

PHYSIOTHERAPY MANAGEMENT IN A 2-MONTH POST-OPERATIVE ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION (ACLR) CASE AT A3 PHYSIO CENTER YOGYAKARTA: A CASE REPORT

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ABSTRACT

Anterior Cruciate Ligament (ACL) injury can cause pain, limited range of motion, knee instability, and impaired functional activities. ACL reconstruction should be followed by physiotherapy rehabilitation to support the recovery of knee function. This study aimed to describe the examination, physiotherapy management, and intervention outcomes in a patient with post-operative Anterior Cruciate Ligament Reconstruction (ACLR). The study used a case report design on a 20-year-old male patient with a right knee post-operative ACLR condition two months after surgery. The intervention was conducted in three sessions over three weeks at A3 Physio Center Physiotherapy Clinic, Yogyakarta. Evaluation was performed using the Numeric Rating Scale (NRS), goniometer, Manual Muscle Testing (MMT), and International Knee Documentation Committee (IKDC). Physiotherapy interventions included TENS, ultrasound, massage gun, patellar mobilization, functional knee exercises, active resisted exercise using a theraband, education, and a home program. After therapy, movement pain decreased from 5/10 to 0/10, resting pain decreased from 2/10 to 0/10, and pressure pain decreased from 3/10 to 0/10. Active ROM of the right knee increased from S: 0°–0°–125° to S: 0°–0°–127°. Quadriceps and hamstring muscle strength remained at 5/5. The IKDC score increased from 58 to 88. Physiotherapy management in post-operative ACLR patients can reduce pain, increase ROM, maintain muscle strength, and improve knee functional ability.

Keywords: ACLR, Physiotherapy, Knee rehabilitation, Knee pain, IKDC

INTRODUCTION

The Anterior Cruciate Ligament (ACL) is one of the primary ligaments responsible for maintaining knee joint stability. Anatomically, the ACL connects the posterior aspect of the femoral condyle to the anterior region of the tibia at the intercondylar eminence and functions to restrict anterior tibial translation relative to the femur. In addition, the ACL contributes to controlling rotational movements of the knee during functional activities that require joint stability (Widyawati et al., 2021). Knee stability is influenced by primary stabilizers, namely ligaments, and secondary stabilizers, namely muscles, which work synergistically to maintain joint motion control (Zakia et al., 2025). Damage to the ACL can compromise the mechanical stability of the knee, resulting in functional limitations, particularly during activities involving changes in direction, running, jumping, and various sports-related movements (Uludağ et al., 2026).

ACL injury is one of the most common musculoskeletal injuries affecting the knee joint, particularly among physically active individuals and athletes. This injury generally occurs through non-contact mechanisms, such as pivoting movements, sudden changes

in direction, rapid deceleration, and improper landing following a jump (Vats et al., 2026). Common clinical manifestations include an audible “pop” sound, acute pain, swelling, knee instability, and restricted range of motion, all of which may interfere with daily activities and athletic performance (Enang et al., 2026). If not managed appropriately, ACL injuries may lead to long-term functional impairments, including activity limitations and diminished movement quality (Forslund et al., 2026).

The importance of effective ACL injury management continues to increase in line with the growing incidence of cases reported worldwide. Knee injuries, including ACL injuries, require considerable attention due to their substantial impact on functional capacity and participation in daily activities (Fischer et al., 2026). In Indonesia, musculoskeletal knee injuries remain a common clinical problem encountered in physiotherapy practice and require appropriate rehabilitation strategies (Widyawati et al., 2021). The high demand for functional recovery highlights the necessity of a comprehensive approach to ACL injury management, aimed not only at restoring anatomical knee stability but also at optimizing patients’ functional abilities and overall quality of movement (Spooren, 2026).

One of the most commonly used treatment approaches for ACL tears is Anterior Cruciate Ligament Reconstruction (ACLR). This procedure aims to replace the ruptured ligament using a graft in order to restore the mechanical stability of the knee (Enang et al., 2026). ACLR is generally recommended for young active patients, athletes, and individuals who experience persistent knee instability following injury. Various studies have demonstrated that ACL reconstruction can improve knee joint stability, reduce complaints of instability, and support patients in returning to their daily activities more safely (Spooren, 2026). Nevertheless, the success of surgical intervention is determined not only by the surgical procedure itself but also by the quality of the rehabilitation program undertaken after surgery (Forslund et al., 2026).

Following ACLR surgery, patients frequently experience various problems, including pain, edema, limited range of motion (ROM), decreased quadriceps and hamstring muscle strength, impaired neuromuscular control, and reduced functional capacity. These conditions may hinder the recovery process and prolong the time required to return to normal activities if not managed appropriately (Lovegrove et al., 2026). Therefore, physiotherapy plays an important role in every phase of post-ACLR rehabilitation through the application of pain-relieving modalities, ROM exercises, muscle strengthening exercises, balance training, and functional exercises tailored to the stage of tissue healing (Ranganathan et al., 2026). A structured and progressive rehabilitation program is required to assist patients in achieving optimal functional recovery and improving their quality of life following ACL reconstruction (Sousa-Fraguas et al., 2026).

Numerous studies and case reports regarding post-ACLR rehabilitation have been published; however, patient recovery outcomes may vary depending on the postoperative period, patient characteristics, the type of intervention provided, and adherence to the rehabilitation program (Johnston et al., 2026). Most studies have focused on long-term

evaluation or the later phases of rehabilitation, whereas reports concerning physiotherapy management in young post-ACLR patients with specific goals of improving functional ability remain relatively limited (Widyawati et al., 2021). This condition highlights the need for more detailed clinical documentation regarding the physiotherapy rehabilitation process during the early to intermediate phases following ACLR. Such documentation may provide a clearer description of the implementation of physiotherapy interventions in daily clinical practice and support the development of evidence-based physiotherapy services (Fischer et al., 2026).

Although numerous studies have reported the effectiveness of rehabilitation programs following Anterior Cruciate Ligament Reconstruction (ACLR), variations in recovery outcomes remain, influenced by patient characteristics, rehabilitation phase, and the type of intervention provided (Johnston et al., 2026). Furthermore, most studies have primarily focused on the evaluation of clinical parameters such as pain, muscle strength, and range of motion (ROM), whereas studies examining the relationship between improvements in these parameters and the ability to perform specific functional activities remain relatively limited (Lovegrove et al., 2026). Therefore, this study offers potential novelty by reporting the implementation of a combination of several physiotherapy modalities and exercise therapy in a young post-ACLR patient who had entered the second postoperative month. The focus is directed not only toward changes in clinical parameters but also toward improvements in the patient's functional ability to perform activities relevant to the daily needs of the Indonesian population (Ranganathan et al., 2026).

Based on the aforementioned background, this study aims to describe the physiotherapy assessment process, intervention management, and rehabilitation outcomes in a patient with a post-operative Anterior Cruciate Ligament Reconstruction (ACLR) condition at A3 Physio Center Physiotherapy Clinic, Yogyakarta. This study is expected to provide an overview of the implementation of physiotherapy programs during the post-ACLR rehabilitation phase and to contribute additional clinical evidence that may serve as a reference for the development of evidence-based physiotherapy practice aimed at improving the functional ability of patients with knee ligament injuries (Fischer et al., 2026; Sousa-Fraguas et al., 2026).

METHODS

This study employed a case report design aimed at providing an in-depth description of the physiotherapy assessment process, physiotherapy management, and intervention outcomes in a patient with a post-operative Anterior Cruciate Ligament Reconstruction (ACLR) condition. The case report design was selected because it can provide a comprehensive clinical overview of the physiotherapy rehabilitation process in a specific case, thereby serving as a reference for physiotherapy practitioners in managing similar cases. The study was conducted at the A3 Physio Center Physiotherapy Clinic, Yogyakarta, from 15 September to 9 October 2025.

The study subject was a 20-year-old male patient with a post-operative ACLR condition of the right knee, two months after surgery. The patient had a history of injury while playing futsal, characterized by an audible “pop” sound, pain, and knee instability. After undergoing ACL reconstruction surgery on 17 July 2025, the patient continued to experience right knee pain, limited knee flexion, and difficulty performing the kneeling sitting position (*duduk simpuh*). These complaints formed the basis for implementing a physiotherapy rehabilitation program aimed at improving knee function and the patient's ability to perform daily activities.

The study procedure began with a physiotherapy assessment and examination, including history taking, physical examination, and measurement of the patient's functional status. Assessments were performed before the intervention (T0) and were evaluated periodically at each treatment session until the end of the rehabilitation program (T3). The evaluated parameters included pain intensity, range of motion (ROM), muscle strength, and knee functional ability.

The data collection instruments used in this study consisted of: (1) the Numeric Rating Scale (NRS) to measure pain intensity on a scale ranging from 0 to 10, where a score of 0 indicates no pain and a score of 10 indicates severe pain; (2) a goniometer to measure knee joint range of motion during flexion and extension movements; (3) Manual Muscle Testing (MMT) to assess quadriceps and hamstring muscle strength using a scale of 0–5; and (4) the International Knee Documentation Committee (IKDC) questionnaire to evaluate knee function, symptoms, and activity performance in patients following ACL reconstruction. The selection of these instruments was based on their established validity and reliability in the assessment of musculoskeletal conditions and post-ACLR rehabilitation (Chiarotto et al., 2019).

The physiotherapy interventions provided included Transcutaneous Electrical Nerve Stimulation (TENS) for 20 minutes to help reduce pain, ultrasound therapy for 2 minutes per treatment area to improve soft tissue elasticity, massage gun therapy for 5 minutes to facilitate muscle relaxation, patellar mobilization, functional knee exercises (quadriceps sets, hamstring sets, and four-way leg raise exercises), as well as active resisted exercises using a theraband, which were focused on strengthening the lower-extremity muscles. In addition, the patient received education and a home exercise program consisting of active exercises and active-assisted exercises performed independently at home to maintain and improve knee flexibility and function.

The rehabilitation program was conducted over three treatment sessions within a three-week period. Evaluations were performed at each session to monitor changes in the patient's condition. The examination results were presented descriptively by comparing measurements obtained before and after the intervention for each observed parameter, including pain, range of motion, muscle strength, and knee functional ability.

RESULTS

The results of pain evaluation using the Numeric Rating Scale (NRS) are presented in Table 1. Based on the table, a reduction in pain was observed across all evaluation

components. Movement pain decreased from 5/10 at T0 to 0/10 at T3, resting pain decreased from 2/10 to 0/10, and tenderness pain decreased from 3/10 to 0/10. These findings indicate an improvement in pain-related complaints following the patient's participation in the physiotherapy program over three treatment sessions.

Table 1. Pain Evaluation Results

Numeric Rating Scale	T0	T1	T2	T3
Movement Pain	5/10	5/10	3/10	0/10
Resting Pain	2/10	2/10	1/10	0/10
Tenderness Pain	3/10	3/10	2/10	0/10

The results of the Range of Motion (ROM) evaluation of the right knee are presented in Table 2. Based on the table, improvements were observed in active, passive, and isometric ROM. Active right knee ROM increased from S: 0°–0°–125° at T0 to S: 0°–0°–127° at T3. Passive ROM increased from S: 0°–0°–127° to S: 0°–0°–130°, while isometric ROM increased from S: 0°–0°–129° to S: 0°–0°–132°. Although the increase in active ROM was relatively small, amounting to only 2°, the interpretation of this finding should be carefully considered in relation to changes in the patient's functional performance, particularly the ability to perform the kneeling sitting position (*duduk simpuh*).

Table 2. Range of Motion (ROM) Evaluation Results

Region	T0	T1	T2	T3
Active Right Knee Motion	S: 0°–0°–125°	S: 0°–0°–126°	S: 0°–0°–127°	S: 0°–0°–127°
Passive Right Knee Motion	S: 0°–0°–127°	S: 0°–0°–127°	S: 0°–0°–130°	S: 0°–0°–130°
Isometric Right Knee Motion	S: 0°–0°–129°	S: 0°–0°–129°	S: 0°–0°–131°	S: 0°–0°–132°

The results of muscle strength evaluation using Manual Muscle Testing (MMT) are presented in Table 3. Based on the table, quadriceps and hamstring muscle strength on both the right and left sides remained at a score of **5**. Therefore, these findings are more appropriately interpreted as indicating that the patient's muscle strength was maintained throughout the physiotherapy program rather than improved.

Table 3. Muscle Strength Evaluation Results

Muscle	Dextra	Sinistra
Quadriceps	5	5
Hamstring	5	5

The results of knee function evaluation using the International Knee Documentation Committee (IKDC) questionnaire are presented in Table 4. Based on the table, the IKDC score increased progressively from 58 at T0 to 68 at T1, 78 at T2, and 88 at T3. This increase indicates an improvement in knee functional ability throughout the course of therapy. At the final evaluation, the patient was reported to be able to perform the kneeling sitting position (*duduk simpuh*) more comfortably and was able to continue to the next phase of the rehabilitation program.

Table 4. International Knee Documentation Committee (IKDC) Evaluation Results

T0	T1	T2	T3
58	68	78	88

The results of this study indicate that physiotherapy management in a post-operative ACLR patient produced positive changes in pain reduction, ROM improvement, knee functional ability, and maintenance of quadriceps and hamstring muscle strength. These findings are consistent with physiotherapy principles that emphasize the importance of structured interventions, periodic evaluation, and a patient-needs-based approach. In physiotherapy practice, the success of an intervention is determined not only by the type of modality used, but also by the accuracy of assessment, exercise planning, patient education, and continuity of the rehabilitation program, as emphasized in various case-based and clinical service physiotherapy studies (Enang et al., 2026; Widyawati et al., 2021; Zakia et al., 2025).

Pain reduction in the patient was reflected in changes in the NRS scores, with movement pain decreasing from 5/10 to 0/10, resting pain from 2/10 to 0/10, and tenderness pain from 3/10 to 0/10. These results indicate that the combination of physiotherapy interventions provided contributed to the improvement of pain-related complaints during the rehabilitation process. This finding is supported by studies showing that physiotherapy plays a role in pain management for various musculoskeletal and post-medical procedure conditions through modalities, therapeutic exercise, education, and activity management approaches (Choo et al., 2026; Ferreira et al., 2026; Uludağ et al., 2026). Therefore, the pain reduction observed in this case can be understood as the result of physiotherapy interventions delivered gradually and adjusted to the patient's tolerance.

In addition to pain, ROM improvement is also an important indicator in the post-ACLR rehabilitation process. In this study, active ROM of the right knee increased from S: 0°–0°–125° to S: 0°–0°–127°, passive ROM increased from S: 0°–0°–127° to S: 0°–0°–130°, and isometric ROM increased from S: 0°–0°–129° to S: 0°–0°–132°. Although the increase in active ROM was relatively small, this result should still be interpreted together with changes in the patient's function, particularly the improved ability to perform the kneeling sitting position reported at the end of therapy. This is in line with the concept of contextualized physiotherapy, which evaluates rehabilitation success not only based on numerical changes in measurement outcomes but also on the achievement of the patient's

functional goals in daily activities (Forslund et al., 2026; Lovegrove et al., 2026; Sousa-Fraguas et al., 2026).

The muscle strength evaluation showed that the Manual Muscle Testing (MMT) scores for the quadriceps and hamstring muscles remained at 5/5 throughout the therapy period. This finding indicates that the rehabilitation program provided was able to maintain muscle strength during the rehabilitation phase being undertaken by the patient. This interpretation is more appropriate than stating that muscle strength improved, as no change in MMT scores was found between the initial and final evaluations. Quadriceps and hamstring strength are important components in maintaining dynamic knee stability after ACL reconstruction. Therefore, maintaining muscle strength during the rehabilitation phase is an important clinical achievement to support the patient's functional recovery process. This finding is consistent with various studies emphasizing the importance of therapeutic exercise and muscle strengthening in maintaining patients' functional capacity during physiotherapy rehabilitation (Casertano et al., 2026; Enang et al., 2026; Ingkapassakorn et al., 2026).

The improvement in functional ability in this study was indicated by an increase in the International Knee Documentation Committee (IKDC) score from 58 at T0 to 88 at T3. This increase indicates improvements in symptoms, knee function, and the patient's ability to perform daily activities. In addition to the IKDC score, functional improvement was also reflected in the patient's improved ability to perform the kneeling sitting position at the end of therapy. This result supports the view that rehabilitation success should not only be evaluated based on physical parameters such as pain or ROM, but also on the patient's ability to achieve activities that are meaningful in daily life. This approach is consistent with the concept of rehabilitation oriented toward patient-centered goals and the improvement of functional participation in daily activities (Demont et al., 2026; Forslund et al., 2026; Rongen et al., 2026).

The findings of this study also indicate that the combination of physiotherapy modalities, therapeutic exercise, education, and a home exercise program contributed to the rehabilitation process in the post-ACLR patient. A structured rehabilitation program enables the patient to participate actively in the recovery process, thereby supporting gradual improvement in knee function. Several studies have shown that the success of physiotherapy is influenced not only by interventions provided in the clinic, but also by patient involvement in independent exercises, adherence to the rehabilitation program, and the physiotherapist's ability to provide effective education (Chong et al., 2026; Johnston et al., 2026; Spooren, 2026). Therefore, a rehabilitation approach that integrates clinic-based therapy and independent home exercises is an important component in achieving optimal rehabilitation outcomes in post-operative ACLR patients.

The novelty of this study lies in reporting the implementation of a comprehensive physiotherapy program in a young post-operative ACLR patient who had entered the second postoperative month, with a specific functional target of improving the ability to perform the kneeling sitting position. Unlike most studies that focus on general rehabilitation outcomes, this study not only evaluated changes in pain, ROM, muscle

strength, and IKDC score, but also related these outcomes to functional activities relevant to the patient's needs. This approach is in line with the development of modern physiotherapy practice, which emphasizes the importance of clinical decision-making based on individual patient needs and the context of the activities to be achieved (Breedt et al., 2026). Furthermore, rehabilitation success is strongly influenced by the physiotherapist's ability to integrate clinical assessment, goal setting, and intervention strategies appropriate to the patient's condition (Truter et al., 2026; Vats et al., 2026). Therefore, this case report may provide additional clinical evidence regarding the implementation of function-oriented physiotherapy rehabilitation tailored to the specific needs of post-ACLR patients.

More broadly, the results of this study indicate that physiotherapy plays an important role in supporting postoperative recovery through a structured, patient-centered, and continuous approach. This concept is consistent with current developments in contemporary physiotherapy, which position rehabilitation as an effort to improve patients' function, participation, and quality of life through a combination of clinical interventions, education, and patient empowerment during the recovery process (Forslund et al., 2026). The implementation of an appropriate rehabilitation program may also reduce activity limitations and accelerate the individual's return to daily and productive activities (Jun et al., 2026). Thus, the findings of this study are not only beneficial for the management of post-operative ACLR patients, but also provide an overview of the importance of applying function-based physiotherapy to support rehabilitation outcomes in various musculoskeletal and post-surgical conditions (Fischer et al., 2026; Monteiro et al., 2026; Rose et al., 2026).

CONCLUSION

Physiotherapy management in a post-operative Anterior Cruciate Ligament Reconstruction (ACLR) patient over a three-week period showed positive results in the patient's recovery process. The interventions, which included Transcutaneous Electrical Nerve Stimulation (TENS), ultrasound, massage gun therapy, patellar mobilization, functional knee exercises, active resisted exercises using a theraband, education, and a home exercise program, were able to reduce pain, improve knee range of motion (ROM), maintain quadriceps and hamstring muscle strength, and improve functional ability, as indicated by an increase in the International Knee Documentation Committee (IKDC) score from 58 to 88. In addition, the patient showed improvement in the ability to perform the kneeling sitting position as one of the main functional targets of rehabilitation. These findings indicate that a structured physiotherapy program oriented toward the patient's functional goals can optimally support the recovery process after ACLR and help the patient return to daily activities more effectively.

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