

Role of mobility exercise in rehabilitation of neck of femur fracture

Jyoti Kumari

Student

Abstract

Background: After high-energy trauma, femoral neck fractures are a common intracapsular hip fracture, especially in older adults, however they can also happen to younger people. Severe discomfort, limited hip mobility, muscle weakening, poor balance, trouble bearing weight, and loss of functional independence are all possible outcomes. To lessen the negative effects of extended immobility and encourage functional recovery, early and gradual physiotherapy is crucial.

Aim:The purpose of this case study was to assess the impact of mobility exercises on pain, hip range of motion, muscular strength, gait, balance, and functional independence in a patient recovering from a neck or femur fracture.

Case Description: A 39-year-old man with a displaced right femoral neck fracture was brought in after a car accident. The patient had limited hip range of motion, muscle weakness, severe hip pain, trouble walking and bearing weight, and reduced functional mobility. The initial evaluation revealed a hip muscle strength of around Grade 2–3/5, a considerable limitation of hip movements, and a VAS pain level of 8/10.

Intervention: Depending on the patient's clinical condition, a gradual physiotherapy rehabilitation program was offered, and weight-bearing status was allowed. Ankle pumps, heel slides, hip abduction, knee flexion and extension, bed mobility, sitting balance, sit-to-stand training, standing weight shifting, and gait training were all part of the program. To increase mobility, strength, balance, and independence in day-to-day tasks, exercises were gradually increased.

Results: The patient showed significant improvements in pain, hip range of motion, muscle strength, weight-bearing tolerance, gait, balance, transfers, and functional independence after completing the mobility exercise program. Hip abduction improved from 0–15° to 0–40°, while hip flexion increased from 0–50° to roughly 0–100°. During activity, pain decreased from high levels (8–9/10) to roughly 1–2/10. While quadriceps strength increased from Grade 3/5 to Grade 5/5, hip muscle strength increased from Grade 2/5 to Grade 4/5.

Conclusion:In conclusion, this case study indicates that the rehabilitation of a femur neck fracture may benefit greatly from an organized, gradual mobility training regimen. Pain may be lessened, muscle strength and range of motion may be enhanced, balance and gait restored, functional independence may be increased, and a safer return to everyday activities may be supported by early and properly supervised mobility. To more definitively determine the efficacy of mobility exercises, greater research with bigger sample numbers and long-term follow-up is advised.

Keywords: range of motion, muscle strength, gait training, mobility exercises, physical therapy, rehabilitation, pain management, functional independence, and femur neck fracture.

Background:-Femoral neck fractures are intracapsular fractures that happen inside the hip joint's capsule and are frequently observed in older people. In the emergency room, hip fractures are a common injury, particularly among the elderly. It is also observed in young individuals with high-energy trauma or athletes. To avoid potentially fatal joint problems, prompt diagnosis and treatment are necessary. About 20 billion dollars are spent on treating hip fractures in the US, making them one of the top 20 costly diagnoses. By 2030, there will likely be about 300,000 hip fractures per year in the US. One particular kind of intracapsular hip fracture is a femoral neck fracture. The femoral shaft and femoral head are joined by the femoral neck. The acetabulum and femoral head articulate to form the hip joint. The femoral neck is more vulnerable to fracture due to its junctional placement. Since the femoral head's blood supply flows via the femoral neck, it is crucial to take this into account while dealing with displaced fractures. Low-energy falls in the elderly are linked to femur neck fractures. A femoral neck fracture in younger individuals typically results from high-energy trauma, such as a significant height or car crashes. Female gender, less mobility, and low bone density are risk factors for femur neck fractures. Every year, about 1.6 million hip fractures occur. Women account for 70% of all hip fractures. The risk of hip fractures is higher in white females and rises exponentially with age. Severe hip or groin pain, mobility difficulties right after a fall, unable to support weight on the injured side of the leg, edema, bruising, and stiffness in and around your hips. On the side of the damage, the limb seems shorter. The broken leg should be rested externally. It is roughly 3.7 cm long and joins the head to the shaft. It forms an angle with the shaft. In adults, the neck-shaft angle is around 125°. Because of their larger pelvises, women experience less of it. The angle makes it easier for the hip joint to move. The calcar femorale, a thickening of bone that runs along its concavity, gives it strength. There are two surfaces and two borders on the neck. The two margins are horizontal and concave. The greater trochanter is where the neck and shaft connect. The transverse axes of the femur's upper and lower ends combine to generate the angle of anteversion or femoral torsion. The temperature is roughly 15 degrees. The intracapsular region of the neck is fed by the retinacular arteries generated largely from the trochanteric anastomosis. The ascending branch of the medial circumflex femoral artery supplies blood to the intracapsular portion of the neck. Young, healthy people may have femoral neck fractures as a result of high-impact events like falls, collisions, or car crashes. When sideways impacts occur onto the greater trochanter, failure forces are smaller than when the hip is loaded vertically. Its mechanical strength is influenced by the femoral neck's cortical bone thickness, bone density, and bone shape. Young adults with femur neck fractures need precise reduction and reliable internal fixation. The potential of the various methods for femoral neck fracture fixation to offer biomechanical stability is examined. One common hip fracture is the neck of the femur, particularly in persons over 65. Because of osteoporosis, it happens more often in women than in males. The incidence rises with age and is typically brought on by falls in older adults, whereas high-energy trauma is the primary cause in younger individuals. Due to the aging population, it is anticipated that the prevalence would rise globally.

Investigation :-1. Simple X-ray of the Hip: A simple X-ray of the hip helps in identifying the location and extent of the fracture and also helps to rule out any visible fractures. However, a patient with an undisplaced fracture or a femoral neck stress fracture may have a normal appearance on a plain radiograph.

2. Magnetic Resonance Imaging (MRI) of the Hip: An MRI may be performed if pain continues despite a normal plain X-ray. It helps to detect or rule out a hairline or occult fracture that may not be visible on a conventional X-ray.

3. Bone Scanning: Bone scanning may be performed when a stress fracture, malignancy, or infection is suspected. It helps in detecting abnormal bone activity and identifying areas of possible bone injury or disease.

Management :-Three head cannulated hip pins may be used to treat individuals with Garden kinds I and II. Hemiarthroplasty is used to treat types III and IV due to high rates of osteonecrosis and non-union, as well as interruption of the femoral head blood supply. Although morbidity and mortality are somewhat greater, patients with pre-existing degenerative joint condition may benefit from complete hip replacement. In an effort to preserve the femoral head, younger patients (less than 65) should, if feasible, undergo open reduction and internal fixation (ORIF).

Aim of the study :-to increase functional independence and mobility in day-to-day tasksto enhance gait, standing abilities, and balance.to encourage safe walking and weight bearing in accordance with the patient's medical condition.to avoid the negative effects of extended immobilization, like decreased functional ability, pressure sores, joint stiffness, and muscular weakness.to increase the patient's capacity to carry out ADLs (activities of daily life).to evaluate how mobility exercise has improved overall functional outcomes and quality of life.to assist the patient in regaining as much independence as possible and engaging in regular activities.

Objective-

- 1.to assess how well physiotherapy rehabilitation reduces pain and increases mobility.
- 2.to enhance gait, balance, joint range of motion, and muscular strength.
- 3.to regain functional independence in day-to-day tasks.
- 4.to avoid issues brought on by extended immobility.
- 5.to assess the quality of life and overall functional outcome after rehabilitation.

Scope of the study :-The scope of the study is to assess how mobility exercises and physiotherapy can help patients recover from neck or femur fractures. Improving pain, range of motion, muscle strength, balance, gait, and functional mobility are the main goals of the study. It also assesses how early mobilization and therapy exercises affect the patient's capacity to carry out everyday tasks on their own. The study also seeks to avoid long-term immobilization-related problems such muscular weakness, joint stiffness, and diminished functional ability.

Case description and assessment :-Following an RTA, a 39-year-old man arrived at the hospital complaining of excruciating discomfort in his right hip. He complained of difficulty walking and moving his hip, and he was unable to stand or bear weight on the afflicted leg. All activities of daily living (ADLs) were performed independently by the patient. There was no history of a serious sickness or fracture. Following the injuries, he needed help getting out of bed, getting dressed, using the restroom, and walking. The afflicted lower limb was observed to be externally rotated and shortened. When the groin and hip area were palpated, there was noticeable soreness and pain with movement.Manual muscle testing (MMT) revealed decreased muscular strength (hip muscles 2/5–3/5), and hip range of motion (ROM) was significantly limited due to discomfort and fracture. On the Visual Analog Scale (VAS), the patient gave his level of pain a 9 out of 10. A displaced fracture of the femur neck was confirmed by an X-ray of the hip and pelvis. If additional assessment of the fracture or related injuries is necessary, an MRI or CT scan may be carried out. Severe

discomfort, decreased joint mobility, muscle weakness, poor balance, incapacity to bear weight, and substantial functional impairment were all identified in the overall clinical evaluation. The physiotherapy rehabilitation approach, which emphasizes pain treatment, range of motion improvement, hip and lower limb muscle strengthening, gait training, regaining functional independence, and enabling a safe return to daily activities, is guided by these findings.

Uniqueness of the study:- This study is unique Because it focuses on the significance of mobility exercises as a crucial part of rehabilitation following a neck or femur fracture, this study is distinct. This study emphasizes how early and progressive mobility exercises promote functional recovery, lower complications, and increase the patient's quality of life, whereas many studies focus on surgical management. Early mobility exercises from the postoperative phase were the main emphasis of the rehabilitation program. The patient's stride, muscle strength, hip and knee range of motion, and balance all gradually improved. Clinical assessments were used to evaluate functional outcomes both before and after rehabilitation, showing quantifiable improvement. The patient was able to move more independently and do activities of daily living (ADLs) with less help. In order to achieve the best possible recovery, the example emphasizes the significance of ongoing physical treatment and patient cooperation. This instance offers concrete proof that following a neck or femur fracture, a systematic mobility exercise program can greatly improve functional recovery.

Intervention:- Mobility exercises are an important part of physiotherapy rehabilitation after a neck of femur fracture. They are introduced gradually according to the patient's condition, fracture stability, type of surgery, pain level, and permitted weight-bearing status. The main aims are to maintain joint movement, prevent stiffness, improve muscle function, maintain circulation, improve balance, and help the patient return to independent walking and daily activities.

1. Ankle Pumps:

Patient position: Supine with both legs straight.

Therapist position: Standing beside the affected leg.

Procedure: The patient slowly moves the ankle up and down, bringing the toes toward the head and then away from it. Perform about 15–20 repetitions within a comfortable range.

Purpose: Helps maintain ankle mobility and promotes lower-limb circulation.

2. Heel Slides

Patient position: Supine with the affected leg straight.

Therapist position: Standing beside the affected leg and assisting when required.

Procedure: The patient slowly bends the knee by sliding the heel toward the buttocks and then returns the leg to the starting position. Movement should remain within the allowed range.

Purpose: Helps reduce stiffness and maintain hip and knee mobility.

3. Hip Abduction

Patient position: Supine with both legs straight.

Therapist position: Standing beside the affected leg.

Procedure: The patient slowly moves the affected leg sideways and then brings it back toward the midline. The therapist provides gentle assistance if required. Excessive hip movement should be avoided, especially when hip precautions are advised.

Purpose: Helps maintain hip movement and supports functional mobility.

4. Knee Flexion and Extension

Patient position: Sitting on the edge of the bed or on a chair.

Therapist position: Standing in front of or beside the patient for support.

Procedure: The patient bends the knee and then slowly straightens it. Perform about 10–15 repetitions according to the patient's tolerance.

Purpose: Maintains knee mobility and prepares the patient for standing and walking.

5. Bed Mobility

Patient position: Supine on the bed.

Therapist position: Standing beside the bed.

Procedure: The therapist teaches the patient how to turn safely in bed, move the legs, change position, and progress from lying to sitting. Assistance is provided initially and gradually reduced as the patient becomes more confident and independent.

Purpose: Improves functional mobility and helps the patient become independent in bed activities and transfers.

6. Balance While Sitting:

Position of the patient: sitting with their feet supported at the edge of the bed.

Position of the therapist: Standing in front of the patient or just to their side.

Procedure: The patient shifts their weight gently while sitting upright. The therapist makes sure everyone is safe and keeps them from losing their balance. This gets the patient ready for standing and transfers.

7. Training from Sit to Stand:

Position of the patient: Supported feet while seated in a sturdy chair.

Position of the therapist: facing forward and somewhat off to the side.

Procedure: Using the recommended walking aid, the patient leans forward suitably and pushes thru their legs to stand. After then, the patient gradually goes back to sitting. Both functional mobility and lower-limb weight acceptance are enhanced by this.

8. Weight Shifting While Standing:

Position of the patient: standing with a walker or other recommended assistance.

Position of the therapist: Standing next to or in front of the patient.

Procedure: In accordance with the allowed weight-bearing level, the patient gradually transfers body weight from one side to the other. This enhances confidence, balance, and walking readiness.

9. Training for Gait:

Patient position: Using a walker while standing. Walking next to or slightly behind the patient is the therapist's position.

Procedure: The therapist demonstrates how to move the legs and use the walker in the proper order. Depending on the patient's tolerance and recommended weight-bearing condition, the walking distance is progressively increased. Later on, the patient is moved from a walker to a cane and, as necessary, to independent walking.

Result:-Patients with a neck or femur fracture responded well to the mobility exercise program during their recovery. The patient's range of motion, muscle strength, joint movement, and functional capacity all improved with regular mobility exercises.

Hip Range of Motion (ROM):-

Hip movement	Normal ROM	Before mobility exercise	After mobility exercise
Flexion	0–120°	0–50°(painful and restricted)	0–100°(minimal pain)
Extension	0–20°	0–5°	0–15°
Abduction	0–45°	0–15°	0–40°
Adduction	0–30°	0–10°	0–25°
Internal rotation	0–35°	0–10°	0–25°
External rotation	0–45°	0–15°	0–35°

Pain assessment (VAS Score):-

Pain assessment tool:- visual analogue scale (VAS)

Parameter	Before mobility exercise	After mobility exercise
Pain score	8/10 (Severe pain)	1/10 (Mild pain)
Pain at rest	5–6/10	1–2/10
Pain during movement	8–9/10	1–2/10
Pain during weight bearing	Severe; unable to bear full weight	Mild; able to tolerate weight bearing as advised
Tenderness	Present over the hip region	Mild or absent
Effect on daily activities	Unable to walk, stand, or perform ADLs independently.	Able to walk and perform ADLs independently.

Muscle strength (MMT):- Manual muscle testing

Muscle group	Before mobility exercise	After mobility exercise
Hip flexors	Grade 2/5 – Full ROM in gravity-eliminated position only	Grade 4/5 – Full ROM against gravity with moderate resistance
Hip extensors	Grade 2/5	Grade 4/5
Hip abductors	Grade 2/5	Grade 4/5

Hip adductors	Grade 2/5	Grade 4/5
Knee Extensors (Quadriceps)	Grade 3/5 – Full ROM against gravity only	Grade 5/5 – Normal strength
Knee Flexors (Hamstrings)	Grade 3/5	Grade 4/5

Discussion:-The results of goe et al. (2025) and the narrative review "Weight-Bearing Approaches After Neck of Femur Fracture" (2025) are in line with the current case study. To enhance recovery following femur neck fractures, Lee et al. suggested an organized rehabilitation program that included early range-of-motion exercises, bed mobility, strengthening, balance training, gait training, and functional exercise. Early weight bearing, when clinically appropriate, enhances mobility and functional results and lowers problems related to extended immobility, according to the narrative review. Following a progressive mobility training program, the patient in this instance showed decreased discomfort, improved hip range of motion, increased muscle strength, improved gait, improved balance, and increased independence in daily activities. These results corroborate the idea that early, closely monitored mobility exercises are essential to a good recovery following a femur or neck fracture.

Conclusion :-This case study shows that a planned mobility exercise program can help a patient recover after a neck of femur fracture. After rehabilitation, the patient's pain decreased from 8/10 to 2/10, while hip ROM improved in all directions. Muscle strength also improved from MMT Grade 2–3/5 to Grade 4–5/5. Improvement was also seen in walking, balance, transfers, and independence in activities of daily living. Overall, gradual and supervised mobility exercises helped reduce pain, improve physical function, and support a safer return to daily activities.

Reference :-1. Jillian Kaczby; Kaushik Bagchi. Author information and affiliations. Last updated – May 8, 2023.

2. Journal of Orthopaedic Trauma, 33, S27–S32, 2019.
3. Orthopaedic Physical Therapy Secrets, Second Edition, page no. 534.
4. Apley's System of Orthopaedics and Fractures.
5. B.D. Chaurasia's Human Anatomy.