

Musculoskeletal Challenges in a Post-Pneumonectomy Patient with Severe Pneumonia – A Case Report

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Abstract

Prolonged intensive care unit (ICU) admissions are frequently associated with significant musculoskeletal complications including muscle wasting, joint stiffness, and impaired mobility. These issues become particularly challenging in patients with severe respiratory illness requiring prolonged mechanical ventilation. We present the case of a female patient with a history of right pneumonectomy who developed left-sided community-acquired pneumonia complicated by type I respiratory failure and repeated episodes of respiratory arrest. The patient required prolonged mechanical ventilation, tracheostomy, and intensive multidisciplinary care. During the ICU course, prevention of musculoskeletal complications such as ICU-acquired weakness, joint contractures, and functional decline became a key aspect of management. Early physiotherapy, positioning strategies, and gradual mobilization were incorporated into the treatment plan following respiratory stabilization. This case highlights the importance of orthopaedic and rehabilitation perspectives in the management of critically ill patients, emphasizing the role of early mobilization and musculoskeletal preservation in improving long-term functional outcomes.

1. Introduction

Prolonged hospitalization in critically ill patients often leads to substantial musculoskeletal complications that significantly affect long-term recovery. Immobilization, mechanical ventilation, systemic inflammation, and critical illness can result in rapid loss of skeletal muscle mass, decreased bone mineral density, joint stiffness, and impaired functional mobility. These complications collectively contribute to the syndrome known as **ICU-acquired weakness**, which may delay rehabilitation and prolong hospital stay.

Patients with severe respiratory illness requiring prolonged ventilation are particularly vulnerable to these musculoskeletal complications. Following pneumonectomy, the physiological reserve of the respiratory system is markedly reduced, making patients susceptible to respiratory failure during acute infections. Consequently, prolonged ICU care is often required, increasing the risk of orthopedic and functional complications associated with immobility.

Orthopaedic considerations in ICU settings include prevention of joint contractures, maintenance of muscle strength, protection

of bone integrity, and facilitation of early mobilization once hemodynamic stability is achieved. Multidisciplinary management involving intensivists, physiotherapists, orthopaedic specialists, and rehabilitation teams plays a vital role in preventing long-term disability.

This case report discusses the musculoskeletal challenges encountered during the ICU management of a patient with severe pneumonia and single-lung physiology and highlights the importance of early orthopaedic rehabilitation strategies.

2. Case Presentation

A female patient presented to the emergency department on **18 December 2025** with severe breathlessness. She had a significant past history of **right pneumonectomy performed during childhood**, leaving her with a single functioning lung.

Due to rapidly worsening respiratory distress, the patient required immediate endotracheal intubation and was transferred to the intensive care unit for further management.

Investigations revealed **left-sided community-acquired pneumonia with type I respiratory failure**, necessitating invasive mechanical ventilation.

Clinical Challenges

Several critical challenges were encountered during the ICU stay:

Single-lung physiology

- Absence of the right lung due to previous pneumonectomy
- Remaining left lung compromised by pneumonia

Airway complications

- Recurrent endotracheal tube blockage
- Episodes of sudden desaturation and bradycardia

Cardiorespiratory instability

- Three episodes of respiratory arrest
- Successful cardiopulmonary resuscitation with return of spontaneous circulation (ROSC)

Severe infection

- Endotracheal cultures positive for *Klebsiella pneumoniae* and non-fermenting gram-negative bacilli

Musculoskeletal risks

- Prolonged immobilization
- Risk of ICU-acquired weakness
- Potential development of joint stiffness and muscle wasting

Psychological distress

- Clinical depression requiring psychiatric evaluation

3. ICU Course and Management

During the ICU stay, the patient experienced multiple critical respiratory events related to airway obstruction and secretion retention. Prompt suctioning and airway management prevented further deterioration.

Because prolonged mechanical ventilation was anticipated, **elective tracheostomy** was performed on **26 December 2025** to facilitate airway clearance and improve ventilatory support.

Microbiological analysis of endotracheal aspirates identified *Klebsiella pneumoniae* and non-fermenting gram-negative bacilli. Culture-directed antibiotic therapy was initiated accordingly.

Respiratory management included

- Mechanical ventilation
- Regular airway suctioning
- Continuous monitoring of oxygenation
- Strict tracheostomy care

4. Orthopaedic and Rehabilitation Measures

Given the prolonged ICU course, preventive strategies were implemented to minimize musculoskeletal complications:

4.1 Positioning Protocols

Regular repositioning to prevent joint stiffness and pressure injuries

4.2 Passive Range-of-Motion Exercises

Early physiotherapy to maintain joint mobility

4.3 Muscle Preservation

Gradual activation of limb muscles once hemodynamically stable

4.4 Early Mobilization Planning

Preparation for progressive mobilization after ventilatory weaning

Psychiatric consultation was also obtained to address the patient's depressive symptoms during the ICU stay.

5. Outcome and Follow-Up

The patient showed gradual respiratory recovery over the following weeks. Mechanical ventilation was successfully discontinued.

On 13 January 2026, the patient was transitioned to **portable AVAPS BiPAP with minimal oxygen support**.

Following respiratory stabilization, rehabilitation efforts focused on restoring mobility and preventing long-term musculoskeletal disability.

After three days of stable respiratory parameters without further desaturation or bradycardia, the patient was transferred from ICU-2 to **ICU-3 on 16 January 2026** for continued recovery and rehabilitation.

6. Discussion

Prolonged ICU hospitalization is a recognized cause of significant musculoskeletal morbidity. Patients requiring mechanical ventilation frequently experience rapid skeletal muscle atrophy due to immobilization, systemic inflammation, and metabolic stress. Muscle mass may decrease by as much as 15–20% within the first week of critical illness, leading to **ICU-acquired weakness and impaired functional recovery**.

In patients with severe respiratory compromise, early mobilization may be delayed because of hemodynamic instability and ventilatory dependence. However, prolonged immobilization increases the risk of several orthopaedic complications including ICU-acquired weakness, joint contractures, reduced bone mineral density, and impaired mobility.

Another important but often overlooked complication in critically ill immobilized patients is **secondary osteoporosis due to inactivity**. Mechanical unloading of the skeletal system during prolonged bed rest leads to increased osteoclastic activity and reduced osteoblastic bone formation, resulting in rapid bone loss. Studies have shown that significant reductions in bone mineral density can occur within weeks of immobilization, particularly in weight-bearing bones such as the femur and vertebrae.

In addition to immobility, **systemic inflammation associated with pneumonia** may further accelerate bone resorption. Pro-inflammatory cytokines such as interleukin-1, interleukin-6, and tumor necrosis factor-alpha released during severe infections can

stimulate osteoclast-mediated bone resorption, thereby contributing to the development of osteoporosis. Patients recovering from severe pneumonia and prolonged ICU stays therefore have an increased risk of fragility fractures, delayed rehabilitation, and long-term functional disability.

The present case illustrates how severe respiratory illness and prolonged ICU care can indirectly lead to orthopaedic complications through both **immobility-induced bone loss and infection-related inflammatory bone resorption**. Preventive strategies are therefore essential.

These include:

• **Early Physiotherapy**

Passive and active limb mobilization helps maintain joint mobility, muscle strength, and mechanical stimulation of bone.

• **Positioning Protocols**

Regular repositioning prevents joint stiffness and pressure injuries while promoting circulation to musculoskeletal tissues.

• **Gradual Weight-Bearing and Mobilization**

Progressive sitting, standing, and ambulation stimulate bone remodeling and reduce the risk of disuse osteoporosis.

• **Nutritional and Metabolic Support**

Adequate intake of calcium, vitamin D, and protein supports bone metabolism during recovery.

• **Multidisciplinary Care**

Coordination between intensivists, physiotherapists, orthopaedic specialists, and rehabilitation teams ensures comprehensive management of musculoskeletal complications in critically ill patients.

The psychological impact of prolonged ICU stay must also be recognized. Depression and anxiety are common among ICU survivors and may reduce patient participation in rehabilitation programs, thereby indirectly worsening musculoskeletal recovery.

Overall, the case highlights that critical illness not only affects cardiopulmonary systems but can also lead to secondary musculoskeletal complications such as disuse osteoporosis, emphasizing the need for integrated orthopaedic and rehabilitation

strategies in ICU care.

7. Conclusion

Severe pneumonia in patients requiring prolonged ICU admission can result in significant musculoskeletal complications secondary to immobility and systemic inflammatory responses. In addition to muscle wasting and joint stiffness, **disuse osteoporosis may develop due to prolonged inactivity and inflammatory cytokine activity associated with severe infection**.

Early recognition of these risks and implementation of preventive measures—including physiotherapy, mobilization strategies, nutritional support, and multidisciplinary rehabilitation—are essential to minimize bone loss and prevent long-term disability.

Integrating orthopaedic rehabilitation principles into critical care management can significantly improve functional outcomes and reduce the risk of osteoporosis and fragility fractures in patients recovering from prolonged critical illness [1-7].

Reference

1. Jean Philippe Bonjour, Ammann P, Rizzoli R. (2001). Bone mineral density changes during bed rest and immobilization. *Osteoporosis International*; 12(7):529-536.
2. Carolyn M. Brown, Hsu J. R. (2010). Skeletal effects of critical illness and immobilization. *Journal of Bone and Joint Surgery*; 92(7):1659-1667.
3. John A. Bilezikian. (2012). Mechanisms of bone loss in immobilization and inflammatory disease. *Endocrine Reviews* ;33(3):379-401.
4. Dale M. Needham, Truong AD, Fan E. (2009). Early physical medicine and rehabilitation for patients with acute respiratory failure. *Critical Care Medicine* ;37(10):S436-S444.
5. Michael P. W. Grocott, Mythen MG, Gan T. J. (2013). Post-intensive care syndrome and long-term musculoskeletal complications after critical illness. *Lancet Respiratory Medicine*;1(9):715-725.
6. Puthuchery, Z. A., Rawal, J., Mcphail, M., Connolly, B., Ratnayake, G., Chan, P., ... & Montgomery, H. E. (2014). Acute skeletal muscle wasting in critical illness. *Survey of Anesthesiology*, 58(4), 159-160.
7. William J. Evans. (2004). Skeletal muscle loss during prolonged inactivity and its impact on bone metabolism. *Journal of Applied Physiology* ;96(2):677-684.

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