

Case Report**EARLY PHYSIOTHERAPY AFTER FEMORAL FRACTURE AND INTRAMEDULLARY NAILING: A CASE REPORT****Abubakar IA^{1*}**¹Department of Physiotherapy, Abubakar Tafawa Balewa University Teaching Hospital, Bauchi State.

*Correspondence: Ibrahim Ahmad Abubakar; +234 8029819190; ibrahimcsskd@gmail.com

Abstract

Background: Femoral fractures are among the commonest fractures of the lower extremity that come with bleeding and pain, and require hospital admission. Patients with such injuries usually suffer long-term disabilities. This case report describes the outcome of a patient following surgical fixation of distal right femoral bone fracture and early physiotherapy intervention program focusing on early weight bearing and strengthening of thigh muscles.

Case Report: The case was a 27-year-old male student who sustained a displaced fracture of the distal right femoral bone as a result of gunshot. The patient was treated with surgical fixation using intramedullary nailing but following surgery, patient complained of reduced quadriceps strength, hip abductor strength, limited range of motion (ROM) and gait disturbance. Physiotherapy intervention focused on early muscle strengthening activities, increasing ROM with exercises for hip, knee and ankle joints.

Conclusion: Early Physiotherapy facilitates long-term success such as decreasing functional impairments and disabilities, which are achieved by early weight bearing, strengthening of the quadriceps/ hip muscles, and increasing the range of motion at the knee joint.

Keywords: Femoral fracture, Early physiotherapy, Intramedullary nailing, Muscle strengthening activities, Early weight bearing.

Cite this article: Abubakar IA. Early physiotherapy after femoral fracture and intramedullary nailing: a case report. Yen Med J. 2021;3(2):153–157.

INTRODUCTION

In the human body, the femur is regarded as the longest, strongest and heaviest tubular bone.¹ In rehabilitation settings, fractures of the distal one-third of the femur are among the commonest fractures.¹ Long term disability as a result of femoral fracture is a major problem in patients.² These fractures occur due to low energy injuries in elderly women or high energy injuries in young men.³ Non-surgical management of femoral fracture includes skeletal traction followed by cast application but operative treatment includes plate osteosynthesis, external fixation, and intramedullary nailing.^{4,5} Introduction of intramedullary nailing by Kuntscher has enhanced prevention and management of infection, non-union of fracture, shortenings and angulations, thereby improving patient outcomes postoperatively.^{6,7}

Intramedullary nailing of the femur has been the gold standard procedure with union rates between 95% and 99% and provides stable fixation and permits early mobilization of the patient.⁸ Fractures of the distal one-third of the femur are associated with impairments and functional limitations attributed to soft tissue damage due to trauma during injury, surgery or both.⁹ These impairments include weakness of the hip abductors and the quadriceps, limited range of motion at the hip and knee joints with pain, and decreased walking endurance.^{2,8,10}

Early weight bearing post-operatively has been encouraged and may result in less hospitalization, may facilitate fracture healing and decreased hospital costs.¹¹⁻¹⁴ Early physiotherapy may also facilitate long term success such as decreasing functional impairments and

disabilities. The aim of this case report is to present the outcome of early physiotherapy following surgical fixation of a distal femoral fracture.

CASE REPORT

The case was a 27-year-old male student who was referred for Physiotherapy. The patient sustained a displaced fracture (figure 1) of the distal one-third of the right femoral bone as a result of gunshot. He was rushed to the emergency department with no history of loss of consciousness, but there was history of bleeding. Prior to surgery, he was placed on traction for 5 weeks. The patient underwent a surgery in the right femur which was an open reduction and internal fixation using intramedullary nailing (Figure 2).

On general physical examination, the patient was conscious, he was met in supine position, there was no shoulder asymmetry and he had ectormorphic body. He was afebrile and acyanosed.

On systemic examinations, there was no obvious respiratory distress and the lung zones were clear. The posture was normal with mild bilateral knee varus of both lower limbs.

On local observation, the patient had marked swelling and scar around the proximal aspect of the right knee joint, and a crepe bandage was placed over the right knee joint with reduced range of motion of the same joint.



Figure 1: Fracture of distal Right Femur

On the first day of assessment, the active and passive movements of all joints of the right lower limb was found to be limited due to pain except for the ankle joint and toes. Muscle power could not be assessed due to pain. The numerical pain rating scale (NPRS) was 9/10 and the goniometric assessment couldn't be carried out due to pain.



Figure 2: Post-operative X-ray

The patient was reassessed when his pain reduced to NPRS 6/10 and the muscle power was found to be 2/5 for hip flexors, hip extensors, hip adductors and hip abductors. It was 2/5 for the knee extensors and the knee flexors. The range of motion (ROM) was found to be limited at the right hip and knee joints. The goniometric assessment was found to be 95° for hip flexion, 0° for hip extension, 100° for hip adduction, and 35° for hip abduction. It was 0° for knee extension and 78° for knee flexion.

During his stay in the hospital, physiotherapy was administered twice a day for the first 10 days post-operative as an in-patient. The patient was later asked to sit on the bed side with both lower limbs suspended so that gravity can act on the operated limb. Cryotherapy, isometric exercises, proper positioning, heel slide on bed, and ankle pump exercises were carried out. Ambulation started with bilateral crutches using the 3-point gait pattern after proper crutch assessment.

At 2 weeks post-operative, an improvised (figure 3) mild sustained passive stretching was employed using bandages and ice. The patient began an out-patient

physiotherapy following an initial examination. The exercises focused on hip and knee joint mobility, strengthening exercises and gait training. The exercises included isometric muscle exercises, abduction and straight leg raise exercises (as could be tolerated by the patient).



Figure 3: Improvised Sustained passive stretching

After 5 weeks postoperative, the patient's management progressed to partial weight bearing with crutches (as could be tolerated) including exercises such as assisted-active hip flexion and extension, assisted-active abduction and adduction, relaxed passive mobilization, patella mobilization, cryotherapy x 20mins, cryokinetics, sustain passive stretching (improvised), heel slides, prone knee bending and terminal knee extension exercises.

On further assessment; NPRS 5/10, muscle power was found to be 3/5 for hip flexors, hip extensors, hip adductors, and hip abductors. It was 3/5 for knee extensors and knee flexors, all limited by pain. ROM assessment was found to be 120° for hip flexion, 0° for hip extension, 105° for hip adduction, and 40° for hip abduction. It was 0° for knee extension and 90° for knee flexion.

Following 9 weeks postoperative, a progressive weight resisted exercises for knee extension was initiated with 0.5 kg weight on a quadriceps table. A hip muscle strengthening exercise using elastic resistance was commenced. Each exercise was performed with 3 sets of

10 repetitions. Balancing activities like gentle weight-shifting exercises (as tolerated by the patient) were performed.

At 12 weeks postoperative, partial weight bearing was initiated. Strengthening exercises were progressed with the patient performing knee extension with 1kg weight. Gait training activities involved sidestepping and backward walking as tolerated by the patient, and a home program was assigned to him.

On further assessment NPRS 3/10, muscle power was found to be 3/5 for hip flexors, hip extensors, hip adductors, and hip abductors. It was 3/5 for knee extensors and knee flexors. The ROM assessment was found to be 125° for hip flexion, 0° for hip extension, 110° for hip adduction and 45° for hip abduction. It was 0° for knee extension and 120° for knee flexion.

After 4 months postoperative, the patient having complied with the home program which was designed to address residual impairments and functional limitations, achieved full ROM at hip and virtually full knee ROM.

The progress of the patient was noted after 12 weeks and the goniometric assessment was found to be 125° for hip flexion, 0° for hip extension, 110° for hip adduction and 45° for hip abduction. It was found to be 0° knee extension and 125° for knee flexion. The gross power for the hip muscles was 4+/5, and those of the knee extensors and the knee flexors were also 4+/5. However, lateral rotation at hip and hip abductors showed residual deficit with a mild limping gait. After 5 months patient continued with the home program and returned to school.

DISCUSSIONS

Fractures of the distal femur are associated with morbidity, mortality and institutionalization.⁵ The patient was a male student who was referred for physiotherapy after sustaining a displaced fracture of the distal one-third of the right femoral bone as a result of gunshot. In-patient physiotherapy was initiated on Day 1 postoperatively and the patient continued outpatient physiotherapy 9 weeks after surgery. Two weeks postoperative, the patient underwent an initial examination which showed limited mobility at hip and knee joints with intense pain, decreased strength of hip abductors and quadriceps, and such was reported in several studies that weakness of the

hip abductors and the quadriceps, limited range of motion at the hip and knee joints with pain, are the major impairments that appeared after related surgical intervention.^{2,8,10} these was also concurrent to the findings of Bain et al who described a significant hip abductor weakness after surgery.¹⁵

The goal of early physiotherapy after intramedullary nailing should be to promote the rapid and safe return to function, minimal disabilities, reduced hospital stay, reduced chances of infection and non-union associated with use of intramedullary nailing.⁷ None of these feared complications was seen in this case as early physiotherapy commenced in time (Day 1 postoperative).

The physiotherapy program was aimed at early weight bearing, muscle strengthening, improved balance, gait training and aerobic conditioning of the patient because following femoral fractures, weakness of quadriceps femoris and hip abductors is the common impairment contributing to an altered gait pattern postoperatively.^{9,10,16} Strengthening of hip muscles began immediately and was gradually progressed. Quadriceps strengthening was progressed from isometric to multiple angle isometrics. Early passive and active assisted exercises for the hip and knee joints were commenced for balance and restoration of normal gait pattern¹⁷ In this case, early muscle strengthening activities showed improvements in dynamic balance and hip muscle strength. A significant improvement in the strength of hip muscles was noted using manual muscle testing at regular intervals.

As the rehabilitation continued, patient progressed from non-weight bearing to full weight bearing which showed significant improvement in his balance, walking endurance and functional independence. This corresponds with findings from the study conducted by Sherrington, et al in which they reported improved dynamic balance and functional performance with early weight bearing.¹⁴ The weight bearing exercises provided better challenge to postural control by a home exercise program assigned to the patient in this case.

Despite significant improvement in the gait of the patient, he walked with residual limping. A previous study

reported that 83% of subjects with femoral fractures had weaker fractured leg which explains the limping gait in this patient. Another similar study reported that a large number of the survivors do not return to their previous normal functional state as the impairments and functional limitations persist beyond 1 year after the surgery, with less than 50% of the patients able to walk without help and only about 40% of them resumed independent activities of daily living.¹⁸

No history of knee flexion contracture was recorded as knee extension exercises using heel propping stretch was frequently done in the program. Asymmetric deficits can complicate weight bearing during movement and may lead to lateral imbalance resulting in falls.¹⁹ Along with mobility and strengthening exercises, the patient performed balancing and conditioning activities to further improve patient's balance to prevent falls; as such no history of falls was recorded throughout the rehabilitation program.

CONCLUSION

In conclusion, early physiotherapy management focusing on early weight bearing with strengthening of hip and knee musculature can help achieve good outcomes and functional independence. Though the patient in this case study achieved good muscle strength and increased ROM at the affected joints, he walked with a limping gait as the only residual deficit.

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