



FUNCTIONAL AND RADIOLOGICAL OUTCOME OF UNSTABLE INTER-TROCHANTERIC FRACTURES USING DYNAMIC HIP SCREW (DHS)

Orthopaedics

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ABSTRACT

The Dynamic Hip Screw (DHS) enables the proximal fragment to collapse in a controlled and concentric fashion, thereby locating its own position of maximum stability. The present prospective study was conducted in the Post Graduate Department of Orthopedics, SKIMS, MCH Bemina, Srinagar on 60 patients with unstable inter-trochanteric fractures and treated with an additional Trochanteric Stabilization Plate (TSP) imposed on the regular Dynamic Hip Screw with the aim to determine the functional and radiological outcome of the Dynamic Hip Screw in treating unstable inter-trochanteric fractures. The data was collected and recorded in Microsoft Excel sheet. The data was analysed with SPSS version 22.0. It was observed that the most (26.6%) of the study subjects were in the age group of 51-60 years and the male to female ratio was 1.85:1. The most common type of fracture was 31A2.2 that was 50% of study subjects and involved left side mostly. The average time for radiological union was 23.5 weeks. 18 (30%) patients reported excellent results, 33 (55%) patients reported good results and 9 (15%) patients reported fair results. 23% patients were reported with complications. It is concluded that DHS provide a better functional and radiological outcome in patients with unstable inter-trochanteric fractures.

KEYWORDS

Hip injury, DHS, Unstable inter-trochanteric fractures, Radiological outcome & Functional outcome.

INTRODUCTION

A significant cause of morbidity in the elderly population is fractures which could be the result of fall injuries. Femoral neck and pertrochanteric fractures make up hip fractures. About 45% to 50% of all hip fractures in the elderly are inter-trochanteric, and 50-60% of them are deemed unstable. The surgical treatment is the main modality treatment of inter-trochanteric fractures^{1,2}

Inter-trochanteric fractures which are unstable can be difficult to treat, and selecting the right implant is essential for fixing the fracture. Operative management for trochanteric fractures enables early rehabilitation and provides the patient greatest chances for functional recovery.³

These type of injuries have been treated with a variety of fixation methods, including sliding hip screws, intramedullary devices like gamma nails, and proximal femoral nails. The Dynamic Hip Screw (DHS) enables the proximal fragment to collapse in a controlled and concentric fashion, thereby locating its own position of maximum stability.⁴

The dynamic hip screw (DHS) is now regarded as the gold standard for outcome assessment after receiving significant recognition in recent years. Although it has been demonstrated that the DHS yields positive results, complications like Varus displacement, screw pull-out, excessive sliding (resulting in shortening), and/or screw breakage are common, especially in unstable inter-trochanteric fractures.⁵

Thus, the present study was conducted to determine the functional and radiological outcome of the Dynamic Hip Screw in treating unstable inter-trochanteric fractures.

MATERIAL AND METHODS

This prospective study was conducted in Post Graduate Department of Orthopedics, SKIMS, MCH Bemina, Srinagar on 60 patients with unstable inter-trochanteric fractures and treated with an additional Trochanteric Stabilization Plate (TSP) imposed on the regular Dynamic Hip Screw w.e.f May, 2020 to June, 2022. These 60 patients were followed for at least nine months (mean 12 months, range 9 to 24

months). The inclusion and exclusion criteria for selection of patients are as under:

Inclusion Criteria

1. Clinical diagnosis of unstable trochanteric femur fracture. (AO Type 31A2.1, 31A2.2 & 31A2.3)
2. Age 21 years to 80 years.
3. Both genders

Exclusion Criteria

1. Open fractures
2. Patients with pathological fractures
3. Poly trauma patients
4. Patients who were not able to walk before the fracture.
5. History of previous surgery on proximal femur fracture
6. Age Below 21 year.
7. Patients with fractures needing other treatments than sliding hip screws
8. Reverse oblique fractures.
9. Patients with dementia, using steroid, immunosuppressant

Following investigation were done for all patients:

1. Radiological: Plain X-ray of the affected hip with femur in two standard projections (AP & Frog leg lateral view) (intra-op).
2. Complete hemogram
3. Renal function test
4. Bleeding time & Clotting time
5. Screening for infections-HIV, HBV, HCV
6. Chest X-ray & Electrocardiogram
7. If needed CT scan of concerned hip joint with 3D reconstruction

Post-operative radiological outcome was assessed by periodic X-rays of the affected hip and functional outcome was assessed by using Harris Hip Score. Non-weight bearing mobilization under the guidance of physiotherapist was started from 3rd post-operative day and Chest physiotherapy was started from 2nd post-operative day. The Weight bearing was started as soon as possible on the basis of patient's pain tolerance, bone quality, fracture reduction and biomechanical stability of the construct. The patients were followed up once in a month for at least 9 months with appropriate radiographs for assessing union and complications like telescoping and varus collapse.

The data was collected and recorded in Microsoft Excel sheet. The data was analysed with SPSS version 22.0.

OBSERVATION AND RESULTS

In our study we used AO/ OTA classification system for patient selection. We included AO31A2 fractures in our study.

Table 1: Type Of Fractures

Type of Fracture	Number of patients	Percentage
31A2.1	12	20%
31A2.2	30	50%
31A2.3	18	30%

In our study most of the patients (50%) had 31A2.2 type of fracture followed by 31A2.3 type of fracture in 30% patients and 31A2.1 type of fracture in 20% patients.

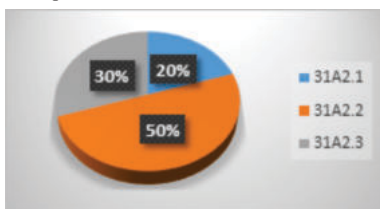


Figure 1: Type Of Fractures

Table 2: Gender Distribution

Gender	Number of patients	Percentage
Male	39	65%
Female	21	35%

In our study 65% patients were males whereas 35% patients were females.

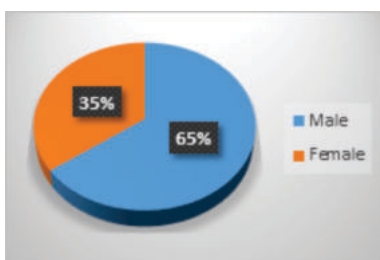


Figure 2: Gender Distribution

Table 3: Side Of Fracture

Side of fracture	Number of patients	Percentage
Left Side	36	60%
Right Side	24	40%

In our study 60% patients had left side inter-trochanteric fracture and 40% had right side inter-trochanteric fracture.

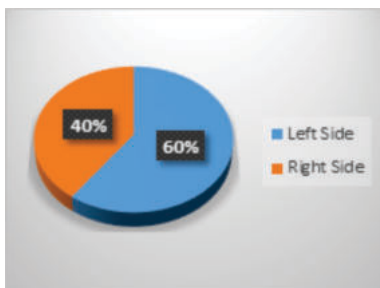


Figure 3: Side Of Fracture

Table 4: Age Wise Distribution

Age Group	No. of Patients	Percentage
21-30	6	10.0%
31-40	14	23.3%
41-50	12	20.0%
51-60	16	26.6%
61-70	8	13.3%
71-80	4	6.6%

In our study most of the patients (26.6%) were in the age group 51-60 years followed by 23.3% in 31-40 year's age group, 20% in 41-50 year's age group, 13.3% in 61-70 year's age group, 10% in 21-30 year's age group and 6.6% in 71-80 year's age group.

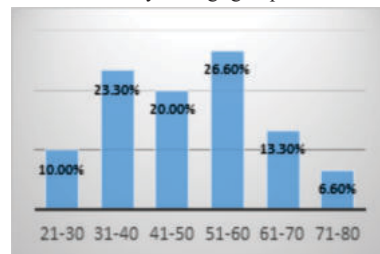


Figure 4: Age Wise Distribution

Table 5: Co-morbidities

Co-morbidities	No. of Patients	Percentage
Type-2 Diabetes	16	26.6%
Hypertension	20	33.3%
Coronary Artery Disease	6	10.0%
Chronic Kidney Disease	2	3.33%
Pulmonary TB	2	3.33%

In our study 20 (33.3%) patients suffered from hypertension, 16 (26.6%) patients suffered from Type-2 Diabetes Mellitus, 6 (10.0%) patients suffered from coronary artery disease, 2 (3.33%) patients suffered from Chronic Kidney Disease and 2 (3.33%) patients had completed treatment for Primary Pulmonary Tuberculosis.

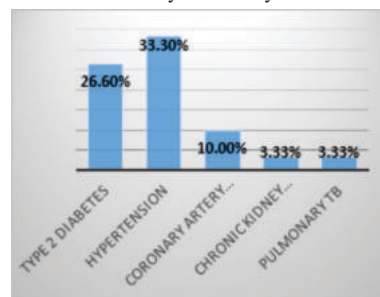


Figure 5: Co-morbidities

Table 6: Operative Details Of Inter-trochanteric Fractures Treated By TSP

Mean time of operation after fracture in days	8.6days
Mean duration of operation	84 minutes
Mean blood loss in ml	164.15ml
Mean size of lag screw	85mm
Mean size of anti-rotation screw	75mm

In our study, all the patients had a mean operative delay of 8.6 days. The mean duration of surgery was 84 minutes and the mean blood loss during surgery was 164.15ml. The mean size of lag screw utilized was 85mm and mean size of anti-rotation screw was 75mm.

In Postoperative Period, mean duration of hospital stay was 6.7 days. The patients were allowed full weight bearing after an average duration of 13.4 weeks. Out of 60 patients, 4 (6.66%) patients had persistent pain in hip region and 02 (3.33%) patients had persistent thigh pain hence the weight bearing was delayed till radiological union occurred and symptoms subsided.

The post-operative radiological outcome was assessed by taking serial X-rays of the affected hip in antero-posterior and frog leg lateral view. All patients achieved radiological and clinical union. 24 (40.0%) patients underwent radiological union by 16 weeks, 16 (26.6%) patients underwent by 18 weeks, 12 (20%) patients underwent union by 20 weeks and 08 (13.3%) patients underwent union by 22weeks. The average time for radiological union was 23.5weeks.

Table 7: Functional Outcome By Harris Hip Score

Functional Outcome	No. of patients	Percentage
Excellent	18	30%
Good	33	55%
Fair	9	15%

The postoperative functional outcome was assessed by Harris Hip Score at 20 weeks. Average Harris hip score was 83.2. In our study 18 (30%) patients reported excellent results, 33 (55%) patients reported good results and 9 (15%) patients reported fair results.



Figure 6: Functional Outcome By Harris Hip Score.

Table 8: Complications

Complications	Total no. of patients	Percentage
Superficial wound infection	3	5%
Urinary tract infection	2	3.3%
Lower respiratory tract infection	1	1.6%
Varus collapse with shortening of >2cm	2	3.3%
Persistent Hip pain	4	6.6%
Persistent Thigh pain	2	3.3%

In our study, 14 (23%) patients encountered various complications. 03 patients had a superficial wound infection and all of them were suffering from Type II Diabetes Mellitus. The infection subsided with prolonged antibiotics and one wound wash. 03 male patients had fever on 4th postoperative day. 02 patients were diagnosed with urinary tract infection and another had lower respiratory tract infection which settled with a course of antibiotics. 02 patients had shortening of > 2 cm due to varus collapse out of which one patient had shortening of 2.4cm and another patient had shortening of 2.6cm which was addressed by heel sole raise footwear. 04 patients had persistent hip pain and another 02 patients had persistent thigh pain. Weight bearing was deferred in these patients and pain was relieved after radiological union.

DISCUSSION

The data was analyzed and discussed with previously available literature.

In our study the most (26.6%) of the study subjects were in the age group of 51-60 years and the male to female ratio was 1.85:1. The most common type of fracture was 31A2.2 that was 50% of study subjects and involved left side mostly. These findings are correlated with the study conducted by Lakho MT et al., (2019) who reported that the mean age of patients was 66.61 ± 7.79 years and majority of the patients were males.⁹ In another study carried out by Kiran Kumar KK et al., (2017) found that the most of the patients were of age ≥ 50 years and majority of the subjects were males.⁷

The current study found that the most common co-morbidity (33.3%) was systolic hypertension, followed by Type- 2 Diabetes Mellitus (26.6%), Coronary artery disease (10.0%), Chronic Kidney Disease and Primary Pulmonary Tuberculosis (3.33% respectively). These results are correlated with the study performed by Dr. Selva kumar P. (2016) Out of 20 patients, 12 had systolic hypertension, 3 had coronary artery disease, 1 had chronic kidney disease, and 1 had successfully finished therapy for primary pulmonary tuberculosis. Additionally, 8 had Type-2 Diabetes Mellitus.⁷

Overall the patients had a mean operative delay of 8.6 days. The mean duration of surgery was 84 minutes and the mean blood loss during surgery was 164.15 ml. The mean size of lag screw utilized was 85 mm and mean size of anti-rotation screw was 75 mm. In Postoperative Period, mean duration of hospital stay was 6.7 days. The patients were allowed full weight bearing after an average duration of 13.4 weeks. Out of 60 patients, 4 (6.66%) patients had persistent pain in hip region and 02 (3.33%) patients had persistent thigh pain hence the weight bearing was delayed till radiological union occurred and symptoms subsided. The postoperative radiological outcome was assessed by taking serial X rays of affected hip in antero-posterior and frog leg lateral view. All patients achieved radiological and clinical union. 24 (40.0%) patients underwent radiological union by 16 weeks, 16

(26.6%) patients underwent by 18 weeks, 12 (20%) patients underwent union by 20 weeks and 08 (13.3%) patients underwent union by 22 weeks. The average time for radiological union was 23.5 weeks. In our study 18 (30%) patients reported excellent results, 33 (55%) patients reported good results and 9 (15%) patients reported fair results. 23% patients were reported with complications and the commonest complication was persistent hip pain followed by superficial wound infection (5%), UTI, varus collapse with shortening of >2 cm & persistent thigh pain (3.3% respectively) and lower respiratory tract infection.

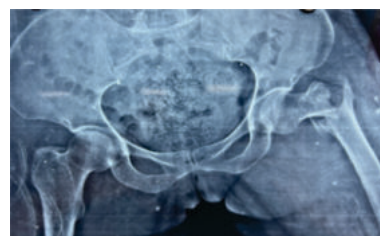
These observations are comparable with the study performed by Pradeep AP et al., (2017) found that the typical length of surgery was 51 ± 14.2 minutes. 66.7% of patients had radiological union by 14 weeks, but all had it by 18 weeks. All of the patients were permitted to bear their full weight by the conclusion of the six-week period, but 11 (36.7%) of them needed assistance from a walking stick. 11 (36.7%) abductor lurches were noticed. In 8 (27%) cases, a 2 cms shortening was noted. Dimon-hungston type osteotomies were necessary in 2 (7%) patients. There were 21 (70%) cases with excellent results, 4 (13.33%) cases with good results, 3 (10%) cases with fair results, and 2 (6.67%) cases with bad results.⁵

In another study performed by Lakho MT et al., (2019) observed that after three months, the overall acceptable outcome was 62.5% (15/24) vs. 86.6% (71/82), p-value = 0.008, for diabetic and non-diabetic patients, respectively. However, individuals with type-2 diabetes had comparatively worse outcomes after three months as compared to non-diabetic patients. Similar to this, individuals above the age of 65 years saw considerably worse outcomes than patients between the ages of 50 and 65 after three months, with an overall acceptable outcome of 72.2% (39/54) as opposed to 90.4% (47/52) (p-value = 0.017, respectively).⁶

CONCLUSION

In our study 30% patients reported excellent results, 55% patients reported good results and 15% patients reported fair results and 23% patients reported various types of complications.

The present study concluded that DHS provide a better functional and radiological outcome in patients with unstable inter-trochanteric fractures.



Pic 1: Anteroposterior Radiograph Showing Unstable Type Inter-trochanteric Fracture Of Left Femur.



Pic 2: Postoperative Antero-posterior Radiographs After Fixation Of The Fracture With Dhs.



Pic 3: Antero-posterior Radiographs Of Hip Taken At Six Months'

Post-op Showing Good Callus Formation And A Uniting Left Inter-trochanteric Fracture.



Pic 4: Clinical Image Showing Functional Ability Of The Patient At Six-month Post-op.

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