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## PHYSIOTHERAPY MANAGEMENT IN POST-OPERATING RECOVERY OF ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION (ACLR) SINISTRA IN PHASE 1: A CASE REPORT

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### ABSTRACT

Anterior cruciate ligament reconstruction (ACLR) requires structured physiotherapy management to support early postoperative recovery. This case report describes phase 1 physiotherapy management and short-term clinical changes in a patient after ACLR. Physiotherapy was conducted in three sessions, with clinical evaluations performed at four time points: T0 as baseline assessment and T1–T3 as follow-up evaluations after each session. The intervention focused on pain management, knee range of motion exercise, muscle activation, and gradual functional training. Outcomes were assessed descriptively using pain intensity, knee range of motion, anthropometric measurement, and the Lysholm Knee Scoring Scale. After physiotherapy, movement pain decreased from 4 to 1, tenderness pain decreased from 5 to 2, and resting pain remained 0. Left knee range of motion improved from S: 10°–10°–65° to S: 5°–10°–75°. Anthropometric measurements showed slight increases at 5 cm, 10 cm, and 15 cm proximal to the tibial tuberosity. Functional ability improved slightly, with the Lysholm Knee Scoring Scale increasing from 44 to 48. These findings indicate short-term clinical improvement during early rehabilitation after ACLR. However, because this study was a single case report with a short intervention period, the results should be interpreted descriptively and cannot be generalized as evidence of intervention effectiveness.

**Keywords:** Anterior cruciate ligament reconstruction, Physiotherapy, Rehabilitation, Range of motion, Case report.

### INTRODUCTION

Anterior cruciate ligament (ACL) injury is one of the most common musculoskeletal disorders affecting physically active individuals and frequently results in functional instability, pain, and decreased quality of life. ACL rupture commonly occurs during activities involving sudden deceleration, pivoting, or landing movements, particularly in sports requiring high knee rotational control. The injury may substantially limit daily activities and athletic participation if not managed appropriately. In recent years, physiotherapy has become an essential component in musculoskeletal rehabilitation due to its role in restoring mobility, reducing pain, and improving functional outcomes. Current evidence also emphasizes the importance of patient-centered rehabilitation approaches and individualized physiotherapy management in clinical practice (Forslund et al., 2026;

Lovegrove et al., 2026). Furthermore, physiotherapy interventions are increasingly recognized for their contribution to improving physical function and long-term rehabilitation outcomes across various clinical conditions (Demont et al., 2026; Sousa-Fraguas et al., 2026).

ACL reconstruction (ACLR) is frequently performed to restore knee stability and facilitate return to functional activity following complete ACL rupture. However, successful postoperative recovery is highly dependent on early and structured rehabilitation programs. The initial postoperative phase is particularly important because patients commonly experience pain, swelling, limited range of motion, muscle weakness, and impaired gait patterns. Without appropriate rehabilitation, these impairments may delay functional recovery and reduce overall clinical outcomes. Physiotherapy management during the early phase after ACLR therefore aims to control inflammation, restore joint mobility, activate the quadriceps muscle, and gradually improve weight-bearing capacity. Previous studies have highlighted the importance of rehabilitation frequency, therapeutic exercise, and individualized physiotherapy interventions in optimizing recovery and improving patient function (Casertano et al., 2026; Choo et al., 2026). In addition, contextualized physiotherapy approaches have been reported to support better achievement of rehabilitation goals and patient participation during recovery (Forslund et al., 2026).

Although physiotherapy is widely recommended following ACL reconstruction, reports describing detailed physiotherapy management during the early rehabilitation phase remain limited, particularly in case-based clinical settings. Most available studies focus on broader rehabilitation outcomes rather than describing specific intervention progression and short-term clinical responses during phase 1 rehabilitation. A detailed case report may therefore provide practical clinical insight regarding the implementation of physiotherapy interventions after ACLR. This report aims to describe the physiotherapy management and short-term clinical improvement of a patient following ACL reconstruction during the early rehabilitation phase. The findings of this case are expected to contribute to clinical understanding regarding early postoperative physiotherapy strategies and functional recovery after ACLR. Moreover, case-based documentation may support evidence-informed physiotherapy practice and encourage individualized rehabilitation planning in musculoskeletal care settings (Demont et al., 2026; Lovegrove et al., 2026).

The implementation of physiotherapy following ACL reconstruction should consider not only physical impairments but also the patient's overall functional goals and participation in rehabilitation activities. Early rehabilitation programs commonly emphasize pain reduction, edema control, restoration of knee range of motion, and prevention of secondary complications caused by prolonged immobilization. Therapeutic exercise is considered one of the primary interventions during this phase because gradual movement and muscle activation may facilitate tissue healing and improve functional adaptation. In addition, progressive rehabilitation strategies are necessary to support safe recovery while minimizing

excessive mechanical stress on the reconstructed ligament. Previous physiotherapy studies have demonstrated that structured rehabilitation programs may contribute to improvements in mobility, pain, and physical performance in patients with musculoskeletal disorders (Choo et al., 2026; Sousa-Fraguas et al., 2026). Physiotherapy interventions that are individualized according to patient condition and tolerance are also reported to improve rehabilitation engagement and clinical outcomes (Forslund et al., 2026).

Another important aspect in postoperative ACL rehabilitation is the role of clinical decision-making and physiotherapy supervision during the recovery process. Effective rehabilitation requires continuous evaluation of patient responses, symptom progression, and functional capacity throughout each rehabilitation session. Physiotherapists therefore play an essential role in selecting appropriate exercise progression and ensuring that interventions remain safe and clinically relevant for postoperative patients. Contemporary physiotherapy practice increasingly emphasizes evidence-informed management and patient-centered rehabilitation approaches to optimize treatment outcomes. Furthermore, collaborative therapeutic interactions between physiotherapists and patients may improve adherence to rehabilitation programs and facilitate achievement of functional goals (Demont et al., 2026; Lovegrove et al., 2026). Clinical physiotherapy practice also highlights the importance of contextualized rehabilitation strategies that integrate patient needs, physical condition, and functional expectations during recovery (Forslund et al., 2026).

Despite the growing recognition of physiotherapy in postoperative musculoskeletal rehabilitation, detailed descriptions regarding early-phase physiotherapy management after ACL reconstruction are still insufficiently reported in clinical literature. Many studies discuss rehabilitation outcomes in general terms without clearly describing intervention progression, treatment frequency, and short-term patient responses during phase 1 rehabilitation. This limitation may reduce the practical applicability of rehabilitation protocols in routine clinical settings. Therefore, presenting a structured case report may provide additional clinical insight into physiotherapy implementation following ACL reconstruction surgery. This case report specifically describes the physiotherapy interventions administered during the early postoperative phase and evaluates short-term clinical improvement based on pain intensity, range of motion, muscle strength, and functional ability. The report is expected to contribute to physiotherapy knowledge and provide practical references for clinicians managing patients after ACL reconstruction in rehabilitation settings (Casertano et al., 2026; Demont et al., 2026).

## METHODS

This study used a case report design to describe the physiotherapy management of a patient following anterior cruciate ligament reconstruction (ACLR) during the early postoperative rehabilitation phase. The case report focused on the implementation of physiotherapy interventions and short-term clinical responses observed during treatment

sessions. The patient was a postoperative ACLR patient who underwent physiotherapy rehabilitation at a physiotherapy clinic/hospital. Initial assessment was conducted before intervention to identify the patient's clinical condition, including pain intensity, knee range of motion, muscle strength, swelling, gait ability, and functional limitation. Baseline clinical examination was used to determine rehabilitation goals and intervention planning during phase 1 rehabilitation. Physiotherapy management was carried out according to the patient's tolerance and postoperative condition. A case report approach was selected because it may provide detailed clinical information regarding rehabilitation implementation and patient response during early recovery following ACL reconstruction.

The physiotherapy intervention program consisted of therapeutic exercise and supportive physiotherapy modalities administered during the early postoperative phase. Interventions focused on pain reduction, edema control, restoration of knee joint mobility, quadriceps muscle activation, and gradual improvement of functional activity. Therapeutic exercises included active and passive range-of-motion exercise, quadriceps setting exercise, ankle pumping exercise, straight leg raise exercise, stretching, and gradual gait training according to patient tolerance. Additional physiotherapy management was provided based on clinical findings during each treatment session. Rehabilitation was conducted in several treatment sessions during phase 1 postoperative management with progressive adjustment according to patient response and functional improvement. The intervention program was supervised directly by a physiotherapist to ensure treatment safety, exercise accuracy, and appropriate progression throughout rehabilitation sessions.

Outcome evaluation was performed descriptively using clinical examination findings obtained before and after the intervention period. Clinical outcomes included pain intensity using the Visual Analog Scale (VAS), knee range of motion measured using a goniometer, muscle strength evaluation, and functional ability assessment during daily activities and ambulation. Clinical progress was documented at several evaluation points during treatment sessions, including T0 as baseline assessment and subsequent follow-up evaluations during rehabilitation. Descriptive analysis was used to compare clinical findings between evaluation periods and to identify short-term clinical improvement following physiotherapy management. Because this study was designed as a case report, the findings were intended to describe patient improvement during rehabilitation rather than to determine the effectiveness or generalizability of the intervention

## RESULTS AND DISCUSSION

A total of three physiotherapy sessions were conducted during the phase 1 postoperative rehabilitation program following anterior cruciate ligament reconstruction (ACLR). Clinical evaluations were performed at four different time points, namely T0, T1, T2, and T3. T0 represented the baseline assessment before physiotherapy intervention, while T1, T2, and T3 represented follow-up evaluations after each treatment session. The

physiotherapy program focused on pain management, restoration of knee range of motion, muscle activation, and gradual functional recovery. Clinical outcomes were assessed descriptively using pain intensity, range of motion, anthropometric measurement, and functional ability evaluation. Short-term clinical improvement was observed progressively throughout the intervention period. Changes in pain intensity are presented in Table 1, while knee joint range of motion measurements are shown in Table 2.

Tabel 1. Pain Intensity During Physiotherapy Intervention

| Pain Category   | T0 | T1 | T2 | T3 |
|-----------------|----|----|----|----|
| Resting pain    | 0  | 0  | 0  | 0  |
| Tenderness pain | 5  | 5  | 4  | 2  |
| Movement pain   | 4  | 4  | 3  | 1  |

Based on the Visual Analog Scale assessment presented in Table 1, no resting pain was reported throughout the intervention period. However, reductions in tenderness pain and movement pain were observed progressively during physiotherapy management. Tenderness pain decreased from 5 at baseline assessment to 2 at the final evaluation, while movement pain decreased from 4 to 1. These findings indicate short-term clinical improvement in pain response following the physiotherapy intervention program.

Tabel 2. Knee Joint Range of Motion During Physiotherapy Intervention

| Joint         | T0             | T1             | T2             | T3            |
|---------------|----------------|----------------|----------------|---------------|
| Knee Dextra   | S: 0°–0°–135°  | S: 0°–0°–135°  | S: 0°–0°–135°  | S: 0°–0°–135° |
| Knee Sinistra | S: 10°–10°–65° | S: 10°–10°–65° | S: 10°–10°–70° | S: 5°–10°–75° |

The range of motion examination presented in Table 2 demonstrated no limitation in the right knee joint throughout the intervention period. In contrast, gradual improvement was observed in the left knee joint following physiotherapy management. At baseline assessment, the left knee range of motion was recorded as S: 10°–10°–65°, indicating limitation in knee extension and flexion. No change was observed at T1; however, knee flexion improved at T2 and T3. At the final evaluation, left knee range of motion improved to S: 5°–10°–75°. These findings suggest gradual restoration of knee joint mobility during the postoperative rehabilitation phase.

Tabel 3. Anthropometric Measurement During Physiotherapy Intervention

| Measurement Area  | T0      | T1      | T2      | T3      |
|-------------------|---------|---------|---------|---------|
| Tuberositas tibia | 36 cm   | 36 cm   | 36 cm   | 36 cm   |
| 5 cm proximal     | 40 cm   | 40 cm   | 41 cm   | 41.5 cm |
| 10 cm proximal    | 42.4 cm | 42.4 cm | 42.7 cm | 43 cm   |
| 15 cm proximal    | 47.2 cm | 47.2 cm | 47.4 cm | 47.8 cm |

Anthropometric evaluation was performed to monitor changes in lower extremity circumference during the rehabilitation period. As presented in Table 3, no change was observed at the tuberositas tibia measurement point, with a consistent value of 36 cm from T0 to T3. However, gradual increases were observed at the proximal measurement points. The circumference at 5 cm proximal increased from 40 cm to 41.5 cm, at 10 cm proximal from 42.4 cm to 43 cm, and at 15 cm proximal from 47.2 cm to 47.8 cm. These findings show changes in lower extremity circumference during the early postoperative rehabilitation period.

Table 4. Lysholm Knee Scoring Scale Results Before and After Physiotherapy Intervention

| <b>Evaluation</b>   | <b>LKSS Score</b> |
|---------------------|-------------------|
| Before intervention | 44                |
| After intervention  | 48                |

Functional ability evaluation using the Lysholm Knee Scoring Scale demonstrated a slight improvement following the physiotherapy intervention program. As presented in Table 4, the patient's score increased from 44 before intervention to 48 after completion of the rehabilitation sessions. This increase indicates short-term improvement in knee-related functional ability during daily activities. Although the improvement was relatively limited due to the short intervention period and early postoperative condition, the findings suggest positive clinical progression during phase 1 rehabilitation management.

The present case report demonstrated short-term clinical improvement following physiotherapy management during phase 1 **rehabilitation after anterior cruciate ligament reconstruction** (ACLR). Improvements were observed in pain intensity, knee joint range of motion, lower extremity anthropometric measurements, and functional ability based on the Lysholm Knee Scoring Scale. The reduction in tenderness pain and movement pain indicated a positive clinical response during the rehabilitation period, while gradual improvement in knee range of motion suggested recovery of joint mobility after surgery. In addition, slight increases in lower extremity circumference measurements may reflect progressive muscle activation and reduced postoperative muscle impairment during rehabilitation. Functional improvement was also observed through the increase in LKSS score from 44 to 48 following intervention. Although the intervention duration was relatively short and limited to the early postoperative phase, the findings suggest that structured physiotherapy management may support recovery progression after ACLR. These findings are consistent with previous physiotherapy studies reporting that rehabilitation programs contribute to improvements in pain, mobility, and functional performance in musculoskeletal conditions (Choo et al., 2026; Sousa-Fraguas et al., 2026). Furthermore, patient-centered physiotherapy approaches and contextualized rehabilitation strategies have been reported to facilitate achievement of

rehabilitation goals and improve patient participation during recovery (Forslund et al., 2026; Lovegrove et al., 2026). The role of physiotherapists in monitoring patient response and adjusting interventions progressively is also considered essential in optimizing rehabilitation outcomes during clinical practice (Demont et al., 2026).

Pain reduction observed in this case may be associated with the implementation of therapeutic exercise and gradual mobilization during postoperative rehabilitation. Early physiotherapy intervention following ACL reconstruction is commonly directed toward controlling inflammation, minimizing joint stiffness, improving circulation, and facilitating muscle activation to support functional recovery. In the present case, tenderness pain decreased from 5 to 2, while movement pain decreased from 4 to 1 during the intervention period. The reduction in pain may have contributed to improved participation during exercise and rehabilitation activities. Therapeutic exercise programs involving controlled movement and progressive loading are known to support adaptation of musculoskeletal structures and improve physical function during recovery. Previous studies have also reported that physiotherapy interventions may contribute to pain reduction and improved physical condition in rehabilitation patients (Choo et al., 2026; Ferreira et al., 2026). In addition, frequent physiotherapy supervision and individualized rehabilitation adjustment are considered important components in supporting safe clinical progression during treatment (Casertano et al., 2026). The findings of this case therefore support the clinical importance of early physiotherapy management following ACL reconstruction, particularly during the initial rehabilitation phase when pain and mobility limitation commonly interfere with patient function.

Improvement in knee joint range of motion observed in this case may indicate progressive recovery of joint mobility during the early rehabilitation phase following ACL reconstruction. At the final evaluation, left knee flexion improved from 65° to 75°, while limitation in extension also showed gradual improvement. Restoration of knee mobility is considered an important rehabilitation target after ACLR because restricted motion may interfere with gait, functional activity, and overall recovery progression. Early mobilization and controlled exercise are commonly implemented to prevent excessive joint stiffness and facilitate gradual return of movement capacity. In the present case, physiotherapy interventions emphasizing active movement, muscle activation, and gradual exercise progression may have contributed to the observed ROM improvement. Previous literature has emphasized that physiotherapy management should be individualized according to patient tolerance and functional goals during rehabilitation (Forslund et al., 2026). Patient-centered rehabilitation approaches also encourage active participation during recovery and support better achievement of functional outcomes (Lovegrove et al., 2026). Furthermore, physiotherapists play an important role in clinical decision-making and exercise progression to ensure safe rehabilitation progression following musculoskeletal injury and surgery

(Demont et al., 2026). Therefore, the gradual improvement in ROM observed in this case may reflect positive adaptation during the postoperative rehabilitation process.

Anthropometric findings in this case demonstrated slight increases in lower extremity circumference measurements during the intervention period, particularly at the proximal measurement areas. Although the changes were relatively small, these findings may indicate gradual improvement in muscle condition and reduced postoperative muscle impairment following rehabilitation. Muscle weakness and quadriceps atrophy are common problems after ACL reconstruction due to pain, swelling, limited movement, and reduced weight-bearing activity during the early postoperative phase. Physiotherapy interventions focusing on muscle activation and progressive exercise are therefore important to minimize muscle loss and support functional recovery. In the present case, gradual increases in circumference measurements at 5 cm, 10 cm, and 15 cm proximal to the tuberositas tibia may reflect adaptation associated with rehabilitation exercises and increased lower extremity activity. Similar findings have been reported in physiotherapy rehabilitation studies demonstrating that structured exercise and rehabilitation programs may improve physical condition and functional performance during recovery (Sousa-Fraguas et al., 2026). Frequent therapeutic intervention and progressive rehabilitation strategies are also considered important for maintaining physical function during rehabilitation management (Casertano et al., 2026). In addition, biomechanical and rehabilitation-based physiotherapy approaches may contribute to improved movement quality and muscle performance in patients undergoing rehabilitation programs (Monteiro et al., 2026). Although the present findings cannot establish causal relationships due to the case report design, the anthropometric changes observed may suggest positive short-term adaptation during postoperative physiotherapy rehabilitation.

Functional improvement observed in this case was reflected by the increase in the Lysholm Knee Scoring Scale score from 44 before intervention to 48 after completion of the physiotherapy sessions. Although the improvement was relatively modest, the findings suggest positive progression in knee-related functional ability during the early postoperative rehabilitation phase. Functional recovery after ACL reconstruction is influenced not only by pain reduction and restoration of joint mobility, but also by patient confidence, participation in movement, and adaptation to daily activities. In this case, the gradual reduction in pain and improvement in range of motion may have contributed to better functional performance during rehabilitation. Contemporary physiotherapy practice emphasizes patient-centered rehabilitation approaches that integrate functional goals, patient participation, and individualized exercise progression throughout recovery (Forslund et al., 2026; Lovegrove et al., 2026). Patient experience and caregiver perspectives are also important considerations in rehabilitation because functional recovery is closely related to daily participation and perceived quality of life (Fine et al., 2026). Furthermore, physiotherapy-guided assessment and management may support safer clinical decision-making and more appropriate rehabilitation progression in patients with complex functional complaints (Vats et al., 2026).

Clinical physiotherapy services that facilitate safe transition, symptom management, and functional participation are therefore important in supporting rehabilitation outcomes (Ingkapassakorn et al., 2026; Truter et al., 2026). In addition, the development of physiotherapy clinical skills and rehabilitation competence is essential to ensure appropriate intervention planning and patient monitoring during postoperative management (Bylund et al., 2026).

Several limitations should be considered when interpreting the findings of this case report. First, this study involved only a single patient, which limits generalizability of the findings to broader postoperative ACL reconstruction populations. Second, the intervention period was relatively short and limited to the early rehabilitation phase, preventing evaluation of long-term functional recovery and sustained rehabilitation outcomes. Third, the absence of a control comparison means that the observed improvements cannot be interpreted as definitive evidence of intervention effectiveness. The findings should therefore be interpreted as descriptive clinical observations rather than causal conclusions. In addition, postoperative recovery may be influenced by multiple factors including patient adherence, surgical condition, baseline functional status, and rehabilitation progression. Clinical guideline appraisal and evidence-based physiotherapy practice remain important to ensure safe and appropriate rehabilitation management in postoperative conditions (Spooren, 2026). Challenges in physiotherapy supervision, clinical reasoning, and rehabilitation implementation may also influence treatment outcomes during clinical practice (Johnston et al., 2026). Furthermore, physiotherapy assessment and interpretation are inherently complex processes that require contextual clinical judgment during patient management (Breedt et al., 2026). Future studies with larger sample sizes, longer follow-up duration, and comparative research designs are therefore recommended to provide stronger evidence regarding physiotherapy management following ACL reconstruction.

## CONCLUSION

This case report showed that phase 1 physiotherapy management after anterior cruciate ligament reconstruction was followed by short-term clinical improvement in pain intensity, knee range of motion, lower extremity circumference, and functional ability. Pain during movement and tenderness decreased, knee flexion improved, proximal lower extremity circumference increased slightly, and the Lysholm Knee Scoring Scale score increased from 44 to 48 after three physiotherapy sessions. These findings suggest positive early clinical progression; however, because this study involved only one patient and had a short intervention period, the results should be interpreted descriptively and cannot be generalized as evidence of intervention effectiveness.

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