**Int. j. adv. multidisc. res. stud.** 2024; 4(4):1037-1040

**Received:** 01-07-2024
**Accepted:** 11-08-2024

International Journal of Advanced Multidisciplinary Research and Studies

**ISSN: 2583-049X**

# Effect of Chest Physiotherapy and Postural Drainage Manoeuvre for Pneumonia Patients in Intensive Care Unit: A Case Report

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**DOI:** https://doi.org/10.62225/2583049X.2024.4.4.3146
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**Abstract**

Pneumonia is defined as the inflammation of the parenchyma of the lungs. It is mostly caused by microbes (viruses/bacteria) infection. The purpose of this study was to determine the impact of chest physiotherapy and postural drainage on patients with pneumonia admitted to high-dependency unit. A case study of a 33-year-old female patient with bacterial pneumonia, physiotherapy was carried out 2 times a day for 7 days. Physiotherapists used a variety of techniques, including percussion, vibration, postural drainage, spirometry exercises, early mobility, and active breathing exercises which could help to reduce the symptoms of pneumonia in this condition. Outcome measurements were evaluated using mMRC Dyspnoea Scale, Intensive Care Unit (ICU) Mobility Scale, Functional Independence Measure (FIM), and Numerical Pain Rating Scale (NPRS). It was concluded that the early physiotherapy rehabilitation with postural drainage could help to resolve pneumonia and relieve dyspnoea.

**Keywords:** Percussion, Vibration, Postural Drainage, Spirometer, Airway Clearance Technique, Breathing Exercises, Modified Medical Research Council, Pulmonary Rehabilitation, Pneumonia

## Introduction

Pneumonia is defined as inflammation of the parenchyma of the lungs. It is mostly caused by microbes (viruses/bacteria), and very rarely because of aspiration, radiation etc [1]. Bacterial pneumonia has a rapid onset with strong cough, the patient appears noxious, leucocytosis, and there are abnormalities seen in radiological imaging [3]. The bacterial pneumonia is mostly caused by Streptococcus pneumoniae, Hemophilus influenzae, Staphylococcus aureus, Streptococci, as well as atypical chlamydia and mycoplasma bacteria [2]. Crowded house, damp house, air pollution caused by the use of firewood/charcoal, and smoking behaviour of parents are also the major cause of pneumonia. The rate of mortality in pneumonia depends upon number of reasons like low birth weight (LBW), lack of vaccinations, lack of sufficient breastfeeding, malnutrition, vitamin A insufficiency, high prevalence of pathogenic bacteria colonization in the nasopharynx, and excessive exposure to air pollution. Clinically pneumonia is represented by fever, headache, restlessness, malaise, decreased appetite, gastrointestinal complaints like nausea, vomiting, or diarrhoea; cough, shortness of breath, chest retractions, tachypnoea and cyanosis. In elderly individuals, diagnosis is difficult because of age- related abnormal symptoms.

Different physiotherapy techniques are used for treating the chest complications in pneumonia, this includes chest mobilization, postural drainage, deep breathing [6] exercises, manual chest physiotherapy such as percussion, vibration and also the strengthening of respiratory muscles and spirometry exercises [4, 5]. Postural drainage technique in which the patient is positioned in different position to facilitate the removal of secretions from the bronchial airways by the help of gravity [7, 8].

The purpose of this study was to determine the impact of chest physiotherapy and postural drainage on patient's sputum production in pneumonia admitted to high-dependency unit.

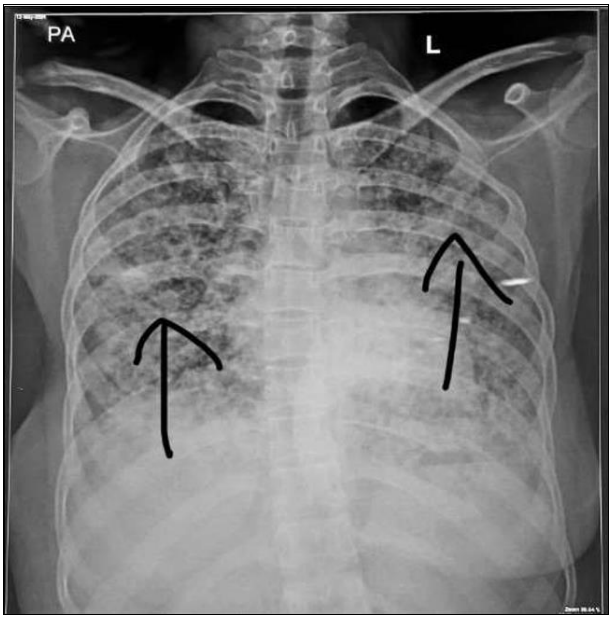


**Fig 1:** Pre-intervention chest X-ray in PA view. The black arrow points at prominent bronchovesicular marking

## Case Presentation

### Patient Information

A 33 -year-old female patient was apparently alright, from last 6 months she is complaining of gradual shortness of breath, chest pain. Since last seven day she is having chest pain, cold, cough and fever seven days prior. After comprehensive blood tests, sputum cultures, X-ray and auscultation. Blood reports revealed increased white blood cell (WBC) and platelet count, increases ESR; sputum culture showed Streptococcus pneumoniae gram positive bacteria; x-ray showed condensed area or opacity at the lower lobe of right lungs and on auscultations we could hear abnormal breathing sound i.e. crackles on lower lobe during inhalation. No previous history of illness or surgery was discovered. She was admitted to the hospital recommended for medical management and chest physiotherapy. The degree of shortness of breath was evaluated by the borg scale, it ranges from 0 to 10 (higher the number, more severe the shortness of breath). There is a value of 7 in this patient A well-planned physiotherapeutic program protocol was implemented. Protocol included postural drainage, percussion and vibration, breathing exercises and spirometry followed by huffing and coughing technique. Physiotherapy was done twice a day for 7days.

For breathing exercises the patient is made to sit in half crook lying position and breathing exercises and spirometry exercises are given. Breathing exercises includes segmental breathing, deep pursed lip breathing for 10 repetitions twice a day for 7 days followed by proper coughing technique to remove the secretions.

Spirometry a mechanical device used increase vital capacity and chest expansion and provides feedback at a present inspiratory flow, or volume of air, with the patient usually encouraged to hold their breath for 2-3 seconds at full inspiration and 2-3 sec holds at full expiration. It is repeated for 15 times twice a day for 7 days.

Then the patient is positioned for postural drainage of right lower lobe anterior and lateral segment. For right lower lobe anterior segment the patient made to sleep on side lying position with pillows under the knees and head 45°down position and for the right lower lobe lateral segment the patient is made to lie in side lying position on left side in 45° head down position. In the postural drainage position the therapist give chest mobilization techniques like percussion and vibration with 10 repetitions in each segment twice a day for seven days. In this position suctioning is done to remove the secretion form the lungs.

**Table 1:** Physiotherapy Program

| | |
|---|---|
| **Duration** | Regular for 7 days |
| **Frequency** | 2 times daily |
| **Intensity** | 40 min per session |
| **Interventions** | 1. Segmental Breathing<br>2. Spirometry<br>3. Coughing<br>4. Postural drainage<br>5. Percussions and vibration<br>6. Suctioning |

**Table 2:** External Oxygen Requirement

| S. No | Days of Hospital Stay | |
|---|---|---|
| 1 | Day 3 | 8L |
| 2 | Day 4 | 5L |
| 3 | Day 5 | 3L |
| 4 | Day 6 | 1L |
| 5 | Day 7 | No Need |


**Fig 2:** Chest X-ray in PA view showing relatively clear lungs, post interventions

It has been demonstrated in this case that chest physiotherapy, postural drainage, spirometry exercises and breathing exercises can assist relieve symptoms and to clear secretions in pneumonia along with proper medical management in adults. It is hoped that after the physiotherapy intervention, the patient will be able to gradually enhance her activities of daily living and improve her quality of life in the future.

## Discussion

Pneumonia is one of the most prevalent health problems in the world irrespective of age groups. The core of therapy for pneumonia is antibiotics; other medications along with chest physiotherapy. Postural drainage [7] is a useful component of chest physical therapy in the treatment of pneumonia and other chest diseases. Many studies have demonstrated the

usefulness of postural drainage in pneumonia. Using the forced expiration approach as an adjuvant to postural drainage in cystic fibrosis treatment, it was demonstrated that postural drainage was a beneficial technique in patient's care.

Varekojis SM *et al*. [9], conducted a comparative study on the therapeutic effectiveness and preference for postural drainage and percussion, intrapulmonary percussive ventilation, and high-frequency chest wall compression in hospitalized cystic fibrosis patients, and found that postural drainage was an effective for airway and chest clearance.

Chest physiotherapy interventions have been utilized widely as a supportive line of treatment for adults with pneumonia. Chest physiotherapy was found to have a positive effect on fewer days spent in the hospital among older patients who had developed hospital acquired respiratory disease [10], Another study revealed that elderly patients were unable to control the release of secretions using passive methods like vibration and postural drainage, which is also referred to as conventional physical therapy (CPT) [11, 12]. On the other hand, a different study demonstrated that CPT could raise oxygenation and decrease secretions [13, 14], Postural drainage, breathing exercises and mobility exercises were introduced to the patient after their admission. From the perspective of physiotherapy, patients with pneumonia experience a range of disorders, including difficulty-clearing mucus, altered breathing patterns, and altered posture, which leads to disruption of daily activities. In a study using pulmonary rehabilitation, which consists of aerobic training, streamlined strength training, and breathing exercises, researchers demonstrated that people with bronchopneumonia have negative short- and long-term limitations in their physical performance. The mMRC Dyspnoea Scale, Numerical Pain Rating Scale (NPRS), and Intensive Care Unit (ICU) Mobility Scale were used as outcome measures to evaluate the patient's treatment [15]. Sessions of physiotherapy were split into two halves. To stress the importance of following the recommended action plan, informed consent was requested for the treatment technique when initially the patient was informed about her state. To lessen airway resistance and enhance breathing, we concentrated on clearing obstructive tracheobronchial secretions. There was a noticeable improvement on every metric during these days, according to the variance in scores. Early mobility of hospitalized patients with pneumonia reduces the length of stay and leverages institutional resources without increasing the risk of outcome measurements [16]. Peripheral oxygen saturation levels improved more when chest PT (continuous positive airway pressure (CPAP)) and traditional chest physiotherapy were used [17].

## Conclusion

Patients requiring artificial respiration due to severe bronchopneumonia are more likely to develop exercise intolerance and respiratory muscle weakness. Improving their physical function requires early intervention, beginning with the acute sickness phase. An early start to chest physiotherapy is crucial for the recovery phase of treating bronchopneumonia because it decreases hypersecretion, decreases the external respiratory demands and for airway clearance. The goal was to improve the patient's respiratory status and speed up their recuperation. Increased airway clearance provides two benefits *i.e.,* improved gas exchange and reduced breathing effort. Our precisely organized pulmonary rehabilitation greatly alleviated the patient's cough, dyspnoea, and weakness. It is effective in developing functional capacities and improving the quality of life.

## Acknowledgements

We thank the patient for making the time and effort and providing consent for this case report.

## Funding

No funding sources for this article.

## Competing Interests

The authors declare that they have no financial or other conflicts of interest in relation to this research and its publication.

## Consent for Publication

The authors have obtained the patient's informed written consent for print and electronic publication of this case report, including reproduction of any images seen herein.

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