

## Original Article

## Effectiveness of Dynamic Hip Screw in Fixation of Trochanteric Fractures of Femur in Elderly Patients

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## ABSTRACT

**Background:** Trochanteric angle of the femur is 125 degrees. 5 cm. Head-neck trochanter enhances hip movement, freeing limbs from pelvis. Age-related. Slow, severe morbidity. pneumonia/thrombosis Decubitus ulcer, knee stiffness, mental decline, etc. Mobility and weight bearing reduce stability. Success is 96% even with unstable fractures. 4 It's used to fix trochanteric fractures. Hip screws fix trochanteric fractures. We treat trochanteric fractures with dynamic hip screws but don't know why. Dynamic hip screws cured older patients with trochanteric fractures. **Objective:** To see the effectiveness of dynamic hip screw in fixation of Trochanteric Fractures of Femur in elderly patients. **Methods:** 30 of 36 study participants were ER admissions, 6 were outpatients. Hospitalized patients were given 5 to 8 kg of surface traction to overcome muscular spasm, minimize pain, and rest the leg in the best functioning position. Skeletal traction was utilized to ease

hip soft tissue contractures and reduce shortening. Pre-operative clinico-radiological tests and other studies assessed GA fitness. Hypertension, anemia, diabetes, and pulmonary problems were treated. After stabilizing, the procedure began. 1 g intravenous after anesthesia induction, 1 g intravenous after 24 hours, and 1 g intravenous after 48 hours of the first dose. Before stitches were removed, antibiotics were taken orally. **Results:** Age ranged 52-95-year-olds. 36.1% of patients were 70-79, 80-89, 60-69, 50-59, and 90-99. (68.077.46) 70-79-year-olds differ from 90-99-year-olds. Women are outnumbered (58.3 percent). 40% Variable patient genders. Most patients were retired (44.4%), housewives (41.7%), or military (13.9 percent). Most injuries were household falls, as most participants were retirees or housewives (69.4 percent). (RTA). vs. RTA. **Conclusion:** The dynamic hip screw streamlines nursing care for over-50 patients, reducing mortality and morbidity. Using crutches to stabilize fractures. Stable and unstable trochanteric fractures of the femur are

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*treated using a dynamic hip screw (DHS). The series is expanded.*

**Keywords:** *Femur, Trochanteric, Hospital, Adult, Patient, Surgery*

## INTRODUCTION

Trochanteric region of the femur is that part which connects the head-neck and shaft of femur at an angle of about 125 degree<sup>1</sup>. The neck is about 5cm long. So, head-neck trochanter facilitates the movement at the hip joint causing limbs to swing clear of the pelvis. Hip fracture is one of the major causes of admission in hospital, increasing each year and accounts for 30° of all the hospital admissions". The incidence of unstable trochanteric fracture increase with age". An ongoing hip fractures, trochanteric fractures constitute the major bulk. Most of the trochanteric fractures occur in-patient from 66 to 76 years of age. It is three times more common in women

than men due to their wider pelvis and because they tend to be less active, develop osteoporosis earlier and tend to live longer than men. Most of the fractures occur in the elderly, usually in association with osteoporosis and as a result of only moderate or minimal trauma. As this is the fracture of old age. morbidity is extreme and complications, such as pneumonia, thromboembolism, decubitus ulcer, knee stiffness: mental deterioration, etc. are frequent. Fracture of the trochanteric region of the femur is one of the common and difficult problems faced by orthopedic surgeons every day. Fracture occurs through the highly vascular cancellous bone and usually heals within 8 to 12 weeks, regardless of the method of treatment, in almost all cases. However, mal-union and varus angulations are common. The demand on the patient, nursing staff and the length of hospitalization period render conservative method of treatment unacceptable today.<sup>2</sup>

There are different devices for fixation of trochanteric fractures, namely Smith-Peterson triflanged nail, Jewett fixed-angle

nail-plate, Gamma interlocking nail, upper femoral interlocking nail, etc. The Jewett fixed-angle nail-plate is still in this subcontinent and also in our hospital.

The sliding device first described by Pohl and later, by Pugh and Massie in the early 1950s gained popularity in the 1970s in its various modified forms. It allows controlled collapse of the major fragments but maintains the neck shaft angle even in unstable fractures<sup>3</sup>. Early mobilization and weight bearing do not hamper the stability of fixation rather impact the fragments. Reported success rate is also high, even in unstable fracture about 96 percent.<sup>4</sup> Till today, it is the most popular and acceptable device for fixation of trochanteric fracture all over the world. Dynamic hip screw is still the first choice for fixation of trochanteric fractures. Dynamic hip screw fixation for trochanteric fracture management is now practicing in our hospital setting but we do not have any study to see its advantage or any disadvantage. So we have selected dynamic hip screw fixation in case of trochanteric fracture of the femur in elderly patient, to see the outcome in our setting.

## MATERIALS AND METHODS

Descriptive study conducted at Department of Orthopedic Surgery, Chittagong Medical College Hospital, Chittagong, with the sample size of 36 patients aged above 50 years admitted to the Chittagong Medical College Hospital with closed trochanteric fracture. The aim of the study is to find out the Effectiveness of dynamic hip screw in fixation of trochanteric fractures of femur in elderly patients.

## MEASURES OF OUTCOME VARIABLES

**a) Demographic variables:**

- (i) Age,
- (ii) Sex and (iii) Occupation,

**b) Clinical variables:**

- (i) cause of injury,
- (ii) Side involved, and
- (iii) Pain, limping, walking ability and movement of the hip.

**c) Diagnostic variables:** Radiological to observe type of fracture (stable or unstable).

**d) Postoperative follow-up variables:**

- (i) hospital stay,
- (ii) limping,
- (iii) walking ability, and (iv) hip range of motion.

**f) Radiological assessment:** regarding progress of union.

**g) Complications:** Early and late postoperative complications.

**h) Final outcome:** The final clinical outcome was analyzed using the criteria followed by Kyle et al.<sup>7</sup> and the results of operations were rated into following categories: (a) excellent, (b) good, (c) fair and (d) poor. They were further categorized into satisfactory (excellent + good) and unsatisfactory (fair + poor) groups.

**DATA COLLECTION:**

A pre -designed pro-forma containing history and examination findings of patient and follow-up were used to collect the data (Appendix-III)

**DATA ANALYSIS:**

Collected data were compiled and appropriate analyses were done using computer-based software SPSS (Statistical Package for Social Science). P value <0.05 was taken as minimum level of significance.

**METHODS**

Out of 36 patients of this series, 30 were admitted through emergency department and only 6 were admitted through the outpatient department. The hospital

admitted patients were put on the surface traction with 5 to 8 kg of weight to overcome muscle spasm, to relieve pain, and to rest the limb in the best functional position according to the methods described by Stewart and Hallett<sup>34</sup>. In late cases, skeletal traction was applied to relax soft tissue contractures around the hip, and therefore, to reduce the shortening and to facilitate reduction. Pre-operative clinico-radiological examinations were performed, and all other relevant investigations were completed for GA fitness. Any associated illness, such as hypertension; anemia, diabetes mellitus, pulmonary problems, etc. were treated adequately. As soon as the general condition of the patient settled down, the patient was brought to operating room for operation. In all cases, 3 doses of prophylactic ceftriaxone (injection) 1 g intravenous after induction of anesthesia and 1 gm intravenous after 24 hours and 1 gm intravenous after 48 hours of the first dose were given followed by course of oral antibiotics until removal of the stitches.

**RESULTS**

Age of the patients ranged from 52 to 95 years. Most of the patients belonged to age group 70-79 years (36.1%), followed by 80-89 years (25%), 60-69 years (22.2%), 50-59 years (11.1%) and 90-99 years (5.6%). The mean ( $\pm$ SD) age of the total study patients (n=36) was 72.1 $\pm$ 1.20 years, male (n=21) was 75.05 $\pm$ 12.62 years and female (n=15) were 68.07 $\pm$ 7.46 years. There are significant differences between 70-79- and 90-99-years age group.

Maximum numbers of patients were males (58.3%) and females were 41.7 percent. There are significant differences between male and female patients.

And thereby maximum number of patients (44.4%) were retired, 41.7 percent housewife and 13.9 percent service holder. There are significant differences between retired and service holder groups.

As most of the study subjects were either retired person or housewife, mostly the cause of injury was domestic fall (69.4%);

only 30.6 percent suffered injuries from Road Traffic Accident (RTA). There are significant differences between domestic fall and RTA.

**Table 1: Cause of injury (n=36)**

Cause of injury	Number of patients	Percentage
Road traffic accident	11	30.6
Domestic fall	25	69.4*
Total	36	100

Table-2 show that stable fracture was sustained by 26 (72% cases and unstable by 10 (28%) cases.

**Table-2. Type of fracture (n = 36)**

Type	Number of patients	Percentage
Stable	26	72.0
Unstable	10	28.0
Total	36	100

Z-2.63, \*P<0.05

Table -3 shows follow up outcome regarding limping, walking ability and hip joint range of motion, out of 36 (100%) patient, 18(50%) patient had no limping and 3 (8.3%) become unable to bear weight at 24 weeks follow up, 11(30.6%) patient regained previous walking ability, flip movement was not possible in 3(8.3%) at 24 weeks follow up. All parameters show gradual improvement.

**Table-3: Follow up outcome of the patient (n = 36)**

Findings	Follow up		
	6 weeks No (%)	12 weeks No (%)	24 weeks No (%)
<b>Limping</b>			
None/ minimum	3 (8.3)	13 (36.1)	18 (50.0)
Weight bearing not possible	23 (63.9)	5(13.9)	3 (8.3)
<b>Walking ability</b>			
Regained previous walking ability	0	8 (22.2)	11 (30.6)
Almost non ambulatory	3 (8.3)	0	.0
<b>Hip joint range of motion</b>			
Full	1 (2.8)	21 (58.3)	25 (69.4)
Not possible due to pain	9 (25.0)	4(11.1)	3 (8.3)

Table-4 shows that overall radiological improvement was observed in 33 (91.7%) patients at 6 weeks and 12 weeks follow-up, however, at 24 weeks, it declined to 32 (88.9%). There are significant differences

between satisfactory and unsatisfactory group in terms of radiological assessment 24 weeks after group in terms of radiological assessment 24 weeks after operation.

**Table-4: Overall radiological assessment (n =36)**

Assessment	Follow up		
	6 week No (%)	12 week No (%)	24 week No (%)
Satisfactory	33(91.7)	33(91.7)	32(88.9)***
Unsatisfactory	3 (8.3)	3 (8.3)	4(11-1)
Total	36(100)	36(100)	36(100)

Z - 4.8, \*\*\*P< 0.001

Unpaired Student's  $T_f$  test. <sup>1Na</sup>Not significant

Table-5 shows previous walking ability of the study subjects. Statistically there is highly significant difference between the two groups.

**Table-5: Previous walking ability (n = 36)**

Walking ability	Number of patients	Percentage
Walking without support	30	88.3***
Walking with a cane	6	16.6
Total	36	100

Z = 4.4, \*\*\*P< 0.001

Table-6 show final clinical outcome of the treatment. Most of the patients obtained good results, followed by excellent, fair and poor. Overall, 75 percent patients obtained satisfactory result (excellent plus good) and 25 percent unsatisfactory (fair plus poor). However, Z test between satisfactory and unsatisfactory result was significant (P=0.01).

**Table 6: Final Clinical Outcome**

Result	Male (n=21)		Female (n=15)		Total n=36	
	No	%	No	%	No	%
Excellent	6	(28.6)	5	(33.3)	11	(30.6)
Good	10	(47.6)	6	(40.0)	16	(44.4)
Fair	3	(14.3)	3	(20.0)	6	(16.7)
Poor	2	((9.5)	1	(6.7)	3	(8.3)
Total	21	100	15	100	36	100
	$X^2 = 0.436, df=3, p=0.33^{NS}$					
Satisfactory	16	(76.2)	11	(73.3)	27	(75.0)**
Unsatisfactory	5	(23.8)	4	(26.7)	9	(25.0)
Total	21	100	15	100	36	100
	$X = 0.038, df=1, P=0.845$					

Z-test: P= 0.005\*\*

NS= Not significant \*\* Significant at P <0.01

## DISCUSSION

This series includes 36 cases of trochanteric fracture in elderly patients over 50 years of age, treated by closed

reduction and internal fixation by dynamic hip screw (DHS). These patients were evaluated with a mean follow-up of 11 months (range; 6 to 12 months) showed a

satisfactory (good to excellent) result of 75 percent. This result is comparable with similar result of study reported by Heyse-Moore et al.<sup>6</sup> They followed up 107 cases of intertrochanteric fractures fixed with Richards dynamic compression device until union of the fracture or failure of fixation, and the clinical outcome was successful in 92.6 percent. Statistically there is no significance of difference between these two studies.

In the present series, the mean age at fracture of 36 patients is 72.14 years (range: 52-95 years), and the age groups 70-79 years comprise the highest number of 13 (36.1%) patients. The mean age of the patients in this series is comparable to other series, e.g. Kyle et al.<sup>4</sup>, Larsson et al.<sup>5</sup> and Bannister et al.<sup>7</sup>

Most (80%) of our population lives in rural areas. Due to illiteracy, superstition, poor socioeconomic status and bad communication system, majority of the patients are treated late, ranging from several days to weeks. The patients in developed countries are treated within 48 to 72 hours. Laskin et al.<sup>8</sup> operated on their patients at an average of 49 hours after injury and Larsson et al.<sup>5</sup> at an average of 37.32 hours after injury<sup>14,35</sup>. But in the present series operations were performed average 17 days after injury.

In this study, according to Evans classification, 72 percent (26 out of 36) of fractures were found to be stable and 28 percent (10 patients) of fractures were unstable. In the series of Evans et al.,<sup>9</sup> 75 percent had stable fractures and 25 percent had unstable fractures. This finding was almost similar to the present series.

Two (5.5%) out of 36 patients in the series had associated injuries, one had bilateral Colies fracture and another had contra lateral ankle injury. The incidence of associated injury slightly lower than the 9 to 10 percent, cited by Larsson et al.<sup>5</sup>

Six (16.6%) of the 36 patients needed a cane in their hands as support for walking; remaining 30 (83.3%) patients could walk without support before fracture. The

associated systemic ailments and reduced ambulatory function before the fracture often compromise the successful treatment.

Physical therapy is essential for successful restoration of mobility. The goal of physical therapy is a return to previous activity and occupational levels. Moreover, early ambulation is essential to avoid morbidity and mortality related to these fractures in elderly patients. Most of the authors are in favor of partial weight bearing within three to five days after operation depending on the stability of fixation

In the present series of 36 cases, excellent result is achieved in 11 (30.6%) patients, good result in 16 (44.4%) patients, fair result in 6 (16.7%) patients and poor result is achieved in 3 (8.3%). Therefore, satisfactory (excellent + good) result is 75 percent and unsatisfactory (fair + poor) result is 25 percent. The rates of results show a good similarity with results shown in the previous publications, i.e. no statistically significant difference obtained present and previous series.

In the present series, the result is satisfactory (excellent and good) in all the cases of stable fracture. Whereas, unsatisfactory result is obtained only in 9 cases of unstable fractures. Heyse-moore et al. also showed that 100 percent clinical success rate in cases of stable fracture fixed by DHS and 91.8 percent clinical success rate in case of unstable fracture but statistically this difference of results between stable and unstable fracture in their study was not significant<sup>6</sup>. Larsson et al. also stated that there had been no significant correlation between fracture type and the ability to regain pre-fracture mobility level.<sup>5</sup> This may be due to that by the use of image intensifier their operation was less extensive and operation time was also much less even in the cases of unstable fractures. Overall radiological improvement was observed in 33 (91.7%)

patients at 6 weeks and 12 weeks follow up, however, at 24 weeks, it declined to 32 (88.9%). Unsatisfactory result in terms of radiological assessment was observed in 3 (8.3%) at 6 and 12 weeks follow up and 4(11.1%) patients at 24 weeks follow up.

There is significant difference between satisfactory and unsatisfactory groups in terms of radiological assessment 24 weeks after operation. The causes of unsatisfactory radiological findings were due to advanced age, osteoporotic bone, unstable fracture but insecure fixation, failure to attend the hospital in time for follow up, negligence of the attendants and early weight bearing to some extent.

The cases in which mechanical failure occurred were unstable fractures, the bones were severely osteoporotic, the position of the lag screw within the femoral head were 1/3 (most vulnerable position for cutout), on the whole the fixation was unsatisfactory from the beginning. For these reasons, partial weight bearing was also delayed and full weight bearing was never possible.

One patient died after 6 months of operation due to complications of diabetes mellitus. So, overall mortality rate in this series is 2.7 percent. This is comparable to the mortality rate (4.3%) reported by Kyle et al. in their prospective study<sup>4</sup>. But the death rate in their retrospective study was 11.4 percent, similar death rate of 18 percent reported by Larsson et al. in a retrospective study<sup>5</sup>. Kyle et al. believed that lowered mortality rate and improved result in their prospective study were due to overall intensive postoperative care, use of telescoping device and early ambulation.<sup>4</sup>

One of the aims of operative treatment is to reduce the hospital stay and thereby reduce the cost and burden on hospital and nursing staff. In the present series though the mean hospital stay is  $22.78 \pm 5.67$  days (range: 8 to 35 days), the average time

from operation to discharge is only 10 days. So the major part of the delay is from admission, to enter into the operating room. Even then the series is comparable to other series in this regard. Bannister et al. showed mean hospital stay 34.5 days, higher than this series<sup>7</sup>. Larsson et al. showed  $18 \pm 15$  days (range: 1 to 73 days).<sup>5</sup> It is felt that closed reduction and internal fixation of inter trochanteric fracture with dynamic hip screw and barrel-plate assembly does not carry any excessive risk of morbidity and mortality, because early mobilization and rehabilitation have been facilitated by the use of the device. The use of image intensifier will advance this procedure further ahead in this regard. As our patients are late and already few days have been spent in bed, it is more important to mobilize the patients earlier by performing their operation with this sliding device.

## CONCLUSION

The treatment of trochanteric fracture of the femur by dynamic hip screw greatly simplifies nursing care, allows early mobilization and reduces mortality and morbidity, especially in patients over 50 years old. The most important point of consideration is the achievement of stable fixation of the fracture, so that early walking with crutch support would be possible.

Considering, all these points, internal fixation by dynamic hip screw (DHS) has been proved to be the treatment of choice for both stable and unstable trochanteric fractures of the femur, more importantly for elderly people over 50 and for late cases who have already spent a few days in bed non-ambulatory.

This can be followed up later on to get long-term results and adding more cases to determine more accurate result can also enlarge the series.

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