

Surgical and Physical Therapy Management of Hip Fracture

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Abstract

Introduction: A hip fracture happens when the proximal end of the femur near the hip joint is broken. Hip fractures are common among elderly population, about one-third of elderly people independently fall every year with 10% of them leading to hip fractures. Hip fractures can be a serious injury if occur above the age of 65 years with life-threatening complication. The femur is the largest and strongest bone thus it requires a high impact force to break and high energy trauma such as motor accident, gunshot wound, jump/fall from height. Although in elderly people a simple fall can lead to femoral fracture which is due to reduced bone mineral density. The healing period of fracture may take up to 3 - 6 months. The other consequences related to hip fracture are high mortality rate, long term disabilities, osteoporosis, and cognitive impairment. Thus an appropriate surgical intervention and post-operative physical therapy are imperative.

Aim of the Study: The review aims to provide an understanding related to hip fracture, surgical intervention, and physical therapy.

Methodology: The review is comprehensive research of PUBMED since the year 1961 to 2014.

Conclusion: Hip fracture is a major cause of morbidity and mortality specially in elderly age group. Many of the patients suffer from multiple medical comorbidities it is important that pre-operative risk management, early surgical intervention, and perioperative management should be done judiciously for hip fractures.

Keywords: Hip Fracture; Surgical Management; Physical Therapy

Introduction

A hip fracture may present in variety of ways ranging from elderly patient reporting of hip pain after a trivial fall to a young patient in hemorrhagic shock after a motor vehicle accident. Multiple factors increases the risk of hip fracture such as gender (prevalent among women and postmenopausal women), increased age, elderly patients on multiple medication such as anxiolytics, opiates, diuretics, low body mass index, low bone mineral density, chronic alcohol and tobacco use, disabilities such as severe stroke, Parkinson diseases and neuropathy and history of previous hip fracture [1,2].

The clinical symptoms may appear as [3,4]:

- A dull ache in groin or hip region
- Inability to put weight on injured leg leading to immobility right after the fall
- Shorter leg on the side of the injured hip
- External rotation of the injured leg
- Stiffness, swelling and bruising around the hip.

The surgical management of hip fracture largely depends on the type of fracture. A hip fracture can be broadly classified as:

- Intracapsular fractures
- Extracapsular fractures.

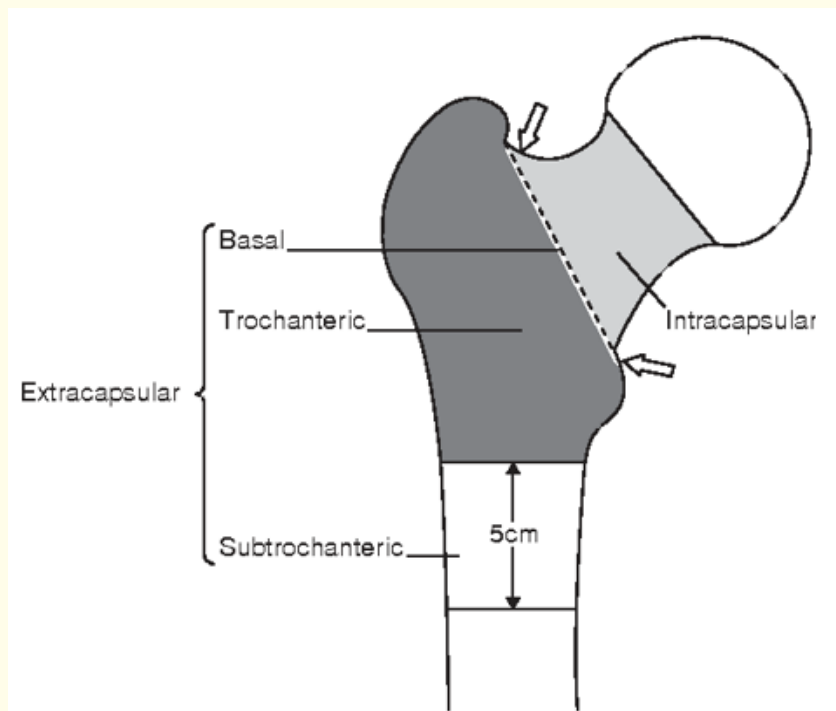


Figure 1: Intracapsular and Extracapsular hip fracture [5].

Intracapsular fractures: They are also known as femoral neck fractures, occurs within the hip capsule and accounts for 45% of all hip fracture in elderly due to senile osteoporosis. Mostly occur due to low impact fall from standing position or from twisting on planted foot. These fractures are susceptible for malunion and avascular necrosis of femoral head. Based on radiographic findings these are further classified as [6,7]:

- Type 1: Undisplaced and incomplete fracture.
- Type 2: Undisplaced and complete fracture.
- Type 3: Complete fracture but incompletely displaced.
- Type 4: Complete fracture and completely displaced.

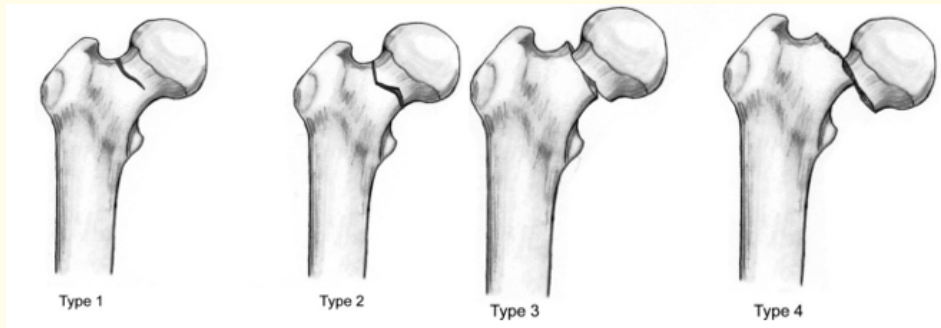


Figure 2: Different types of intracapsular hip fracture [8].

Extracapsular fractures: This can be further divided as an intertrochanteric or subtrochanteric fracture. An intertrochanteric fracture occurs between the greater and less trochanter and common in the geriatric population with osteoporosis of bone. A subtrochanteric fracture occurs 2.5 inches below lesser trochanter [9].

Diagnosis

The diagnosis of hip fracture is made on the basis of patient history, physical examination, and radiography. Limited and painful hip range motion, especially in internal rotation, shortened the injured leg, externally rotated and abducted in supine position, pain on passive hip motion, antalgic gait, ecchymosis, tenderness on palpation and swelling of inguinal and femoral neck area are the common physical findings. The initial assessment is done with plain radiograph, standard x-ray include anteroposterior (AP) view of pelvis and cross-table lateral view of involved hip. However, the occult hip fracture is often undetectable by radiography thus MRI is the next diagnostic modality. In any case if MRI is contraindicated, a bone scan and CT scan are other alternate imaging option to detect occult hip fractures [10-12].

Once the diagnosis has been established the patient, family and surgeon determined the course of action. Majority of hip fracture is treated with surgical intervention depending upon the fracture pattern. But in elderly patient and others with serious co-morbidities, non-operative management and rehabilitation have also opted as other treatment option [13].

Management

Mainly aim to:

- Restore pre-injury level of ambulatory status,
- Prevent complications,
- Avoid further fractures (mainly in osteoporotic patients).

Non-operative management and rehabilitation

This involves either early mobilization or a period of bed rest or traction followed by a progressive weight-bearing and is usually indicated in patients with severe co-morbidities, in which the risk of surgical procedure and anesthesia outweigh the benefits and for those patients who are non-ambulatory or bedridden at baseline, fracture fixation will not improve their ambulatory status. Because 90% of hip fractures are managed surgically, the evidence in favor of non-operative management is less. Mortality with non-operative treatment is also higher in bed rest than early mobilization because of increased incidence of complication such as venous thromboembolism [13]. Management in osteoporotic patient also include medications that treat the main causes and improve bone quality (anabolic-antiresorptive treatment).

Operative management

The management of the hip fracture is combination of properly timed surgery and rehabilitation. The surgical intervention also depends on the location of the fracture, whether displaced or not and age. In comparison with non-operative management, the operative management has resulted in reduced length of hospital stay and improved rehabilitation [14].

Intracapsular fractures

Displaced [15,16]:

- For patients < 60 years: Urgent anatomical reduction (closed - open if closed methods failed) and internal fixation with cannulated screws.
- For patients between 60 - 80 years: The management is controversial. Hemi-arthroplasty significantly reduces the risk of revision surgery after a year.
- For patients > 80 years: Most surgeon favors arthroplasty. Total hip arthroplasty may reduce pain and functional limitation more than hemiarthroplasty.

Undisplaced: Internal fixation with a hip screw or multiple cannulated screw.

The three major types of surgical fixation for Intracapsular fractures are as follow.

In-situ fixation

This technique is useful for impacted minimally displaced fracture. It consists of placement of three large cannulated screws across the fracture site into femoral head. Weight-bearing status depends on surgeon and ideally, the patients are instructed to touch-down weight-bearing with a walker for approximately 8 - 12 weeks [13].

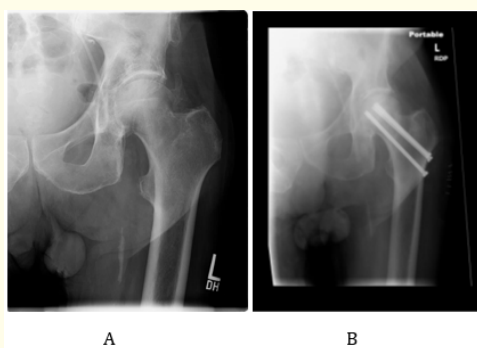


Figure 3: A and B showing minimally displaced fracture and internal fixation with the screw [13].

Hemi-arthroplasty

This technique consists of surgical replacement of proximal femur. The common approach is lateral and posterior. The lateral approach involves splitting of hip abductors and precaution to be taken to include no active abduction against resistance, no adduction past neutral, no external rotation and no extension. While the posterior approach involves releasing of short external rotators of hip and then repairing these muscles with precaution includes such as no internal rotation beyond neutral, no hip flexion more than 90 degrees, no adduction past neutral [17].

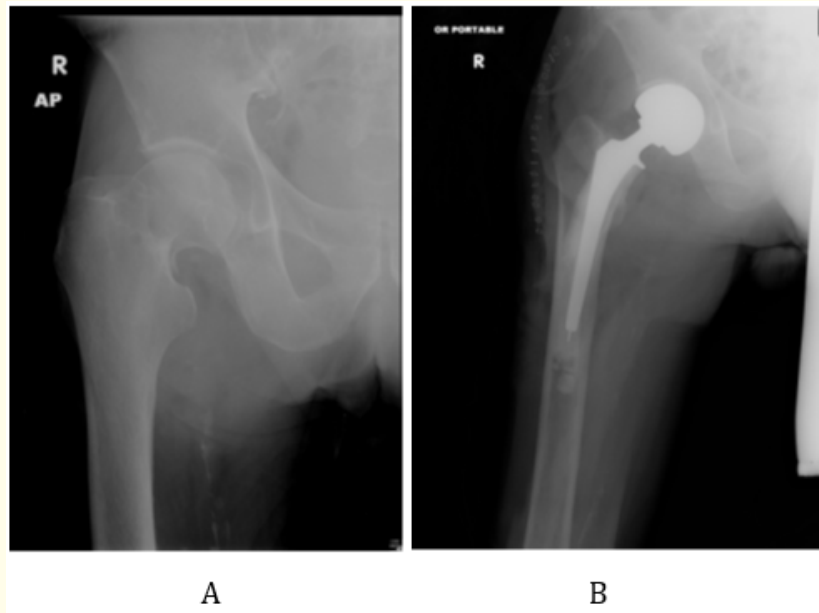


Figure 4: A and B showing fracture femoral neck with hemiarthroplasty done for the same [13].

Total hip arthroplasty

This technique is primarily used for degenerative joint disease and comprises of elective replacement of hip joints. It is proven to be very useful in femoral neck fracture in active elderly patients with pre-existing hip arthritis. The approaches are similar to those of hemiarthroplasty [18].

Extracapsular fractures

Intertrochanteric hip fractures- this account for 50% of hip fractures in the elderly population. The fracture line typically runs between the greater and less trochanter. Since this area is well-vascularized, it reduces the risk of non-union and osteonecrosis as compared to femoral neck fractures. Thus, these fractures can be treated with internal fixation. The two main surgical techniques are as follow [13].

Cephalomedullary nail

This consist of placing an intramedullary rod down the femoral shaft combined with a sliding hip screw directed into the center of femoral head. Several small incisions are given along the lateral thigh and require no post-operative precaution. Generally, the patients are permitted weight bearing as tolerated, but with difficult fracture patterns may warrant non-weight bearing or partial weight-bearing status. The rehabilitation after surgery mainly gaits training, strengthening and ranging motions [13].

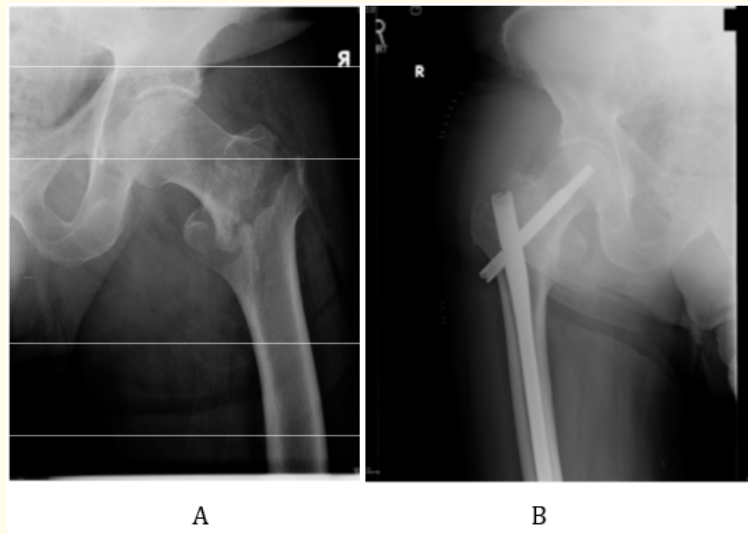


Figure 5: A) Showing intertrochanteric hip fracture B) Placement of the intramedullary rod with a sliding hip screw [13].

Sliding hip screw with the side plate

In this technique, a slide plate is stabilized along the lateral aspect of the proximal femur in conjunction with a sliding hip screw into the femoral head. A small incision is made along the lateral proximal femur for placement of side plate. No post-operative precaution be followed. Weight-bearing and rehabilitation are similar to that of cephalomedullary process [13].

Physical therapy

The main aim of physical therapy after surgical intervention is to improve muscle strength, improve walking efficiently, gait training and preventing further fractures. According to a study, a significant improvement in physical performance and quality of life was found in patient with 10 weeks home-based progressive resistance training exercise program [19].

The patient training usually begins the day after surgery from a sitting position with abducted hip during the transfer from bed to chair. On second and third day patient is allowed to start walking between parallel bars or later with a walker or cane. Warming up on stationary bicycle for 10 - 15 minutes is recommended. Progressive weight-bearing should continue as tolerated till full weight-bearing should start according to physical status. In case of internal fixation partial weight-bearing should start for 8 - 10 weeks and full weight-bearing after 3 months. Begin range of motion exercises for hip, knee, and ankle. The strengthening exercises can be started post 6 weeks of surgery [20,21].

Prolonged bed rest makes the patient susceptible to pressure sores, atelectasis, pneumonia, deconditioning and thromboembolic complication. Hence weight-bearing immediately after surgery is recommended. It is also important for mobility, balance, activities of daily living and quality of life. Internal rotation from hip flexion is stressful for joint, straight leg raise can provoke irritation to nerve hence avoided for 4 weeks and impact activities for 4 weeks. Cardiovascular training is also an important part of therapy [22].

The patient underwent prosthetic replacement should avoid following for 12 weeks [23]:

- Hip flexion more than 70 to 90 degrees
- External rotation of the leg

- Adduction of leg past midline
- Bending forward from waist more than 90 degrees.

Following are the component of Rehabilitation program [23]:

Theraband and manual exercise

- Hip extension
- Heel raises onto toes
- Standing diagonal reach
- Modified get up and go
- Overhead arm extension
- Resisted rowing (double arm lifting).

Vest and Manual exercises

- Repeated chair stands
- Lunges- forward and back
- Stepping up and down (plyometric step)
- Calf raises- both legs and one leg.

Conclusion

Hip fractures are an increasing problem, with each individual fracture conferring substantial costs to the individuals affected and to society in general. The elderly population is most commonly susceptible. The surgical intervention of hip fractures and timing of surgery depends on the location, pattern, extent, and age of the patient. Internal fixation, Hemi and total arthroplasty are commonly done procedure for intracapsular fractures while sliding screw with intramedullary rod and cephalomedullary surgical techniques are applied for extracapsular fracture. Physical therapy is utmost import to revive the basic functions performed in day-to-day life. The aim of physical therapy is to improve walking safety and efficiency, muscle strengthening. The key component of physical therapy and rehabilitation following hip fracture is education on its prevention. Safety at home to prevent falls, regular moderate exercise which can slow bone loss and maintain muscle strength to improves balance and coordination.

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