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## Study on the functional outcome of stable intertrochanteric fractures treated with dynamic hip screw

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### Abstract

**Aim:** To assess the clinical and functional results of using a Dynamic hip screw in the treatment of stable intertrochanteric fractures.

**Methods and materials:** Over a period of one year starting from November 2016 to November 2017, 20 patients diagnosed with stable intertrochanteric fracture classified as Type 1 Boyd and Griffin classification were included in the study. All cases were treated with closed reduction and internal fixation with a dynamic hip screw by a single surgeon. Harris Hip score was used to assess functional outcome.

**Results:** We had 11 male and 9 female patients in the study group. Their mean age was 56.8 years. All of them had unilateral type 1 Boyd and Griffins intertrochanteric fractures which are described as stable fractures. None of the cases had any intraoperative complications. All the cases were reduced by closed means. Tolerated weight bearing was allowed from the second to the tenth postoperative day. The mean follow up period was 30.6 (21 to 41) months. There were no cases of fracture fixation failure, loss of reduction, screw cut out, non union or deep infection. There were no superficial infection. The mean functional score was 93.6 (78.8 to 100).

**Conclusion:** We observed that Dynamic Hip Screw when used for stable intertrochanteric fractures results in excellent to good functional outcomes however increasing age may cause a decline in functional scores.

**Keywords:** Intertrochanteric fractures, proximal femoral fractures, dynamic hip screw, DHS

### Introduction

In recent decades the number of cases of proximal femoral fractures has dramatically increased<sup>[1]</sup>. About one third of patients that sustain the fracture die within a year of the injury<sup>[2]</sup>. It also reduces life expectancy by an average of 1.8 years and one fifth of the rest of the patient's life is spent with dependency on long term care services<sup>[3]</sup> while those who do survive beyond 6 months only fifty percent get back to their prefracture functional state<sup>[4]</sup> Studies show that early fixation and mobilization reduces mortality in this group of patients<sup>[5, 6]</sup>.

Half of all hip fractures in elderly are intertrochanteric fractures more than 50% of which are of unstable variety<sup>[8, 9]</sup>. About 5% of these fractures occur in the age group of 20 - 40 yrs while the rest of the 95% occur in the age group above 50 yrs indicating a bimodal pattern of occurrence. Because they occur in the elderly and in persons with low bone stock, they usually tend to be of unstable pattern<sup>[10]</sup>. These group of patients owing to their age have multiple comorbidities and those in the age group of 40 - 50, who sustain these fractures are chronic alcoholics or have chronic illnesses<sup>[11, 12]</sup>. Prolonged recumbency in these patients, according to Watson Jones, is due to malunion secondary to shortening and coxa vara. This can be prevented by early intervention and fixation avoiding the deformity from occurring and allowing early mobilization<sup>[13, 14]</sup>.

Intertrochanteric fractures' fixation began in the 1950s<sup>[15, 16]</sup>. Extra medullary devices like DHS have proved to be good for stable fracture patterns<sup>[17]</sup>.

One of our other published papers evaluating the outcomes and relevance of use of Proximal femoral nail in the treatment of unstable intertrochanteric fractures justified its use with regards to the functional outcomes it produced<sup>[18]</sup>. Our aim in this study was to evaluate the

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results of use of DHS in our patient population with stable intertrochanteric fractures.

DHS was considered the gold standard for the fixation of intertrochanteric fractures during the 80s and 90s. It consists of a large fragment side plate with a barrel at the plate's proximal end angled at varying degrees, ranging from 125 to 150 degrees. It consists of a 12.5 mm large diameter lag screw of lengths between 65 to 135 mm. They work on dynamic compression principle and have been found to fail due to screw cut out or plate pull off. Also, their allowance for controlled collapse, resulting in shortening and changes in abductor function, has driven the search for more stable treatment options<sup>[19]</sup>.

### Materials and Methods

This was a single site study, carried out at Raichur Institute of Medical Sciences, Raichur between November 2016 and November 2017. Ethical clearance was obtained from the institute's ethical committee. There were 20 patients included in the study. All cases were diagnosed to have type 1 stable fractures as per Boyd and Griffin classification (1949).

Type 1: Stable (two part)

Type 2: Unstable with posteromedial comminution

Type 3: Subtrochanteric extension with lateral shaft extension of the fracture distally at or just below the lesser trochanter

Type 4: Subtrochanteric with intertrochanteric extension with the fracture lying in at least 2 planes<sup>[20]</sup>.

Patients who were unfit for surgery, those who did not give consent, those suffering from terminal illnesses or malignancies with short life expectancy, patients with cognitive disturbances, polytrauma, those who were non ambulant preinjury were excluded from the study. Medical fitness for surgery was obtained and all were fixed using Dynamic hip screw by a single surgeon under subarachnoid block.

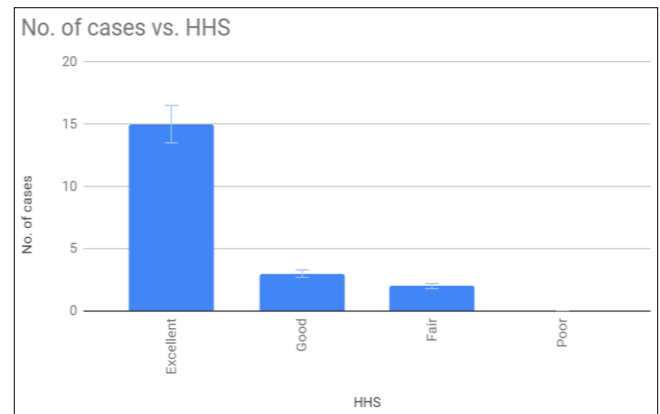
Patient was put on a traction Fig with the fractured limb put on longitudinal traction and the normal limb placed in a well leg holder. Fracture reduction was done under fluoroscopic guidance and fixation started after good to satisfactory reduction, as per Baumgartner's criteria<sup>[21]</sup>, was obtained. A lateral incision for guide wire, lag screw and side plate insertion was used. A tip apex distance of < 25 mm was aimed at. Intravenous antibiotic coverage was started 30 minutes prior to the skin incision and continued for 5 days postoperatively.

Knee mobilization, static quadriceps exercises were started from the first postoperative day. Follow up was carried out at regular intervals. Radiographic and functional assessment using Harris Hip score were carried out at each follow up. Quality of reduction was assessed using modified Baumgaetner criteria<sup>[21]</sup>.

### Results

20 patients, 11 men and 9 women underwent diagnosed with simple intertrochanteric fractures were fixed using dynamic hip screws. All reductions were achieved using closed methods. The group's mean age was 56.8 years and ranged from 28 to 80 years. All the fractures classified as per Boyd and Griffin classification were type 1, stable fractures. The average duration from the day of admission to day of surgery was 4.8 days (3 - 7 days). All surgeries were performed by a single surgeon, the senior most of the authors. There were no intra operative complications. The mean surgical time was 25 mins (20 - 30 mins). Tolerated assisted weight bearing was begun from the 2nd to 10th postoperative day based on patient's pain tolerance. The mean follow up period in our study was 30.6 months (21 -

41 months). Harris hip score was 93.6 on an average with a range of 78.8 to 100. Fifteen were excellent, three good, two fair and none were poor. None of our cases underwent reoperations nor was there any mortality during the study period.



**Fig 1:** Functional outcomes in accordance to Harris Hip Score. 75% had excellent, 15% had good and 10% had fair results. There were no poor outcomes.



**Fig 2:** Preoperative x ray showing a type 1 intertrochanteric fracture. Alongside is the immediate postoperative x ray showing satisfactory reduction as per Baumgaetner criteria.



**Fig 3:** Images depicting active range of motions of the case shown in fig 1 at 6 months follow up.



**Fig 4:** Preoperative, immediate postoperative and 6th month follow up X-rays of another of our case.



**Fig 5:** Follow up X-ray of one of our cases at 18th month follow up. Complete radiological union of the fracture noted.



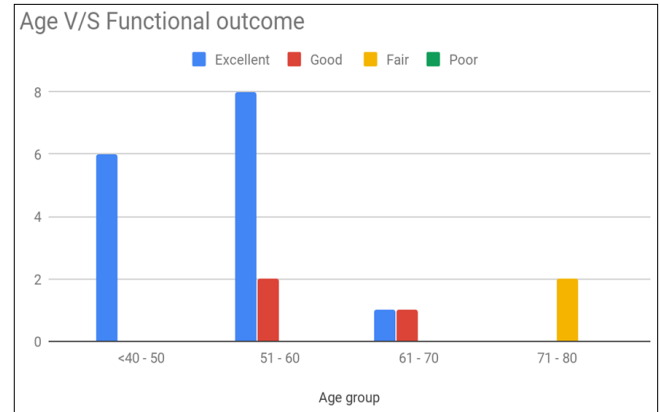
**Fig 6:** 3rd month follow up X-ray of a stable intertrochanteric fracture treated with DHS.

## Discussion

The elderly are typically are predisposed to sustain intertrochanteric fractures [22]. Subjecting this group of population to surgical intervention is fraught with possibility of occurrence of complications due to multiple factors like reduced functional reserve, depressed immune system, multiple co morbid conditions and increased risk of anesthetic complications [23]. Dynamic hip screw is one of the most commonly used implants to fix intertrochanteric fractures [24]. It is preferred more for stable fractures than for unstable ones as the revision rates for unstable fractures are as high [25, 26].

In the present study we fixed 20 cases of stable intertrochanteric fractures with Dynamic hip screws and sought to evaluate their functional outcomes.

In our study, though there were no poor functional outcomes; we observed that with increasing age the functional outcomes declined as we could only achieve fair outcomes in patients of age group between 71 to 80. However some studies found no direct influence of age on the rate of complications [27].



**Fig 7:** Influence of age on functionality. Though there were no poor outcomes, all the fair outcomes were noted in the most elderly cohort of patients

We found no cases of avascular necrosis (AVN) of the femoral head whose risk according to Feng Yang *et al.* is elevated in patients with co morbid conditions like hypertension, Diabetes mellitus and ischemic heart disease which predisposes to atherosclerosis subsequently leading to AVN [28].

We did not observe any cases of non union as described by Beam *et al.* though our patient population demographically was at risk for impaired bone healing [29].

In our study, 75% of patients had excellent, 15% had good while 10% had fair results. In comparison, Mardani Kivi *et al.* had 31.7% excellent, 63.3% good and 5% fair results [30]. Shetty *et al.* found 59.4% of their patients with unstable intertrochanteric fractures treated with DHS augmented with trochanteric stabilization plate had excellent to good results [31]. Barwar *et al.* observed 45.8% of their patients to have excellent results at the end of a year, having used DHS with a locking side plate to treat intertrochanteric fractures [32]. The higher percent of excellent results in this study could be attributed to the fact that, unlike the other mentioned studies, we included only stable fractures in this study as per the protocol of the institute.

## Conclusion

We observed that Dynamic Hip Screw when used for stable intertrochanteric fractures results in excellent to good functional outcomes however increasing age may cause a decline in functional scores.

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