

Multimodal Physiotherapy Management for Adhesive Capsulitis: A Case Report

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Abstract

Background: Adhesive capsulitis is a musculoskeletal disorder characterized by progressive shoulder pain and restricted range of motion, resulting in functional limitations. Multimodal physiotherapy is commonly used in clinical practice; however, reports remain limited, particularly in describing detailed short-term clinical outcomes of structured multimodal physiotherapy programs in real-world clinical settings.

Objective: This case report aims to describe the clinical outcomes of a multimodal physiotherapy program on pain, range of motion (ROM), and functional ability in a patient with adhesive capsulitis.

Methods: A 69-year-old male presented with a 5-month history of left shoulder pain and stiffness. The patient underwent four physiotherapy sessions over two weeks. The intervention consisted of Transcutaneous Electrical Nerve Stimulation (TENS), Short Wave Diathermy (SWD), manual therapy, and a structured home exercise program. Outcomes were assessed using the Numeric Rating Scale (NRS), ROM measurement, and the Shoulder Pain and Disability Index (SPADI).

Results: Pain during movement decreased from 5/10 to 2/10, while tenderness decreased from 4/10 to 3/10. ROM improved in flexion (80° to 100°), extension (20° to 30°), abduction (70° to 90°), and adduction (20° to 30°). The SPADI score improved from 62% to 45%, indicating reduced disability.

Conclusion: Multimodal physiotherapy was associated with short-term improvements in pain, ROM, and functional ability in this patient. However, these findings are limited to a single case and should be interpreted with caution.

Keywords

Adhesive Capsulitis; Physical Therapy Modalities; Range of Motion, Articular; Pain Measurement; Shoulder Pain; Disability Evaluation

Introduction

Adhesive capsulitis, commonly referred to as frozen shoulder, is a disabling musculoskeletal condition characterized by progressive shoulder pain and global restriction of both active and passive range of motion (ROM).¹ The condition is associated with inflammatory and fibrotic changes in the joint capsule, leading to capsular thickening, collagen accumulation, and subsequent joint stiffness.² These pathological changes impair shoulder biomechanics and significantly limit functional activities such as reaching overhead, dressing, and personal hygiene.³

Clinically, adhesive capsulitis progresses through three distinct phases: the freezing phase, marked by increasing pain and gradual loss of motion; the frozen phase, characterized by reduced pain but persistent stiffness; and the thawing phase, during which partial or complete recovery of motion may occur.⁴ Although the condition is often described as self-limiting, recovery can take several months to years, and some patients may experience residual functional deficits if not managed appropriately.^{5,6}

Epidemiological evidence indicates that adhesive capsulitis affects approximately 2–5% of the general population and up to 11% of individuals with diabetes mellitus.⁷ The condition is more prevalent among older adults and has been reported to occur more frequently in females.⁷ In addition to metabolic factors such as diabetes, other potential risk factors include prolonged immobilization, previous shoulder injury, and systemic conditions affecting connective tissue.⁸

Physiotherapy is widely recognized as a cornerstone in the conservative management of adhesive capsulitis, aiming to reduce pain, restore joint mobility, and improve functional capacity.^{4,9} Various interventions have been proposed, including electrotherapy modalities such as Transcutaneous Electrical Nerve Stimulation (TENS) and Short Wave Diathermy (SWD), manual therapy techniques, and therapeutic exercise programs.¹⁰ The rationale for combining these modalities lies in their complementary mechanisms, including pain modulation, enhancement of tissue extensibility, and improvement of joint mechanics.¹¹

Despite the increasing use of multimodal physiotherapy approaches in clinical practice, the current literature remains limited in providing detailed descriptions of short-term clinical outcomes from structured, combined interventions, particularly within real-world case-based settings. Furthermore, variability in intervention protocols and insufficient reporting of clinical parameters reduce the reproducibility and applicability of existing evidence.¹² This highlights the need for well-documented case reports that clearly describe intervention strategies and patient outcomes.

Therefore, this case report aims to describe the clinical outcomes of a multimodal physiotherapy program on pain intensity, range of motion, and functional ability in a patient with adhesive capsulitis. The report is intended to contribute to the clinical evidence base by providing a detailed account of intervention parameters and short-term patient response in a real-world setting.

Methods

This study employed a descriptive case report design in accordance with the CARE (Case Report) guidelines to provide a detailed account of clinical presentation, intervention, and outcomes in a patient with adhesive capsulitis. The case was managed in a physiotherapy clinical setting at RS Indriati, Indonesia. Prior to participation, the patient received a comprehensive explanation

regarding the purpose, procedures, potential benefits, and risks of the intervention. Written informed consent was obtained for both treatment and publication of anonymized clinical data.

The subject was a 69-year-old male who presented with a 5-month history of progressive pain and stiffness in the left shoulder. The patient reported difficulty performing daily activities such as reaching overhead, dressing, combing hair, and retrieving objects from the back pocket. Information regarding comorbidities, including diabetes mellitus, prior treatment history, and other risk factors commonly associated with adhesive capsulitis, was not comprehensively recorded and should be considered in future documentation to enhance clinical interpretability.

Patients' medical history, including comorbidities such as diabetes mellitus, hypertension, or previous shoulder disorders, was not comprehensively documented in the initial assessment. The patient also did not report any prior physiotherapy or medical intervention for the current condition. Information regarding occupational activities and daily functional demands was limited; however, the patient reported difficulty performing overhead and self-care activities. These limitations should be considered when interpreting the clinical outcomes.

Clinical assessment was conducted through structured anamnesis and physical examination focusing on the musculoskeletal system. Pain intensity was measured using the Numeric Rating Scale (NRS), a valid and reliable instrument widely used in musculoskeletal conditions.⁶ Functional ability was assessed using the Shoulder Pain and Disability Index (SPADI), which has demonstrated good validity and reliability for evaluating pain and disability in patients with shoulder disorders.⁷ Range of motion (ROM) was measured using a standard goniometric method and recorded in degrees for shoulder flexion, extension, abduction, and adduction. Baseline findings included movement pain (5/10), tenderness (4/10), flexion (80°), extension (20°), abduction (70°), adduction (20°), and SPADI score of 62%, indicating moderate disability.

The diagnosis of adhesive capsulitis was established based on clinical findings of progressive shoulder pain accompanied by global limitation of both active and passive ROM. However, specific diagnostic criteria and differential diagnoses, such as rotator cuff pathology or glenohumeral osteoarthritis, were not explicitly documented. Future reports should incorporate standardized diagnostic criteria and, where available, supporting investigations such as imaging to strengthen diagnostic accuracy.

The diagnosis of adhesive capsulitis was based on clinical presentation characterized by progressive onset of shoulder pain and global restriction of both active and passive range of motion, particularly in external rotation. These findings are consistent with commonly accepted clinical diagnostic criteria. Differential diagnoses such as rotator cuff tear, subacromial impingement syndrome, and glenohumeral osteoarthritis were not formally assessed through imaging, which represents a limitation of this case.

The intervention consisted of a multimodal physiotherapy program administered over four sessions within a two-week period (twice weekly). Each session included a combination of electrotherapy, manual therapy, and therapeutic exercise. Transcutaneous Electrical Nerve Stimulation (TENS) was applied using a conventional mode with a frequency of 80–100 Hz at a sensory-level intensity described as a comfortable tingling sensation, for a duration of 12 minutes. Short Wave Diathermy (SWD) was delivered in continuous mode at a thermal intensity perceived as mild warmth without discomfort, for 12 minutes. The reported parameters (200 Hz, 50 µs) require clarification, as they are not standard for SWD and may reflect documentation inconsistency.

Manual therapy was performed using glenohumeral joint mobilization techniques; however, the specific grades (e.g., Maitland Grade I–IV), direction of mobilization, and progression were not fully detailed in the original report. For reproducibility, future documentation should specify mobilization grades, duration per technique, and clinical reasoning for selection. Manual therapy was performed using glenohumeral joint mobilization techniques, primarily targeting anterior-posterior and inferior gliding. The mobilization was applied at a moderate intensity; however, the specific grading (e.g., Maitland Grade II–III) and duration per technique were not formally documented in the original clinical record.

A structured home exercise program was prescribed, including pendulum exercises and active-assisted external rotation movements. Patients were instructed to perform the exercises daily; however, detailed parameters such as frequency, number of repetitions, and duration per session were not clearly documented and should be standardized in future reports. The home exercise program included pendulum exercises and active-assisted external rotation movements, which were instructed to be performed daily. However, specific parameters such as number of repetitions, sets, and duration per session were not standardized and were adjusted based on patient tolerance. The selection of multimodal intervention was based on existing evidence suggesting that the combination of electrotherapy, manual therapy, and therapeutic exercise may provide complementary effects in reducing pain and improving joint mobility in patients with adhesive capsulitis.

To provide a clear and structured overview of the patient's clinical course, including symptom onset, intervention phases, and outcome evaluation, the timeline is presented in Table 1. This presentation facilitates understanding of the chronological relationship between baseline condition, therapeutic intervention, and observed clinical changes throughout the treatment period.

Table 1. Clinical Timeline of the Case

Phase	Timeframe	Description
Initial condition	Month 0–5	Progressive onset of pain and stiffness in the left shoulder, leading to functional limitations in daily activities
Baseline assessment	Session 1	Initial evaluation documenting pain intensity (NRS), range of motion (ROM) limitation, and functional disability (SPADI)
Intervention phase	Weeks 1–2	Four physiotherapy sessions (twice weekly) consisting of TENS, SWD, manual therapy, and a structured home exercise program
Follow-up assessment	Session 4	Re-evaluation showing changes in pain intensity, ROM, and SPADI score after completion of intervention

Data analysis was conducted descriptively by comparing pre- and post-intervention outcomes. Given the nature of a single-case design, no inferential statistical analysis was performed. Changes in clinical outcomes were interpreted based on observed differences in pain scores, ROM values, and SPADI percentages. Consideration of minimal clinically important difference (MCID), particularly for SPADI, was not included in the original analysis and should be incorporated in future studies to enhance clinical relevance.

Results

The clinical outcomes were evaluated to determine changes in pain intensity, range of motion (ROM), and functional ability following a multimodal physiotherapy program over four sessions. The presentation of results is aligned with the study objective and focuses on descriptive changes observed between baseline and post-intervention assessments. To provide a concise overview of clinical progression, the main outcomes are summarized in Table 2.

Table 2. Summary of Clinical Outcomes Before and After Intervention

Outcome	Baseline	Post-Intervention (Session 4)	Change
Pain (NRS – movement)	5/10	2/10	↓3
Pain (NRS – tenderness)	4/10	3/10	↓1
Flexion ROM	80°	100°	+20°
Extension ROM	20°	30°	+10°
Abduction ROM	70°	90°	+20°
Adduction ROM	20°	30°	+10°
SPADI Score	62%	45%	↓17%

As shown in Table 1, improvements were observed across all measured outcomes after four physiotherapy sessions. Pain intensity demonstrated a gradual reduction throughout the intervention period. No substantial change was observed between the first and second sessions; however, a noticeable decrease occurred during the third and fourth sessions. Movement-related pain decreased from 5/10 to 2/10, while tenderness decreased from 4/10 to 3/10. This pattern indicates a delayed but progressive analgesic response following repeated intervention sessions.

Range of motion improved consistently across all assessed movements. Shoulder flexion increased by 20°, from 80° at baseline to 100° at the final session, while extension improved by 10°. Similarly, abduction increased by 20°, and adduction improved by 10°. The improvement in ROM occurred progressively over the four sessions, suggesting a cumulative effect of the intervention on joint mobility.

Functional ability, as measured by SPADI, also showed improvement following the intervention. The score decreased from 62% (moderate disability) to 45%, indicating a reduction in perceived pain and disability. Clinically, this improvement was reflected in the patient's enhanced ability to perform daily activities such as dressing, reaching overhead, and grooming. However, some limitations persisted, particularly in movements requiring internal rotation, such as reaching the back pocket. Although a reduction in SPADI score was observed, the change was not compared against established minimal clinically important difference (MCID) values. Therefore, the clinical significance of this improvement cannot be definitively determined.

To further illustrate the temporal progression of clinical outcomes across intervention sessions, a session-by-session summary is presented in Table 2. This presentation highlights the pattern of change in pain, range of motion, and functional status observed throughout the treatment period.

Table 2. Temporal Progression of Clinical Outcomes Across Sessions

Session	Clinical Description
Session 1	Baseline assessment showing high pain intensity, limited ROM, and moderate functional disability
Session 2	Minimal change in pain intensity and ROM compared to baseline
Session 3	Initial reduction in movement-related pain and slight improvement in ROM
Session 4	Further reduction in pain and measurable improvement in ROM and functional ability

Although improvements were observed, the magnitude of change was not evaluated against established minimal clinically important difference (MCID) thresholds, particularly for SPADI. Therefore, the clinical significance of these changes should be interpreted cautiously. Overall, the results indicate short-term improvements in pain, ROM, and functional ability following a multimodal physiotherapy intervention, based on descriptive analysis of a single case.

Discussion

This case report describes the short-term clinical outcomes of a multimodal physiotherapy program in a patient with adhesive capsulitis, demonstrating improvements in pain intensity, range of motion (ROM), and functional ability after four treatment sessions. These findings are consistent with the theoretical and clinical understanding that combined physiotherapy interventions may address multiple underlying mechanisms of adhesive capsulitis, including pain, capsular stiffness, and functional impairment.^{1,6,9}

The observed improvement in ROM, particularly in flexion and abduction, can be attributed to the combined effects of manual therapy and therapeutic exercise. Adhesive capsulitis is characterized by capsular fibrosis and contracture of the glenohumeral joint, leading to global motion restriction.² Joint mobilization techniques are known to enhance capsular extensibility, improve joint arthrokinematics, and reduce mechanical restrictions.³ Additionally, repetitive active and passive movements may stimulate collagen remodeling and reduce adhesions within the joint capsule.^{3,4} The gradual increase in ROM across sessions in this case suggests a cumulative effect of repeated mechanical loading and mobilization. These findings are in line with previous studies reporting that structured physiotherapy programs can significantly improve shoulder mobility in patients with adhesive capsulitis.^{5,10,11}

Pain reduction observed in this case may be explained by the neurophysiological effects of electrotherapy modalities, particularly Transcutaneous Electrical Nerve Stimulation (TENS), as well as the thermal effects of Short Wave Diathermy (SWD). TENS is widely recognized for its role in modulating pain through the gate control theory and activation of descending inhibitory pathways, thereby reducing nociceptive transmission.⁷ Meanwhile, SWD provides deep tissue heating, which enhances blood circulation, reduces muscle spasm, and increases tissue extensibility.¹³ The combination of these modalities likely contributed to the delayed but progressive reduction in pain observed after multiple sessions. Similar findings have been reported in previous clinical studies demonstrating that electrotherapy combined with exercise can effectively reduce pain and improve patient comfort during movement.⁹

From a functional perspective, the reduction in SPADI score indicates an improvement in the patient's ability to perform daily activities. The SPADI is a validated instrument that reflects both pain and disability, making it a clinically meaningful outcome measure in shoulder disorders.¹⁰ Although a decrease from 62% to 45% suggests functional improvement, the magnitude of change should be interpreted cautiously, as the minimal clinically important difference (MCID) was not formally assessed. This limitation highlights the importance of integrating clinically meaningful thresholds in future case reports to strengthen the interpretation of outcomes.

Despite these positive findings, the results of this case report must be interpreted within the context of its methodological limitations. First, as a single-case design, the findings cannot be generalized to a broader population. Second, the absence of a control condition makes it difficult to isolate the specific contribution of each intervention component. Third, the short duration of follow-up (four sessions over two weeks) limits the ability to assess long-term outcomes and sustainability of improvements. Additionally, incomplete reporting of patient characteristics, such as comorbidities and prior treatment history, may influence the interpretation of clinical response. These limitations are consistent with those commonly associated with case report studies and should be considered when applying the findings to clinical practice.

Recent systematic reviews and clinical guidelines have emphasized the role of multimodal physiotherapy in improving outcomes in adhesive capsulitis, particularly when combining manual therapy and exercise interventions.¹⁴ Another important consideration is the variability and partial incompleteness of intervention parameters. For instance, the specific grades and techniques of manual therapy were not fully described, and certain electrotherapy parameters require clarification. This limits reproducibility and highlights the need for standardized reporting of intervention protocols in future studies. In terms of clinical implications, this case supports the use of a multimodal physiotherapy approach as part of conservative management for adhesive capsulitis, particularly in the early stages of rehabilitation. The combination of electrotherapy, manual therapy, and structured exercise may provide complementary benefits by addressing pain, mobility, and functional limitations simultaneously.

However, clinicians should individualize treatment based on patient characteristics and monitor progress over a longer period to ensure sustained improvement. Overall, this case contributes to the growing body of evidence supporting multimodal physiotherapy in adhesive capsulitis, while also emphasizing the need for more rigorous studies, such as randomized controlled trials, to establish causal relationships and optimize treatment protocols.

Conclusion

This case report demonstrates that a multimodal physiotherapy program, consisting of electrotherapy, manual therapy, and structured exercise, was associated with short-term improvements in pain, range of motion, and functional ability in a patient with adhesive capsulitis. These findings align with the study objective of describing clinical outcomes following a combined intervention approach. However, given the single-case design, short intervention duration, and absence of long-term follow-up, the results cannot be generalized. The observed improvements should therefore be interpreted as individual clinical responses rather than definitive evidence of treatment effectiveness.

From a practical perspective, a multimodal physiotherapy approach may be considered as part of conservative management to address multiple aspects of adhesive capsulitis, particularly in improving mobility and reducing pain during the early phase of rehabilitation. Future studies with larger samples, standardized intervention protocols, and extended follow-up periods are recommended to establish clinical effectiveness and optimize treatment strategies.

Author Contribution

Hafidz Taqjudien Amrullah: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing original draft.
Arif Priyanto: Conceptualization, Methodology, Supervision, Validation, Writing review and editing.
Widyo Bintoro: Investigation, Resources, Validation, Writing review and editing.

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Conflict of Interest Statement

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Ethics Statement

Written informed consent was obtained from the patient for participation and publication of anonymized clinical data. According to institutional policy and international guidelines, formal ethical approval is not required for single case reports that do not involve experimental interventions or identifiable patient information. All procedures were conducted in accordance with the Declaration of Helsinki.

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