiratory failure, non-invasive positive pressure ventilation.

Two to fifteen percent of community-acquired pneumonia (CAP) cases requiring hospitalization have legionella pneumonia (1). A study on CAP cases demonstrated that only 3% of all sporadic legionella pneumonia cases could be diagnosed (2). Legionella pneumonia has a grave clinical course and requires treatment at intensive care unit (ICU) and one of the major determinants of prognosis is the need for mechanical ventilation, with higher mortality rates in patients requiring this treatment (3,4).

Non-invasive positive pressure ventilation (NPPV) is a treatment modality for CAP patients with hypoxemia. NPPV significantly reduces respiratory rate, the need for intubation, and duration of ICU stay.

The present case was admitted to ICU due to CAP and diagnosed with legionella pneumonia. He developed respiratory failure and has been successfully treated with NPPV. We present our diagnostic and therapeutic approach and discuss the issue in the light of previous literature.

CASE REPORT

A 34-years-old man was admitted to emergency room for severe pneumonia and acute renal failure. He had cough with yellow-green sputum production, fever, mild dyspnea, nausea, vomiting, oliguria, and diarrhoea since five days before his admission. Body temperature was 40°C, and diarrhoea was non-bloody with a frequency of 10 to 15 times per day. On the day before admission, he was admitted to another hospital because of worsening dyspnea where a chest X-ray was obtained demonstrating a dense multi-lobar consolidation. As severe CAP requires treatment at an ICU, he was referred to our hospital. Upon arrival to the emergency room vital signs were as follows: respiratory rate 30 breaths/min, pulse 120 beats/min, blood pressure 110/80 mmHg, and the body temperature 37.2°C. His oxygen saturation was 83% while breathing room air. He was

conscious. No lymphadenopathy was detected. Inspiratory crackles were heard at both mid- and lower lung zones. There was no peripheral oedema or digital clubbing. The heart and abdomen were normal. Maculas and papules with 1 mm diameter were present over his arms and legs. The findings of neurological examination were unremarkable. Chest X-ray examination revealed the presence of multilobar pneumonia (Figure 1). The patient was transferred to ICU due to severe CAP [(respiratory failure requiring mechanical ventilation (PaO₂/FiO₂ ratio of 127, respiratory rate > 30/min, multilobar pneumonia)]. The patient was a driver. His medical history was not remarkable. He used to drink little amounts of alcohol and had been smoking 44 pack/year. He has no travel history.

Upon arrival to the medical ICU, vital signs were as follows: respiratory rate 40 breaths per minute, pulse 130 beats per minute, temperature 38.2°C, blood pressure 110/58 mmHg. Results for complete blood count and blood chemistry are depicted in Table 1. Oxygen administration was commenced and arterial blood gas analysis revealed the following: PaO₂ 51 mmHg, PaCO₂ 31 mmHg, HCO₃ 16 mmol/L, pH 7.32. FiO₂ was 0.40 with a PaO₂/FiO₂ ratio of 127. Acute Physiology Assess-

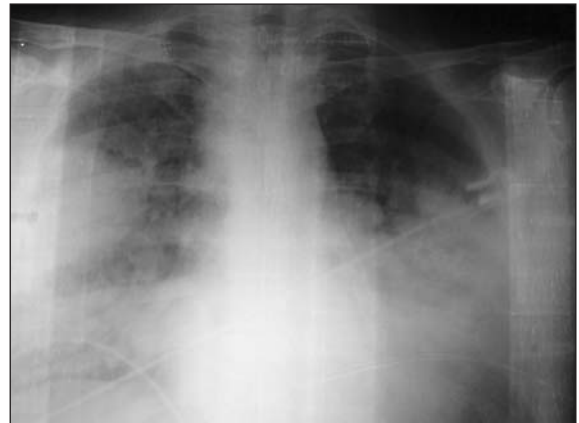


Figure 1. Chest X-ray examination revealed the presence of multilobar pneumonia.

Table 1. Results of laboratory tests when patient was at intensive care unit.

Hemoglobin (g)	11.9
Hematocrit (%)	35.4
Leukocyte (mm ³ /dL)	11.300
Total protein (g/dL)	0.91
Albumin (g/dL)	2.9
LDH (U/L)	1379
Glucose (mg/dL)	117
BUN (mg/dL)	60
Creatinine (mg/dL)	7.4
SGOT (U/L)	90
SGPT (U/L)	52
Sodium (mmol/L)	135
Potassium (mmol/L)	4.3
Chloride (mmol/L)	102
Alkalene phosphatase (U/L)	212
GGT (U/L)	30
Total bilirubin (mg/dL)	0.91
Direct bilirubin (mg/dL)	0.53

ment and Chronic Health Evaluation (APACHE) II and Murray lung injury scores were 20 and 7, respectively. Patient was diagnosed with acute respiratory distress syndrome due to severe CAP.

Specific urinary-antigen test for *Legionella pneumophila* was positive. Clarithromycin 500 bid IV and rifampicin 600 mg PO were started. A drug reaction characterized with macular skin rashes developed, and these lesions disappeared with local steroid and antihistaminic treatment.

At the ICU, the patient developed tachypnea (respiratory rate: 52/min) and severe respiratory distress ($\text{PaO}_2/\text{FiO}_2 < 200$) and NPPV was commenced. (BiPAP S, full face mask, IPAP/ EPAP 20/8, FiO_2 55%). Acidosis could not be corrected by BiPAP and the oxygen need of the patient increased; for this reason and for a better control over tidal volume, treatment with Puritan Bennett 7200 ventilator was initiated. With NPPV support, a 20% decrease in respiratory rate and a symptomatic relief was obtained. The need for NPPV gradually decreased during the following days, and by the 10th day at ICU mechanical ventilation could be completely terminated (Table 2).

Table 2. Respiratory parameters and blood gas analysis.

	ER	ICU							
		0 h	7 h	8 h	16 h	Day 3	Day 8	Day 11	Day 12
FiO_2	0.21	0.40	0.40	0.40	0.55	0.55	0.30	0.30	0.30
Ventilator	-	-	BiPAP S	BiPAP S	Puritan Bennett 7200	Puritan Bennett 7200	Puritan Bennett 7200	Puritan Bennett 7200	Puritan Bennett 7200
Mode	-	-	BiPAP	BiPAP	CPAP	CPAP	CPAP	CPAP	CPAP
RR	40	40	40	40	49	31	37	26	24
Pressure support	-	-	12	12	20	25	30	15	15
PEEP	-	-	8	8	8	8	6	5	5
PaO_2	51	51	76	90	87	80	66	83	83
PaCO_2	26	31	31	35	31	33	38	34	34
HCO_3	14.3	16	15.5	15.5	15	17	24	21	21.6
pH	7.36	7.32	7.30	7.26	7.27	7.32	7.40	7.39	7.40
$\text{PaO}_2/\text{FiO}_2$	242	127	190	225	158	145	220	276	276

FiO_2 : Fraction of inspired oxygen in a gas mixture, ER: Emergency room, BiPAP: Bilevel positive airway pressure, CPAP: Continuous positive airway pressure, RR: Respiratory rate, PEEP: Positive end expiratory pressure, PaO_2 : Arterial oxygen pressure, PaCO_2 : Arterial carbondioxide pressure.

Renal functions of the patient returned to the normal levels with fluid replacement and medical treatment. The temperature continued to be high and presence of enterococci was detected in one of successive blood cultures. Teicoplanin 1 x 400 mg IV was added to the treatment and temperature decreased during follow-up.

During the follow up at ICU, the need for oxygen gradually decreased and NPPV was stopped by the 13th day at ICU, and patient was transferred to the wards.

DISCUSSION

There has been an increase in the incidence of legionella pneumonia during the last years. Among the agents causing CAP *Streptococcus pneumoniae*, *Legionella pneumophila* have the highest mortality rates (5). Legionella pneumonia has a grave clinical course and requires treatment at ICU (3). It is the second most frequent cause of pneumonia requiring treatment at ICU (6). The mortality rate of legionella pneumonia requiring treatment at ICU is nearly 30%. Following conditions has been reported as the determinants of prognosis for legionella pneumonia treated at ICU: chronic heart disease, diabetes mellitus, creatinine ≥ 1.8 mg/dL, septic shock, extensive involvement demonstrated radiologically, need for mechanical ventilation, plasma Na level ≤ 136 mEq/L, PaO₂/FiO₂ < 130 mmHg, and BUN ≥ 30 mg/dL (4).

Severe pneumonia cases requiring treatment at ICU has a higher mortality rate than cases treated at ward or at home (7). Previous studies revealed a higher mortality rate in patients requiring mechanical ventilation (4). NPPV provides mechanical ventilation without endotracheal intubation, decreases the incidence of ventilator associated pneumonia, and by preserving the speech and nutritional ability of patients increases the quality of life (8). There are several studies assessing the effectiveness of NPPV in hypoxemic acute respiratory failure. A study with 11 acute respiratory failure patients by Patrick W et al. suggests that NPPV decreases the frequency of intubation, particularly for selected cases. In addition, NPPV is a safe method for patients with CAP (9). In a study by Confalonieri et al. with 56 CAP patients, NPPV significantly decreased the rate of respiration, need for intubation, and the duration of ICU stay (10).

With the recent advances in laboratory diagnosis techniques, legionella pneumonia is becoming a more frequently diagnosed cause of CAP. Mostly, it requires treatment at ICU due to the severe clinical course. If there is no specific contraindication, NPPV may be used for the treatment of legionella pneumonia cases at ICU, as it might reduce the need for intubation and shorten the duration of ICU stay.

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