

Physiotherapy Outcomes in an Elderly Patient Following Postoperative Shoulder Dislocation with K-Wire Fixation: A Case Report

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Received 6 April 2026; Revised 12 April 2026; Accepted 12 April 2026; Published 5 May 2026

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Abstract

Background: Shoulder dislocation is a common musculoskeletal injury associated with pain, reduced range of motion (ROM), decreased muscle strength, and functional limitations, particularly in elderly patients following surgery.

Objective: To evaluate the clinical outcomes of physiotherapy intervention in an elderly patient following postoperative shoulder dislocation.

Methods: This case report involved a 75-year-old female with postoperative right shoulder dislocation following surgical reduction and K-wire fixation. Outcomes included pain assessed using the Numeric Rating Scale (NRS), muscle strength using Manual Muscle Testing (MMT), ROM using a goniometer, and functional ability using the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire. The intervention consisted of therapeutic exercises (ROM, strengthening, scapular stabilization, and proprioceptive training), physiotherapy modalities (infrared and transcutaneous electrical nerve stimulation), and a home exercise program. Data were analyzed descriptively without statistical testing. Assessments were conducted at pre-intervention (T1–T2) and post-intervention (T3–T4).

Results: Pain decreased from NRS 6 to 4 ($\Delta = -2$). Muscle strength improved from MMT grade 3 to 4 across all movements. ROM increased in both sagittal and frontal planes. Functional ability improved, with DASH scores decreasing from 52.5 to 43.3 ($\Delta = -9.2$).

Conclusion: Physiotherapy intervention resulted in clinically meaningful improvements in pain, ROM, muscle strength, and functional outcomes in an elderly postoperative shoulder dislocation patient. However, these findings are limited to a single case with a short follow-up period and should be interpreted with caution.

Keywords

Shoulder Dislocation; Exercise Therapy; Physical Therapy Modalities; Postoperative Care; Aged; Rehabilitation

Introduction

Shoulder dislocation is a common musculoskeletal injury characterized by displacement of the humeral head from the glenoid cavity, most frequently occurring in the anterior direction due to forced abduction and external rotation.¹ This condition represents a significant clinical concern due to its high incidence and potential to cause long-term functional impairment. Epidemiological data indicate an incidence ranging from 11 to 29 cases per 100,000 individuals annually, with a bimodal distribution across age groups.²

In younger individuals, shoulder dislocation is commonly associated with high-energy trauma or sports-related injuries. In contrast, in older adults, it is more frequently caused by low-energy trauma such as falls.³ Age-related physiological changes, including decreased bone mineral density, reduced muscle strength, and diminished ligament elasticity, contribute to increased susceptibility to injury and delayed recovery in this population.⁴ Furthermore, elderly patients are more likely to present with concomitant conditions such as rotator cuff tears, osteoporosis, and joint degeneration, which may complicate both surgical management and rehabilitation outcomes.⁵

Postoperative shoulder dislocation presents additional rehabilitation challenges compared to conservative cases. Surgical intervention, including reduction and internal fixation, often necessitates a period of immobilization, which can lead to joint stiffness, muscle atrophy, and impaired neuromuscular control.⁶ These factors may significantly limit functional recovery and independence in daily activities, particularly in elderly patients. Early and structured rehabilitation is therefore essential to restore joint mobility, improve muscle strength, and prevent secondary complications such as adhesive capsulitis.⁷

Physiotherapy plays a central role in postoperative management by addressing pain, restoring range of motion, enhancing muscle performance, and facilitating functional recovery. Interventions such as therapeutic exercise, scapular stabilization, proprioceptive training, and the use of modalities like infrared and transcutaneous electrical nerve stimulation (TENS) have been shown to contribute to improved clinical outcomes.^{8–10} These approaches not only target impairments at the body structure and function level but also promote activity and participation, consistent with the International Classification of Functioning, Disability and Health (ICF) framework.¹¹

However, despite the recognized importance of physiotherapy, current evidence is predominantly focused on non-operative management or mixed populations, with limited studies specifically addressing postoperative rehabilitation following shoulder dislocation, particularly in elderly patients.^{4,6} Moreover, most available evidence is derived from randomized controlled trials or systematic reviews that do not fully capture the complexity of individualized clinical presentations encountered in real-world practice.

This highlights a critical research gap in understanding the clinical application and outcomes of physiotherapy interventions in elderly postoperative shoulder dislocation cases. Additionally, case-based evidence remains important for providing detailed clinical insights, especially in complex scenarios involving surgical intervention, advanced age, and functional limitations.

This case is clinically relevant because it involves an elderly patient undergoing surgical fixation and subsequent hardware removal, representing a multifactorial rehabilitation challenge influenced by age-related physiological decline and postoperative constraints. Understanding the response to physiotherapy in such cases may provide valuable guidance for clinical practice.

Therefore, this study aims to describe the physiotherapy management and evaluate its clinical outcomes in an elderly patient following postoperative shoulder dislocation, focusing on pain reduction, improvement in range of motion, muscle strength, and functional ability.

Methods

This study employed a descriptive case report design conducted in accordance with the CARE (CAse REport) guidelines to ensure comprehensive and transparent reporting. The study was carried out at a physiotherapy service facility affiliated with Universitas Muhammadiyah Surakarta between June and July 2025. The subject was a 75-year-old female who presented with postoperative right shoulder dislocation following a fall on June 27, 2025. The patient underwent surgical reduction with internal fixation using Kirschner wire (K-wire) on the same day. Internal fixation was removed 24 days postoperatively. Following the procedure, the patient was referred for physiotherapy due to persistent pain, limited range of motion, decreased muscle strength, and functional limitations in daily activities.

Initial physiotherapy assessment revealed pain during movement, restricted range of motion in flexion, extension, abduction, and adduction, decreased muscle strength, and difficulty performing activities such as combing hair and dressing. Vital signs were within normal limits (blood pressure 118/90 mmHg, heart rate 78 bpm, respiratory rate 18 breaths/min, oxygen saturation 99%, body temperature 36.6°C), with a body mass index of 19.6 kg/m². Radiological examination confirmed right humeral head dislocation. Although detailed classification was not available, shoulder dislocation may be further characterized based on associated lesions such as Bankart and Hill-Sachs defects, as described in previous studies.

Pain intensity was assessed using the Numeric Rating Scale (NRS), a valid and reliable instrument ranging from 0 to 10. Range of motion was measured using a standard goniometer with established reliability in musculoskeletal assessment. Muscle strength was evaluated using Manual Muscle Testing (MMT), a widely used clinical method with acceptable reliability. Functional ability was assessed using the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire, which has demonstrated validity and reliability for upper extremity function assessment.

The physiotherapy intervention was designed based on clinical findings, tissue healing principles, and patient tolerance. The program consisted of therapeutic exercise, physiotherapy modalities, and patient education. In the early postoperative phase, the intervention focused on pain reduction and protection of healing tissues through passive and assisted movements. As the patient progressed, active exercises and strengthening were gradually introduced to restore mobility and muscle function. This progression was based on clinical reasoning to balance tissue protection and functional recovery. The intervention protocol was structured according to the Frequency, Intensity, Time, and Type (FITT) principle to ensure clarity and reproducibility. The detailed intervention protocol is presented in Table 1.

Table 1. Physiotherapy Intervention Protocol Based on FITT Principle

Component	Description
Frequency	2 sessions per week
Intensity	Low to moderate, adjusted to patient tolerance
Time	30–45 minutes per session
Type	ROM exercises (PROM, AAROM, AROM), strengthening (isometric and progressive), scapular stabilization, proprioceptive training, infrared, TENS, education, home exercise

Therapeutic exercises included progressive range of motion exercises starting from passive range of motion (PROM), advancing to active-assisted (AAROM), and active range of motion (AROM). Strengthening exercises began with isometric contractions and progressed based on patient tolerance. Scapular stabilization and proprioceptive training were included to improve coordination and joint stability. The physiotherapy program was conducted over a short-term period consisting of two treatment sessions within one week.

Physiotherapy modalities included infrared therapy and transcutaneous electrical nerve stimulation (TENS), each applied for approximately 15 minutes per session. Patient education and a home exercise program were provided during each session (approximately 10 minutes), focusing on condition understanding, adherence to exercise, safe activity modification, and prevention of re-injury.

The physiotherapy program was conducted over a short-term period consisting of two treatment sessions within one week. The intervention was designed in accordance with the phases of tissue healing. In the early postoperative phase, the focus was on pain reduction and protection of healing tissues through passive and assisted movements. As the patient progressed, active exercises and strengthening were introduced to restore mobility and improve muscle function. This progression was based on clinical reasoning to balance tissue protection and functional recovery. To provide a comprehensive overview of the patient's clinical course, a chronological timeline of events, including injury, surgical intervention, and physiotherapy management, is presented in Table 2.

Table 2. Timeline of Clinical Events and Intervention

Time Point	Event	Description
Day 0	Injury	Fall causing right shoulder dislocation
Day 0	Surgery	Reduction with K-wire fixation
Day 24	Postoperative phase	Removal of internal fixation
T1–T2	Pre-intervention	Baseline assessments
T3–T4	Post-intervention	Outcome evaluations

Outcome evaluations were conducted at four time points: two pre-intervention assessments (T1–T2) and two post-intervention assessments (T3–T4). Variables measured included pain (NRS), muscle strength (MMT), range of motion (goniometer), and functional ability (DASH). No additional follow-up assessment beyond the immediate post-intervention phase was conducted.

which limits the evaluation of long-term outcomes. Data were analyzed descriptively by comparing pre- and post-intervention values. No statistical analysis was performed due to the single-case design.

This study was approved by the Health Research Ethics Committee of Universitas Muhammadiyah Surakarta (No. 2046/KEPK-FIK/III/2026). Written informed consent was obtained from the patient prior to participation. This case report was prepared in accordance with CARE guidelines to ensure comprehensive and transparent reporting.

Results

Physiotherapy intervention was administered over two treatment sessions, with four evaluation points conducted at baseline (T1–T2) and post-intervention (T3–T4). Outcomes were assessed using the Numeric Rating Scale (NRS), Manual Muscle Testing (MMT), goniometric measurement of range of motion (ROM), and the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire. To provide a structured overview of changes in clinical outcomes across all evaluation time points, the results are summarized in Table 3. This table presents the progression of pain intensity, muscle strength, range of motion, and functional ability from baseline (T1–T2) to post-intervention (T3–T4), allowing for clear comparison of pre- and post-intervention conditions.

Table 3. Clinical Outcomes Across Evaluation Phases (T1–T4)

Variable	T1	T2	T3	T4
NRS (pain)	6	6	4	4
MMT Flexion	3	3	4	4
MMT Extension	3	3	3	4
MMT Abduction	3	3	4	4
MMT Adduction	3	3	3	4
ROM Sagittal (Flex–Ext)	40°–0°–40°	45°–0°–45°	45°–0°–45°	50°–0°–55°
ROM Frontal (Abd–Add)	50°–0°–25°	55°–0°–25°	55°–0°–25°	65°–0°–30°
DASH Score	52.5	52	46	43.3

Notes: NRS, Numeric Rating Scale; MMT, Manual Muscle Testing; ROM, Range of Motion; DASH, Disabilities of the Arm, Shoulder and Hand.

Pain intensity decreased from NRS 6 at baseline (T1–T2) to 4 at post-intervention (T3–T4), indicating an absolute change of Δ NRS = -2. Muscle strength improved across all shoulder muscle groups. Flexion, abduction, and adduction increased from MMT grade 3 to 4, while extension improved from grade 3 at baseline to grade 4 at T4. Range of motion demonstrated progressive improvement in both planes. In the sagittal plane, flexion–extension increased from 40°–0°–40° at T1 to 50°–0°–55° at T4. In the frontal plane, abduction–adduction improved from 50°–0°–25° to 65°–0°–30°. The improvement in range of motion can be expressed as absolute changes, with flexion increasing by approximately 10° and abduction increasing by approximately 15° from baseline to the final evaluation (Δ ROM).

Functional ability also improved, as reflected by a reduction in DASH score from 52.5 at baseline to 43.3 at T4, corresponding to an absolute change of Δ DASH = -9.2. To further illustrate the trend of clinical improvement across evaluation points, a graphical representation of pain and functional outcomes is recommended.

To enhance the visualization of clinical outcome progression across evaluation phases, graphical representations of pain intensity and functional ability were constructed. The trends demonstrate changes in Numeric Rating Scale (NRS) and Disabilities of the Arm, Shoulder and Hand (DASH) scores from T1 to T4, as illustrated in Figure 1 and Figure 2.

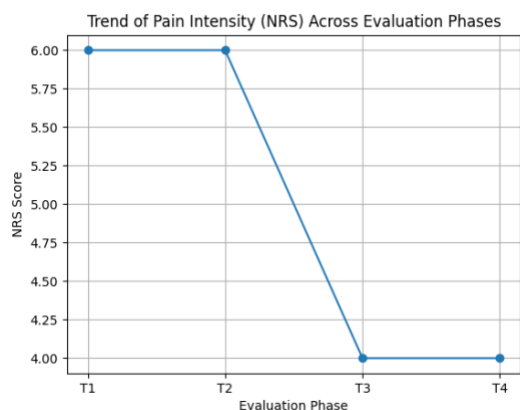


Figure 1. Trend of pain intensity (NRS) across evaluation phases (T1–T4).

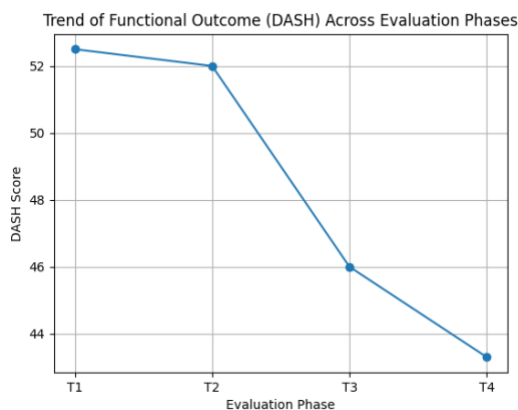


Figure 2. Trend of functional outcome (DASH score) across evaluation phases (T1–T4).

No statistical analysis was performed due to the single-case design. All findings are therefore presented descriptively without inferential interpretation. No additional follow-up assessment beyond the immediate post-intervention phase (T4) was conducted, which limits the evaluation of long-term outcomes.

Discussion

This case report demonstrated that a structured physiotherapy program combining therapeutic exercise, physiotherapy modalities, and patient education was associated with clinically meaningful improvements in pain, range of motion (ROM), muscle strength, and functional ability in an elderly patient following postoperative shoulder dislocation. The reduction in pain intensity (Δ NRS = -2) observed in this study may be attributed to the combined effects of infrared therapy and transcutaneous electrical nerve stimulation (TENS). Infrared therapy promotes vasodilation and enhances local circulation, facilitating tissue healing and reducing muscle tension, while TENS modulates nociceptive transmission through the gate control mechanism.^{12,13} These findings are consistent with previous systematic reviews reporting that electro-physical agents can effectively reduce postoperative and musculoskeletal pain, thereby enabling greater participation in active rehabilitation.^{12,13}

Improvements in ROM across sagittal and frontal planes may be explained by the progressive implementation of ROM exercises, including passive (PROM), active-assisted (AAROM), and active (AROM) movements. Early mobilization following shoulder surgery has been shown to maintain capsular elasticity, prevent adhesions, and reduce the risk of joint stiffness.¹⁴ Furthermore, scapular stabilization exercises likely contributed to improved scapulohumeral rhythm, which is essential for coordinated shoulder movement.¹⁵ These findings align with previous studies demonstrating that targeted exercise interventions can enhance joint mobility and functional outcomes in shoulder rehabilitation.^{14,15}

The observed increase in muscle strength from MMT grade 3 to 4 suggests that progressive strengthening exercises were effective in restoring muscle function. Initial isometric exercises are particularly beneficial in the early postoperative phase, as they allow muscle activation without excessive joint stress.¹⁶ As rehabilitation progresses, gradual strengthening supports improved dynamic stability of the glenohumeral joint, particularly through activation of the rotator cuff and scapular stabilizers.¹⁷ This is crucial for preventing recurrent instability and supporting functional movement patterns.¹⁸

Functional improvement, as reflected by the reduction in DASH score (Δ DASH = -9.2), indicates that the intervention had a positive impact beyond impairment-level outcomes.¹⁹ This finding is consistent with the International Classification of Functioning, Disability and Health (ICF) framework, which emphasizes the interaction between body functions, activities, and participation.²⁰ The integration of therapeutic exercise with patient education and a home exercise program likely contributed to improved independence in daily activities and sustained functional gains.²¹

A key strength of this case lies in its clinical context. This report describes an elderly patient undergoing postoperative management following internal fixation and subsequent hardware removal, representing a complex rehabilitation scenario influenced by age-related physiological decline and surgical constraints.²² Compared to younger populations or non-operative cases, elderly patients often exhibit slower recovery due to reduced tissue elasticity, sarcopenia, and impaired regenerative capacity.²³ Therefore, individualized and progressive rehabilitation strategies are essential to optimize outcomes while minimizing the risk of complications.²⁴

Despite these positive findings, several limitations should be acknowledged. First, this study involved a single case, which limits the generalizability of the results. Second, the short duration of intervention may not fully capture long-term functional outcomes or recurrence risk. Third, the absence of a control condition precludes comparison with other rehabilitation approaches. Therefore, the findings should be interpreted cautiously and considered as preliminary clinical evidence. Additionally, the absence of long-term follow-up limits the ability to determine the sustainability of the observed improvements.

From a clinical perspective, this case highlights the importance of early, structured, and individualized physiotherapy in postoperative shoulder dislocation, particularly in elderly patients. The combination of pain management, progressive exercise, and patient education appears to be a practical and feasible approach in clinical settings. Future research should focus on higher-level study designs, such as randomized controlled trials or prospective cohort studies, to evaluate the effectiveness of specific physiotherapy protocols and establish stronger evidence for clinical guidelines.

Conclusion

This case report demonstrates that a structured physiotherapy program combining therapeutic exercise, physiotherapy modalities, and patient education may provide clinically meaningful improvements in pain, range of motion, muscle strength, and functional ability in an elderly patient following postoperative shoulder dislocation.

The observed improvements suggest that early and individualized rehabilitation plays an important role in facilitating functional recovery and promoting independence in daily activities. However, given the single-case design and short intervention duration, these findings should be interpreted with caution and cannot be generalized to broader populations. Further research using higher-level study designs, such as randomized controlled trials, is needed to establish stronger evidence regarding the effectiveness of physiotherapy interventions in postoperative shoulder dislocation, particularly in elderly populations.

Author Contribution

Angelita Noor Ramadhini: Conceptualization, Methodology, Investigation, Data curation, Formal analysis, Writing original draft.
Totok Budi Santoso: Supervision, Validation, Methodology, Writing, review, and editing.
Lathifah Muknatun Amiin: Investigation, Resources, Data curation.

Acknowledgments

The author would like to express sincere gratitude to the patient for her cooperation and participation in this case report. Appreciation is also extended to the clinical supervisors and instructors for their professional guidance and support throughout the physiotherapy management process.

Conflict of Interest Statement

The authors declare no conflict of interest.

Funding Sources

This study received no external funding.

Ethics Statement

This study was approved by the Health Research Ethics Committee of Universitas Muhammadiyah Surakarta (No. 2046/KEPK-FIK/III/2026). Written informed consent was obtained from the patient prior to participation.

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