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Research Article

Enhancing Chest Expansion by Segmental Breathing and Specific Splinted Positioning in Pleural Effusion Patient: A Case Report on Effective Therapeutic Interventions

Dr. Sachin Chaudhary[1*], Dr. Bhiniksha Mandlik[2], Dr. Neha Ingale Chaudhary[3], Dr. Ira Indurkar[4], Mr. Nikhil mangrulkar[5], Dr.Shubhada Gade[6]

[1*]Principal cum Professor, Department of Cardiorespiratory Sciences, Datta Meghe College of physiotherapy. Contact no. : +91 9960898805 Email ID: drsachin1982@gmail.com
[2]PG resident, Department of Cardiorespiratory Sciences, Datta Meghe College of physiotherapy. Contact no. : +91 7020690618 Email ID: bhinikshamandlik28@gmail.com
[3]Professor, Department of Neurosciences, Datta Meghe College of physiotherapy. Contact no. : +91 9975457653 Email ID: nehaneuro85@gmail.com
[4]Asso. Professor, Department of Neurosciences, Datta Meghe College of physiotherapy. Contact no. : +91 8806449657 Email ID: physioira@gmail.com
[5]Asst. Professor, Department of Computer Technology, Yeshwantrao Chavan college of engineering. Contact no. : +91 7767888776 Email ID: nmmangrulkar@ycce.edu
[6]Professor, Datta Meghe Medical College Nagpur Email ID- Shubhagade@gmail.com,

***Corrosponding author**: Dr. Sachin Chaudhary
*Principal cum Professor, Department of Cardiorespiratory Sciences, Datta Meghe College of physiotherapy. Contact no. : +91 9960898805 Email ID: drsachin1982@gmail.com

ABSTRACT:
Introduction: Although pleural effusion is a quite frequent illness, there are currently no established guidelines for India. Its significant impact on quality of life, the role of physiotherapy in management remains under-investigated. This case report aims to address this gap by evaluating the effectiveness of early physiotherapy interventions in a patient with massive pleural effusion.
Main Symptoms and Clinical Findings: A 39-year-old male presented with shortness of breath and dry cough attributed to right-sided massive pleural effusion. Initial investigations confirmed the diagnosis, and an intercostal chest drain was inserted.
Main Diagnoses, Therapeutic Interventions, and Outcomes: The patient received physiotherapy interventions targeting both short-term and long-term goals. However, chest expansion limitations due to post-ICD insertion pain emerged as a primary challenge. Focused positioning and segmental breathing exercises initiated in the second week led to significant improvements in chest expansion and a reduction in dyspnoea as measured by the MMRC scale.
Conclusion: This case demonstrates the potential of early, targeted physiotherapy in managing the symptoms and functional limitations associated with pleural effusion. The rapid improvement in chest expansion and reduced breathlessness following specific interventions highlights the value of physiotherapy in this patient population. However, the delayed initiation of effective physiotherapy and the patient's early discharge limited the overall treatment duration and precluded long-term follow-up, emphasizing the need for further research to establish optimal treatment protocols and outcomes.

Key Words: Pleural Effusion, Chest Expansion, Respiratory Complications, Therapeutic Interventions, Case Report, Lung Function, Respiratory Therapy, Patient Outcomes, Pulmonary Rehabilitation

***Author for correspondence: Email:** *drsachin1982@gmail.com*

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INTRODUCTION:

Pleural effusion is the build-up of extra fluid between the layers of the pleura, which are thin membranes that line the lungs and the inside of the chest cavity, helping to lubricate and ease breathing. (1) Under normal circumstances, the pleural space averaging about 10 to 20 mm in width contains only a little amount (10 to 20 ml) of serous fluid to ensure smooth lung movement within the chest cavity during respiration. However, the accumulation of extra fluid can considerably impair a patient's capacity to execute daily tasks successfully and efficiently as it can compress the lungs. This compression makes it difficult for the lungs to fully expand when you breathe in, leading to symptoms like shortness of breath, chest pain, and coughing. (1) (2)

Pleural effusion is a common problem in India, often requiring invasive tests for diagnosis. Despite this, many doctors treat it without proper testing, leading to misdiagnosis and complications. The need for evidence-based guidelines tailored to India is crucial to improve patient outcomes. The goal of the National College of Chest Physicians and the Indian Chest Society guideline is to offer evidence-based recommendations on the diagnosis, treatment, and initial evaluation of pleural effusions resulting from a variety of aetiologies. Although pleural effusion is a quite frequent illness, there are currently no established guidelines for India. Since the issues India faces are distinct, there is strong justification for establishing an all-encompassing, evidence-based guideline. (3)

In order to treat pleural effusion, medical professionals may aspirate fluid to relieve dyspnoea, insert a chest tube if fluid builds up quickly, or perform pleurodesis in cases of malignant effusion. Treating the underlying cause of a pleural effusion is preferable than treating the effusion itself in order to effectively relieve it. (4) The physiotherapy management includes breathing exercises, thoracic expansion, and incentive-spirometer-based respiratory exercises. In individuals with pleural effusion, deep breathing exercises are utilised to fully expand the lungs and increase lung volumes and oxygenation. (5) (6) (7) (8) This exercise supports lung function and guards against lung collapse caused by inactivity or a persistent accumulation of fluid in the pleural cavities.

Patients with pleural effusions are instructed to perform segmental breathing exercises in order to promote or enhance localised lung expansion.

This case report presents a unique contribution to the existing body of knowledge by focusing on the early intervention of physiotherapy in a patient with massive pleural effusion. While the literature predominantly emphasizes medical and surgical management of this condition, this case highlights the potential of physiotherapy as a primary treatment modality. (4)

Pleural effusion causes reduction of chest expansion and it leads to lung atelectasis, because the capacity of the thorax is limited and excess fluid causes the lungs to collapse. (4) So, the present Case report aims to address the impact of physiotherapy on pleural effusion management, with a focus on Positioning and breathing exercise interventions on symptom relief and improvement in chest expansion. The purpose of this case report is to examine Positioning and Segmental breathing exercise interventions on the restoration of Chest Expansion in a 39 yr old male patient with right sided massive pleural effusion.

PATIENT INFORMATION:

The patient gave written and verbal consent for this case report. The patient was a 39 year-old male presented with symptoms of difficulty in breathing while walking, and a persistent cough for 10 days. The patient also had fever 10 days ago, so he visited PHC where he was positive for typhoid, presently did not have reports. Despite receiving medical treatment for 6 days which alleviated the fever, the difficulty in breathing and cough persisted. So, chest X-ray was done and was s/o abnormality therefore, he was referred to get admitted in hospital for further treatment. There was no past medical history of hypertension, diabetes mellitus, tuberculosis, or bronchial asthma, but there was a family history of hypertension with hereditary tendencies. He was smoker from 10-12 years and occasional drinker since 1 year.

On examination, his temperature was 37.2°C, pulse was 102 beats/min, respiratory rate was 22 breaths/min, blood pressure was 112/88mmHg and oxygen saturation measured by pulse oximetry was 98% on room air. There was no pallor, clubbing, pedal oedema, icterus or lymphadenopathy. The breath sounds were diminished over the right side. No adventitious sounds were heard on either side of the chest.

Investigations including complete blood count, liver function tests were normal, kidney function test revealed decrease in sodium (Na+) - serum. The ECG was unremarkable and within normal limits. The chest X-ray revealed right-sided pleural effusion, blunting of the left costophrenic angle, shift of mediastinal position. He was subjected to pleural tapping where 100-150 ml of fluid was drained and sent for further investigation, which returned normal results. Later he was subjected to USG abdomen and pelvis reporting right sided pleural effusion. An intercostal chest drain (ICD) insertion was planned after it. The patient was treated with antibiotics and was referred for physiotherapy.

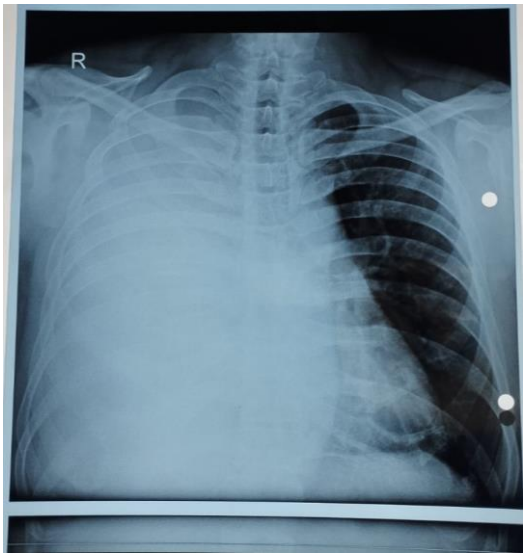


Figure1a:
Frontal chest radiograph
(dated 12/1/2024)

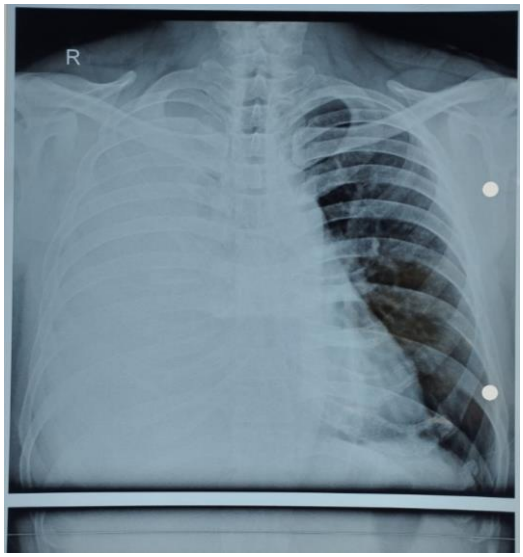


Figure1b:
Frontal chest radiograph
(dated 13/1/2024)

CLINICAL FINDINGS:

Upon admitting to the IPD, the patient underwent an initial evaluation by physical therapy on 13/1/2024. During the general examination, the patient was found to be conscious, cooperative, and well-oriented to time, place, and person. His vital signs were stable, with a temperature of afebrile, a pulse rate of 90 bpm, blood pressure of 110/80 mm Hg, a respiratory rate of 23 breaths per minute, and an oxygen saturation of 95%. He had a mesomorphic build. The patient presented with symptoms of difficulty in breathing on walking and a persistent cough for 10 days.

Table 1: Clinical findings and assessment

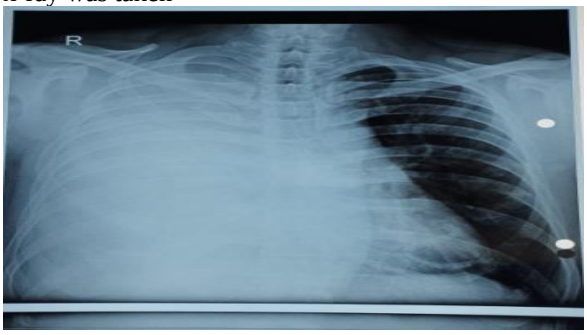
PARAMETER	**FINDINGS**
Breathlessness	Onset: gradual Duration: since 10 days MMRC grade II (walks slower than people of same age on the level because of breathlessness, or have to stop for breath when walking on my own pace on the level) Aggravating Factor: On walking Relieving Factor: At rest
Cough	Onset: Gradual Duration: Since 10 days Type: Dry Frequency: Intermittent Diurnal Variation: At night Aggravating Factor: While talking Relieving Factor: Cough syrup, rest
Pain Assessment	Pleural tapping done on 13/01/2024 (100-150 ml fluid drained) Site: 5th ICS mid axillary line Grade on NPRS: 4 Onset: Gradual Aggravating factor: On movement Relieving factor: At rest
Past Medical & Surgical History	No history of hypertension (HTN), diabetes mellitus (DM), tuberculosis (TB), or bronchial asthma (BA)
Present Medical & Surgical History	No surgical history Allergies: Pollen (grassweed)
Personal History	Diet: Mixed Sleep: Disturbed due to ICD insertion

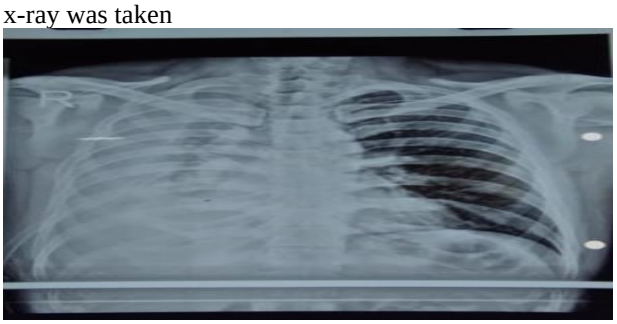
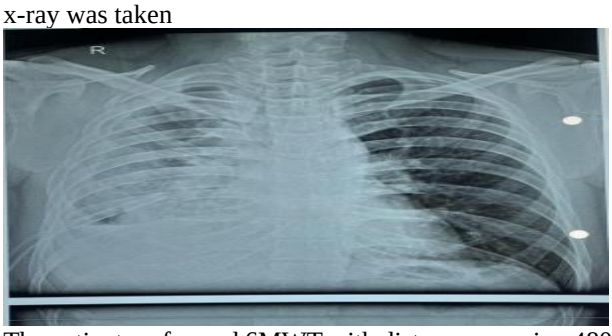
	Addiction: Smoking for 10-12 years (1 cigarette daily) and Drinking alcohol occasionally (once a month) Bowel/Bladder: Intact
Family History	Family type: Nuclear Number of family members: 5 Presence of hereditary diseases: Hypertension (HTN)
Socioeconomic History	Earning members of family: 2 Patient left job one year ago Class: Lower middle class
Respiratory Physical Examination	**Inspection:** - Diminished mobility of chest wall on right side - Bulging of intercostal spaces on affected side - Respiratory rate: 23 breaths/min - Use of accessory muscles - Character: Abdomino-thoracic
	Palpation: - Diminished mobility of chest wall on right side - Shift of mediastinum to opposite side - Chest expansion (nipple level): 0.3 in - TVF: Diminished over right side
	Percussion: - Anteriorly: Dull - Posteriorly: Dull - Axilla: Dull
	Auscultation: - Breath sounds: Diminished over right side - Foreign sounds: Absent - Vocal resonance: Egophony

During the functional assessment, the patient could not perform6 minute walk test because of breathlessness.
The patient exhibited no change in chest expansion, exacerbated by an incision made at the right 5th intercourse to space for intercostal drainage, leading to diminished chest movement. Despite this, he was an excellent candidate for this case report due to his high motivation to regain functional strength and achieve independence in all activities of daily living.

TIMELINE:

Table 2: Timeline for historical and current information

A few weeks ago	The patient began experiencing breathlessness during work and a persistent cough.
10 days ago	Onset of fever, difficulty in breathing while walking, and a persistent cough. The patient received medical treatment for fever, which was alleviated, but the difficulty in breathing and cough persisted.
12/01/2024	Patient was admitted and diagnosed. x-ray was taken 
13/01/2024	Pleural tapping performed, draining 100-150 ml of fluid. x-ray was taken

	 Physiotherapeutic assessment was done and treatment was started. Patient couldn't perform 6MWT
14/01/2024	300+500 ml fluid drained in a day
15/01/2024	ICD was introduced 500+250 ml fluid drained in a day
16/01/2024	250 ml fluid drained in a day. Total 1950ml fluid was drained.
17/01/2024	x-ray was taken  The patient performed 6MWT with distance covering 280 meters with 1 rest period in between.
23/01/2024	x-ray was taken  The patient performed 6MWT with distance covering 480 meters without any rest period in between.

DIAGNOSTIC ASSESSMENT:

As we have discussed Respiratory Physical Examination in the clinical findings. Here are the Diagnostic assessments in detail.

- **Laboratory Testing:**

Fluid obtained from pleural tapping was analyzed in the laboratory. The results indicated normal findings, showing no signs of infection or malignancy. This ruled out some potential causes but did not provide a definitive diagnosis.

- **Imaging:**

A chest X-ray revealed right sided effusion, blunting of the left costophrenic angle, shift of mediastinal position. These findings suggested a substantial accumulation of fluid and changes in the anatomical structures within the chest cavity, indicating the need for further intervention.

- **Ultrasound (USG) Thorax :**

The ultrasound findings confirmed the presence of fluid and suggested the necessity for an intercostal chest drain (ICD) insertion. This intervention was required to manage the pleural effusion effectively and relieve the patient's symptoms.

- **Additional Investigations:**

The patient's complete blood count and liver function tests were within normal limits. However, the kidney function test revealed a decreased level of serum sodium

(Na+). The electrocardiogram (ECG) showed no abnormalities, and the cardiac enzyme levels were also within normal limits.

Confirmation of Diagnosis:
The presence of fluid in the pleural space, as confirmed by imaging (chest X-ray and ultrasound), points to pleural effusion as the diagnosis in this instance. Normal results from the pleural tapping fluid analysis ruled out infection and cancer as possible causes.

Consideration of Other Diagnoses:
Infection: Initially thought to be the cause because pleural effusion is frequently linked to illnesses like tuberculosis or pneumonia. This was ruled out, nonetheless, by the fluid analysis's lack of infection indicators.
Malignancy: Although the normal cytological results in the fluid analysis ruled this out, malignancy is another prevalent cause of pleural effusion.
Heart failure: This condition is frequently linked to pleural effusion, yet it was less plausible given the normal ECG.
Liver disease: Can result in pleural effusion; however, this was ruled out by normal liver function tests.
Kidney Disease: Could contribute to fluid imbalance, with the kidney function test revealing a decreased level of serum sodium (Na+). Despite this finding, the decrease in serum sodium was not significant enough to be the primary cause of the effusion.

Prognosis
The patient's prognosis with pleural effusion depends on multiple factors, such as the efficacy of the treatment and the identification of any underlying causes.

Short-term Prognosis:
- The insertion of an intercostal chest drain (ICD) is anticipated to relieve immediate symptoms like breathlessness and chest discomfort by removing the excess fluid.

Long-term Prognosis:
- Regular monitoring for any recurrence of pleural effusion is necessary, as the exact underlying cause remains undetermined.
- Follow-up evaluations are necessary to identify any underlying conditions that were not initially detected but patient failed to follow up.

Potential Complications:
- There was a delay in diagnosis and treatment, due to a lack of immediate hospitalization facilities, could result in complications such as recurrent effusion or infection.
- Financial limitations also restrict the patient's ability to access continuous and comprehensive care, which is essential for effective management and monitoring.

Overall Prognosis:
- The overall outlook is cautiously optimistic, given the non-malignant and non-infectious nature of the effusion. However, socioeconomic factors impacting the patient's access to ongoing medical care must be considered.
- Identifying and addressing any underlying cause, if discovered in future assessments, will be vital for the patient's long-term health and prevention of recurrence.

By considering these factors, we developed a comprehensive and individualized care plan for the patient, ensuring timely interventions and continuous monitoring to manage symptoms and prevent recurrence effectively.
Short-term and long-term goals were established based on initial impairments, focusing on positioning to relieve breathlessness and promote relaxation, breathing exercises to improve oxygenation and perfusion, thoracic mobility exercises to increase air volume inspired, and incentive spirometry to train primary muscles of inspiration. Additionally, positioning and segmental breathing exercises helped to expand lung segments, with a focus on increasing thoracic expansion. Later focused on exercise tolerance, cardiovascular endurance, and restoring the patient's fitness and functional independence.

The patient had to face various challenges for the diagnostic procedures to take place as in,
- Due to the lack of facility of hospitalization, the patient experienced delays in receiving an accurate diagnosis and appropriate treatment. This delay could have potentially worsened the patient's condition.The patient had to travel to a larger, more equipped facility to access the necessary imaging techniques and hospitalization. This added complexity and extended the duration of the diagnostic process.
- The costs associated with repeated imaging, fluid analysis, and various medical interventions posed a significant financial burden on the patient, who belonged to a lower middle-class socioeconomic status. The cumulative expenses of diagnostic tests and a potential hospital stay strained the family's financial resources.Given their financial situation, affording comprehensive care without financial assistance or insurance coverage was a significant challenge for the patient and their family.
- In the early stages, the patient and their family preferred using home remedies, which delayed seeking professional medical help. This initial delay in presenting to medical professionals further complicated the diagnostic and treatment process.

The patient remained appropriate for this case report due to his decreased functional capacity and strong motivation to return to full independence.

THERAPEUTIC INTERVENTION:
- **Pharmacologic Interventions:**
- **Inj. CTRI + SULBACTAM 1.5gm (BD):** This combination antibiotic was administered twice daily to manage or prevent bacterial infections that could complicate the patient's condition.

- **TCLARIBIO 250mg (TOS):** This antibiotic was given once daily, aiming to address any underlying or potential infections.
- **T PULMOCLEAR (BD):** This medication was prescribed twice daily to help clear mucus and support lung function.
- **Syp TUS-DX 10ml (BD):** This cough syrup was given twice daily to alleviate cough and reduce airway irritation.
- **Inj NEOMOL (SOS):** An injection used as needed for pain relief or to address acute symptoms.
- **T DOLO 6song (BD):** A pain reliever administered twice daily to manage discomfort and pain associated with the pleural effusion.
- **Syp DUPHALAC ISMI (HS):** A syrup provided at bedtime to address constipation, which can be a side effect of some medications or reduced physical activity.
- **DUOLIN (TOS):** This bronchodilator was given once daily to improve airway function and ease breathing.

➢ **Surgical Intervention:**

- *Insertion of Intercostal Chest Drain (ICD):* This procedure was performed to drain the accumulated fluid from the pleural space, providing immediate relief from symptoms such as breathlessness and chest discomfort.

➢ **Preventive Interventions:**

- *Nebulization (INHALEX) (BD):* Nebulized treatments were administered twice daily to help keep the airways clear and prevent respiratory complications.
- *Monitoring and Follow-Up:* Regular assessments and monitoring were implemented to detect any recurrence of pleural effusion or other complications, aiming to prevent further issues.

➢ **Self-Care Interventions:**

- ***Education and Guidance:*** The patient and their family were educated about the condition, treatment plan, and self-care measures to manage symptoms and support recovery effectively. This included guidance on medication adherence, recognizing symptoms that require medical attention, and maintaining overall respiratory health.

➢ **Physiotherapeutic interventions:**

Initial interventions were aimed at addressing short-term and long-term goals discussed below,

Table 3: short term goals and long term goals

Short term goals	Long term goals
1. Patient and Family Education. 2. To relieve breathlessness. 3. To relieve cough. 4. To reduce work of breathing 5. To increase thoracic expansion. 6. To prevent further cardiopulmonary complications. 7. Optimize respiratory muscle strength and endurance. 8. To maintain good posture.	1. To obtain and maintain full expansion of affected and non-affected lung. 2. To improve exercise tolerance. 3. To maintain cardiovascular endurance.

Table 4: Timeline For Physiotherapy Protocol

Day	Goals	Interventions	Dosage	Rationale
Day 1-3	- Educate patient and family about pleural effusion and treatment	Educated about pleural effusion, importance of timely intervention, management plan, and role of physiotherapy.		Initial education provided comprehensive understanding of the condition and treatment plan.
	- Relieve immediate symptoms (breathlessness, chest discomfort)	**Dyspnoea Relieving Positions:** - Semi-Fowler and - forward lean standing.	When feeling breathless.	
		Deep breathing exercise (inspiratory diaphragmatic and expiratory Pursed Lip Breathing)	18-20 breaths (6 breaths/min) with rest interval after every 6 breaths.	

		Sleep and Rest **Positioning:** Semi-Fowler during sleep		
		Relaxation Techniques: Relaxed sitting and forward lean sitting		
	- Relieve cough	**Active Cycle Of Breathing Technique**	10 minutes , twice a day.	
	- Prevent respiratory complications	**Incentive Spirometry:** Begin regular use.	3 sets of 10 repetitions each	Strengthen respiratory muscle
Day 4-7	To enhance lung function and thoracic expansion	**Thoracic Mobility Exercises:** - Shoulder elevation, - pectoral stretch. **Continue Deep breathing exercise and Incentive Spirometry**		Increase thoracic expansion
	Prevent complications	**Avoidance of Alcohol & Smoking:** Reinforce quitting.		
Day 8-14	To enhance lung function and thoracic expansion	**Positioning for Full Thoracic Expansion:** Lying on the unaffected side with firm pillows,	30 minutes, 4 times daily.	Increase thoracic expansion and respiratory muscle strength.
		Segmental Breathing Exercise: Begin practice.	18-20 breaths (6 breaths/min) with rest interval after every 6 breaths.	
		Continue Thoracic Mobility Exercises and Incentive Spirometry		
	- Optimize respiratory function and support long-term recovery - Increase exercise tolerance and functional independence	**Endurance:** Marching on the spot, brisk walking, stair-climbing, cycling	Alternate day exercise for 15 minutes	- Restore patient to fitness and functional independence. - Prevent recurrence of pleural effusion and other complications.
		Exercise Circuit Training: Aerobic exercises	warm-up (3-5 min), conditioning (15-20 min), cool-down (3-5 min).	

		Continue Segmental Breathing Exercises: Focus on lung segment expansion and gas exchange. **Monitor and Adjust Interventions:** Evaluate and adjust treatments as needed.		

Prescription of home exercise
Frequency: twice a day
Intensity: not more than 20% of HRR
Type: aerobic exercises
Time: 30 minutes daily

During the initial phase of treatment (Day 1-7), deep breathing exercises were implemented with the goal of improving chest expansion and overall respiratory function. However, these exercises did not yield significant improvements in chest expansion. The primary factors contributing to this limitation were:

1. **Pain from ICD Insertion:** The insertion of an intercostal chest drain (ICD) resulted in pain and discomfort , which limited the effect of deep breathing exercises on expansion of chest fully.
2. **Persistent Breathlessness:** Due to the pain and limitation of chest expansion, the patient continued to experience breathlessness, which impeded their ability to benefit from the deep breathing exercises fully.

Recognizing the limitations of deep breathing exercises, the focus shifted in the second week (day 8-14) to segmental breathing combined with strategic positioning:

1. **Segmental Breathing:** This technique was introduced to target specific lung segments, promoting localized lung expansion and improving gas exchange in areas affected by the pleural effusion.
2. **Positioning:** The patient was positioned on the unaffected side with firm pillows under the thorax for 30 minutes, four times a day. This positioning facilitated better lung expansion on the affected side and reduced discomfort during breathing.

OUTCOMES AND FOLLOW UP:

Table 5: Outcome measures of the patient

Outcome measures		**Baseline**	**After 1st week**	**After 2nd week**
Modified Medical Research Council Dyspnoea Scale		2	1	0
Chest Expansion	At sternal notch	0.3 inch	0.5 inch	1.6 inch
	At xiphiod	0.5 inch	0.5 inch	1.4 inch
	At T_8 vertebral level	0.5 inch	0.8 inch	1.5 inch
Spirometer		600 cc	600cc	900cc
6MWT		Not able to perform	6MWD is 280 meters with 1 rest period in between	6MWD is 480 meters without rest period.

Following two weeks of inpatient physical therapy, the patient exhibited notable improvements in aerobic capacity, chest expansion, exercise tolerance, and cardiovascular endurance.

- Initially, there were not much difference in improvement in chest expansion after one week; however, the introduction of segmental breathing and appropriate positioning resulted in noticeable improvements in chest expansion and reduction in breathlessness. The localized approach of segmental breathing addressed the specific areas affected by the pleural effusion more effectively than deep breathing exercises alone.
- **Potential Impact of Earlier Implementation:** If segmental breathing had been initiated during the first week, along with appropriate positioning, it is likely that the patient would have experienced quicker improvements in chest expansion and a reduction in recovery time. The delay in starting this approach may have contributed to a slower overall recovery.

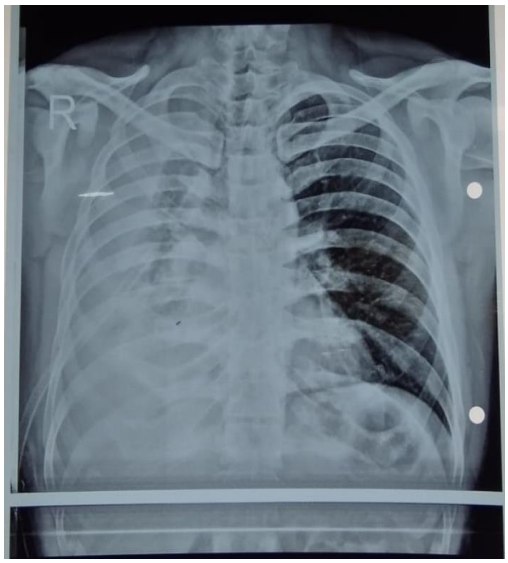


Figure 2a:
Frontal chest radiograph
(dated 17/1/2024)

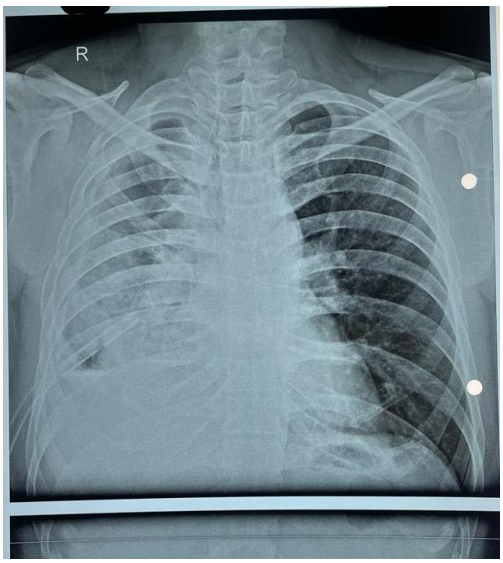


Figure 2b:
Frontal chest radiograph
(dated 23/1/2024)

The patient did not perceive the follow-up appointments as crucial to their health, leading to a lack of motivation to attend. This perception might stem from a belief that the initial treatment was sufficient or from an underestimation of the importance of ongoing monitoring and intervention.

In India, a significant number of patients are lost to follow-up due to high illiteracy rates, lack of health awareness, and poverty. Financial constraints make it difficult for patients to afford repeated visits to health centres and ongoing treatment, while heavy patient loads and long hospital queues further discourage follow-up. The limited number of specialized tertiary care centres in big cities attracts patients from across the state, leaving other healthcare facilities under-equipped to meet the needs of the broader population. Additionally, the lack of systematic tracking in hospitals and the availability of alternative medicine providers contribute to the issue. Hospital information systems are underdeveloped, which exacerbates the problem of maintaining patient follow-up. (9)

DISCUSSION:

This case report demonstrates an in-depth assessment of a patient with massive pleural effusion that includes both therapeutic and diagnostic measures. The article emphasises the use of segmental breathing exercises and positioning strategies as a customised strategy to address certain functional limitations and enhance patient results. Significant functional improvements, such as improved aerobic capacity, exercise tolerance, and chest expansion, are seen in this case. A large amount of information about the efficacy of the used physiotherapeutic therapies is provided by the inclusion of detailed patient progress. This case study highlights the significance of early and flexible rehabilitation procedures in maximising recovery by tracing the progression from the first deep breathing exercises to segmental breathing and positioning methods.

Due to the fact that this case study is based on a single instance, its conclusions could not apply to all pleural effusion patients. The results may not apply to other patients due to differences in pleural effusion aetiology and individual responses to treatment. The ability to directly ascribe benefits to the therapies outlined is limited in the lack of a control group and comparative data. Determining the relative efficiency of the therapies is difficult in the absence of a comparable baseline. The overall recuperation timeline may have been affected by the delay in implementing segmental breathing exercises. This delay emphasises how important it is to plan early and appropriately for interventions.

The literature on pleural effusion management highlights the importance of a comprehensive approach to treatment, including both medical and physiotherapeutic strategies. Studies have demonstrated that early intervention with targeted physiotherapy can improve respiratory function and reduce complications associated with pleural effusion. (6) (7) (8) (5) Segmental breathing exercises have been found to improve localized lung expansion and gas exchange, addressing specific areas affected by pleural effusion. (4) Additionally, positioning techniques that promote lung expansion, such as lying on the unaffected side, have been recommended to optimize recovery. (4)

However, a review of the literature also reveals that many existing guidelines and studies primarily focus on medical and surgical management, with less emphasis on tailored physiotherapy interventions. (4) The need for evidence-based guidelines that incorporate physiotherapy is evident, especially in contexts where access to specialized care is limited. (3) This case report contributes to the literature by highlighting the potential of physiotherapy as a primary treatment modality and underscores the need for further research to establish comprehensive guidelines.

Conclusion

The observed increases in chest expansion and functional capacity after the introduction of segmental breathing exercises and placement techniques add credibility to the conclusions drawn from this case study. There is scientific justification for the necessity for adaptive therapy strategies given the early dependence on deep breathing exercises, which did not result in significant changes, and the later benefits of segmental breathing and strategic posture. The limits of the early interventions that have been seen highlight the significance of prompt assessment and modification of treatment strategies in order to maximise patient outcomes.

Primary Take-Away Lessons

This case study demonstrates the significant rise in chest expansion and total functional ability in patients with pleural effusion that can be achieved with customised physiotherapeutic interventions, such as segmental breathing exercises and strategic posture. It shows that while the early benefits of deep breathing exercises may be limited, significant improvements in respiratory function and patient comfort can result from a tailored approach that addresses specific lung segments and optimises placement. The paper emphasises how crucial early diagnosis and adaptable treatment plans are to helping pleural effusion patients recover and become functionally independent.

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ANNEXURE I: Patient Perspective

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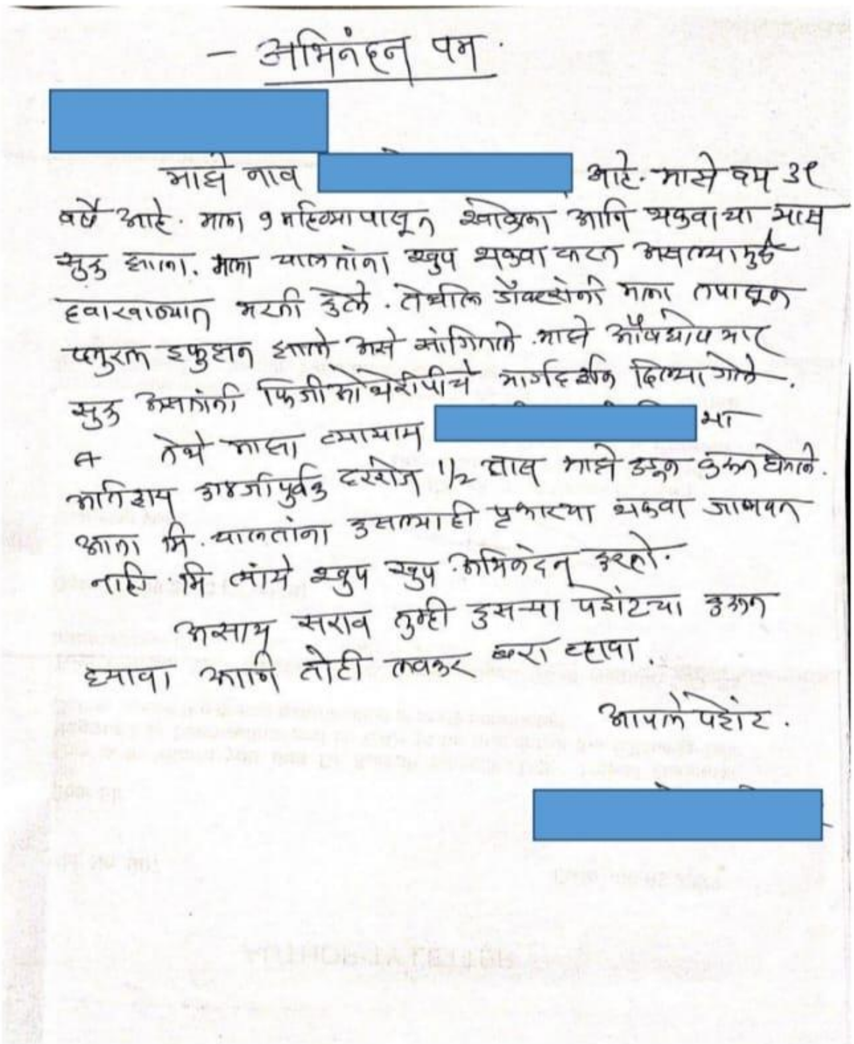

- अभिनंदन पत्र.

[redacted]

माझे नाव [redacted] आहे. माझे वय ३९
वर्षे आहे. मला १ महिन्यापासून खोकला आणि थकवा यांचा त्रास
सुरु झाला. मला चालतांना खुप थकवा येत असल्यामुळे
हवाखान्यात भरती केले. तेथील डॉक्टरांनी मला तपासून
प्लुरल इफ्युजन झाले असे सांगितले. माझे औषधोपचार
सुरु असतांना फिजीओथेरपीचे मार्गदर्शन दिल्या गेले.
व तेथे माझा व्यायाम [redacted] मा
कारिशाय उर्जापूर्वक दररोज 1/2 तास माझे कडून करुन घेतले.
आता मी चालतांना कसल्याही प्रकारचा थकवा जाणवत
नाहि. मि त्यांचे खुप खुप अभिनंदन करतो.
असाच सराव तुम्ही दुसऱ्या पेशंटच्या कडून
घ्यावा आणि तेही लवकर बरा व्हावा.

आपला पेशंट.

[redacted]

ANNEXURE II: Informed Consent

ANNEXURE II: Informed Consent

CONSENT FORM

I, Mr./Mrs./Miss [redacted] of my own free will of choice, hereby give my consent to be included in the above case report.

I have been clearly informed to my satisfaction the purpose of the case report and thus, I agree to fully cooperate and participate in it.

I have been informed that no part of my information shall be revealed except the data which will be used for the case report and adequate secrecy will be maintained.

Also, no part of the information will be used against me.

I am also aware of my right to opt out at any time and prevent my data to be utilized at any phase of the case report if I desired.

Signature [redacted]

[redacted]

[redacted]