Case report

Novel physiotherapeutic approach towards a case of boyd and griffin type 2 intertrochanteric fracture

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ABSTRACT

Intertrochanteric fractures of femur are one of the commonest fractures encountered in orthopedic practice. It is mostly seen in the older age groups. An increased incidence of these fractures is noted these days owing to the increased life expectancy. An intertrochanteric fracture occurs along the line that is located between the greater and lesser trochanter. These fractures are seen most commonly in the elderly and are usually the result of a fall. The goal of care for this particular type of fracture should be to restore the patient to his or her preinjury status as quickly as possible. The potential benefits of operative intervention include rapid mobilization, ease of nursing care, shorter hospitalization, decreased mortality and restoration of function. A 60-year-old male with right sided Boyd and Griffin type 2, was diagnosed by orthopedic surgeon, after a fall, on which open reduction and fixation with proximal femoral nailing SOS dynamic hip screw was done. Post operatively the patient had impaired limb movements and inability to perform daily activities. After operation, patient was managed with physical therapy treatment comprising of static regimens, progressing to dynamic exercises, electrotherapeutic techniques, strengthening exercises, gait exercise for a duration of 10 weeks. Patient was given physiotherapy regime for 5 days per week for 10 weeks. This study shows that the operative method and timely recovery in physical therapy contributed to the progress of ROM, strength of muscle, functional activities progressively, which successfully led to further recovery.

Keywords: Intertrochanteric Fracture, Boyd and Griffin type 2, Physical Rehabilitation.

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INTRODUCTION

Intertrochanteric fractures are defined as extracapsular fractures of the proximal femur that occur between the greater and lesser trochanter. The intertrochanteric aspect of the femur is located between the greater and lesser trochanters and is composed of dense trabecular bone. The greater trochanter serves as an insertion site for the gluteus medius, gluteus minimus, obturator internus, piriformis, and site of origin for the vastus lateralis. The lesser trochanter serves as an insertion site for the iliacus and psoas major, commonly referred to as the iliopsoas. The calcar femorale is the vertical wall of dense bone that extends from the posteromedial aspect of the femur shaft to the posterior portion of the femoral neck. This structure is important because it determines whether or not a fracture is stable. The vast metaphyseal region has a more abundant blood supply, contributing to a higher union rate and less osteonecrosis compared to femoral neck fractures [1].

These fractures occur both in the elderly and the young, but they are more common in the elderly population with osteoporosis due to a low energy mechanism. The female to male ration is between 2:1 and 8:1. These patients are also typically older than patients who suffer femoral neck fractures. In the younger population, these fractures typically result from a high-energy mechanism [1].

In Boyd and Griffin type 2 Intertrochanteric fracture line extends along the intertrochanteric line with comminution and displacement-stable [2]. On physical examination, patient present with pain in thigh region and inability to bear weight on the affected lower limb after experiencing a fall or injury [3]. Plain Radiographs of anteroposterior view and cross table lateral view of the affected hip and full length radiographs for affected femur are chosen to evaluate these fractures. The general approach towards these fractures consists of various methods of closed reduction, traction and immobilization [1].

Post-operative complications that can be seen in these condition are Implant failure and cutout, anterior perforation of distal femur, nonunion, infection. The incidence of nonunion is low, less than 2% [4]. The major goal of physiotherapy rehabilitation after an intertrochanteric fracture is to enable the patient to walk, especially if they were ambulatory prior to the injury. Mobilization of the patient
should be initiated almost immediately after completion of the surgical procedure. Range of motion exercises are encouraged as soon as the initial pain subsides and the patient can safely cooperate with the physical therapist. ROM in all directions is advised, to prevent flexion and adduction contractures that can make ambulation more difficult. Getting the patient to a level where they can control the involved limb is essential to permit adequate mobility in bed, preventing and/or lessening the occurrence of pressure ulcers, to allow for independent transfers into and out of bed and to promote the initiation of weight-bearing and restoration of gait. Balance and coordination instructions are given concurrently with all phases of rehabilitation. Strengthening the hip abductors gradually reduces the Trendelenburg gait pattern commonly seen following a hip fracture. Progressive resistive exercises are used, starting with abduction while standing or the use of a sliding board while supine. As strength increases, the patient is instructed to perform the exercises while lying on the contralateral side, thus abducting against gravity. Once 20–30 repetitions can be performed, progressive resistance is added. Strengthening the hip flexors, extensors, rotators and adductors is also important to insure restoration of muscle strength, flexibility and endurance to allow progression of gait [2].

After the fracture heals and rehabilitation is complete, occasional decreased mobility may be the end result. Patient adaptation may involve having to accept the permanent use of a cane or walker to aid in balance, reduce Trendelenburg characteristics associated with weak abductors seen in gait, and to increase patient confidence, safety and mobility.

In this case report, a modified physiotherapy approach is taken for the rehabilitation of rare case of Boyd and Griffin type 2 Intertrochanteric fracture. 

Patient’s information

A 60-year-old male patient with right-handed dominance, a farmer by profession. One month back he fell from the tree sustaining injury to his right thigh. Patient then developed swelling over right thigh which was gradually progressive and was not able to bear weight on his right leg. He was taken to private based hospital for primary management, then he came to A.V.B.R.H with the complain of pain over right thigh for definitive management. After consulting the orthopedic surgeon, X-ray was performed and report suggested Boyd and Griffin type 2 Intertrochanteric fracture of right side femur. Patient went under surgical treatment were open reduction and internal fixation was done with Dynamic hip screw with spinal anesthesia on 29-01-2021. Physiotherapy session were started after surgery. Post operatively patient had chief complain of pain, swelling over right thigh and was unable to raise his leg off the bed to walk. Patient has no significant personal or family history.

Clinical finding

A proper written consent was taken from patient. The patient was explained about physical examination and intervention. On general examination patient was conscious, well oriented with time, place, person and cooperative. Patient was haemodynamically stable, afebrile with BP-126/84 mm hg, pulse rate was 80 beats/min, respiratory rate was 16 breaths per min. Patient had no findings of cyanosis, icterus, clubbing, and edema.

The patient was examined in supine position. On inspection the patient’s right leg was slightly abducted and knee and ankle in neutral position. On palpation the temperature of local area was normal. Diffuse swelling over the thigh was present. On NPRS scale pain graded as 6/10 on rest and 9/10 on slight activity. Patient has grade 3 tenderness on thigh. Range of motion has been mentioned in below table. Hip movement and SLR was not elicited due to pain and intertrochanteric fracture. Active ankle and toe movement was present. Muscle strength assessment was taken and compared on both limbs in table. On neurological examination, all the sensations were present, distal circulation was intact. Reflexes were normal. There was no limb length discrepancy. Pre-operative X-ray are shown in figure and despite post-operative X-ray of fracture fixed with implants i.e. dynamic hip screw.

Table 1: Range of motion assessment

| Joint movement | Left Active | Passive | Right Active | Passive |
|----------------|-------------|---------|--------------|---------|
| Flexion        | 0-80°       | 0-100°  | NT           | NT      |
| Extension      | 0-10°       | 0-15°   | NT           | NT      |
| Abduction      | 0-40°       | 0-45°   | 0-40°        | 0-30°   |

Figure 1: Pre-operative X-ray of right sided hip joint

Figure 2: Post-operative X-ray ORIF with Dynamic hip screw
Physiotherapy Protocol
Physiotherapy rehabilitation for duration of 8 weeks, 2 days per week, home program and follow up.

Therapeutic Intervention
Physical therapy interventions were targeted towards improving the seen impairments. Therapeutic exercise was the major focus of the intervention. In which target was lower-extremity muscle force, walking endurance, functional training, and flexibility training. The therapy was conducted twice a week for 8 weeks. The patient was advised to perform daily hamstring muscle stretching independently to address his range-of-motion limitation.

Short Term Goal
Patient education, to reduce pain and tenderness, to prevent respiratory complication, improve range of motion, muscle strength of lower limb, promote early mobility

Long Term Goal
To promote independent walking with or without support, to improve static and dynamic balance, to improve the endurance and functional activities of daily living.

Table 2: Manual muscle testing

| Joints Movement | Left side | Right side |
|-----------------|-----------|------------|
| Hip Flexors     | 4/5       | NT         |
| Extensors       | 4/5       | NT         |
| Adductors       | 4/5       | 1/5        |
| Adductors       | 4/5       | 1/5        |
| Internal rotators | 4/5     | NT         |
| External rotators | 4/5     | NT         |
| Knee Flexors    | 4/5       | 1/5        |
| Extensors       | 4/5       | 1/5        |
| Ankle Plantar flexors | 5/5   | 4/5        |
| DorsiFlexors    | 5/5       | 4/5        |

Table 3: Treatment plan

| Phase (week wise ) | Therapeutic exercise |
|--------------------|----------------------|
| Phase I: Immediate postoperative phase ( Week 1-2) |
| Precaution         | No active ROM of Hip joint. Avoid activities of daily living. No lifting of heavy objects. Avoid prone and side lying |
| To reduce inflammation | Cryotherapy application for 8 to 10 minutes |
| To reduce pain and tenderness | Application of ice pack for 8 – 10 minute Thermotherapy, Ultrasound, two times a day. |
| To improve range of motion | Hip and knee passive ROM exercises, 10 repetitions x 2 Isometric exercises – static quadriceps, hamstring, glutes ( 5 sec hold, .10 sec relax, 10 repetitions, 2 sets) Isotonic exercises – ankle pumps |
| Phase II: Protection phase(week 2-6) |
| To reduce inflammation and pain | Cryotherapy continued for 8 to 10 min |
| To improve ROM | Progressive assisted exercises for back, knee and ankle. Progress to passive ROM until full pain free ROM is achieved. Isometric exercises for hip, knee, and ankle ( 5 sec |

Phase III: Intermediate phase (6-8 week) To improve ROM and muscle strength, endurance and functional activities Core stabilisation exercises. Strengthening of uninvolved lower extremity. Power conditioning in right lower extremity

Phase IV: Advanced strengthening exercises (week 8-10) To improve strength, endurance and functional activities Active full range of motion and stretching exercises. Enhancing stability, balance, fitness and open-chain proprioceptive activities. Progressive strengthening exercises(10-2) Resisted and dynamic exercises to quadriceps, hamstring, glute and back muscles

Home program
Patients were asked to continue all resistant movements, to increase strength, endurance and activity of daily living activities.

Follow up
Mostly on completion of physiotherapy, the patient reported normal functional activities without pain complaints or limited range of motion. He had a complete range of motion and a muscle strength of 5 degrees on her right lower limb. After that patient had returned to his daily life activities.

DISCUSSION
Inter-trochanteric fractures are common in the elderly due to weak eyesight, poor muscle coordination and associated comorbidities like osteoporosis. Surgical treatment of these fractures significantly reduces the morbidity and mortality by allowing early mobilization, hence preventing the complications arising out of prolonged bed rest [5]

Initially cryotherapy is required to reduce pain and swelling. Progressive movements are initiated to reduce joint contracture [6][7]. Progressive mobilization was shown to be effective in raising the ROM during recovery and reducing the chance of vascular disease and various methods such as incremental range of motion exercises, soft tissue mobilization, isometric exercises, open and close chain muscle training, muscle strengthening, stretching, body position training have been established [8][9]. Muscle energy technique also used to increase ROM explain by Kucukse et al.[10] Gabriel’s study showed that physical therapy training had a beneficial effect on morale building, enhancing gait in post-operative physical therapy [8]. Dynamic equilibrium and care quality mobility are enhanced by neuromuscular stimulation and adjustment of parameters, gait efficiency and patient ambulation [11][12]. Movement therapy is helpful to restore normal movement of all joints followed by immobilization [13]. Resistive conditioning can be innovative in order to boost muscular endurance. Preventive treatment has been established to increase disability, comorbidty and facilitate therapeutic recovery [13].

The recovery process will concentrate on enhancing life expectancy. Gradual activity including appropriate pain management
are the main priorities of care and home installation to program the need for stairs, handrails, better ventilation, elimination of slippery sheets. Related mobility assistance must also be provided. A fall reduction rehabilitation program can be effective. The patient was directed to conduct all of the activities as part of the home regimen and was presented with a prescribed checklist and recommended for follow-up visits. The objectives of this studies was to focus on the importance of timely surgical treatment and necessary physiotherapy recovery to meet the functional capacity and prognostic objectives.

CONCLUSION
An Intertrochanteric fractures of femur are one of the commonest fractures encountered in orthopedic practice. It is mostly seen in the older age groups. An increased incidence of these fractures is noted these days owing to the increased life expectancy. In a male patient that was with right sided Boyd and Griffin type 2, was diagnosed by orthopedic surgeon, after a fall, on which open reduction and fixation with proximal femoral nailing SOS dynamic hip screw was done although this clinical study shows that the classical surgical approach and the accelerated organized recovery of physiotherapy contributed to the enhancement of functional objectives i.e. decreased pain and tenderness, enhanced ROM, muscle speed and agility, which helped the patient regain physical function.

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