PHYSIOTHERAPY MANAGEMENT FOR PATIENT WITH PRIMARY SPONTANEOUS PNEUMOTHORAX DEXTRA : A CASE STUDY

Lifia Rahma Listyana[1], Wahyu Tri Sudaryanto[2] , Abdul Haris[3]

[1]*Physiotherapy Departement, Faculty of Health Science, Muhammadiyah University of Surakarta*
[2]*Physiotherapy Departement, Faculty of Health Science, Muhammadiyah University of Surakarta*
[3]*Physiotherapy, PKU Muhammadiyah Hospital of Yogyakarta*

*Corresponding author: Lifia Rahma Listyana, Email: liflistyarahma@gmail.com

Abstract

Introduction : Primary Spontaneous Pneumothorax is the presence of air or gas in the pleural cavity that can cause the lung to collapse but without any prior chest trauma or history of lung disease. Generally, patients with primary spontaneous pneumothorax present with chest pain accompanied by breathless to decreased thoracic expansion. The purpose of this case study is to report the results of a physiotherapy program in a patient with primary spontaneous pneumothorax.
Case Presentation : The patient was a 62-year-old male laborer, was diagnosed with primary spontaneous pneumothorax dextra. The patient reported the breathless with non-productive cough. Asymmetrical chest movements, with the dextra lower than the sinitra. Chest X-ray showed that dextra lung had collapse.
Management and Outcome : The intervention was given one session every day for 7 days consist of Segmental Breathing Exercise, Thoracic Expansion Exercise, and Pursed Lip Breathing. Each program is repeated 3-5 times, interspersed with rest and Breathing Control. Evaluation of the results of the intervention in measuring the degree of breathless using the Brog Scale, measuring thoracic expansion using a medline, as well as the results of a chest X-ray.
Discussion : The physiotherapy program in cases of primary spontaneous pneumothorax is given segmental breathing exercise and thoracic expansion exercise to increase thoracic expansion and maximize the inspiration-expiration process. The pursed lip breathing program aims to relieve breathless interspersed with breathing control to restore a calm breathing pattern.
Conclusion : Physiotherapy management for patient withprimary spontaneous pneumothorax dextra with the intervention that is Segmental Breathing Exercise, Thoracic Expansion Exercise, Pursed Lip Breathing can relieve breathless, increase thoracic expansion and restore lung function.

Keywords : Primary Spontaneous Pneumothorax, Segmental Breathing Exercise, Thoracic Expansion Exercise, Pursed Lip Breathing

INTRODUCTION

Pneumothorax can be defined as air in the pleural cavity. Primary Spontaneous Pneumothorax (PSP) is the presence of air or gas in the pleural cavity that can cause the lung to collapse but without any prior chest trauma or history of lung disease. (Hisyam B, 2006) Pneumothorax cases are more common in men than women. In the UK, cases of primary spontaneous pneumothorax in men are 24 per 100,000 population and 9.8 per 100,000 population in women. (Gupta D, 2000) According to a study conducted at a hospital in Indonesia, Pneumothorax dominant occurs in males. The mortality rate shows a value of 33.7% with the most common cause being respiratory failure. (Widjaya DP, 2014)

Primary management is oxygen therapy or pleural drainage. (Lee S, 2014) The cause of primary spontaneous pneumothorax is thought to be due to rupture of the blebs/bullae. (Noppen, 2010) The bullae or the blebs could develop due to numerous characteristics, such as distal bronchial tree anomaly, distal airway inflammation, local ischemia, and malnutrition. (SP, 2010) Generally, patients with primary spontaneous pneumothorax present with chest pain accompanied by breathless to decreased thoracic expansion. In some cases, lung collapse occurs. Lung collapse caused by loss of negative intrapleural pressure resulting in a decrease in vital capacity to a decrease in the partial pressure of oxygen. (Robert DJ, 2015) Interventions that can be done regarding complaints in cases of pneumothorax consist of Segmental Breathing Exercise, Thoracic Expansion Exercise, Pursed Lip Breathing. The purpose of this case study is to report the results of a physiotherapy program in a patient with primary spontaneous pneumothorax.

CASE PRESENTATION

The patient was a 62 year old male laborer, was diagnosed with primary spontaneous pneumothorax dextra. The patient complained of breathless with a borg scale of 7 (very severe) accompanied by a non-productive cough. The patient has comorbidities, Diabetes Mellitus (DM) Hyperglycemia. The vital signs were within normal limits, with the use of oxygen nasal cannula and Water Seal Drainage (WSD) in the right chest. Based on the results of the chest X-ray, there is still a lucent area without a pattern on the right hemithorax, the right lung collapses leading to a right pneumothorax with a normal heart size. The chest movement is asymmetrical, with the dextra lower than sinistra (Fig. 1A).

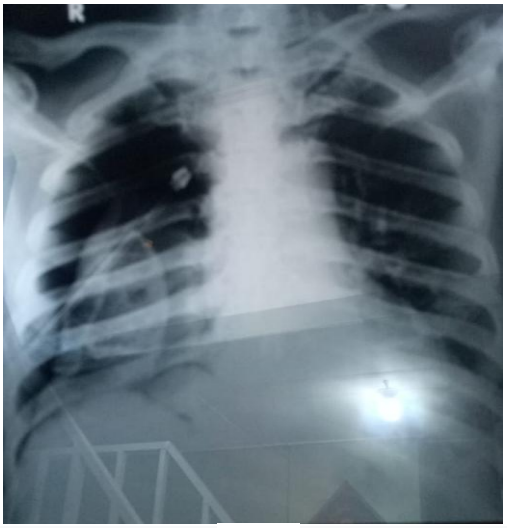
The results of the percussion showed hyperresonance, with auscultation the breath sounds on the right side were lower than the left side and a bubble sound was heard, but there was no sputum. In the measurement of thoracic expansion, the difference between expiration and inspiration in the axilla is 1 cm, intercosta IV-V is 1.5 cm, and the xiphoid process is 2 cm.

MANAGEMENT AND OUTCOME

The patient attended a physiotherapy program every day for 7 days while in the hospital. The aims program to relieve breathless, increase thorax expansion, and restore lung function. Treatment is carried out in one session every day consist of Segmental Breathing Exercise, Thoracic Expansion Exercise, and Pursed Lip Breathing. Each program is repeated 3-5 times, interspersed with rest and Breathing Control.

Based on results of the program, the patient condition was improved. Degradation the value of the borg scale with T 7 (very heavy) to T_{last} 0 (not breathless at all). Increased expansion of the thorax at the axilla, intercosta IV-V, and prosesus xiphoid with T 1cm;1.5cm;2cm to T_{last} 3cm;3cm;2cm. On the chest X-ray, there was an increase in lung size and a slight reduction in pressure was seen (Fig. 1B).

(A)



(B)

DISCUSSION

The physiotherapy program carried out for primary spontaneous pneumothorax patients aims to relieve breathless, increase thorax expansion, and restore lung function through several interventions, consist of Segmental Breathing Exercise, Thoracic Expansion Exercise, and Pursed Lip Breathing.

The results of the measurement of thoracic expansion with the value of the difference between expiration and inspiration before the physiotherapy program at the axilla point of 1 cm, intercosta IV-V 1.5 cm, prosesus xiphoid 2 cm. This is because the presence of air in the pleural

Fig. 1 Chest X-Ray (A) Before the physiotherapy program (B) After the physiotherapy program

cavity causes impaired mobility of the lungs towards inspiration. After the physiotherapy program, there were differences in the axilla points that is 3 cm, IV-V intercosta 3 cm, prosesus xhipoid 2 cm. Increased thoracic expansion occurs through the mechanism of the stretch reflex in segmental breathing exercise. The purpose of fast stretches is to provide facilitation to the muscles so that the muscles will contract. Then there is the process of inspiration accompanied by an increase in thoracic expansion and lung capacity. The above muscle facilitation also causes maximum expulsion of air through the expiration process.(Sarkar A, 2010)

The Thoracic Expansion Exercise (TEE) aims to increase the mobilization of the thoracic cage and improve posture. The mechanism of Thoracic Expansion Exercise (TEE) is to inhale slowly until the lung cavity is filled with air accompanied by actively moving the hands up and exhaling slowly while lowering until the air in the lung cavity feels empty. When the patient take a deep breath and exhale slowly, it causes the lung cavity to expand and contract, resulting in contraction of the respiratory muscles and chest muscles which will affect the mobilization of the thoracic cage. (Lewis L.K., 2012)

On the value of the Borg Scale there was a drastic change from a value of 7 (very heavy) to a value of 0 (no breathless at all). Thoracic Expansion Exercise (TEE) also serves to reduce breathless because it streamlines the work of the respiratory muscles so that it can improve decreased lung ventilation in patients with pneumothorax. (Aishwarya Gatty, 2021)

The Pursed Lip Breathing (PLB) exercise provides benefits through the inspiration process, consist of by contracting the main inspiratory muscles, resulting in an increase in lung volume. According to research studies that have been carried out, Pursed Lip Breathing (PLB) in lung diseases who have complaints of shortness of breath can reduce shortness of breath.(Borge, 2014)

In the breathing control technique, that is breathing using the lower side of the lungs and minimizing the use of the accessory muscles of the breath so that the patient takes a breath in a relaxed condition it will be useful to restore a calm and rhythmic breathing pattern.(Borge, 2014)

CONCLUSION

Physiotherapy management for patient withprimary spontaneous pneumothorax dextra with the intervention that is Segmental Breathing Exercise, Thoracic Expansion Exercise, Pursed Lip Breathing can relieve breathless, increase thoracic expansion and restore lung function.

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