
PHYSIOTHERAPY MANAGEMENT IN PNEUMONIA CASES IN THE ICU: CASE REPORT

W. Wahyuni¹, Galih Adi Isak², Bangkit Dwi Prihantoro¹, Neriza Dwiyanti¹, Siti Fadhilah¹, Tomiana¹, Dimas Budi Lestari¹, M. Irfan Jasir Pabrizadinata¹, M. Rajab Sa'bana¹, Raden Shafira Saniyyah R.¹, Ruth Golda Meir¹, Yunita Rahayu Pratiwi¹, Brissa Isabel Salsabila¹

¹Physiotherapy Study Program, Faculty of Health Sciences, University of Muhammadiyah Surakarta

²Physiotherapy Department, PKU Muhammadiyah Hospital Yogyakarta

*Corresponding author: W. Wahyuni. Email : wahyuni@ums.ac.id

Abstract

Introduce: Data from the 2019 Global Burden of Diseases study shows that lower respiratory tract infections including pneumonia and bronchiolitis affect 489 million people worldwide. Children <5 years and adults >70 years are the populations most affected by pneumonia, according to the 2019 GBD study.

Purpose: Knowing the physiotherapy management of pneumonia cases in the ICU

Methods: using the case report method taken at PKU Yogyakarta Hospital

Conclusion: Providing intervention in the form of passive rib torsion in patients in ICU care with the use of ventilators due to pneumonia is considered capable of increasing chest expansion.

Keywords: pneumonia; ICU; passive rib torsion

INTRODUCTION

Pneumonia is an acute respiratory infection that affects the distal alveoli and bronchials of the lungs (Torres et al. 2021). Pneumonia occurs due to inflammation of the lung parenchyma caused by bacterial, viral, fungal and parasitic microorganisms (Natasya 2022). Pneumonia caused by bacteria can be classified into two types, namely gram positive and gram negative. Some examples of bacteria that cause gram-positive pneumonia include *Streptococcus pneumoniae* (*pneumococcus*), *Staphylococcus aureus*, *Enterococcus*, and *Streptococcus pyogenes*. Meanwhile, bacteria that cause gram-negative pneumonia include *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, and *Haemophilus influenzae*. Pneumonia caused by fungal infections is rare, but may occur in individuals with immune system problems such as AIDS, use of immunosuppressive drugs, or other health conditions (Putri and Hasan 2014). The disease is divided into CAP (*Community-Acquired Pneumonia*) or HAP (*Hospital-Acquired Pneumonia*) which includes (*Ventilator-Associated Pneumonia*). Aspiration pneumonia represents 5-15% of all CAP cases; however, its prevalence among patients with HAP is unknown.

Data from the 2019 *Global Burden of Diseases* study shows that lower respiratory infections including pneumonia and bronchiolitis affect 489 million people worldwide. Children <5 years and adults >70 years

are the populations most affected by pneumonia, according to the 2019 GBD study. Finally, aspiration pneumonia accounts for 5-15% of all CAP cases and is associated with poorer outcomes, especially in older patients with multiple comorbidities (Torres et al. 2021).

In adults, mixed infections of respiratory viruses and bacterial pathogens, especially rhinoviruses with pneumococcus, have been shown to be associated with more severe pneumonia and longer hospitalizations (Aronen et al. 2019). Older people or geriatric patients have a higher risk of developing pneumonia due to several factors such as decreased gag reflex, decreased immune system, impaired temperature regulation, and various cardiopulmonary problems. A decrease in the gag reflex in geriatrics can cause pneumonia due to aspiration (entry of foreign bodies or fluid into the lungs) (Putri and Hasan 2014).

The humoral immune system depends on the good functioning of B lymphocytes in the body. Geriatric patients often experience various systemic disorders that can interfere with the function of B lymphocytes, resulting in decreased antibody production. This disorder can also be a factor that increases the risk of infection by pathogenic microorganisms that commonly cause bacterial pneumonia. After pathogenic microorganisms enter the alveolus, proinflammatory mediators are released and trigger an inflammatory response, which further gives rise to clinical manifestations (Putri and Hasan 2014).

METHOD

History of the disease and medical treatment. A seventy-one-year-old man, with a diagnosis of pneumonia, was hospitalized with shortness of breath. A doctor treats with a tracheostomy and ventilator (tidal volume 165 ml) the percentage of ventilator oxygen assistance is 50%. Hematology tests showed low hemoglobin (8.9 g/dL) and hematocrit (26.8), abnormal PaO₂ 12.5 mmHg, and moderate hypoxic PaCO₂ 30.7 mmHg. X-Ray: shows increased vascular smearing in the perihilary of both pulmos. Physical examination: A man on a ventilator, with generalized muscle atrophy, malnutrition, severe dyspnea, decreased chest expansion in the left and right, dimness in both lungs, decreased air ingress with bronchovesicular breathing sounds and gross crepitation in both lungs.

Treatment: *Passive rib torsion* in the apical part of the lung added to the *chest* therapy program; postural drainage, percussion, and breathing exercises once daily for 3 days (Leelarungrayub 2012).



Figure 1. Implementation of *passive rib torsion* in the apical lung

Progression: After treatment, repeated chest radiographs showed increased aeration and less infiltration in both lungs. Treatment with T-piece for 1 hour alternately in a 4-hour period, since there is hypoglycemia, malnutrition, dyspnea and the use of some respiratory accessory muscles.

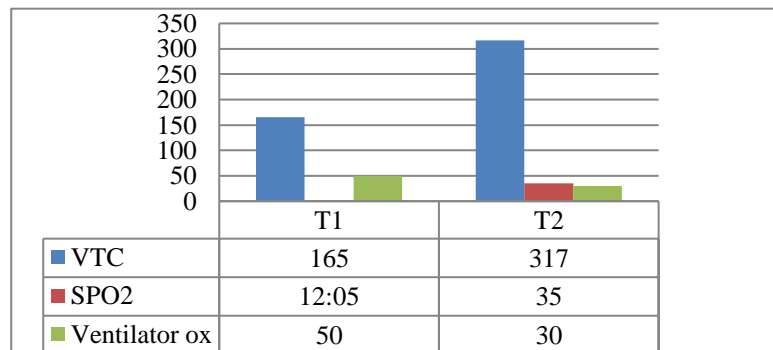
Remaining problems: General weakness, ineffective breathing, shortness of breath, chest expansion and stiffness are minimized, and reduction of air entry without crepitation.

End result: In this case, *passive rib torsion* chest mobilization or stimulated antero-posterior movement of the sternum increases chest expansion by evaluating expiratory tidal volume (VTE), expiratory tidal volume increases from 165mL to 317mL, and SpO₂ increases 35mmHg, aid presentation on oxygen ventilator to 30%. However, treatment does not reach perfection there are other causative factors such as pneumothorax, malnutrition and the patient's overall condition.

DISCUSSION

After physiotherapy was carried out 3 times with modalities in the form of passive rib torsion in the apical part of the lung added to the chest therapy program; Postural drainage, percussion, and breathing exercises once daily for 3 days.

Graphic 1. Results of therapeutic evaluation



In this case, *passive rib torsion* chest mobilization or stimulated anterior-posterior movement of the sternum increased chest expansion by evaluating expiratory tidal volume (VTE), expiratory tidal volume increased from 165 to 317 mL, and SpO₂ increased by 35mmHg, aid presentation on oxygen ventilator to 30%.

However, treatment does not reach perfection there are other causative factors such as pneumothorax, malnutrition and the patient's overall condition. Based on the physiotherapy point of view, pneumonia patients cause various levels of disorders, namely in the form of difficulty removing sputum, changes in breathing patterns, changes in posture, disruption of daily activities due to the complaints mentioned above and weight loss, growth 3 and child development can be hampered if physiotherapy is not done immediately.

Physiotherapy modalities can reduce and even overcome disorders, especially those related to motion and function using chest therapy in the form of postural drainage, percussion and vibration will reduce or eliminate sputum and spasm of respiratory muscles, clear the airway, make it comfortable, relieve the respiratory tract and finally cough colds can be stopped (Indriyani 2021).

CONCLUSION

Providing intervention in the form of chest mobilization in patients in ICU care with the use of ventilators because pneumonia is considered able to increase chest expansion. However, this intervention has not achieved maximum results due to pneumothorax, malnutrition, and the patient's overall condition.

In addition, this study only conducted three evaluations due to time constraints. Therefore, for the next researcher is expected to conduct research with a longer period of time so that the results obtained are more optimal.

REFERENCES

- Aronen, Matti, Laura Viikari, Ia Kohonen, Tytti Vuorinen, Mira Hämeenaho, Maarit Wuorela, Mohammadreza Sadeghi, Maria Söderlund-Venermo, Maati Viitanen, and Tuomas Jartti. 2019. “Respiratory Tract Virus Infections in the Elderly with Pneumonia.” *BMC Geriatrics* 19 (111). <https://doi.org/10.1186/s12877-019-1125-z>.
- Indriyani. 2021. “Penatalaksanaan Fisioterapi Pada Penderita Pneumonia Di Rs Paru Dr. Ario Wirawan Salatiga.” *Research of Service Administration Health and Sains Healthys* 2 (1): 14–19. <https://doi.org/10.58258/rehat.v2i1.3173/>.
- Leelarungrayub, Donrawee. 2012. “Chest Mobilization Techniques for Improving Ventilation and Gas Exchange in Chronic Lung Disease.” *InTech*, 399–422.
- Natasya, Febrina Aulia. 2022. “Tatalaksana Pneumonia.” *Jurnal Medika Hutama* 3 (2): 2392–99.
- Putri, Rizki Maulidya, and Helmia Hasan. 2014. “Tinjauan Imunologi Pneumonia Pada Pasien Geriatri.” *Cermin Dunia Kedokteran* 41 (1): 14–18. <https://doi.org/10.55175/cdk.v41i1.1166>.
- Torres, Antoni, Catia Cilloniz, Michael S. Niederman, Rosario Menéndez, James D. Chalmers, Richard G. Wunderink, and Tom van der Poll. 2021. “Pneumonia.” *Nature Reviews Disease Primers* 7 (25): 1–28. <https://doi.org/10.1038/s41572-021-00259-0>.