

Case Report

Effect of early mobilization and gait training in post-operative winquisht type-IV, shaft femur fracture

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ABSTRACT

One of the most common injuries addressed by orthopedic surgeons is femoral shaft fractures. Little finger metacarpal fractures are frequently isolated, closed, and have a simple fracture shape, with conservative care having little effect on patients' functional outcomes. These fractures are frequently accompanied with polytrauma and can be fatal. For physiologically stable individuals, intramedullary nailing (IMN) is the most commonly used therapy. Clinical Presentation: A 30 years old male meet with an RTA on which he had post-operative knee stiffness and injuring his mid shaft femur, little finger of hand and lacerated wound over abdomen. Internal fixation was done to fix the fracture segment because of the post operated knee stiffness from the previous operation his knee ranges where limited. Rehabilitation goals where set according to his knee stiffness. By the end of the rehab protocol he was able to do his ADL independently. The literature stated that the ultimate goal is to improve the weight bearing and gait of the patient in order to regain his ADL. Commonly, the femur fracture is due to the weakness of Quadriceps femoris muscle.

Keywords: Femoral Shaft fracture, Road accidents, Little finger fracture, Intramedullary nailing, Knee Stiffness.

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INTRODUCTION

Road traffic accidents are human tragedies that can cause significant human suffering due these. They impose a significant societal cost in the form of premature deaths, injuries, and lost potential revenue. A road traffic accident (RTA) has an influence on an individual, their health, and well-being, and also on their family. RTA is a leading source of sickness and fatality in India ^[1].

Fracture, defined as a break in the structural continuity of bone and is a major musculoskeletal health concern around the world. External causes of extremities fractures, such as motor vehicle crashes, falls, sports injury, and assault, are roughly the same all across the world. In certain other studies, motor vehicle collisions were the most common external cause of fractures, particularly in areas where road traffic injury is a neglected epidemic ^[2].

One of the most common injuries addressed by orthopedic surgeons is femoral shaft fractures. These fractures are frequently accompanied with polytrauma and can be fatal. For physiologically stable individuals, intramedullary nailing (IMN) is the most commonly used therapy ³ Metacarpal bone fractures are one of the most common upper limb injuries seen in orthopedics. Little finger metacarpal fractures are frequently isolated, closed, and have a simple fracture shape, hence conservative therapy has little effect on patients' functional outcomes.

Irreducible fractures, open fractures, rotational/angulation deformity, shortening, numerous fractures, bone loss, and fractures combined with substantial soft tissue injury are all indications for surgery. ^[3] Intramedullary nailing (IMN) is the first choice for treating femoral shaft fractures because of its low complication rate (4.9%) and because it is an effective alternative for aseptic nonunion of noncomminuted femoral shaft fractures, with union rates ranging from 72% to 100%.

Open fractures, cigarette use, weight bearing is delayed, comminution of the fracture site, instability of fracture reduction, nonsteroidal anti-inflammatory medicines may interfere with fracture healing, and poor nail diameter selection have all been identified as risk factors for femur shaft fracture nonunion ^[4].

Normal walking and daily tasks such as walking and descending stairs or standing from a seated posture necessitate complete knee extension. A limited range of motion in the knee, whether in flexion or extension, may contribute to a functional impairment and an increased risk of osteoarthritis. The phrases stiffness and contracture are also used to characterize the knee's restricted range of motion (ROM). Patients describe stiffness as the sensation that active and/or passive joint motion is difficult or limited, interfering with daily tasks ^[5].

Patient information

A 30 years old male while going to work on his bike tried to overtake another vehicle ahead of him, had a slip on his bike and collided with divider. He was then taken to local hospital by the people on road where they did dress for lacerated wound on his stomach. As further management was not possible there, he was taken to government hospital in Amravati. In Amravati, suturing was done for wound near eye and lacerated wound and for further management, he was taken to AVBRH, Sawangi(M), Wardha. In AVBRH, an x-ray was taken which relived mid shaft femur fracture of Winquist type IV, fracture 5th finger left hand and commutated iliac crest fracture right leg. CT scan didn't show any organ damage. Suturing was done for lacerated wound over the abdomen. He then underwent Femur intramedullary nailing for shaft femur right leg and K-wire fixation for little finger left hand. For further management, she was recommended for physiotherapy. Seven years, Prior to this accident he met with an road traffic accident injuring his mid-shaft tibia and supracondylar fracture femur on the same side. An intramedullary nailing was done for the mid-shaft femur fracture. This surgery led to restricted range at his knee joint of about 0-30° of flexion and a complete knee extension.

Clinical Findings

Patient was conscious, cooperative and well-oriented to time, place and person. He was evaluated in supine lying position with the shoulders and ankle at same level and plane. On Inspection, the leg was in elevated position using pillows and the hip was in external rotation. The knee was slightly flexed with ankle in neutral position. Swelling present on and around the right knee. Tenderness was present around the operated site.

Table 1. Pre-rehabilitation Range of motion and Manual muscle testing

Joint	Lt Active	Lt Passive	Rt Active	Rt Passive	Limitation
Hip					
Flexion	0-180°	0-180°	NA	NA	Unable to perform due to pain
Extension	NA	NA	NA	NA	Unable to perform due to pain
Abduction	0-45°	0-45°	NA	NA	Unable to perform due to pain
Internal Rotation	0-40°	0-40°	NA	NA	Unable to perform due to pain
External Rotation	0-45°	0-50°	NA	NA	Unable to perform due to pain
Knee					
Flexion	0-130°	0-130°	NA	NA	Unable to perform due to pain
Extension	130-0°	130-0°	NA	NA	Unable to perform due to pain
Ankle					
Plantar Flexion	0-85°	0-90°	0-40°	0-50°	NA
Doris Flexion	0-20°	0-20°	0-17°	0-20°	NA
Inversion	0-35°	0-35°	0-30°	0-35°	NA
Eversion	0-25°	0-25°	0-22°	0-25°	NA

Local temperature was normal while examining the patient and there was no edema found in and around the area. No loss of superficial sensation (Light, touch, pressure) at right lower extremity was found. The score on VAS was 8/10 & LEFS is 0.

Table 2. Manual Muscle testing Strength (MMT)

Muscles	Right	Left
Hip		
Flexors	Weak and painful	Strong and painless
Extensors	Weak and painful	Strong and painless
Abductors	Weak and painful	Strong and painless
Adductors	Weak and painful	Strong and painless
Knee		
Flexors	Weak and painful	Strong and painless
Extensors	Weak and painful	Strong and painless
Ankle		
Plantar Flexors	Strong and painless	Strong and painless
Doris Flexors	Strong and painless	Strong and painless
Invertors	Strong and painless	Strong and painless
Evertors	Strong and painless	Strong and painless

Pre-operative X-ray

Figure 1: Little finger fracture

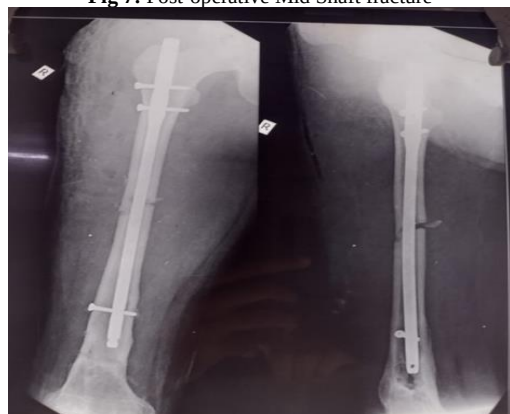


Figure 2: lacerated wound on Abdomen



Figure 3. Femur Fracture



Figure 4. K-wire Fixation**Post-Operative X-ray****Figure 5. Abdominal wound after Suture Removal****Fig 6: Abdominal wound after Suture****Fig 7: Post-operative Mid Shaft fracture****Therapeutic intervention**

Short-term aims included preventing respiratory problems, reducing pain and oedema, maintaining and increasing joint range of motion and strength, promoting early mobility, avoiding pressure sores, encouraging walking (non-weight bearing), and independent ADL tasks. The long-term objective was to enhance independent walking with and without a walker (partial/ full weight bearing), static and dynamic balance, indoor and outdoor mobility, independent ADL activities, and ergonomics. To increase the patient's quality of life and muscle strength in the post-operative period [6,7].

Table 3. Post-Operative Management

Long term goals	Short term goals
To prevent Post-operative complications.	Gait Training
To improve muscle strength	Improve quality of life
To increase range of motion	Improve activity of daily living
	To maintain available range

Week -1

Day 1-2 Cryotherapy (8-10 min; 3-4 times/day), deep breathing (10 sec hold of 10 sets in 10 repetitions in 4 times/day), spirometry (10 sec hold of 10 sets in 10 repetitions in 4 times/day), ankle toe movement (set of 10, 2 repetition twice a day), static quads, hams and glutei (10 sec hold of 10 sets in 10 repetitions in 4 times/day), to limit the danger of pressure sores, active motions for unaffected limbs were continued, along with adequate positioning and bed mobility.

Day 3 Cryotherapy, deep breathing, spirometry, ankle-toe movement, static quads, hamstrings, and glutei, active movements for unaffected limbs, and adequate alignment were maintained, as well as active assisted SLR (0-100) to maintain quadriceps and hamstring strength, reduce joint stiffness, and expand range, active assisted hip abduction (0-05°), adduction (05-0°) to maintain hip abductor adduction. Heel slides (0-500) are used to maintain quadriceps and hamstring strength, as well as to minimize joint stiffness and increase range of motion.

Day 5-7 Cryotherapy, deep breathing, spirometry, ankle toe movement, non-weight bearing walking with walker, static quads, hams, and glutei, and active exercises for unaffected limbs were all continued. To preserve hip abductor and adductor strength, reduce joint stiffness, and enhance range, the operated leg's ranges were increased to active assisted SLR (0-10°), active assisted hip abduction (0-10°), adduction (10-0°) and heel slides (0-10°).

Week- 2

Active assisted motions were progressed to active SLR (0-400) to maintain quadriceps and hamstring strength, reduce joint stiffness, and improve range, active hip abduction (0-300), adduction (30-00) to maintain hip abductor and adductor strength, reduce joint stiffness, and improve range, heel slides (0-200), and active assisted dynamic quads (available range) to maintain quadriceps strength and hamstring strength, long sitting with or without bed support to decrease

joint stiffness and enhance mobility, long sitting with or without bed support to decrease joint stiffness and promote mobility.

Week 3-4 cryotherapy, deep breathing, spirometry ankle toe movement, walking with walker (non- weight bearing), static quads, hams and glutei, half bridging (10 repetition 3-4/day), active exercises for unaffected limb was continued. Active movements were proceeded to light power resisted exercises in active SLR (0-30°), active hip abduction (0-30°), adduction (30-0°) to maintain hip abductor and adductor strength, heel slides (0-30°), and active aided dynamic quadriceps (0-30°). Long periods of sitting, as well as bedside sitting with or without bed support, were encouraged. Bedside standing with a walker and non-weight bearing walking with a walker helps enhance balance, reduce fear of falling, and increase confidence and strength.

Week 5 and 6 Cryotherapy, deep breathing, spirometry, ankle toe movement, and previous week's activities were continued (yellow theraband i.e. mild resistance), walking with crutch (50 % weight bearing on unaffected upper limb), above elbow cast was removed, elbow movement (available range), feast (available range), upper limb strengthening with 1 kg dumb bell.

Week 7 and 8 cryotherapy, deep breathing, spirometry, ankle toe movement, and previous week's exercises, upper limb training with 2-3 kg dumb bells (green theraband i.e. moderate resistance) for increasing the strength.

Post- Rehabilitation

The VAS score was 4/10 and the Lower Extremity Functional Scale score is 31/80 at the end of 4th week. The Dynamic Gait Index Score is 14/24.

DISCUSSION

In this case report, we found a young male who has suffered from a tibial as well as supracondylar femur fracture 7 years prior to this accident which lead to a post-operative knee stiffness. He again meets with an accident with a mid-shaft femur fracture and little finger fracture and a lacerated wound over stomach. Intra medullary nailing and K wire fixation was done and low intensity exercise program which gradually progressed, keeping in mind the knee stiffness he has prior to this operation all the exercise where done 3 times a day of 10 sets each. With the help of rehabilitation program, he was a able to resume his ADL independently. Mark V Paterno et. al. concluded that the health-related rehabilitation and injury must be taken in consideration [7]. Patient with serious lacerated wound, fractures and post-operative stiffness of the knee which may cause inability to bend the knee completely which was modified according to him [8]. A specific goal-based progression should be included at particular attempt especially weight bearing activities which improves the ADL and enhances the recovery of the patient. The aim was to manage the injury [9,10]. Mark V Paterno et. Al. stated that. the ultimate goal is to improve the weight bearing and gait of the patient in order to regain

his ADL. Commonly, the femur fracture is due to the weakness of Quadriceps femoris muscle. Due to trauma or muscle injury the muscle lacks strength to do daily activities [11]. It is been illustrated that due to displaced femur fracture the working of quadriceps femoris muscle is weak. That is the reason that the main focus was on quadriceps strengthening.[6] Haodong Zhou et.Al. concluded that eight or more weeks of immobility in flexion of the leg substantially increases the stiffness of the knee. Unassisted remobilization could not reverse the increased stiffness. In addition, remobilization gradually exacerbated the stiffness of the knee as the immobility duration was longer than 8 weeks [5].

CONCLUSION

In this case report we present a case with a old tibia fracture for which intra medullary nailing was done with knee stiffness and knee flexion range of 30 meet with an accident injuring his little finger, mid shaft femur fracture and lacerated wound in the abdomen. An intra medullary nailing was done on the femur fracture of the stiff knee. Rehabilitation goals where meet considering this stiffness and contractures. By the end of the rehabilitation, he was able to do his ADL independently with minimal to no assistance.

Limitations

Due to little finger fracture and abdominal wound his ambulation was is delayed, to allow adequate healing of the fracture and proper wound healing.

Informed consent

Informed consent was obtained from patient included in the study.

Author's contribution

All authors contributed equally for the study.

Conflict of interest

The authors declare that they have no conflict of interest.

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