

Analysis of outcome of dynamic hip screw fixation for trochanteric fractures of femur

Kaushlendra Kumar¹, Suresh Kumar^{2*}

¹Assistant Professor, ²Associate Professor, Department of Orthopaedics, MGM Medical College and L.S.K. Hospital, Kishanganj. Bihar, INDIA.
Email: kajal6160@gmail.com

Abstract

Problem Statement: The life expectancy of average Indian population has increased in recent day and thus the incidence of osteoporosis and osteoporosis related fracture has also increased. So these days, the trochanteric fractures are more commonly encountered than past. **Method:** Patient with age 25 years or more with trochanteric fracture of femur were isolated or with other injury were included in this study. After admission, patients were examined and investigated as per following parameters for their fitness for surgery and anaesthesia. DHS Plate are made up of 316 L stain less steel with screw hole as per length of the plate. It has a low profile design reducing risk of trochanteric bursitis. These are available in a wide range of size and barrel angle, with standard or short barrels, for varied clinical situation. Among 30 cases of trochanteric fractures of femur. Duration of study period from Mar 2015 to Feb2016. **Results:** Range of the age of the patients was 25 – 70 years. Average age was 55 years. Maximum number of patients was seen above the age of 50 years (56.7%). Male : Female ratio was 1:2. **Conclusion:** Internal fixation is the treatment of choice in all type of trochanteric fracture all over the world. Lack of prompt and adequate medical facilities, illiteracy and poor economic condition of the patients in our country is major problem in the use of internal fixation method as a treatment modality. Other major problem is poor acceptance for operative treatment by the patients and their relatives. Keeping all of the above factors in mind we selected DHS fixation for treatment of trochanteric fracture of femur in patients with good compliance and adequate affordability.

Key Word: Osteoporosis, Trochanteric fractures, Femur, DHS fixation.

*Address for Correspondence:

Dr. Suresh Kumar, Associate Professor, Department of Orthopaedics, MGM Medical College and L.S.K. Hospital, Kishanganj. Bihar, INDIA.

Email: kajal6160@gmail.com

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INTRODUCTION

Trochanteric fractures of proximal femur is common in elderly, osteoporotic people, most of them are elderly women. It is caused either by a fall directly onto the greater trochanter or by an indirect twisting injury.¹ The incidence of trochanteric fractures is varies from gender, races and country to country. In U.S.A, annual rate of trochanteric fractures in elderly female is about 63 per

100,000 and in males 34 per 100,000 and the mortality is 16.7% which is more than twice that for femoral neck fractures. The relationship between hip fracture type and individual health status (including number of co-morbidities and activity level) is controversial according to some studies, trochanteric fracture patients are biologically older than those who sustain a femoral neck fracture and that they had low general health and hospital admission, poorer pre fracture ambulatory ability and higher number of associated medical conditions that affected fracture management². Undisplaced trochanteric fractures can be much more difficult to diagnose accurately from the initial clinical and radiographic evaluation. Repeated orthogonal radiographs with the hip in internal rotation may be helpful to demonstrate the fracture line. Further diagnosis may include the CT scan, technetium bone scan or MRI, however these are not used in this study³.

Surgery should be performed as soon as temporary and reversible medical co-morbidities are identified and

managed appropriately. In physiologically stable patients with trochanteric fractures, delay in surgery greater than 72 hours are associated with significant increased in mortality and infectious morbidity.⁴ Surgery should proceed on a semi urgent basis and almost always within 48 hours, skeletal traction is only appropriate for those patients with gross shortening and significant muscle masses where excessive bleeding and soft-tissue injuries are co-existed.⁵

Most of the trochanteric fractures are treated by rigid internal fixation except, in cases, who are medically unfit with extremely poor anaesthetic and surgical risk. Strength of the fracture-implant assembly is determined by⁶:

- 1) Bone quality.
- 2) Fragment Geometry.
- 3) Reduction.
- 4) Implant design.
- 5) Implant placement.

Regarding implant selection, two broad categories of internal fixation devices are commonly used: sliding compression hip screw with side plate assemblies and intra medullary fixation devices.

The sliding compression screw provides additional compression axially. Regarding fixation of trochanteric fracture with sliding compression hip screw with plate devices consist of large lag screw placed in the centre of the femoral neck and head and a side plate along the lateral side of the femur⁷. The use of axial compression in promoting union in this area of the femur are important in healing by achieving compression at fracture sites.

RESULTS

Among 30 cases of trochanteric fractures of femur, most of them were purely intertrochanteric fractures while some of them were intertrochanteric with subtrochanteric extension. All these patients were followed up for 6 month at 6th, 12th, 18th and 24th week.

There are various implants are available for this purpose like Gamma nail, dynamic hip screw, dynamic condylar screw, proximal femoral intramedullary nail, and newer implants like Mitkovic’s dynamic external and internal fixator system and Medoff Biaxial compression plate fixation device. The nail plate angle determines the bending moment⁸. Higher the angle smaller the moment because of shorter distance from the line of load bearing and the axis of side plate⁹. The screw-plate interface angle is variable and depends on the anatomy of the patient and the fracture pattern. The advantage of the sliding lag screw, compared with a static screw, is that it allows for impaction of the fragments¹⁰; this impaction increases the bone-on-bone contact, promoting osseous healing while decreasing implant stress¹¹. The disadvantages is common e.g. shortening and rotation at the fracture site.

METHODS

Patient with age 25 years or more with tronchanteric fracture of femur were isolated or with other injury were included in this study. These patients were admitted through the emergency /OPD. After admission, patients were examined and investigated as per following parameters for their fitness for surgery and anaesthesia. DHS Plate are made up of 316 L stain less steel with screw hole as per length of the plate. It has a low profile design reducing risk of trochanteric bursitis. These are available in a wide range of size and barrel angle, with standard or short barrels, for varied clinical situation.

Table 1: Age Distribution

| Age | No of Cases | Percentage (%) |
|--------------|-------------|----------------|
| < 30 years | 2 | 6.7% |
| 30- 40 years | 4 | 13.3% |
| 40-50 years | 7 | 23.3% |
| > 50 years | 17 | 56.7% |
| Total | 30 | 100% |

Range of the age of the patients was 25 – 70 years. Average age was 55 years. Maximum number of patients was seen above the age of 50 years (56.7%). Male : Female ratio was 1:2.

Table 2: Sex Distribution

| Sex | No of cases | Percentage (%) |
|--------------|-------------|----------------|
| Male | 10 | 33.3% |
| Female | 20 | 66.7% |
| Total | 30 | 100% |

Above table shows preponderance of female 20 (66.7%) and Male:Female ratio is 1:2.

Table 3: Types of Injury

| Mode of Injury | No. of cases | Percentage (%) | Male | Percentage (%) | Female | Percentage (%) |
|-----------------------|--------------|----------------|-----------|----------------|-----------|----------------|
| Minor slip or stumble | 15 | 50% | 3 | 30% | 12 | 60% |
| Fall from Height | 2 | 6.7% | 1 | 10% | 1 | 5% |
| Major Trauma | 3 | 10.0% | 1 | 10% | 2 | 10% |
| RTA | 10 | 33.3% | 5 | 50% | 5 | 25% |
| Total | 30 | 100% | 10 | 100% | 20 | 100% |

Above observation was based on history. Commonest mode of injury was minor slip-overall 50% and 65% in female and 6.7% in male fall in this group. Second commonest was RTA (33.3%). It occurred in 50% male and 10% in females.

Table 4: Type of fracture (According to Boyd and Griffin)

| Type | No of cases | Percentage |
|------|-------------|------------|
| 1 | 2 | 6.7% |
| 2 | 11 | 36.6% |
| 3 | 14 | 46.7% |
| 4 | 3 | 10.0% |

Out of 30 patients 14 (46.7%) were type 3 (Boyd and Griffin) fractures.

Table 5: According to Evan's classification

| Type | Non of cases | Percentage |
|---|--------------|-------------|
| TYPE I: | | |
| Undisplaced | 1 | 3.3% |
| Displaced stable medial cortical apposition | 13 | 43.3% |
| Displaced unstable no apposition | 3 | 10% |
| Comminuted | 9 | 30.0% |
| TYPE II | | |
| | 4 | 13.4% |
| TOTAL | 30 | 100% |

Out of 30 cases 26 (86.6%) were type 1 and 4 cases (13.4%) were type 2 (Evan's) fractures.

Table 6: Side of Fracture

| Side | No of Patients | Percentage |
|--------------|----------------|-------------|
| Right | 20 | 66.7% |
| Left | 10 | 33.3% |
| Total | 30 | 100% |

In this series 20 patients (66.7%) were right side and 10 (3.3%) were left side of the limb effected.

Table 7: Associated injuries

| Associated injury | No of cases | Percentage |
|---------------------------|-------------|------------|
| Head injury | 1 | 3.3% |
| Distal radial fracture | 4 | 13.3% |
| Fracture humerus | 1 | 3.3% |
| Fracture clavicle | 1 | 3.3% |
| Fracture medial malleolus | 1 | 3.3% |
| Rib fracture | 1 | 3.3% |

Most common associated injury was distal radius fracture (4 cases). These associated fracture were treated appropriately by-conservative/operative method.

Table 8: Injury surgery interval

| Duration | No. of cases | Percentage (%) |
|------------|--------------|----------------|
| < 7 days | 4 | 13.3% |
| 8-14 days | 11 | 36.7% |
| 15-21 days | 15 | 50.0% |

In our study majority of the cases (15 cases) were operated within 2 weeks. The cause of delay of operation were either unfit for anaesthesia or presented late to us.

Table 9: Showing Size of Implant

| Size of Implant, (Number of Holes and Barrels) | Number of Patients | Percentage (%) |
|---|--------------------------|-------------------|
| 4 and short | 9 | 30.0% |
| 5 and short | 17 | 56.7% |
| 6 and long | 2 | 6.7% |
| 7 and long | 1 | 3.3% |
| 8 and long | 1 | 3.3% |

In dynamic hip screw study group 5 holes plate with short barrel were used in majority of cases (56.7%).

Table 10: Showing Blood Loss

| Blood Loss (ml) | DHS | |
|-----------------|-----------------|----------------|
| | No. of Patients | Percentage (%) |
| <100 ml | 3 | 10.0% |
| 100 ml – 200 ml | 21 | 70.0% |
| 200 ml – 300 ml | 5 | 16.7% |
| 300 ml – 400 ml | 1 | 3.3% |
| Total | 30 | 100% |

In maximum number of patients showing blood loss was between 100 ml – 200 ml (70%) in this study group.

Table 11: Clinical Union

| Post operative weeks | Status of clinical union (No. of cases) | | | |
|-----------------------|---|---------|-----------------------|---------|
| | Swelling | | Local Bony tenderness | |
| | Absent | Present | Absent | Present |
| 6 th week | 23 | 7 | 3 | 27 |
| 12 th week | 25 | 5 | 26 | 4 |
| 18 th week | 30 | Nil | 30 | Nil |
| 24 th week | 30 | Nil | 30 | Nil |

Local swelling at fracture site present only 7 cases at 6th post operative weeks. Almost all local swelling absent around 14 – 18 weeks. Local bony tenderness disappears around at 16 – 18 weeks.

Table 12: Radiological Union

| Amount of Callus | No. of cases | | | |
|-------------------------|----------------------|-----------------------|-----------------------|-----------------------|
| | 6 th week | 12 th week | 18 th week | 24 th week |
| No visible callus | 3 | 0 | 0 | 0 |
| Little amount of callus | 19 | 1 | 0 | 0 |
| Fair amount of callus | 8 | 21 | 2 | 1 |
| Good amount of callus | Nil | 8 | 28 | 29 |

Except in one patient with cut out of hip screw, in all patients callus appears progressively in predictive way. At 24th week most of the patient showed good amount of callus.

At 6th post operative week only 7 patients were allowed Partial weight bearing. Almost all patients (except one patient with proximal cut through of hip screw) were allowed Full weight bearing at 24th week.

DISCUSSION

DHS are require less technical expertise; achieve radiological union of trochanteric fracture along with early mobilization; avoids the different medical complications caused by prolonged bed ridden state. Among DHS/DCS/Intramedullary devices fixation in trochanteric fracture, placement of DHS may be a simple job according to some study²⁶. But it may become easier by presence of following factors like timely surgery, judicious planning of surgery, reduction technique, proper used of C-arm image intensifier, experience of the

surgical team etc.¹² However, our main aims was to assess the outcome of DHS fixation, to achieve early mobilization, union at fracture site and finally rehabilitation. In our study, we perform a prospective study, in Dynamic hip screw (DHS) fixation in trochanteric fracture of femure. Parameters of observation and complications have been mentioned previously in different tables. The average age of the patient in our study (Table - 1) was 55 years. The youngest patient was 25 years old and oldest was 70 years old. Almost all of the above mentioned authors belong to western or

developed countries. The average age was 55 years in our study lower than that reported by others. Average life span of an Indian is lower than that of western countries (average Indian life span 64 years, European 78 years, American 82 years, Japanese 84.4 years, according to WHO data). Indian reach their senility earlier than western people. Therefore, these fractures were seen at an earlier age in Indian than western or developed countries.

CONCLUSION

The life expectancy of average Indian population has increased in recent day and thus the incidence of osteoporosis and osteoporosis related fracture has also increased. So these days, the trochanteric fractures are more commonly encountered than past. Now a days, internal fixation is the treatment of choice in all type of trochanteric fracture all over the world. Lack of prompt and adequate medical facilities, illiteracy and poor economic condition of the patients in our country is major problem in the use of internal fixation method as a treatment modality. Other major problem is poor acceptance for operative treatment by the patients and their relatives. Keeping all of the above factors in mind we selected DHS fixation for treatment of trochanteric fracture of femur in patients with good compliance and adequate affordability. Each case was evaluated according to some criteria. Each patient was advised to perform mobilisation exercises soon after surgery, gradual crutch walking, partial weight bearing and full weight bearing after union was achieved. In present study it is concluded that dynamic hip screw (DHS) fixation is technically simple but effective procedure for fixation of inter trochanteric fracture of femur. So Dynamic Hip Screw fixation have been still a popular method of internal fixation for intertrochanteric fracture and is specially indicated when trochanteric fracture involving pyriformis fossa. Of course others successful methods are

available for internal fixation of different types of trochanteric fractures.

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