

Physiotherapy for Adhesive Surgical Scar After Achilles Tendon Repair: Scar Mobilization and Exercise Case Report

Kurnia Ramadhan¹, Nur Hikmawaty², Masfufah³

^{1,2}Physiotherapy Professional Program, Faculty of Nursing, Hasanuddin University, Indonesia

³Physiotherapy, Medical Rehabilitation Department, Dr. Tadjuddin Chalid Hospital, Makassar, Indonesia

Corresponding author:

Name: Kurnia Ramadhan

E-mail: rmdkurnia4@gmail.com

Phone: +62 857 5762 3043

Received 13 August 2026; Revised 13 September 2026; Accepted 13 September 2026; Published 30 September 2026.

©2026 The Authors. Published by the Physiotherapy Study Program, Faculty of Medicine, Udayana University, in collaboration with the Indonesian Physiotherapy Association (Ikatan Fisioterapi Indonesia). This is an open-access article distributed under the terms of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

Abstract

Background: Adhesive surgical scars after Achilles tendon repair may restrict tissue mobility and contribute to pain, limited ROM, muscle weakness, gait impairment, and functional limitations.

Objective: To describe physiotherapy management and clinical changes in a patient with an adhesive linear surgical scar one month after right Achilles tendon repair.

Methods: A 63-year-old woman received two physiotherapy sessions on May 18 and 21, 2026, consisting of scar mobilization, AROM and PROM, isometric strengthening, weight shifting, walking, balance, and deep breathing exercises. Outcomes included pain, scar characteristics, muscle strength, anxiety, functional status, and ankle ROM.

Results: After two sessions, resting pain decreased from 2 to 0, movement pain from 6 to 4, and tenderness from 9 to 6. VSS improved from 7 to 5, HRS-A from 27 to 20, and Barthel Index from 90 to 99. Ankle muscle strength improved from 3/5 to 4/5. Dorsiflexion increased from 25° to 37°, plantarflexion from 38° to 40°, and eversion from 12° to 15°, while inversion remained 34°. Circumference difference remained unchanged at 1 cm.

Conclusion: Two physiotherapy sessions were accompanied by improvements in pain, scar characteristics, muscle strength, ankle ROM, anxiety, and functional status. However, causality cannot be established because this was a single case involving multimodal intervention without post-treatment follow-up.

Keywords

Achilles Tendon; Tendon Injuries; Rehabilitation; Exercise Therapy; Cicatrix

Introduction

Achilles tendon repair is commonly followed by a structured rehabilitation program aimed at restoring ankle mobility, muscle strength, weight bearing, gait, balance, and functional capacity.¹⁻⁴ The postoperative recovery period may be accompanied by musculoskeletal and functional impairments, including pain, muscle weakness, restricted ankle range of motion (ROM), and limitations in walking and daily activities.⁴ Rehabilitation following Achilles tendon repair generally incorporates progressive ankle mobilization, weight bearing, muscle strengthening, functional exercise, and neuromuscular control according to the stage of tendon healing.¹⁻⁴ Consequently, physiotherapy management should integrate protection of the healing tendon with progressive restoration of mobility, strength, neuromuscular control, gait, and functional performance.¹⁻⁴ The progression of these components requires consideration of the patient's clinical condition and tolerance to physical loading.⁵

In addition to musculoskeletal impairment, postoperative healing may result in changes to the integumentary system, particularly scar formation at the surgical incision.⁶ In the present case, physiotherapy assessment identified a linear surgical scar over the right ankle that was adherent to the underlying tissue, as indicated by restricted scar and surrounding tissue mobility during palpation and scar mobilization, accompanied by a sensation of tightness. Therefore, the term adhesive surgical scar is used consistently throughout this report. The term hypertrophic scar is not used as a diagnosis because objective documentation of excessive scar thickness or extension beyond the original wound margins was not available. Scar characteristics were assessed using the Vancouver Scar Scale (VSS), which evaluates vascularity, pigmentation, pliability, and scar height.⁷ In this patient, the scar was approximately 4 cm long and 0.5 cm wide and was associated with hyperpigmentation, tightness, and restricted soft tissue mobility.

Scar management may be clinically relevant when scar characteristics are accompanied by pain, restricted tissue mobility, or functional limitations. Evidence concerning non-invasive scar interventions indicates that massage therapy may reduce pain and scar related symptoms, although much of the available evidence concerns burn scars.^{1,8} Other evidence concerning postoperative scar massage has demonstrated considerable variation in intervention techniques, treatment dosage, and outcome measures, highlighting the need for individualized application according to scar characteristics and clinical presentation.⁶ Although these findings provide a rationale for considering scar mobilization as an adjunctive intervention, evidence specifically addressing adhesive surgical scars following Achilles tendon repair remains limited.⁶ In this case, scar mobilization was therefore incorporated to address the clinically observed restriction in scar mobility while avoiding excessive mechanical stress on the healing surgical region.

The patient's clinical problems extended beyond the surgical scar and included pain, ankle muscle weakness, restricted ROM, impaired balance, altered gait, and anxiety. The initial assessment identified pain during rest, movement, and palpation, ankle muscle strength of 3/5 on Manual Muscle Testing (MMT), and restrictions in ankle movement. The patient also demonstrated reduced weight bearing on the right lower limb and loss of heel strike during gait, indicating limitations in functional mobility. These findings support the use of a multimodal physiotherapy approach incorporating scar mobilization, active and passive ROM exercise, strengthening exercise, weight shifting, walking exercise, and balance training. Progressive rehabilitation following Achilles tendon

repair is important for restoring lower limb function and supporting the gradual return to daily activities and other functional demands.^{2,3,5,9}

A clinical gap remains regarding the description of physiotherapy management for patients who present simultaneously with adhesive surgical scar and musculoskeletal and functional impairments following Achilles tendon repair.^{3,5,6,9} Existing scar literature predominantly involves burn populations, whereas Achilles tendon rehabilitation literature has primarily emphasized restoration of strength, ROM, function, gait, and return to sport, with less specific attention to surgical scar characteristics as an integumentary problem.^{3,9} This distinction is clinically relevant because scar mobility, pain, muscle weakness, restricted ROM, impaired balance, altered gait, and anxiety may coexist during postoperative recovery and may influence the patient's participation in rehabilitation.^{9,10} A case description integrating these clinical domains may therefore provide useful information regarding how physiotherapy interventions are selected and adapted to an individual clinical presentation.

Accordingly, this case report aimed to describe the physiotherapy management of a 63-year-old woman with an adhesive linear surgical scar of the right ankle approximately one month after Achilles tendon repair. The intervention comprised scar mobilization, active and passive ROM exercise, isometric strengthening, weight shifting, walking exercise, balance exercise, deep breathing exercise, and therapeutic communication, with progression based on the patient's clinical status and tolerance. The report describes the patient's clinical presentation, assessment procedures, intervention process, and changes in selected clinical outcomes following two physiotherapy sessions. The outcomes included pain intensity, scar characteristics, ankle muscle strength, ROM, anxiety, and functional status. The report is intended to provide a clinically detailed description of multimodal physiotherapy management in a postoperative Achilles tendon repair case with adhesive surgical scar, without assuming a causal treatment effect from the observed changes.

Methods

This study used a descriptive case report design to document the clinical presentation, physiotherapy assessment, intervention process, and changes observed in a single patient with an adhesive surgical scar of the right ankle one month after Achilles tendon repair. The case was conducted at the Physiotherapy Unit, Department of Medical Rehabilitation, Dr. Tadjuddin Chalid Hospital, Makassar, Indonesia. The physiotherapy program was based on principles of early functional rehabilitation after Achilles tendon repair and was modified according to the stage of tendon healing, clinical presentation, and patient tolerance.²⁻⁵ Physiotherapy was initiated on May 18, 2026, approximately four weeks after surgery. At this stage of recovery, ankle ROM was performed in a controlled manner without forcing dorsiflexion beyond the clinically permitted range, consistent with recommendations to protect the healing tendon during early postoperative rehabilitation.⁴

The patient was a 63-year-old woman who underwent right Achilles tendon repair on April 18, 2026, following an Achilles tendon rupture that occurred after she slipped while climbing into a vehicle. Before receiving physiotherapy, the patient continued to use the affected limb for daily activities but subsequently developed increasing pain and difficulty walking. At the initial physiotherapy assessment on May 18, 2026, she presented with an adhesive surgical scar, pain, ankle muscle weakness, restricted ankle ROM, impaired gait and balance, and anxiety. The patient was classified as full weight bearing and was able to ambulate independently without a walking aid, brace, or orthosis. An elastic bandage was observed during static inspection. Dynamic gait assessment demonstrated loss of heel strike and reduced stance on the right lower limb. The patient had a history of hypertension, hypercholesterolemia, and hyperuricemia. Her initial vital signs were blood pressure 170/90 mmHg, pulse rate 87 beats/min, respiratory rate 20 breaths/min, body temperature 36.5°C, and peripheral oxygen saturation 100%.

The initial physiotherapy examination included history taking, static and dynamic inspection, palpation, pain assessment, ankle ROM measurement, MMT, scar assessment, balance assessment, functional assessment, and anxiety assessment. Static inspection showed a surgical scar over the right heel with darker coloration at the wound margins, while palpation identified tenderness around the lateral malleolar region and an adhesive scar with darker pigmentation than the surrounding tissue. The scar was classified clinically as an adhesive surgical scar because restricted mobility of the scar and underlying tissue was observed during palpation and scar mobilization. The patient did not have documented objective evidence of excessive scar thickness or extension beyond the original wound margins; therefore, hypertrophic scar was not used as the diagnosis.

Pain intensity was assessed using the Visual Analog Scale (VAS), ranging from 0 to 10, with 0 representing no pain and 10 representing the most severe pain. Pain was assessed under three conditions: at rest, during ankle movement, and during palpation. The same assessment procedure was used at baseline and at the final evaluation. Paresthesia was not treated as a pain outcome and was not interpreted using the VAS. Ankle muscle strength was assessed using MMT on a 0 to 5 scale for dorsiflexion, plantarflexion, inversion, and eversion. The patient performed active movement against gravity and manual resistance according to her ability. The examiner, patient position, direction of movement, and resistance location were maintained consistently between baseline and final assessment.

Ankle ROM was measured in degrees using a universal goniometer for dorsiflexion, plantarflexion, inversion, and eversion. Patient positioning, segment stabilization, goniometer axis, and alignment with the relevant anatomical landmarks were standardized between assessments. Movement was measured to the patient's tolerated endpoint without forcing the joint. The same measurement procedure was applied at baseline and final assessment to improve measurement consistency. Scar characteristics were assessed using the Vancouver Scar Scale (VSS), including vascularity, pigmentation, pliability, and scar height.⁷ A lower VSS score indicates less pronounced scar characteristics. The VSS was used as a clinical description of the scar, while acknowledging that its validity and reliability are better established for burn scars than for surgical scars.⁷ Anxiety was assessed using the Hamilton Rating Scale for Anxiety (HRS A) through structured interview and observation, with lower scores indicating less severe anxiety.¹¹ Functional independence was assessed using the Barthel Index, covering activities of daily living including feeding, dressing, bathing, toileting, transfers, mobility, and stair use. Higher scores indicate greater functional independence.¹²

The physiotherapy program consisted of two treatment sessions conducted on May 18 and May 21, 2026. Each session lasted approximately 45 minutes. Treatment was provided in the Physiotherapy Unit, Department of Medical Rehabilitation, Dr. Tadjuddin Chalid Hospital, using standard facilities available in the physiotherapy treatment area. No specialized equipment was used. The intervention was delivered by the first author, a student of the Physiotherapy Professional Program at Hasanuddin University, under the supervision of a licensed physiotherapist registered with the hospital's Medical Rehabilitation Unit. The intervention sequence consisted of deep breathing exercise, scar mobilization, ankle PROM and AROM, strengthening exercise, weight shifting, walking exercise, and balance exercise.

Scar mobilization was performed with the patient in a supine position and the ankle placed in a comfortable position. Circular friction, longitudinal gliding, cross fiber friction, and skin rolling were applied over the adhesive surgical scar using light to moderate

pressure according to tolerance and without provoking excessive pain or local irritation. The procedure was performed for approximately 10 minutes per session. Ankle AROM and PROM were subsequently performed slowly in dorsiflexion, plantarflexion, inversion, and eversion within the patient's tolerated range. The exercise component consisted of 10 repetitions for 2 sets and was performed for approximately 6 minutes. Dorsiflexion was not forced beyond the clinically permitted range because the tendon remained in the healing phase.⁴

Weight shifting was performed with bilateral foot support using anterior, posterior, and lateral weight shifts for approximately 6 minutes. Because the patient was already classified as full weight bearing but demonstrated reduced loading of the right lower limb, the exercise was used to facilitate controlled weight acceptance and symmetrical load distribution. Walking exercise was performed for approximately 7 minutes, using 5 repetitions for 2 sets, with emphasis on step control, load distribution, and gait pattern. Balance exercise was performed for approximately 7 minutes using static standing, changes in weight distribution, and progressive loading according to tolerance, with 5 repetitions for 2 sets. Isometric ankle strengthening was performed for approximately 8 minutes using 10 repetitions for 2 sets, with resistance adjusted according to the patient's capacity.

The intervention was individualized according to the patient's identified problems. Scar mobilization was selected because of restricted scar mobility and tissue adherence. AROM and PROM were selected because of restricted ankle ROM. Isometric strengthening was selected because ankle muscle strength was graded 3/5. Weight shifting was selected because the patient demonstrated reduced acceptance of load on the right lower limb, while walking exercise addressed loss of heel strike and reduced stance during gait. Balance exercise addressed impaired postural control and difficulty maintaining standing stability. Deep breathing exercise and therapeutic communication were incorporated because anxiety was identified during the initial assessment.

The first session focused on adaptation to movement and controlled loading. Scar mobilization, ankle ROM, isometric strengthening, weight shifting, walking, and balance exercises were performed according to the initial clinical findings. During the second session, the same intervention components were continued, with progression determined by the patient's response during the first session. Progression was considered when the patient could complete the previous exercise dose safely while maintaining appropriate movement technique and control without an increase in clinically relevant symptoms. For weight shifting and walking, progression depended on improved right limb load acceptance and gait quality without loss of balance. For balance training, progression depended on the ability to maintain stable posture without external assistance or excessive compensation. For strengthening, progression depended on the ability to perform ankle contractions with appropriate technique without increased symptoms around the Achilles tendon.

Regression was applied when the patient demonstrated exercise intolerance, including increased pain that interfered with exercise, increased symptoms around the surgical area, reduced movement control, excessive compensation, inability to maintain right limb loading, impaired postural stability, or inability to complete the exercise safely. In such circumstances, exercise demands were reduced by modifying intensity, duration, repetitions, loading, movement range, or task complexity. All modifications remained consistent with the healing phase of the Achilles tendon and the patient's clinical response. The challenge level was therefore determined by movement quality, postural control, load acceptance, gait safety, symptom response, and tolerance rather than by a predetermined increase in external resistance.

Vital signs were monitored before, during, and after exercise, particularly during weight shifting, walking, and balance activities because of the patient's initial blood pressure of 170/90 mmHg. Exercise intensity was maintained at low to moderate levels and adjusted according to tolerance. Blood pressure screening and monitoring were incorporated into the physiotherapy process in accordance with recommendations for cardiovascular safety in outpatient physical therapy.¹³ Treatment was stopped if the patient developed chest pain, excessive dyspnea, dizziness, presyncope or syncope, palpitations, severe fatigue, or significant loss of balance. A blood pressure response reaching 250 mmHg systolic or 115 mmHg diastolic was also considered a criterion for stopping exercise. If blood pressure remained elevated on reassessment or increased disproportionately during exercise, higher intensity activity was to be postponed and medical consultation considered.¹³

The patient was also given a home program consisting of ankle AROM, isometric ankle muscle contractions, weight shifting, walking exercise, and deep breathing exercise according to her weight bearing status and tolerance. Adherence was assessed through the patient's report during the evaluation, and she reported completing all prescribed exercises during the intervention period. Exercises were performed slowly without forcing movement or loading and were to be discontinued if increased pain, swelling, or symptoms around the surgical area occurred. No adverse events related to the physiotherapy procedures were reported or observed during the two treatment sessions. The patient tolerated the intervention without increased pain, swelling, bleeding, or other postoperative complications.

The second session on May 21, 2026, served as both the second intervention session and the final evaluation. No additional physiotherapy assessment or follow up was conducted after that date. Therefore, the reported outcomes represent changes between baseline and the final assessment after two sessions and do not represent longer term treatment outcomes. Patient perspective was not formally collected using a structured patient perspective procedure and is therefore not presented as an independent outcome. Written informed consent was obtained from the patient for participation in physiotherapy and publication of clinical information related to the case. Separate written consent was also obtained for publication of patient images when applicable. Personal identifying information was kept confidential and was not included in the manuscript.

Results

The clinical course of the patient from injury to the final evaluation is presented in Figure 1. The patient sustained a right Achilles tendon injury on April 4, 2026, and underwent Achilles tendon repair on April 18, 2026. The initial physiotherapy assessment was performed on May 18, 2026, approximately four weeks after surgery. Two physiotherapy sessions were conducted on May 18 and May 21, 2026. The evaluation on May 21, 2026 was used as the final evaluation, with no further physiotherapy follow up conducted after this date.

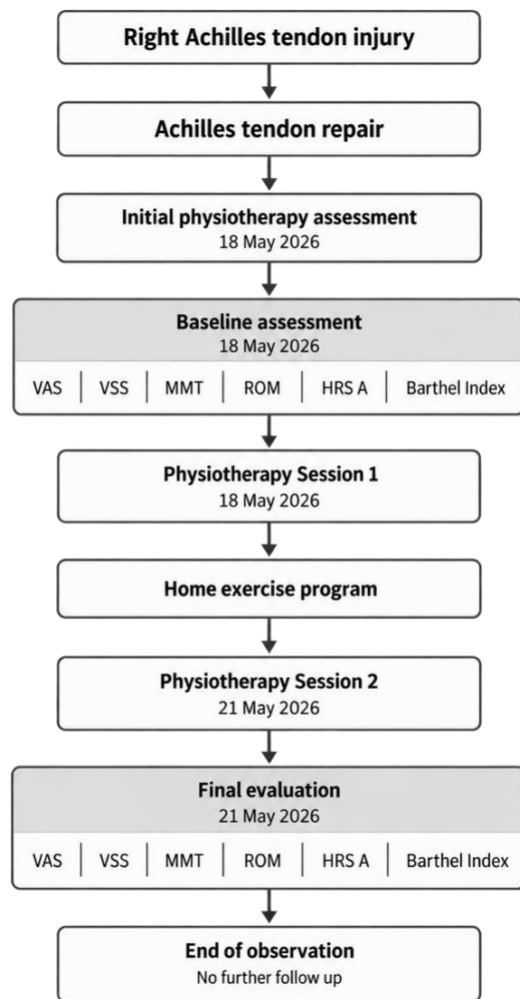


Figure 1. Clinical timeline and flow of physiotherapy management.

At the initial assessment, the patient was a 63-year-old woman presenting with an adhesive linear surgical scar of the right ankle, pain, ankle muscle weakness, restricted ankle ROM, impaired gait and balance, and anxiety. Static inspection showed a surgical scar with darker coloration around the wound margins and an elastic bandage. Dynamic assessment demonstrated loss of heel strike, cautious walking, and reduced loading of the right lower limb. Palpation identified tenderness around the lateral malleolar region and restricted mobility of the scar tissue. The baseline clinical findings are summarized in Table 1.

Table 1. Baseline clinical assessment

Parameter	Baseline result
VAS, pain at rest	2
VAS, pain during movement	6
VAS, pain on palpation	9
Vancouver Scar Scale	7
HRS A	27
Barthel Index	90
Limb circumference difference	1 cm
MMT ankle	3/5

As shown in Table 1, the highest baseline VAS score was recorded during palpation, with a score of 9, followed by pain during movement with a score of 6. The patient also demonstrated ankle muscle weakness with an MMT score of 3/5, a VSS score of 7, an HRS A score of 27, and a Barthel Index score of 90. The limb circumference difference between the affected and contralateral sides was 1 cm.

The baseline ankle ROM measurements are presented in Table 2. Dorsiflexion was 25°, plantarflexion was 38°, inversion was 34°, and eversion was 12°. Compared with the reference values documented in the clinical assessment, ROM was restricted in all four assessed directions. The most pronounced numerical restriction was observed in dorsiflexion and eversion.

Table 2. Baseline ankle ROM

Ankle movement	Baseline	Reference value
Dorsiflexion	25°	35°
Plantarflexion	38°	45°
Inversion	34°	35°
Eversion	12°	15°

The patient subsequently received two physiotherapy sessions, each lasting approximately 45 minutes. The intervention consisted of scar mobilization, ankle AROM and PROM, isometric strengthening, weight shifting, walking exercise, balance exercise, and deep breathing exercise. The intervention was adjusted according to the patient's clinical condition and tolerance during treatment.

The changes in the clinical outcomes between the initial and final evaluations are presented in Table 3. VAS pain scores decreased at rest from 2 to 0, during movement from 6 to 4, and during palpation from 9 to 6. The VSS score decreased from 7 to 5, while the HRS A score decreased from 27 to 20. The Barthel Index increased from 90 to 99, and the MMT score increased from 3/5 to 4/5. In contrast, the limb circumference difference remained unchanged at 1 cm.

Table 3. Comparison of clinical outcomes before and after physiotherapy

Outcome measure	Baseline	Final evaluation	Change
VAS, pain at rest	2	0	-2
VAS, pain during movement	6	4	-2
VAS, pain on palpation	9	6	-3
Vancouver Scar Scale	7	5	-2
HRS A	27	20	-7
Barthel Index	90	99	+9
Limb circumference difference	1 cm	1 cm	0 cm
MMT ankle	3/5	4/5	+1 grade

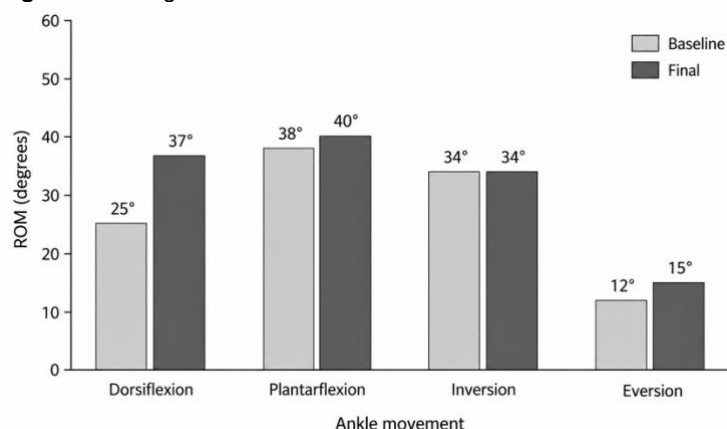
As shown in Table 3, changes were observed across pain, scar characteristics, anxiety, functional independence, and ankle muscle strength. The largest numerical reduction among the VAS measurements occurred for pain during palpation, which decreased by 3 points. The MMT score increased by one grade, while the Barthel Index increased by 9 points. No change was observed in the limb circumference difference.

Changes in ankle ROM are presented in Table 4 and illustrated in Figure 2. Dorsiflexion increased from 25° to 37°, plantarflexion increased from 38° to 40°, and eversion increased from 12° to 15°. Inversion remained unchanged at 34%. The largest numerical change was therefore observed in dorsiflexion, with an increase of 12°.

Table 4. Changes in ankle ROM before and after physiotherapy

Ankle movement	Baseline	Final evaluation	Change
Dorsiflexion	25°	37°	+12°
Plantarflexion	38°	40°	+2°
Inversion	34°	34°	0°
Eversion	12°	15°	+3°

Figure 2. Changes in ankle ROM between the initial and final evaluations.



The patient also reported reduced pain and improved walking ability during the intervention period. The increase in the Barthel Index from 90 to 99, as shown in Table 3, indicates a higher level of functional independence at the final evaluation. However, gait and balance were assessed clinically without a standardized quantitative outcome at the final evaluation. Therefore, changes in gait and balance are described qualitatively and are not presented as independent quantitative outcomes.

No adverse events were reported or observed during either physiotherapy session. The patient reported adherence to the prescribed home exercise program. The final evaluation on May 21, 2026 marked the end of the observation period. Accordingly, the findings presented in Tables 3 and 4 represent changes observed after two physiotherapy sessions and should not be interpreted as evidence of causal treatment effectiveness or longer-term outcomes.

Discussion

This case describes a 63-year-old woman approximately four weeks after right Achilles tendon repair who presented with an adhesive surgical scar accompanied by pain, ankle muscle weakness, restricted ROM, altered gait, impaired balance, and anxiety. These findings are consistent with the multidimensional problems that may occur during rehabilitation following Achilles tendon repair, in which restoration of ankle mobility, muscle strength, weight bearing, gait, neuromuscular control, and functional capacity are important rehabilitation targets.^{2,5}

The most notable change in this case was observed in ankle muscle strength, with MMT increasing from 3/5 to 4/5 across dorsiflexion, plantarflexion, inversion, and eversion. Muscle weakness is commonly encountered during the early rehabilitation period after Achilles tendon repair and may be associated with postoperative immobilization and reduced physical activity.^{2,9} Progressive rehabilitation incorporating controlled exercise is recommended to restore muscle capacity while considering the stage of tendon

healing.² In the present case, isometric strengthening was selected because the initial ankle muscle strength was 3/5. The exercise was combined with AROM and PROM and was progressed according to the patient's tolerance. The observed increase in MMT may represent improved muscle performance during the observation period; however, the contribution of isometric exercise cannot be separated from the effects of the other interventions provided concurrently.

Pain decreased across all VAS conditions, from 2 to 0 at rest, from 6 to 4 during movement, and from 9 to 6 during palpation. These findings are consistent with previous observations that physiotherapy following Achilles tendon repair may be accompanied by reductions in pain and improvements in ankle mobility and walking ability.¹⁴ Evidence from a broader meta analysis also suggests that massage therapy may reduce postoperative pain, although the available evidence is not specific to Achilles tendon repair.¹⁵ Therefore, the reduction in pain in this case may be compatible with the combined effects of movement exercise, manual intervention, and increased functional activity, but a specific treatment effect cannot be established.

The adhesive surgical scar was an important clinical finding in this case. The scar was characterized by hyperpigmentation, tightness, and restricted mobility of the scar and underlying tissue. Adhesions following Achilles tendon repair may influence local tissue mobility and clinical outcomes, and previous research has reported improved outcomes following release of adhesions after minimally invasive Achilles tendon repair.¹⁶ In addition, systematic review evidence indicates that massage based scar interventions may improve pain and scar related symptoms, although much of the available evidence concerns burn scars and the certainty of evidence remains limited.¹⁸ Evidence regarding postoperative scar massage also demonstrates substantial variation in intervention techniques, dosage, and outcome measures.⁶ Consequently, the decrease in VSS from 7 to 5 in this case should be interpreted as an observed change in scar characteristics rather than definitive evidence of scar resolution. The VSS itself also has stronger validation in burn scars than in surgical scars.⁷

Ankle ROM improved in three of the four assessed directions. Dorsiflexion increased from 25° to 37°, plantarflexion from 38° to 40°, and eversion from 12° to 15°, whereas inversion remained unchanged at 34°. The largest numerical change occurred in dorsiflexion. ROM exercise is an established component of postoperative Achilles tendon rehabilitation and is generally progressed according to the stage of tendon healing and clinical tolerance.^{2,5} Previous clinical research has also reported improvements in ankle mobility during physiotherapy following operative Achilles tendon repair.¹⁴ In the present case, ROM exercises were performed without forcing dorsiflexion because the tendon remained in the healing phase. Thus, the observed ROM changes are clinically compatible with progressive restoration of ankle mobility, although spontaneous postoperative recovery and repeated exposure to movement may also have contributed.^{2,5}

The patient also demonstrated a reduction in HRS A score from 27 to 20 and an increase in Barthel Index from 90 to 99. Psychological factors may change during rehabilitation following Achilles tendon rupture, indicating that psychological status can be relevant to the rehabilitation process.¹⁰ Deep breathing exercise and therapeutic communication were incorporated as supportive components because anxiety was identified during the initial assessment. The improvement in the Barthel Index occurred alongside walking, weight shifting, balance, and strengthening exercises, which were selected to address the patient's functional limitations. However, because these components were delivered simultaneously, the observed functional change cannot be attributed to a specific intervention.

The unchanged circumference difference of 1 cm provides an important counterpoint to the improvements observed in other outcomes. This finding indicates that the clinical changes were not uniform across all parameters. Similarly, although gait and balance impairments were identified during the initial assessment, no standardized quantitative post intervention measures were available for these outcomes. Therefore, improvement in gait or balance cannot be concluded objectively from this case.

The multimodal approach was clinically appropriate for the patient's combination of integumentary, musculoskeletal, functional, and psychological problems. Early functional rehabilitation following Achilles tendon repair is supported in the literature, although rehabilitation must remain appropriately progressive because excessive or poorly controlled mobilization during tendon healing may increase the risk of rerupture.^{2,17} The intervention in this case therefore emphasized controlled movement, progressive loading, and patient tolerance rather than predetermined increases in intensity.

Several limitations should be considered. This was a single patient case report with only two physiotherapy sessions and no control or comparison condition. Multiple interventions were administered concurrently, preventing determination of the contribution of individual treatment components. The final evaluation was performed on May 21, 2026, with no subsequent follow up. Therefore, the durability of the observed changes cannot be determined. In addition, the absence of standardized post intervention gait and balance measurements limits interpretation of these functional domains.

Overall, this case provides a clinical description of multimodal physiotherapy management for an adhesive surgical scar accompanied by musculoskeletal, functional, and psychological impairments following Achilles tendon repair. Changes were observed in pain, scar characteristics, ankle muscle strength, ROM, anxiety, and functional independence after two sessions. These findings should be interpreted as individual clinical changes during a short observation period rather than evidence of causal effectiveness. Further studies with larger samples, longer intervention periods, serial standardized measurements, and longer follow up are needed to evaluate the potential clinical benefits of this approach.

Conclusion

Multimodal physiotherapy management in a 63-year-old woman with an adhesive surgical scar approximately one month after right Achilles tendon repair was accompanied by changes across several clinical outcomes after two physiotherapy sessions. The observed changes included reduced pain intensity, with VAS scores decreasing at rest from 2 to 0, during movement from 6 to 4, and during palpation from 9 to 6. Ankle muscle strength increased from MMT 3/5 to 4/5, while ankle ROM increased in dorsiflexion, plantarflexion, and eversion, with inversion remaining unchanged. The VSS score decreased from 7 to 5, the HRS A score decreased from 27 to 20, and the Barthel Index increased from 90 to 99.

The findings indicate clinical changes in pain, scar characteristics, ankle mobility, muscle strength, anxiety, and functional independence during the short observation period. The multimodal intervention consisted of scar mobilization, AROM and PROM, isometric strengthening, weight shifting, walking exercise, balance exercise, deep breathing exercise, and therapeutic communication, with progression based on the patient's clinical condition and tolerance.

However, these findings cannot be interpreted as evidence of causal treatment effectiveness because this report involved a single patient, only two treatment sessions, concurrent intervention components, and no control condition or longer term follow up. Further studies with larger samples, longer rehabilitation periods, standardized outcome measurements, and follow up are required to determine the reproducibility and potential effectiveness of multimodal physiotherapy for patients with adhesive surgical scars following Achilles tendon repair.

Author Contribution

Kurnia Ramadhan: Conceptualization, Methodology, Investigation, Data Curation, Formal Analysis, Writing Original Draft, Writing Review and Editing.

Nur Hikmawaty: Conceptualization, Methodology, Validation, Supervision, Writing Review and Editing.

Masfufah: Investigation, Validation, Supervision, Formal Analysis, Writing Review and Editing.

Acknowledgments

The authors sincerely acknowledge the Physiotherapy Professional Program, Hasanuddin University, for academic support and institutional resources. The authors also thank Dr. Tadjuddin Chalid Hospital, Makassar, for clinical collaboration and support during the study.

Conflict of Interest Statement

The authors declare that there is no conflict of interest.

Funding Sources

This study received no external funding.

Ethics Statement

Written informed consent was obtained from the patient before participation and for publication of the clinical information. The case report was conducted in accordance with the principles of the Declaration of Helsinki, and patient anonymity was maintained throughout the preparation of the manuscript.

References

1. Santuzzi CH, Gonçalves Liberato FM, Fachini de Oliveira NF, Sgrancio do Nascimento A, Nascimento LR. Massage, laser and shockwave therapy improve pain and scar pruritus after burns: a systematic review. *J Physiother*. 2024;70(1):8-15.
2. Liu X, Dai TJ, Li BL, Li C, Zheng ZY, Liu Y. Early functional rehabilitation compared with traditional immobilization for acute Achilles tendon ruptures: a meta-analysis. *Bone Joint J*. 2021;103-B(6):1021-1030.
3. Massen FK, Shoap S, Vosseller JT, Fan W, Usseglio J, Boecker W, et al. Rehabilitation following operative treatment of acute Achilles tendon ruptures: a systematic review and meta-analysis. *EFORT Open Rev*. 2022;7(10):680-691.
4. Saxena A, Giai Via A, Grävare Silbernagel K, Walther M, Anderson R, Gerdesmeyer L, et al. Current consensus for rehabilitation protocols of the surgically repaired acute mid-substance Achilles rupture: a systematic review and recommendations from the GAIT study group. *J Foot Ankle Surg*. 2022;61(4):855-861.
5. Gould H, Bano J, Akman J, Fillar A. Postoperative rehabilitation following Achilles tendon repair: a systematic review. *Sports Med Arthrosc Rev*. 2021;29(2):130-145.
6. Scott HC, Stockdale C, Robinson A, Robinson LS, Brown T. Is massage an effective intervention in the management of post-operative scarring? A scoping review. *J Hand Ther*. 2022;35(2):186-199.
7. Knight D, Parks J. 108 An introductory systematic review of the Vancouver Scar Scale: versions, validations and utilizations. *J Burn Care Res*. 2025;46(Suppl 1):S86.
8. Lin TR, Chou FH, Wang HH, Wang RH. Effects of scar massage on burn scars: a systematic review and meta-analysis. *J Clin Nurs*. 2023;32(13-14):3144-3154.
9. Marrone W, Andrews R, Reynolds A, Vignona P, Patel S, O'Malley M. Rehabilitation and return to sports after Achilles tendon repair. *Int J Sports Phys Ther*. 2024;19(9):1152-1165.
10. Slagers AJ, Dams OC, van Zalinge SD, Geertzen JHB, Zwerver J, Reininga IHF, et al. Psychological factors change during the rehabilitation of an Achilles tendon rupture: a multicenter prospective cohort study. *Phys Ther*. 2021;101(12):pzab226.
11. Rabinowitz J, Williams JBW, Hefting N, Anderson A, Brown B, Fu DJ, et al. Consistency checks to improve measurement with the Hamilton Rating Scale for Anxiety (HAM-A). *J Affect Disord*. 2023;325:429-436.
12. Bouwstra H, Smit EB, Wattel EM, van der Wouden JC, Hertogh CPM, Terluin B, et al. Measurement properties of the Barthel Index in geriatric rehabilitation. *J Am Med Dir Assoc*. 2019;20(4):420-425.e1.
13. Severin R, Sabbahi A, Albarrati A, Phillips SA, Arena S. Blood pressure screening by outpatient physical therapists: a call to action and clinical recommendations. *Phys Ther*. 2020;100(6):1008-1019.
14. Sikorski Ł, Czamara A. Assessment of effectiveness of 15 weeks of physical therapy on biplanar ankle mobility, gait and pain level in patients following operative repair of the Achilles tendon. *Ortop Traumatol Rehabil*. 2021;23(1):33-44.
15. Liu C, Chen X, Wu S. The effect of massage therapy on pain after surgery: a comprehensive meta-analysis. *Complement Ther Med*. 2022;71:102892.
16. Carmont MR, Knutsson SB, Brorsson A, Karlsson J, Nilsson-Helander K. The release of adhesions improves outcome following minimally invasive repair of Achilles tendon rupture. *Knee Surg Sports Traumatol Arthrosc*. 2022;30(3):1109-1117.
17. Wang R, Huang L, Jiang S, You G, Zhou X, Wang G, et al. Immediate mobilization after repair of Achilles tendon rupture may increase the incidence of re-rupture: a systematic review and meta-analysis of randomized controlled trials. *Int J Surg*. 2024;110(6):3888-3899.