Original Research Paper

Volume - 11 | Issue - 10 | October - 2021 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Orthopedics

A STUDY TO DETERMINE THE FUNCTIONAL OUTCOME IN THE MANAGEMENT OF STABLE PER TROCHANTERIC HIP FRACTURES WITH DYNAMIC HIP SCREW.

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ABSTRACT **BACKGROUND:** The use of a dynamic hip screw (DHS) for stable as well as unstable intertrochanteric hip fracture fixation has been successfully applied in fracture healing for more than 25years. DHS fixation on unstable trochanteric fractures still has a more failure rate compared to stable fractures, mostly due to osteoporosis in patients. Thus, this study is aimed to investigate the biomechanical property of the DHS system to provide the stable fixation in intertrochanteric A1 and A2 fractures1.

MATERIAL AND METHODS: This is a retrospective study of 54 patients with trochanteric fractures of the femur that were treated with DHS (Dynamic hip screw) during the period of two years from April 2019 to March 2021 in a tertiary care hospital. All surgeries were performed under spinal and epidural anaesthesia. Surgery done was an internal fixation with DHS plate. Results: Among 54 cases, 55.5% were A1, and 44.4% were A2 pertrochanter fractures. The clinical and functional outcomes of the procedure were excellent in 25 patients (46.29%), good in 19 patients (35.18%), fair in 8 patients (14.81%), and 2 (3.7%) of the patients had poor results.

CONCLUSIONS: Intertrochanteric fractures are essentially fractures of the elderly, which demand prompt treatment and early ambulation. The dynamic hip screw is the operative treatment of choice for stable trochanteric fractures.

KEYWORDS :

Introduction:

Pertrochanteric fractures occur in the region extending from the extracapsular basilar neck region to the region along the lesser trochanter proximal to the shaft of femur. Intertrochanteric and peri-trochanteric are generic terms for pertrochanter fractures. Injury creates a wide range of fractures in the proximal metaphyseal region of bone, with damage to the intersecting cancellous, tensile lamellar networks and weak cortical bone[1].

This results in displacement of the fractured fragments and injury to the attached muscle groups. These structures are subjected to multiplanar stresses when surgical repair is done. This region of the femur shares many common biomechanical properties with other metaphyseal–diaphyseal fractures with respect to the difficulty in obtaining stable fixation. Though predominantly associated with low-energy older age patients, high-energy trauma in young patients can result in similar patterns of fracture[2].

Trochanteric fractures of the femur are common at the old age group, but it is not uncommon in the younger age group. Trochanteric fractures unite readily, unlike fractures of the neck of the femur. There is no fear of complications like avascular necrosis of head and its delayed complication of osteoarthritis. Although trochanteric fractures unite without surgical intervention, malunion with coxa-Vara deformity may result in shortening of the limb and a limp[3,4].

Until surgical operative treatments involving the use of several implants were introduced in the 1950s, hip fractures were mostly managed during conservative methods with traction and bed rest. Different operative procedures with various implants have been described for the treatment of intertrochanteric fractures[4].

The primary goal of treatment in hip fractures must be early mobilization to prevent secondary complications. This can be achieved by a dynamic hip screw[5].

Here we are studying the results of the dynamic hip screw in the management of intertrochanteric fracture by analysing the factors which influence post-operative mobility which reduce mortality and morbidity.

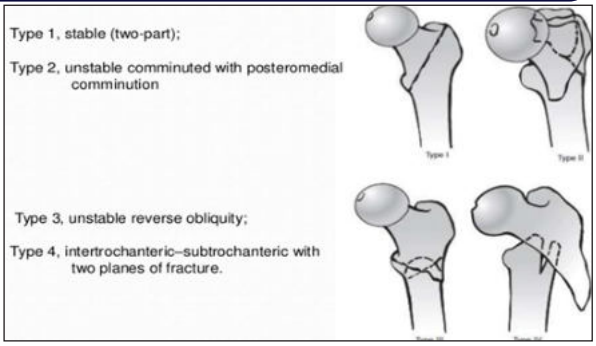


Figure 1: boyd's Classification Of Intertrochanteric Fractures.

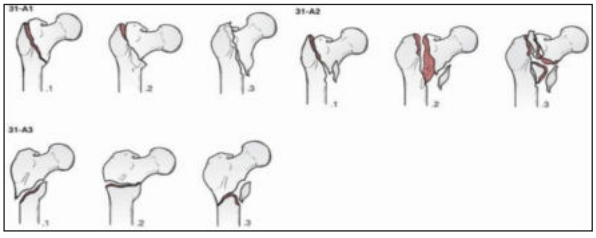


Figure 2: Ao Classification Of Intertrochanteric Fractures.

Material and Methods:

This is a retrospective study of 54 patients with intertrochanteric fractures of the femur that were treated with DHS (Dynamic hip screw) from April 2019 to March 2021 in a tertiary care hospital.

In the study confirmed cases of Intertrochanteric fractures of either sex were treated with extramedullary Dynamic hip screw and plate.

INCLUSION CRITERIA:

- Patient who has been diagnosed as having intertrochanteric fractures on radiographs and medically fit for surgery and those treated with Dynamic Hip screw.
- Patients from 18 years of age and upto 75 years of age.

EXCLUSION CRITERIA:

- Patients with sub trochanteric extension.
- Patients with compound fractures, pathological fractures.
- Patients who were managed with other modalities of treatment.

METHODOLOGY

Patients admitted with injury to the hip were examined and investigated pelvis with both hips AP and Lateral view (whenever possible) radiographs, the patients with diagnosed inter-trochanteric fractures were given Skin traction. Radiographs were studied again, and fractures classified with using Orthopaedic Trauma Association (OTA) and Boyd's classification. All fractures who were treated using Dynamic hip screw, were followed up at 6 weeks, 3months, and 6 months. Patients were evaluated based on intraoperative blood loss, duration of the surgery, postoperative complications, duration of hospital stay were noted and studied. Functional outcome was assessed based on Kyle's criteria[6] and all patients at 6 months of follow up (after fracture union) were assessed as per the following criteria.

Excellent: a. Fracture united, b. No pain, c. No infection, d. Full range of motion at hip, e. No shortening, f. Patient able to sit crossed leg and squat, g. independent gait.

- Good: a. Fracture united, b. Occasional pain, c. No infection, d. Terminal restriction of hip movements, e. Shortening by half an inch, f. Patient able to sit crossed leg and squat, g. Use of cane back to full normal activity.
- Fair: a. Fracture united, b. Moderate hip pain, c. No infection, d. Flexion restricted beyond eighty degrees, e. Noticeable limb shortening up to one inch, f. Patient not able to sit crossed leg, g. Patient walks with support of walker, h. Back to normal activities with minimal adjustments.
- Poor: a. Fractures not united, b. Pain even with slightest movement at hip or rest, c. Infection, d. Range of movements at hip restricted, Flexion restricted beyond sixty degrees, e. Shortening more than one inch, f. Patient not able to sit crossed leg or squat, g. Patient can-not walk without walking aid, h. Normal activities not resumed.

RESULTS:

The study involved 54 confirmed cases of Intertrochanteric fractures of which there were 32 males and 22 females. All the cases were managed with extramedullary fixation "Dynamic Hip Screw" fixation . The age distribution was from 24 to 68 years. The average age was 57 years and the largest group of patients belonged to 51 to 60 years. Out of 54 confirmed cases 38(71%) patients had a fracture due to domestic fall and 16(29%) patients due to road traffic accidents. All the fractures were classified as per Orthopaedic Trauma Association (OTA) and Boyd's Classification, according to which 31A1 were considered to be stable fractures. 31A2 and 31A3 were unstable fractures. In our study, 30 patients were 31A1, 24 were 31A2. The average operating time was 65mins (42min-95min) after anaesthesia induction. Closed reduction was achieved in 44 patients (90%), whereas 11 (10%) patients required open reduction. The average operating time was 75 minutes from the incision to closure. The hospital stay was more in patients with co-morbidities and complications, with highest duration of stay being 26 days. The average hospital stay was 15.22 days (9 minimum –26 maximum) from date of admission to date of discharge.

Age in years	Number of patients
21-30	6
31-40	9
41-50	11
51-60	16
61-70	12
Total Patients	54

Male patients	32
Female patients	22
Total	54

Post-operative complications: Total Post-operative complications in our study were 15 %. Early postoperative complications included shortening of 2 mm in (3) patient and in (3) patient superficial infection was seen.(2) patients had Varus Mal union in our study. Results were evaluated by Kyle's criteria in our series, and we had 46.29 % excellent, 35.18 % good, 14.81 % fair and 3.7 % poor results. The average intra operative blood loss was very minimal. The average blood loss was 78 ml, and it was considerably more in patients who required a limited open reduction. Only six (11.11 %) of our patients required intra or post-operative transfusion.

Figure 3 And 4: Radiographs Done At The Time Of Presentation.

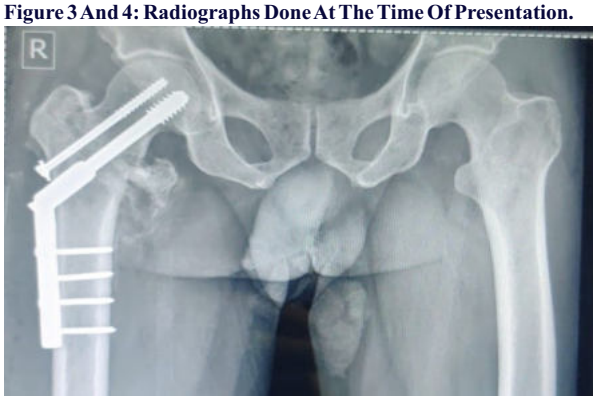


Figure 5 And 6: Radiographs Showing The Use Of Dynamic Hip Screw And Plate In Fixation Of Pertrochanter Fractures.

DISCUSSION:

Pertrochanter femoral fractures are of intense interest globally. They are the most often operated fracture type, have the highest postoperative fatality rate of surgically treated fractures, and are a serious health resource issue due to the high cost of care required after injury. The reason for the high cost of care is mostly related to the poor recovery of functional independence after conventional fracture care in many patients[7]. Interestingly there has been no significant change in mortality or functional recovery over the past 50 years of surgical treatment. Ironically , the last 50 years of study of hip fracture

treatment are related to false assumptions that have been a hindrance to improvement in the management of the hip fracture patient: (1) Uncontrolled shortening and varus collapse are acceptable in hip fractures, but not other fractures; (2) reduction does not matter with sliding screw systems as the fracture will "collapse to stability" since rotation is not a problem and that placement of the head fixation takes precedence over fracture reduction; (3) union without implant failure overrides the requirement of a stable anatomic reduction to the detriment of optimal functional recovery; and (4) the orthopaedic surgeon just fixes the fracture as opposed to treating the total musculoskeletal requirements of the patient[8,9]. The reasons for these assumptions are related directly to the historical evolution of hip fractures treatment and the arguments that shaped our current understanding. A new paradigm regarding hip fracture care and treatment is currently in evolution, which hopefully will advance our treatment goal back to optimal functional recovery and prevention of future hip fractures

Lambotte described the four components of treatment of fractures surgically the first is exposure of the fracture, which today means visualization of the fracture deformity, and the safest approach to ensure reduction and placement of the implant in the correct position. The second is reduction of the fracture, which is critical to the stability and functional recovery of the patient. Inadequate reduction is the major preventable aetiology for lost reduction and implant failure in pertrochanter fractures. The third step is provisional fixation in an anatomically reduced position; this is frequently the most neglected step in hip fracture surgery. This involves the reduction of the fracture and then maintenance of the fracture with either provisional Kirschner pins and/or clamps to hold the fracture in position while the bone is prepared for the definitive implant. The final step is definitive fixation, which should maintain the reduced fracture in an acceptable anatomic and functionally correct position until fracture healing is complete[8,9,10].

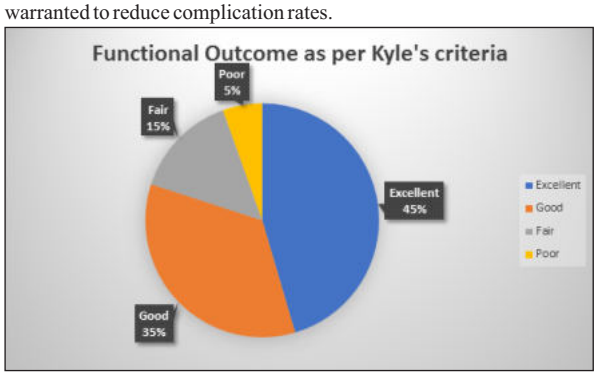
The successful treatment of Intertrochanteric fractures depends on many factors like Age of the patient, his general health, time from fracture to definitive management, the efficiency of treatment, co-existing medical illness, and the Stability of the fixation. At present it is believed that all Intertrochanteric fractures should be fixed internally to reduce the morbidity and the mortality of the patient[11]. But the appropriate method and the ideal implant by which to fix the Intertrochanteric fracture is still in a debate. Because each method having its own advantages and the disadvantages[12].

In the present study 54 patients of Intertrochanteric fractures were studied. In our study the average age was 57 years. We had 32 male patients and 22 female patients. The most common mode of injury in our study was domestic fall 70.7%, which is comparable to most of the Indian studies. This was also affected by the age as the older the patient is more likely getting the fracture by domestic falls. Total post-operative complications in our study were 15%. There was no case of non-union. Infection was present in 3% of the patient it was superficial which was treated with antibiotics and dressing in the ward, no patient required debridement or revision and healed well. Results were evaluated by Kyle's criteria in our series we had 46.29% excellent, 35.18% good, 14.81 % fair and 3.7% poor results. The success of the Dynamic hip screw depends on good surgical technique, proper instrumentation and good C-arm visualization and early physiotherapy. All the patients were operated on fracture table. We found following advantages. Reduction with traction is easier, less assistance is required, Manipulation of the patient is reduced to minimum also the placement of the patient on the fracture table is important, for better exposure the upper body is abducted away 10-15°. Position of the C-arm should be such that proximal femur is seen properly in AP and lateral view. The anatomical reduction and secure fixation of the patient on the operating table are vital for easy handling and good surgical result. If reduction was not achieved by traction and manipulation then K-wire reduction was done, in which K-wire was introduced in the fracture fragment and reduction was tried. In our study one of the important factors was the cost and easy availability of the implant. Dynamic hip screw introduced by Clawson in 1964 remains the implant of choice due to its favourable results and low rate of complications[13,14]. It provides controlled compression at the fracture site. Its use has been supported by its biomechanical properties which have been assumed to improve the healing of the fracture. The common causes of fixation failure are instability of the fractures, osteoporosis, lack of anatomical reduction, failure of fixation device and incorrect placement of the screw[15].

Dynamic hip screw (DHS) is a recommended implant designed for the fixation of stable as well as unstable intertrochanteric fractures. However, several complications have been associated with DHS fixation in unstable fracture[15]. Despite complications, it remains the most reliable and successful treatment option for stable as well as unstable intertrochanteric fracture. though there is an increasing trend towards the use of intra-medullary devices evidence suggests that they fail to deliver better outcomes compared to DHS especially in A1 and A2 fractures[16].

An early restoration of patient's pre-fracture activity and lifestyle is the primary goal, in elderly patients. However, various factors influence the functional outcomes in these patients including adequate internal fixation, less blood loss, less anaesthesia time, early mobilization, and general health of the patient[17]. Preservation of ambulation is a key part of the treatment of these fractures in patients with intertrochanteric fracture[18]. It vastly depends on the quality of fracture stabilization, associated skeletal injuries, post-operative early physiotherapy, and perioperative complications. Over the years, many efforts have been made in the improvement of biomechanics design and implants for fixation of these fractures.

In contradiction to the increased risk of intertrochanteric fracture and complications after DHS fixation, we observed no statistically significant differences in functional outcomes of DHS after six months of fixation amongst the patients. DHS results in acceptable outcomes in most of the patients and it is a very suitable treatment option. However, further improvements in devices and techniques are warranted to reduce complication rates.



CONCLUSION:

The study has shown that DHS plate in management of intertrochanteric fractures results in lower complication rate and maintenance of reduction. The best treatment for these fractures remains controversial. Although, DHS is one of the standard treatments, high failure rates in unstable fractures have been reported. The aim of treatment for intertrochanteric fractures is to make patients mobile and ambulatory and to be able to restore the functional level which was present before the trauma, in the shortest period of time. To accomplish such a goal, we need an implant which causes minimal damage to vascular supply of bone and has a lower complication rate. DHS may help us to achieve our goal.

Conflict of Interest: Nil
Funding: Nil
Ethical approval: in Compliance with ethical standards.
Informed consent: well explained and taken.

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