Majalah Ilmiah Fisioterapi Indonesia
Indonesian Scientific Journal of Physiotherapy

Case Reports / Case Studies
ISSN (Print): 2303-1921
ISSN (Online): 2722-0443
Volume 14, Number 03, Pages 891-898 (2026)
DOI: https://doi.org/10.24843/mifi.000001975

Physiotherapy Rehabilitation After ORIF in Scapular and Multiple Rib Fractures: A Case Report

Ana Amaliya Fitri[1], Wahyuni[2], Leo Muchamad Dachlan[3]

[1]Physiotherapy Professional Program, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia
[2]Academic Counselor of Physiotherapy Professional Program, Faculty of Health Sciences, Universitas Muhammadiyah Surakarta, Surakarta, Indonesia
[3]Dr. Moewardi Regional General Hospital, Surakarta, Central Java, Indonesia

Corresponding author:
Name: Ana Amaliya Fitri
E-mail: anaamaliafitri@gmail.com
Phone: +62 857-2763-8406

Received 17 May 2026; Revised 21 May 2026; Accepted 22 May 2026; Published 23 September 2026.

Abstract
Background: Combined scapular and multiple rib fractures are uncommon injuries associated with pain, shoulder dysfunction, respiratory impairment, and functional limitations. Evidence on physiotherapy rehabilitation following Open Reduction Internal Fixation (ORIF) remains limited.
Objective: To describe physiotherapy rehabilitation and changes in pain, shoulder Range of Motion (ROM), muscle strength, thoracic expansion, and functional ability following ORIF.
Methods: A CARE guideline-based case report involved a 55-year-old woman with right scapular and multiple right rib fractures following ORIF. Physiotherapy was provided twice weekly for four weeks, totaling eight sessions, including Transcutaneous Electrical Nerve Stimulation (TENS), therapeutic ultrasound, thoracic mobilization, active-assisted and progressive active exercises, and breathing exercises. Outcomes were assessed using the Numeric Rating Scale (NRS), goniometric ROM, Manual Muscle Testing (MMT), thoracic expansion, and Shoulder Pain and Disability Index (SPADI).
Results: Resting pain decreased from 3/10 to 1/10, tenderness from 9/10 to 5/10, and movement pain from 8/10 to 5/10. Shoulder flexion improved from 80° to 115° and abduction from 80° to 110°. Muscle strength improved from grade 3 to grade 4, while thoracic expansion increased by 2 cm at all measurement levels. SPADI decreased from 82.3% to 68.4%.
Conclusion: A structured physiotherapy program was associated with improvements in pain, shoulder mobility, muscle strength, thoracic expansion, and functional ability following ORIF. Findings should be interpreted cautiously because they are based on a single case.

Keywords
Scapular Fractures; Rib Fractures; Physiotherapy; Rehabilitation; ORIF; Shoulder Function

Introduction
Fractures of the scapula and ribs are musculoskeletal injuries commonly associated with high-energy trauma, particularly motor vehicle accidents, falls from height, and blunt thoracic trauma. Scapular fractures account for approximately 0.5%–1% of all fractures and 3%–5% of shoulder girdle injuries.[1,2] Despite their relatively low incidence, scapular fractures are clinically important because they are frequently associated with severe thoracic and multisystem injuries, including rib fractures, pulmonary contusion, pneumothorax, and neurovascular complications.[3] Previous epidemiological studies have reported that more than 50% of patients with scapular fractures present with concomitant rib fractures, indicating substantial force transmission to the thoracic region.[3,4] Consequently, combined scapular and multiple rib fractures may result in substantial morbidity, prolonged recovery, respiratory dysfunction, shoulder impairment, and reduced quality of life.[5]

The scapula plays an important role in coordinated upper-extremity movement by functioning as a dynamic stabilizer and force-transmitting structure between the thorax and upper limb.[6] Disruption of scapulothoracic biomechanics following trauma may impair glenohumeral rhythm, alter scapular positioning, reduce shoulder elevation, and contribute to persistent functional limitation during daily activities.[7] In addition, multiple rib fractures are commonly associated with severe thoracic pain and restricted chest wall mobility, which may impair respiratory mechanics and thoracic expansion.[8] Patients with rib fractures frequently develop shallow breathing patterns due to pain during inspiration, thereby increasing the risk of atelectasis, secretion retention, pneumonia, and reduced pulmonary function.[5,8] Therefore, patients with concomitant scapular and multiple rib fractures may experience combined musculoskeletal and respiratory dysfunction that substantially limits physical activity and functional independence.

Open Reduction Internal Fixation (ORIF) is commonly performed in unstable or displaced fractures to restore anatomical alignment, improve structural stability, and facilitate early mobilization.[9] Although surgical stabilization may improve fracture alignment and mechanical integrity, postoperative patients often continue to experience pain, soft tissue stiffness, reduced shoulder Range of Motion (ROM), muscle weakness, and impaired functional performance during recovery.[10] Furthermore, postoperative immobilization and thoracic pain may aggravate respiratory dysfunction and interfere with activities of daily living.[11] Early rehabilitation is therefore considered essential to optimize postoperative recovery, minimize secondary complications, and restore functional independence.[12]

Physiotherapy rehabilitation plays an important role in postoperative management following musculoskeletal and thoracic trauma through interventions targeting pain reduction, restoration of mobility, improvement of muscle performance, and enhancement of respiratory function.[13] Transcutaneous Electrical Nerve Stimulation (TENS) has been reported to reduce pain through neuromodulatory mechanisms associated with the gate control theory, thereby improving tolerance to movement and exercise.[14] Therapeutic ultrasound has also been used to facilitate tissue healing, improve local circulation, and reduce pain and soft tissue stiffness, although evidence regarding its effectiveness in musculoskeletal rehabilitation remains controversial.[15] Progressive exercise therapy, including active-assisted exercise, active mobilization, and scapular stabilization exercise, has been shown to improve shoulder mobility, neuromuscular control, and functional performance following shoulder injury.[16] Respiratory physiotherapy interventions, including thoracic mobilization and breathing exercise, are also recommended to improve chest wall expansion, respiratory mechanics, and pulmonary function in patients with rib fractures.[5,17] Therefore, combining musculoskeletal and respiratory rehabilitation strategies may support more comprehensive postoperative recovery in patients with complex thoracic injuries.

Despite growing evidence regarding rehabilitation after shoulder injury and thoracic trauma, evidence specifically addressing physiotherapy rehabilitation in patients with combined scapular fracture and multiple rib fractures following ORIF remains limited. Most previous studies have focused either on isolated scapular fractures or respiratory rehabilitation in rib fracture populations, whereas integrated rehabilitation approaches addressing both shoulder dysfunction and thoracic impairment have rarely been reported.[3,5,16] Moreover, limited evidence is available regarding the clinical effects of combining electrotherapy, progressive shoulder exercise, scapular stabilization, and thoracic mobilization within a structured rehabilitation program for complex post-ORIF cases involving both musculoskeletal and respiratory dysfunction. This limited evidence highlights an important clinical gap in physiotherapy rehabilitation for patients with combined scapular and multiple rib fractures.

Therefore, this case report aimed to describe a structured physiotherapy rehabilitation program and evaluate changes in pain intensity, shoulder ROM, muscle strength, thoracic expansion, and functional ability in a patient with right scapular and multiple rib fractures following ORIF. This report is expected to provide additional clinical insight regarding integrated and multidisciplinary rehabilitation strategies for patients with complex musculoskeletal and thoracic injuries.

Methods

This study was conducted using a case report design based on the CARE guideline.[18] The report described the physiotherapy rehabilitation process in a patient with right scapular fracture and multiple right rib fractures following Open Reduction Internal Fixation (ORIF). The patient received outpatient physiotherapy management at the Medical Rehabilitation Unit of Dr. Moewardi General Hospital, Surakarta, Indonesia, from September to October 2025 as part of a multidisciplinary rehabilitation approach involving orthopedic surgeons, rehabilitation physicians, and physiotherapists. Written informed consent for publication was obtained from the patient prior to manuscript preparation.[19]

The patient was a 55-year-old woman diagnosed with right scapular fracture and multiple right rib fractures following high-energy thoracic trauma caused by a motor vehicle accident. ORIF was performed on July 5, 2025. The patient was right-hand dominant with no previous history of shoulder dysfunction, neurological disorder, cardiopulmonary disease, or other major musculoskeletal disorder. Information regarding Body Mass Index (BMI) and occupational status was not available in the medical record.[20] Initial physiotherapy assessment identified shoulder pain, limited shoulder Range of Motion (ROM), decreased muscle strength, reduced thoracic expansion, and impaired functional activities. The patient was medically stable and referred for physiotherapy rehabilitation approximately one month after surgery.

Eligibility for physiotherapy intervention was determined collaboratively by the orthopedic and rehabilitation teams. Inclusion criteria included confirmed diagnosis of scapular and multiple rib fractures following ORIF, age ≥18 years, hemodynamic stability, preserved cognitive function, and ability to participate actively in supervised physiotherapy sessions. Exclusion criteria included uncontrolled pain, untreated pneumothorax, severe pulmonary contusion, unstable cardiopulmonary condition, neurological deficits limiting participation, and contraindications to exercise or electrotherapy intervention.

Clinical outcome evaluation was conducted at baseline prior to intervention and repeated after completion of the four-week rehabilitation program. Pain intensity was assessed using the Numeric Rating Scale (NRS), a valid and reliable instrument commonly used for musculoskeletal pain assessment.[21] Shoulder ROM was measured actively using a universal goniometer for flexion, extension, abduction, adduction, internal rotation, and external rotation movements. Muscle strength was evaluated using Manual Muscle Testing (MMT) according to standard muscle grading procedures. Thoracic expansion was measured using a non-elastic tape measure at the axillary, xiphoid, and intercostal levels by calculating the difference between maximal inspiration and maximal expiration. Measurements were performed in an upright sitting position and repeated three times to minimize measurement variability.[22] Functional ability was evaluated using the Shoulder Pain and Disability Index (SPADI), a validated questionnaire consisting of pain and disability subdomains for shoulder-related functional assessment.[23] Outcome assessment was conducted by the attending physiotherapist involved in patient management.

The rehabilitation timeline and intervention sequence are summarized below to facilitate reproducibility and conversion into a CARE flow diagram (Figure 1).

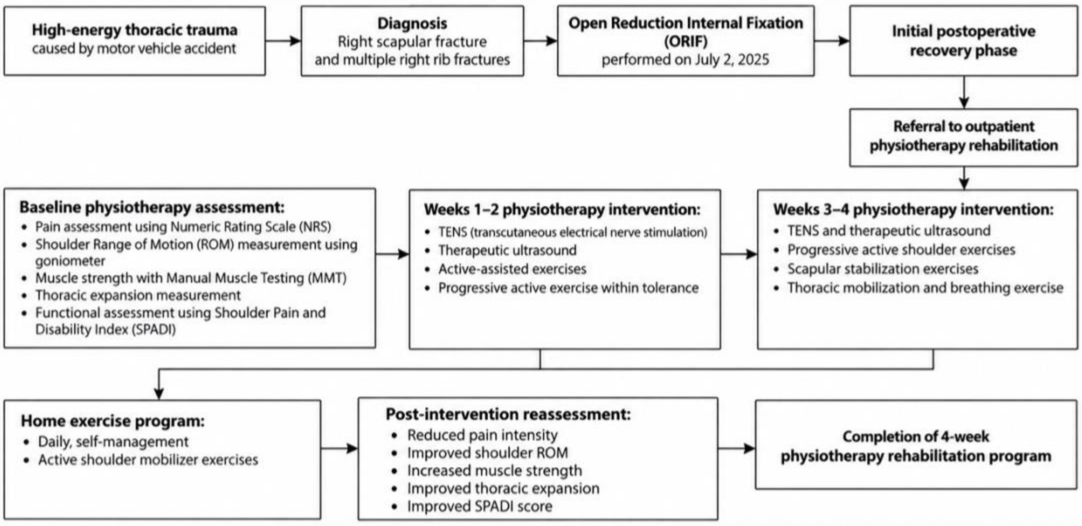

Figure 1. Clinical and Rehabilitation CARE Timeline

Physiotherapy intervention was administered twice weekly for four weeks, resulting in a total of eight supervised sessions. Each session lasted approximately 40–60 minutes and was structured according to the FITT (Frequency, Intensity, Time, Type) principle. The four-week rehabilitation duration was selected to facilitate early postoperative mobilization, progressive exercise adaptation, and monitoring of short-term functional recovery following ORIF.[24] Interventions focused on pain management, restoration of shoulder mobility, muscle strengthening, thoracic mobilization, and functional recovery.

Therapeutic ultrasound was initially administered to the right shoulder region using continuous mode with a frequency of 1 MHz and intensity of 1.0–1.5 W/cm² for 5–10 minutes depending on patient tolerance. Ultrasound was applied to reduce pain, improve soft tissue extensibility, and facilitate movement preparation before exercise. TENS was subsequently applied to the right rotator cuff region using conventional mode with a frequency of 50–100 Hz, pulse width of 50–100 μs, and stimulation intensity adjusted according to comfortable sensory tolerance without visible muscle contraction. TENS was delivered for approximately 15 minutes during each session.

Exercise therapy was progressively introduced according to patient tolerance and clinical presentation. During the initial rehabilitation phase, passive ROM and active-assisted ROM exercises were performed for shoulder flexion, extension, abduction, adduction, and rotational movements within pain-free or minimally painful ranges (NRS ≤5/10). Exercise progression was determined based on pain tolerance, movement quality, ROM improvement, and the patient's ability to perform active movement without compensatory shoulder elevation.[25] Progressive active exercise and scapular stabilization exercise targeting the supraspinatus, infraspinatus, rhomboid major, subscapularis, and latissimus dorsi muscles were initiated during weeks 3–4 to improve shoulder stability, neuromuscular control, and functional movement.

Thoracic mobilization and breathing exercises were also incorporated throughout rehabilitation to improve chest wall mobility and respiratory function. Controlled inspiratory-expiratory breathing patterns were combined with active thoracic expansion exercises and synchronized upper-extremity movements for approximately 5–10 minutes per session. The patient additionally received a home exercise program consisting of breathing exercise and active shoulder mobilization performed independently once daily. Home exercise adherence was monitored through weekly verbal reporting during physiotherapy sessions.[26]

Throughout the intervention period, no adverse events, cardiopulmonary complications, or worsening postoperative symptoms were observed. Patient tolerance and safety were continuously monitored during exercise progression and electrotherapy application.

Data were analyzed descriptively by comparing pre-intervention and post-intervention clinical findings**.** Inferential statistical analysis was not performed because the study used a single-patient case report design intended to describe clinical outcomes rather than establish causal inference or generalizability.

Results

The patient completed all eight physiotherapy sessions over the four-week rehabilitation period without interruption. Home exercise adherence was reported as good based on weekly verbal monitoring, and no adverse events, cardiopulmonary complications, or worsening postoperative symptoms were identified during the intervention period. Clinical evaluation was performed before intervention (baseline) and after completion of the rehabilitation program. Outcomes included pain intensity, shoulder Range of Motion (ROM), muscle strength, thoracic expansion, and functional ability.

To evaluate changes in pain intensity during rehabilitation, pain outcomes measured using the Numeric Rating Scale (NRS) are presented in Table 1. The table summarizes changes in resting pain, tenderness, and movement pain following completion of the physiotherapy program.

Table 1. Changes in Pain Intensity Based on Numeric Rating Scale (NRS)

Pain Condition	Pre-intervention	Post-intervention	Absolute Change	Percentage Change
Resting pain	3/10	1/10	−2	66.7%
Tenderness	9/10	5/10	−4	44.4%
Movement pain	8/10	5/10	−3	37.5%

The findings demonstrated reductions across all pain conditions following intervention. Resting pain decreased from 3/10 to 1/10, whereas tenderness and movement pain decreased by four and three points, respectively. Reduced pain intensity likely contributed to improved tolerance for active movement and participation in exercise progression during rehabilitation.

Changes in shoulder ROM following physiotherapy intervention are summarized in Table 2. ROM evaluation was performed actively using a universal goniometer to assess mobility changes in all shoulder movement directions.

Table 2. Changes in Right Shoulder Range of Motion (ROM)

Movement	Pre-intervention	Post-intervention	Absolute Change	Percentage Change
Flexion	80°	115°	+35°	43.8%
Extension	15°	30°	+15°	100%
Abduction	80°	110°	+30°	37.5%
Adduction	5°	15°	+10°	200%
Internal rotation	10°	30°	+20°	200%
External rotation	10°	25°	+15°	150%

Shoulder ROM improved in all movement directions after rehabilitation. The greatest absolute improvements were observed in shoulder flexion and abduction, indicating improved overhead functional movement capacity. Increased rotational ROM also reflected improved scapulohumeral mobility and reduced movement restriction following postoperative rehabilitation.

Muscle strength changes based on Manual Muscle Testing (MMT) are presented in Table 3. Evaluation was conducted to determine changes in shoulder muscle performance during the rehabilitation period.

Table 3. Changes in Muscle Strength Based on Manual Muscle Testing (MMT)

Muscle Group	Pre-intervention	Post-intervention
Deltoid	3	4
Latissimus dorsi	3	4
Supraspinatus	3	4
Pectoralis major	3	4

Subscapularis	3	4
Infraspinatus/Teres minor	3	4

All evaluated muscle groups improved from grade 3 to grade 4 following intervention. These findings indicated increased active movement capacity against moderate resistance and improved shoulder girdle stability during upper-extremity movement.

Thoracic expansion outcomes are presented in Table 4 to evaluate changes in chest wall mobility and respiratory mechanics following thoracic mobilization and breathing exercise.

Table 4. Changes in Thoracic Expansion

Measurement Level	Pre-intervention	Post-intervention	Absolute Change
Axillary expansion	4 cm	6 cm	+2 cm
Xiphoid expansion	6 cm	8 cm	+2 cm
Intercostal expansion	4 cm	6 cm	+2 cm

Thoracic expansion increased at all measurement levels following rehabilitation. The observed increase of 2 cm at the axillary, xiphoid, and intercostal levels suggested improved chest wall mobility and respiratory efficiency. Thoracic expansion values approaching 5–7 cm may indicate clinically improved respiratory mobility compared with the restricted baseline condition.[27]

Functional ability outcomes based on the Shoulder Pain and Disability Index (SPADI) are summarized in Table 5. The SPADI total score was used to evaluate overall shoulder-related pain and functional disability because subdomain-specific scoring data were not available in the original clinical documentation.[28]

Table 5. Changes in Functional Ability Based on SPADI

Assessment Time	Total SPADI Score
Pre-intervention	82.3%
Post-intervention	68.4%

The total SPADI score decreased by 13.9%, indicating improved shoulder-related functional ability following rehabilitation. The observed reduction exceeded the previously reported minimal clinically important difference (MCID) threshold for SPADI, suggesting clinically meaningful improvement rather than numerical change alone.[29] Improvement in SPADI outcomes was consistent with reductions in pain intensity and improvements in shoulder mobility, muscle strength, and thoracic expansion observed throughout the intervention period.

Overall, the rehabilitation outcomes demonstrated progressive clinical improvement after the four-week physiotherapy program. The patient showed reduced pain intensity, improved shoulder ROM, increased muscle strength, improved thoracic expansion, and better functional ability without complications during the rehabilitation process.

To improve visualization of clinical progression during rehabilitation, graphical presentation of the primary outcomes is recommended. The graphs should summarize changes in pain intensity, shoulder mobility, thoracic expansion, and functional ability before and after intervention. These visual presentations may facilitate interpretation of rehabilitation outcomes and strengthen compliance with CARE guideline recommendations for case report reporting (Figure 1-5).

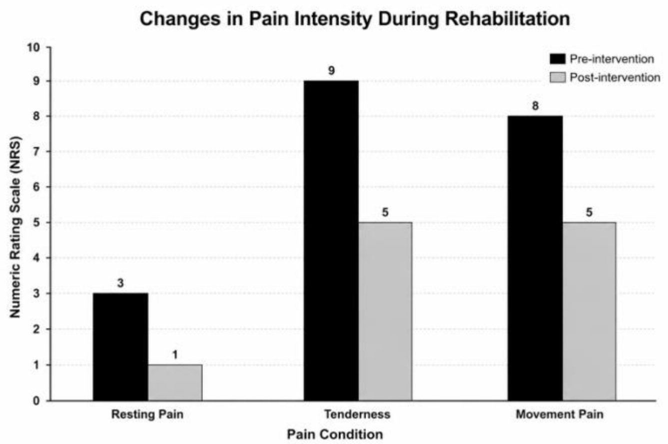

Figure 2. Changes in Pain Intensity During Rehabilitation

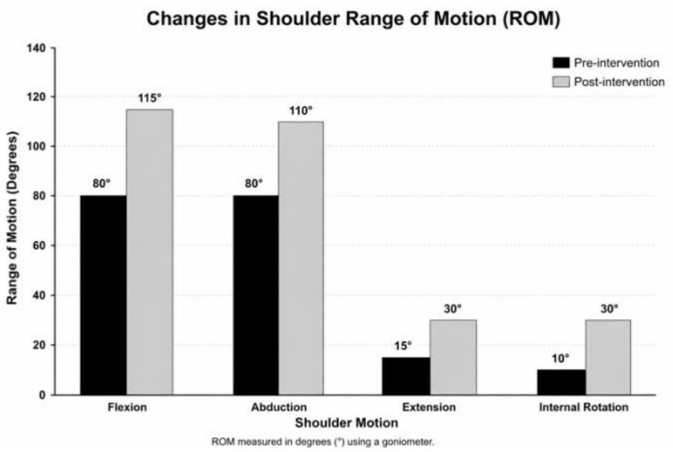

Figure 3. Changes in Shoulder Range of Motion (ROM)

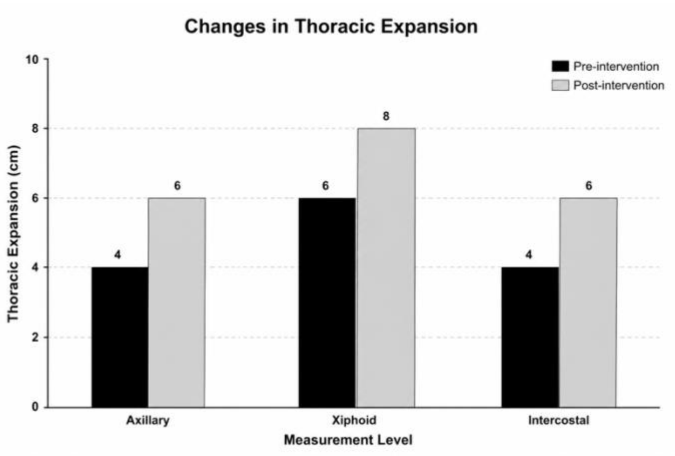

Figure 4. Changes in Thoracic Expansion

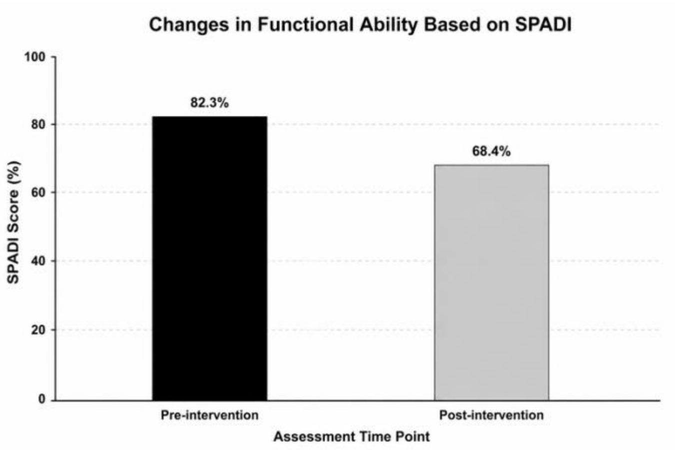

Figure 5. Changes in Functional Ability Based on SPADI

Discussion

This case report demonstrated progressive clinical improvement following a four-week physiotherapy rehabilitation program in a patient with right scapular fracture and multiple right rib fractures after Open Reduction Internal Fixation (ORIF). Improvements were observed in pain intensity, shoulder Range of Motion (ROM), muscle strength, thoracic expansion, and functional ability based on the Shoulder Pain and Disability Index (SPADI). These findings support the important role of integrated physiotherapy rehabilitation in addressing combined musculoskeletal and respiratory dysfunction following complex thoracic trauma.

Scapular fractures are relatively uncommon injuries that are frequently associated with severe thoracic trauma because of the substantial force required to disrupt the scapular complex.[1,3] The coexistence of multiple rib fractures may further aggravate functional impairment by contributing to chest wall instability, inspiratory pain, and respiratory dysfunction.[5] In the present case, the patient initially presented with shoulder pain, limited shoulder ROM, reduced muscle strength, decreased thoracic expansion, and impaired functional ability. These findings are consistent with previous studies reporting that combined shoulder girdle and thoracic injuries commonly result in substantial limitations in upper-extremity movement and respiratory mechanics.[13,15]

One of the primary findings in this report was the reduction in pain intensity across resting pain, tenderness, and movement pain following physiotherapy intervention. Pain reduction likely contributed to improved tolerance for active mobilization and exercise progression throughout rehabilitation. The analgesic effect observed in this case may partially be explained by the use of Transcutaneous Electrical Nerve Stimulation (TENS), which has been reported to modulate nociceptive transmission through activation of large-diameter afferent fibers according to the gate control theory.[14] Previous systematic reviews have also suggested that TENS may improve pain tolerance and facilitate movement participation during musculoskeletal rehabilitation.[14,30] However, the observed reduction in pain should not be interpreted solely as the effect of electrotherapy because postoperative tissue healing and natural recovery following ORIF may also contribute to symptom improvement over time. This consideration is important to avoid over-attribution of clinical outcomes to physiotherapy intervention alone.

Therapeutic ultrasound was also incorporated into the rehabilitation program as part of pain management and movement preparation before exercise. Ultrasound has been proposed to improve local circulation, increase collagen extensibility, reduce muscle spasm, and facilitate soft tissue healing through thermal and non-thermal mechanisms.[31] Nevertheless, evidence regarding the effectiveness of therapeutic ultrasound in musculoskeletal rehabilitation remains inconsistent, with several systematic reviews reporting variable clinical benefits beyond exercise therapy alone.[15] Therefore, although ultrasound may have contributed to symptom reduction and improved tissue extensibility in this patient, its isolated therapeutic effect cannot be conclusively determined within this multimodal rehabilitation program.

Improvement in shoulder ROM represented another important finding in this case. The greatest ROM gains were observed in shoulder flexion and abduction, which are movements highly dependent on coordinated scapulothoracic and glenohumeral motion. Disruption of scapular positioning and scapulothoracic rhythm following trauma may impair shoulder elevation, alter muscle activation patterns, and restrict functional upper-extremity movement.[7] Progressive ROM exercise and scapular stabilization exercise in this case likely contributed to restoration of shoulder movement by improving neuromuscular control, reducing periarticular stiffness, and facilitating coordinated shoulder mechanics. Similar findings have been reported in rehabilitation studies emphasizing the importance of scapular-focused exercise for improving shoulder mobility and functional recovery following musculoskeletal injury.[16,32]

Muscle strength improvement from grade 3 to grade 4 across all evaluated muscle groups also indicated improved shoulder girdle function during rehabilitation. Progressive active exercise and scapular stabilization exercise were introduced gradually to restore muscular activation and functional movement capacity while minimizing excessive stress on healing structures**.** Improved muscle performance may have contributed to better shoulder stability and reduced compensatory movement during upper-extremity activity. Previous rehabilitation studies have similarly demonstrated that strengthening exercise may improve scapular stability, neuromuscular coordination, and upper-extremity performance following shoulder dysfunction.[32,33]

Thoracic expansion improved at all measurement levels following intervention, suggesting enhanced chest wall mobility and respiratory mechanics. Patients with multiple rib fractures commonly develop shallow breathing patterns because of pain during inspiration, resulting in reduced thoracic expansion and impaired ventilation.[5,8] Respiratory physiotherapy interventions, including thoracic mobilization and breathing exercise, are therefore considered important components of rehabilitation to reduce respiratory complications and maintain pulmonary function.[17] Improvement in thoracic expansion in this patient may reflect reduced pain-related respiratory guarding, increased chest wall mobility, and improved inspiratory capacity following repeated breathing exercise and active thoracic mobilization. Similar findings have been reported in studies demonstrating beneficial effects of respiratory rehabilitation on thoracic mobility and pulmonary function in patients with rib fractures and thoracic dysfunction.[17,34]

Functional improvement based on SPADI findings further supported the overall positive clinical changes observed during rehabilitation. The reduction in SPADI score exceeded previously reported minimal clinically important difference (MCID) thresholds for shoulder-related disability assessment, indicating clinically meaningful improvement.[29] Functional recovery likely resulted from the combined effects of pain reduction, improved shoulder mobility, enhanced muscle strength, and improved thoracic mobility. Nevertheless, postoperative recovery following ORIF naturally progresses over time as tissue healing occurs. Consequently, the functional gains observed in this case may reflect the combined influence of surgical stabilization, biological healing, and physiotherapy rehabilitation rather than a single intervention effect.

This report highlights the importance of integrating musculoskeletal and respiratory rehabilitation in patients with combined scapular and rib fractures. Rehabilitation should not focus solely on shoulder mobility but also address thoracic expansion and breathing mechanics because respiratory dysfunction may substantially delay recovery and increase complication risk. Multidisciplinary collaboration among orthopaedic surgeons, rehabilitation physicians, and physiotherapists may therefore be important for optimizing postoperative recovery in complex thoracic trauma cases.

Several limitations should be acknowledged in this report. This study involved only a single patient, thereby limiting generalizability to broader patient populations. The absence of a control condition also makes it difficult to determine the relative contribution of each intervention component and distinguish treatment effects from natural postoperative recovery. In addition, SPADI subdomain-specific scores and radiological follow-up data were not available in the original clinical documentation.[29] Outcome assessment was conducted by the treating physiotherapist, which may introduce evaluator bias. Furthermore, the relatively short observation period did not permit evaluation of long-term functional outcomes or recurrence of movement limitation. Future studies with larger sample sizes, controlled rehabilitation protocols, and longer follow-up periods are therefore needed to evaluate the effectiveness of integrated physiotherapy rehabilitation in patients with combined scapular and multiple rib fractures following ORIF.

Conclusion

This case report demonstrated that a structured physiotherapy rehabilitation program following Open Reduction Internal Fixation (ORIF) in a patient with right scapular fracture and multiple right rib fractures was associated with reduced pain intensity, improved shoulder Range of Motion (ROM), increased muscle strength, enhanced thoracic expansion, and improved functional ability based on SPADI outcomes. The rehabilitation program combining electrotherapy, progressive shoulder exercise, scapular stabilization, thoracic mobilization, and breathing exercise may support recovery of both musculoskeletal and respiratory function following complex thoracic trauma.

From a clinical perspective, integrated physiotherapy rehabilitation addressing both shoulder dysfunction and thoracic impairment appears important for optimizing postoperative recovery and reducing functional limitation after combined scapular and rib fractures. Multidisciplinary collaboration among orthopedic surgeons, rehabilitation physicians, and physiotherapists may further enhance rehabilitation outcomes in patients with complex musculoskeletal and thoracic injuries.

Nevertheless, the findings of this report should be interpreted cautiously because the study involved only a single patient with a relatively short follow-up period. Future studies with larger sample sizes, controlled rehabilitation protocols, objective respiratory outcome measures, and longer follow-up periods are needed to clarify the effectiveness of integrated physiotherapy rehabilitation following ORIF in patients with combined scapular and multiple rib fractures.

Clinical Implications

This report highlights the potential importance of combining musculoskeletal and respiratory rehabilitation strategies in postoperative physiotherapy management following complex thoracic trauma. Early rehabilitation emphasizing pain control, progressive mobilization, scapular stabilization, thoracic mobilization, and breathing exercise may contribute to improved functional recovery and reduced postoperative limitation.

Limitations

Several limitations should be considered when interpreting the findings of this report. The study involved only a single patient without a control comparison, thereby limiting generalizability and preventing determination of the isolated effects of each intervention component. In addition, radiological follow-up evaluation and SPADI subdomain-specific scores were unavailable in the original clinical documentation.The relatively short follow-up duration also limited evaluation of long-term functional recovery and recurrence of movement restriction.

Author Contribution

Ana Amaliya Fitri: Conceptualization, Investigation, Data Curation, Formal Analysis, Methodology, Visualization, Writing – Original Draft.
Wahyuni: Supervision, Validation, Methodology, Writing – Review & Editing.
Leo Muchamad Dachlan: Clinical Supervision, Resources, Validation, Writing – Review & Editing.

Acknowledgments

The authors would like to express sincere gratitude to the Medical Rehabilitation Unit of Dr. Moewardi General Hospital Surakarta and the patient for their cooperation and participation in this case report. The authors also acknowledge the clinical supervisors and rehabilitation staff for their professional guidance and support throughout the physiotherapy management process.

Conflict of Interest Statement

The authors declare no conflict of interest related to this publication.

Funding Sources

This study received no external financial support.

Ethics Statement

Written informed consent for publication was obtained from the patient prior to manuscript preparation. This case report was prepared in accordance with the CARE guideline for case report reporting.

References

1. Franssen AJPM, Daemen JHT, Luyten JA, Meesters B, Pijnenburg AM, Reisinger KW, et al. Treatment of traumatic rib fractures: an overview of current evidence and future perspectives. J Thorac Dis. 2024;16(8):5399-5408.
2. Kayali H, Ahmed AF, Ibrahim T. Scapular fractures at a level 1 trauma center: a cross-sectional study. Qatar Med J. 2022;2022(1):8.
3. Chuang CH, Huang CK, Li CY, Hu MH, Lee PY, Wu PT. Surgical stabilization of the ipsilateral scapula and rib fractures using the mirror Judet approach: a preliminary result. BMC Musculoskelet Disord. 2022;23(1):105.
4. Schmidt V, Mukka S, Bergdahl C, Ekholm C, Brüggemann A, Wolf O. Epidemiology, treatment, and mortality of 3973 scapula fractures from the Swedish fracture register. J Shoulder Elbow Surg. 2025;34(1):e47-e56.
5. Battle C, Pelo C, Hsu J, Driscoll T, Whitbeck S, White T, et al. Expert consensus guidance on respiratory physiotherapy and rehabilitation of patients with rib fractures: an international, multidisciplinary e-Delphi study. J Trauma Acute Care Surg. 2023;94(4):578-583.
6. Zyskowski M, Pesch S, Greve F, Wurm M, von Matthey F, Pfeiffer D, et al. Concomitant intra-articular glenohumeral lesions in fractures of the scapula body. J Clin Med. 2020;9(4):943.
7. Kibler WB, Ludewig PM, McClure PW, Michener LA, Bak K, Sciascia AD. Clinical implications of scapular dyskinesis in shoulder injury: the 2013 consensus statement from the scapular summit. Br J Sports Med. 2013;47(14):877-885.
8. Coary R, Skerritt C, Carey A, Rudd S, Shipway D. New horizons in rib fracture management in the older adult. Age Ageing. 2020;49(2):161-167.
9. Toft F, Moro F. Does ORIF of rare scapular spine fractures sustained after reverse shoulder arthroplasty benefit elderly patients? A case-series appraisal. Orthop Traumatol Surg Res. 2019;105(8):1521-1528.
10. Lopes Sauers A, Ator R, González J. Rehabilitation after scapular fractures. In: Pires RE, Labronici PJ, Giordano V, editors. Fractures of the scapula: current management concepts. Cham: Springer International Publishing; 2024. p.137-143.
11. Shin HJ, Son HH. Effect of diaphragmatic breathing training with visual biofeedback on respiratory function in patients with multiple rib fractures: a randomized-controlled study. Turk J Phys Med Rehabil. 2024;70(1):131-141.
12. Wall OFC. Guidelines management of chest wall. 2025.
13. Hefny AF, Mansour NA, Hefny MA, Masuadi E, Al Bahri S, Elkamhawy AA, et al. Significance of scapular fracture existence in blunt chest trauma: a retrospective cohort study. Surg Res Pract. 2024;2024:3550087.
14. Walsh DM, Howe TE, Johnson MI, Sluka KA. Transcutaneous electrical nerve stimulation for acute pain. Cochrane Database Syst Rev. 2006;(1):CD006142.
15. Page MJ, Green S, McBain B, Surace SJ, Deitch J, Lyttle N, et al. Manual therapy and exercise for rotator cuff disease. Cochrane Database Syst Rev. 2016;2016(6):CD012224.
16. Lu J, Cheng S, Dai H, Zhao G, Jiang S, Wang Z, et al. Effects of scapular motion control training on treatment of patients with scapular fractures: an observational study. Medicine (Baltimore). 2024;103(40):e39541.
17. Zhang H, Ding Y, Ren J, Zhu J. Effect of respiratory training intervention on rehabilitation of patients with rib fracture: a meta-analysis. BMC Sports Sci Med Rehabil. 2025;17(1):59.
18. Gagnier JJ, Kienle G, Altman DG, Moher D, Sox H, Riley D. The CARE guidelines: consensus-based clinical case reporting guideline development. J Med Case Rep. 2013;7(1):223.
19. Taiwo T, Obiakor B, McClung S, Shinkai K. Informed consent practices for publication of patient images in dermatology journals. JMIR Dermatol. 2025;8:e60795.
20. Aldekhyyel R, Chen ES, Rajamani S, Wang Y, Melton GB. Content and quality of free-text occupation documentation in the electronic health record. AMIA Annu Symp Proc. 2016:1708-1716.
21. Hawker GA, Mian S, Kendzerska T, French M. Measures of adult pain: Visual Analog Scale for Pain (VAS Pain), Numeric Rating Scale for Pain (NRS Pain), McGill Pain Questionnaire (MPQ), Short-Form McGill Pain Questionnaire (SF-MPQ), Chronic Pain Grade Scale (CPGS), Short Form-36 Bodily Pain Scale (SF-36 BPS), and Measure of Intermittent and Constant Osteoarthritis Pain (ICOAP). Arthritis Care Res (Hoboken). 2011;63 Suppl 11:S240-S252.
22. Shobo A, Kakizaki F. Effects of two sitting positions on chest volume. Rigakuryoho Kagaku. 2015;30(4):499-502.
23. Roy JS, MacDermid JC, Woodhouse LJ. Measuring shoulder function: a systematic review of four questionnaires. Arthritis Care Res (Hoboken). 2009;61(5):623-632.
24. Hoepelman RJ, Beeres FJP, van Veelen N, Houwert RM, Babst R, Link BC, et al. Treatment and outcome in combined scapula and rib fractures: a retrospective study. Eur J Orthop Surg Traumatol. 2023;33(6):2337-2345.

25. Chepeha J, Silveira A, Sheps D, Luciak-Corea C, Styles-Tripp F, Beaupre L. A standardized criteria-based progressive shoulder exercise program is effective in managing rotator cuff-related shoulder pain: a prospective cohort study. PLoS One. 2025;20(7):e0328728.
26. Bachmann C, Oesch P, Bachmann S. Recommendations for improving adherence to home-based exercise: a systematic review. Phys Med Rehab Kurortmed. 2018;28(1):20-31.
27. Wang JS. The effect of thoracic cage mobilization and breathing exercise on respiratory function, spinal curve and spinal mobility in elderly with restrictive lung disease. J Int Acad Phys Ther Res. 2018;9(1):1393-1397.
28. Roach KE, Budiman-Mak E, Songsiridej N, Lertratanakul Y. Development of a shoulder pain and disability index. Arthritis Rheum. 1991;4(4):143-149.
29. Salvatore G, Longo UG, De Salvatore S, Candela V, Piergentili I, Bandini B, et al. Evaluating shoulder pain and disability index (SPADI) outcomes post-rotator cuff repair: minimal clinically important difference (MCID), patient acceptable symptom state (PASS) and substantial clinical benefit (SCB) analysis. J Back Musculoskelet Rehabil. 2025;38(5):974-980.
30. Kim J, Lee S, Ji M, Kim D, Moon H, Lee W. Low-intensity pulsed ultrasound in acute multiple rib fracture: a prospective analysis, randomized controlled trial and pilot study. J Thorac Dis. 2025;17(9):6374-6389.
31. Rajasekhar S. Therapeutic ultrasound applications in physical therapy: a comprehensive review of its role in soft tissue healing and pain reduction. Int J Emerg Res Eng Technol. 2024;5:20-28.
32. Melo ASC, Moreira JS, Afreixo V, Moreira-Gonçalves D, Donato H, Cruz EB, et al. Effectiveness of specific scapular therapeutic exercises in patients with shoulder pain: a systematic review with meta-analysis. JSES Rev Rep Tech. 2024;4(2):161-174.
33. dos Santos C, Bastos de Almeida I, Jones MA, Matias R. Effects of a scapular-focused exercise protocol for patients with rotator cuff-related pain syndrome: a randomized clinical trial. J Funct Morphol Kinesiol. 2025;10(4):475.
34. Alar T. The effects of analgesic treatment and chest physiotherapy on the complications of the patients with rib fractures resulting from blunt chest trauma. Ulus Travma Acil Cerrahi Derg. 2020.