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Research Articles

Physiotherapy Management in Case of Intercondylar Femur Malunion (D) Post Orif : Case Report

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Abstract: Intercondylar fractures of the femur are complex intra-articular injuries involving the medial and lateral condyles at the distal end of the femur bone, just above the knee joint. These injuries are commonly caused by high-energy trauma, such as motor vehicle accidents or falls from significant heights. This study presents a case report of a 23-year-old unemployed female patient. The assessment tools used included the Numeric Pain Rating Scale (NPRS) for evaluating pain intensity, a goniometer for measuring the range of motion (ROM), Manual Muscle Testing (MMT) for assessing muscle strength, and the Lysholm Knee Scoring Scale for evaluating functional activity. After three physiotherapy sessions conducted over three weeks, the patient demonstrated a reduction in pain, an improvement in muscle strength, an increased joint range of motion, and enhanced functional activity. A rehabilitation program consisting of Transcutaneous Electrical Nerve Stimulation (TENS), forced knee flexion with a quadriceps board, active knee flexion and extension exercises with a gym ball, stretching exercises, and active functional training was found to be effective in improving the patient's post-operative outcomes following malunion intercondylar femur fracture (right) post-ORIF.

Keywords: fracture, intercondylar femur, physiotherapy

1. Introduction

Femoral intercondylar fractures are complex intra-articular injuries that occur between the medial and lateral condyles of the distal femur, just above the knee joint. These injuries are generally caused by high-energy trauma, such as traffic accidents or falls from a height, and are most common in active young adults. At the age of 20 to 30, these fractures are more common in men due to high axial loads accompanied by rotational movements (Karekar et al., 2023). Although the incidence is relatively low overall, femoral intercondylar fractures require careful treatment because they can damage the joint surface and surrounding soft tissues. This fracture is included in the category of distal femoral fractures and represents around 15.4% of all fractures, with significant variations in shape and severity depending on the mechanism of injury (Cahyani et al., 2024). Post-internal fixation complications are also a concern, where the risk of delayed union and non-union is around 6.4%, while implant failure is reported at 3.6%. This risk increases in conditions of imbalanced loading, excessive immobilization, or poor soft tissue quality after surgery (Nauth et al., 2024). The prognosis is generally good for young patients if treatment is carried out appropriately and supported by progressive rehabilitation. However, delayed mobilization and suboptimal treatment can cause long-term complications such as joint stiffness, chronic pain, or impaired knee function (Chaouch et al., 2022).

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The femur, the most prominent human bone, supports body weight and mobility. In the distal femur, some ligaments function to stabilize the knee joint, including the tibial collateral ligament (medial) and fibular collateral ligament (lateral), as well as the patellar ligament that connects the quadriceps muscle to the patellar bone. In this area, some muscles play a role in the movement of the knee and hip joints, such as the quadriceps femoris, which is responsible for knee extension, and the hamstrings, which play a role in knee flexion. The gastrocnemius muscle contributes to knee flexion and is part of the calf muscle. Tension of these muscles can cause deformity in the affected segment, which affects muscle function. Therefore, rehabilitation is essential to restore normal strength and function during healing (Doris, 2020).

Delays in treatment can result in neglected conditions, potentially leading to complications (Iqbal et al., 2021). Femoral intercondylar malunion occurs when the fractured femur bones fuse in an unanatomical position, causing deformity and impaired function. In the case of femoral intercondylar malunion, malunion can interfere with the mechanics of the knee joint due to misalignment of the distal femoral articular surface, risking pain, instability, and functional limitations.

Distal femoral fractures have evolved in their treatment approaches from non-operative to conservative methods. The goal is to achieve and maintain sound joint reduction and allow active mobilization as soon as possible to minimize joint stiffness and muscle atrophy, which are often seen in conservative treatment (Fratto, 2023). Each patient will undergo physiotherapy on the first day after surgery and start a rehabilitation program, starting with basic exercises such as leg lifts and sitting with leg extension positions, which are done every day until reaching a stage where the patient can walk independently. Strengthening of the quadriceps muscle showed continuous improvement throughout the postoperative period. Physiotherapy interventions included TENS, active flexion and extension exercises with a gym ball, stretching, and active training. This study aims to evaluate the effectiveness of these exercises in the rehabilitation process in cases of post-intercondylar femoral fracture.

2. Literature Review

Femoral intercondylar fractures are complex intra-articular injuries that typically result from high-energy trauma, such as motor vehicle accidents or falls. These fractures, which occur between the medial and lateral condyles of the distal femur, are particularly challenging due to their potential to disrupt knee joint mechanics and surrounding soft tissues (Karekar et al., 2023). While they account for a relatively small proportion of all femoral fractures, their impact on joint function and long-term mobility is significant (Nauth et al., 2024).

Rehabilitation following surgical fixation plays a crucial role in recovery, yet there is ongoing debate regarding optimal intervention strategies (Iqbal et al., 2021). Some studies emphasize early mobilization to prevent stiffness and muscle atrophy, while others caution against excessive loading due to the risk of delayed union or implant failure. Physiotherapy modalities such as TENS, active flexion-extension exercises, and progressive strength training have been shown to improve pain, range of motion, and functional outcomes. However, the effectiveness of these interventions can vary depending on factors such as patient age, fracture severity, and adherence to rehabilitation protocols (Karekar et al., 2023).

A critical gap in the literature is the lack of standardized rehabilitation guidelines for cases of malunion, where bones heal in a misaligned position. Most existing research focuses on acute fracture management rather than addressing complications like malunion. Additionally, while some studies report success with gym ball exercises and forced flexion techniques, others highlight the need for caution due to potential soft tissue strain. These inconsistencies suggest a need for further research to establish evidence-based protocols tailored to malunion cases.

3. Methods

This study used a case report method that observed a 23-year-old female patient. This study was conducted in December 2024. The patient had undergone four operations for Malunion Intercondylar Femur (D) post-or if due to infection, with the last operation performed in November 2024.

The patient reported experiencing pain, swelling, and infection in the right knee after surgery. The pain felt like pulling and often appeared when the patient moved, such as when the knee was bending. In addition, the patient also experienced pain in the right thigh, especially when pressure was applied around the incision wound area. Limited movement, especially when bending the knee, was also complained of. The patient felt he did not dare to squat because of the pain that still existed. The pain level in a motion described by the patient was 6/10, while pressure pain was 7/10. The pain felt resembled a pulled muscle, which indicated muscle shortening. The results of the examination showed limited movement when bending the knee. The patient also had difficulty lifting the right lower leg, which indicated weakness in the iliopsoas muscle.

The measuring instruments used in this study included the NPRS (Numeric Pain Rating Scale) to assess pain levels, a goniometer to evaluate range of motion (ROM), an MMT (Manual Muscle Testing) to measure patient muscle strength, and the Lysholm Knee Scoring Scale to assess functional ability.

The rehabilitation program followed by the patient included TENS for 15 minutes, Forced Flexi Knee With Quadriceps Board, active flexion and extension exercises with a gym ball, stretching, and active exercises three times over three weeks. This therapy program aims to increase muscle strength and reduce pain to increase the patient's range of motion. Each movement is done in three sets, with eight repetitions for each set. Patients are also asked to do home programs such as Forced Flexi Knee with a prone lying position or sitting on the edge of the bed, active flexion and extension exercises, stretching, and active exercises. The results of the study were conducted during three meetings in the case of Malunion Intercondylar Femur (D) Post Orif with the modalities provided such as TENS, Forced Flexi Knee With Quadriceps Board, active flexion and extension exercises with a gym ball, stretching, and active exercises.

4. Results

The results of the evaluation of the TENS intervention, Forced Flexi Knee With Quadriceps Board, Active flexion and extension knee with a gym ball, Stretching, and active exercises in post-op patients with Malunion Intercondylar Femur (D) Post Orif during three meetings in three weeks are shown in the appendix table.

Table 1. Results of NPRS (Numeric Pain Rating Scale) evaluation

Knee dextra	**T1**	**T2**	**T3**
Silent pain	0/10	0/10	0/10
Pressure pain (Incision Wound)	7/10	5/10	3/10
Movement pain (Knee Flexion)	6/10	5/10	3/10

Table 1 shows the pressure pain score using the NPRS scale in the right knee area, with a decrease of 2 points at each meeting in the measurement of pressure pain after the intervention and a decrease of 1 point in movement at the second meeting, then decreasing again by 2 points at the third meeting.

Table 2. Results of MMT (Manual Muscle Testing) evaluation

Muscle type (dextra)	T1	T2	T3
Quadriceps	*2+*	*3*	*3+*
Hamstrings	*2+*	*3*	*3+*

Table 2 shows the results of MMT, which showed an increase from 2+ to 3+ at the last meeting for postoperative leg muscle strength.

Table 3. Results of Goniometer evaluation

Regio	T1	T2	T3
Knee dextra	S : 0-0-45	S : 0-0-55	S : 0-0-60

The Goniometer measurements in Table 3 show increased flexion joint movement from S: 0-0-45 to S: 0-0-60.

Table 4. Lysholm Knee Scoring Scale evaluation results

T1	T2	T3
24	35	47

Table 4 shows an increase in the Lysholm Knee Scoring Scale score from 24 at the initial meeting, which is considered poor, to 47 at the last meeting, indicating an increase in the patient's functional activity.

5. Discussion

This study found significant progress in patients after being given 3x interventions, both in terms of increased joint range of motion, stronger muscles, less pain, and more functional activities. The purpose of the study was to provide information on how to provide treatment in the Malunion Intercondylar Femur (D) post-or if and how the patient's recovery progresses after being given the treatment.

TENS is effective in modulating pain through the gate control mechanism and the release of beta-endorphins, as reported in the study by Mita Noviana (2024). The study showed that TENS intervention for 15 minutes before exercise can reduce pain by up to 40% in patients after orthopedic surgery. This modality provides an immediate analgesic effect, allowing patients to exercise more comfortably. According to Wahyono & Utomo (2016), stretching has benefits for increasing flexibility and range of motion of joints, reducing stiffness and pain, and helping restore joint and muscle function, which is in line with what researchers do. A forced flexi knee with a quadricep board can control soft tissue stretching, making it easier for patients and physios to manage.

Active flexion and extension exercises with a gym ball can help increase muscle strength, increase joint movement, and reduce pain. This exercise can also help recovery and increase mobility (Firmansyah, 2020). Active flexion-extension exercises using a gym ball provide dual benefits, as stated in the study of Esteban-García et al. (2021), proving that controlled instability of the gym ball not only increases quadriceps muscle strength but also significantly improves neuromuscular control and reduces functional pain. This effect is reinforced by the findings of Lin et al. (2022), which showed increased regional blood flow after exercise.

6. Conclusion

A 23-year-old female patient with a diagnosis of Malunion Intercondylar Femur (D) post-orif followed a rehabilitation program with TENS intervention and physiotherapy exercises for three meetings in three weeks, which resulted in decreased pain, increased muscle strength, range of motion, and functional activity ability. Further research is recommended to try other intervention methods for comparison.

7. Limitation

This study has several limitations that should be considered when interpreting the results. First, the findings are based on a single case report, which limits generalizability to broader populations. While the patient showed significant improvement in pain, muscle strength, and joint mobility, individual responses to rehabilitation can vary due to factors such as baseline fitness, surgical technique, and compliance with therapy.

Second, the short follow-up period (three weeks) restricts the ability to assess long-term outcomes, such as the risk of osteoarthritis or chronic instability. A longer observation period would provide more comprehensive data on functional recovery and potential late complications.

Finally, the rehabilitation program combined multiple interventions (TENS, stretching, active exercises), making it difficult to isolate the specific contribution of each modality. Future studies could employ a controlled design to compare the efficacy of individual components. Despite these limitations, the study offers valuable insights into the potential benefits of structured rehabilitation for femoral intercondylar malunion and underscores the need for further research in this area.

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