

## An Overview of Fixation Failure, Malunion and Possible Complication of Soft Tissue and Bone Infection

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### Abstract

### Original Research Article

**Background:** Trochanter fractures form the majority of hip fractures. The majority of trochanteric fractures occur in patients aged 66 to 76. The majority of fractures occur in the elderly, typically as a result of osteoporosis and mild or minor trauma because this is an elderly age fracture. Morbidity is severe and obvious such as thromboembolism and pneumonia. Decubitus ulcers, stiff knees, mental decline, etc. are all common. Mal-union and varus angulations are common. 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. In this article we want to explain the Fixation failure using dynamic hip screw, malunion and possible complication of soft tissue and bone infection due to this. **Objective:** The main objective is to overview the Fixation Failure, Malunion and Possible Complication of Soft Tissue and Bone Infection. **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 to find the fixation failure, malunion and possible other complications. **Results:** The patients' ages ranged from 52 to 95 years. The majority of patients were 70-79 years old (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  $72. \pm 1.20$  years, male (n=21) was  $75.05 \pm 12.62$  years and female (n=15) were  $68.07 \pm 7.46$  years. Maximum number of patients (44.4%) were retired, 41.7% housewife and 13.9% service holder. There are significant differences between retired and service holder groups. That among the patients, most of them sustained injuries on their right side (69.4%>), and left side involvement was only in 30.6%. 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. Out of 36 cases, 2 (5.5%) had associated injuries. One had bilateral Colles' fracture and another had contralateral ankle injury. There are some early and late complications of the patients. Statistically there are no significant differences between highest and lowest complication rates. 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, p value between satisfactory and unsatisfactory result was significant (P=0.01). Out of 36 cases, 2 (5.5%) had associated injuries. **Conclusion:** The treatment of trochanteric fractures of the femur using a dynamic hip screw considerably simplifies nursing care, permits early mobilization, and lowers mortality and morbidity, particularly in patients over the age of 50. After surgery, patients may experience certain movement restrictions and develop some illness due to certain factors but it can be decrease if we consider taking care of the issues. Internal fixation using a dynamic hip screw (DHS) has been proven to be the treatment of choice for both stable and unstable trochanteric fractures of the femur, particularly in patients over the age of 50 and those who have previously spent a few days immobile in bed. This may be followed up in the future to obtain long-term findings, and the series can be expanded by adding more instances to establish more accurate results.

**Keywords:** Fixation failure, Dynamic hip screw, complications after fixation, Malunion, soft tissue and bone infection.

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## INTRODUCTION

The trochanter is the area of the femur that forms a about 125-degree angle between the femoral head/neck and the femoral shaft [1]. The neck is around 5cm long. So, head-neck trochanter enhances the

mobility at the hip joint enabling limbs to swing clear of the pelvis. Hip fracture is one of the leading causes of admission in hospital, growing each year and accounts for 30% of all the hospital admissions [2]. The frequency of unstable trochanteric fracture rises with

aging [3]. Trochanter fractures form the majority of hip fractures. The majority of trochanteric fractures occur in patients aged 66 to 76 [8]. The majority of fractures occur in the elderly, typically as a result of osteoporosis and mild or minor trauma. Because this is an elderly age fracture Morbidity is severe and obvious such as thromboembolism and pneumonia. Decubitus ulcers, stiff knees, mental decline, etc. are all common. Malunion 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 [5].

Trochanter fractures can be fixed with different tools, such as the Smith-Peterson triflanged nail, the Jewett fixed-angle nail-plate, the Gamma interlocking nail, the upper femoral interlocking nail, and so on. The Jewett fixed- angle nail plate is still in this subcontinent and is also in our hospital.

In the early 1950s, Pohl and then Pugh and Massie wrote about a sliding device. In the 1970s, different versions of this device became popular. It lets the major pieces fall apart in a controlled way, but it keeps the angle of the neck shaft even when the fracture is unstable [6]. Early movement and weight-bearing do not affect the stability of the fixation. Instead, they affect the pieces of the bone. Even with unstable fractures, the success rate is high; at about 96% [7]. It is still the most common and widely accepted way to fix a broken trochanter all over the world [10].

Dynamic hip screw is still the first choice for fixation of trochanteric fractures [9]. 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. In this article we want to explain the Fixation failure using dynamic hip screw, malunion and possible complication of soft tissue and bone infection due to this.

## METHODOLOGY

We did this descriptive study on Department of Orthopedic Surgery, Chittagong Medical College Hospital from January 2005 to December 2006, on 36 patients aged above 50 years who were admitted to the Chittagong Medical College Hospital with closed trochanteric fracture as. A pre-designed format incorporating the patient's medical history, examination

findings, and follow-up information was utilized to gather the data.

Using the statistical program SPSS (Statistical Package for Social Science), the collected data were collated and analyzed appropriately. The significance threshold was set at 0.05 for P values.

### Inclusion Criteria

- Elderly patients aged over 50 years.
- Both sexes.
- Irrespective of occupation and/or socioeconomic status.
- Trochanteric fracture, both stable and unstable (as diagnosed.
- By radiography) e) Trochanteric fracture due to trauma of any severity or any kind.

### Exclusion Criteria

- Basal neck fracture.
- Subtrochanteric fracture.
- Pathological fracture.
- Open fracture.
- Presence of frank source of infection.
- Major injuries to chest, abdomen and head.

Patient unfit for anesthesia and major surgical intervention due to medical problem.

The final clinical outcome was analyzed using the criteria followed by Kyle *et al.*, [1]. The results of operations were rated into following categories:

- Excellent.
- Good.
- Fair and
- Poor.

## RESULTS

Table 1 shows the age group of the patients. 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 72.120 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.

**Table 1: Age distribution of the patient (n =36)**

Age group	Number of patients	Percentage
50-59	4	11.1
60-69	8	22.2
70-79	13	36.1
80-89	9	25.0
90-99	2	5.6
<b>Total</b>	<b>36</b>	<b>100</b>

Z=1.45, P<0.05

Table 2 shows that maximum number of patients (44.4%) was retired, 41.7% housewife and

13.9% service holder. There are significant differences between retired and service holder groups.

**Table 2: Occupation of the patients (n=36)**

Occupation	Number of patients	Percentage
Retired	16	44.4
House wife	15	41.7
Service holder	5	13.9

Table 3 shows that among the patients, most of them sustained injuries on their right side (69.4%), and left side involvement was only in 30.6%.

**Table 3: Side involved (n=36)**

Side	Number of patients	Percentage
Right	25	69.4
Left	11	30.6
<b>Total</b>	<b>36</b>	<b>100</b>

Z=2.32, P<0.05

Table 4 shows 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 aftergroup in terms of radiological assessment 24 weeks afteroperation.

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

Assessment	Follow up			p value
	6 weeks No (%)	12 weeks No (%)	24 weeks No (%)	
Satisfactory	33(91.7)	33(91.7)	32(88.9)***	0.01
Unsatisfactory	3 (8.3)	3 (8.3)	4(11-1)	
<b>Total</b>	<b>36(100)</b>	<b>36(100)</b>	<b>36(100)</b>	

Table 5 shows Out of 36 cases, 2 (5.5%) had associated injuries. One had bilateral Colles' fracture and another had contralateral ankle injury.

**Table 5: Associated systemic illness (n =36)**

Associated systemic illness	Number of patients	Percentage
Pulmonary problem	5	13.9
Hypertension	5	13.9
Cardiovascular problem	3	8.3
Diabetes mellitus	3	8.3
<b>Total</b>	<b>16</b>	<b>44.4</b>

Table 6 shows the early and late complications of the patients. Statistically there are no significant

differences between highest and lowest complication rates.

**Table 6: Complication in the patients (n=36)**

Complications	Number of patients	Percentage
Early		
Nonspecific pain	5	13.8
Deep wound infection	3	8.3
Stitch infection	4	5.5
Urinary tract infection	1	2.7
Pneumonia	1	2.7
High fever and late death	1	2.7
Late		
Lag screw cutout	2	5.5
<b>Total</b>	<b>36</b>	<b>100</b>

Table 7 shows that, statistically there is highly significant difference between the two groups. 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, p value between satisfactory and unsatisfactory result was significant ( $P=0.01$ ). Out of 36 cases, 2 (5.5%) had associated injuries.

**Table 7: 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)
<b>Total</b>	<b>21</b>	<b>100</b>	<b>15</b>	<b>100</b>	<b>36</b>	<b>100</b>
X <sup>2</sup> = 0.436, df=3, p=0.33NS						
Satisfactory	16	(76.2)	11	(73.3)	27	(75.0)
Unsatisfactory	5	(23.8)	4	(26.7)	9	(25.0)
<b>Total</b>	<b>21</b>	<b>100</b>	<b>15</b>	<b>100</b>	<b>36</b>	<b>100</b>
X = 0.038, df=1, P=0.845						

## DISCUSSION

This series includes 36 cases of trochanteric fractures in people over the age of 50 that were fixed with a dynamic hip screw after closed reduction and internal fixation (DHS). 75 percent of these patients had a satisfactory (good to excellent) outcome after being followed up for an average of 11 months (range: 6 to 12 months). This result is similar to what Heyse-Moore *et al.*, said about their study. They kept track of 107 cases of intertrochanteric fractures that were fixed with the Richards dynamic compression device until the fracture healed or the fixation failed. In 92.6 percent of the cases, the clinical outcome was successful. From a statistical point of view, there isn't a big 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.

Thirty-one (86.1%) of the patients in this series are sedentary workers, such as housewives, retired service holders, etc. Only five (13.9%) are service holders, and all of them are men who are younger than the others. In the present study, however, surgery was conducted an average of 17 days following injury.

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.

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. In the present series, only in

2 (5.5%) cases, the lag screw cutout of the femoral head with varus angulation. These cases are considered as mechanical or implant failure. In one case, there is coxa vara deformity. Satisfactory radiological healing in acceptable alignment occurs in the remaining 33 cases (91.7%). Radiological healing or satisfactory clinical outcome is possible even after mechanical failure. There are more studies to support the fact that it is clear from these two studies that mechanical or radiological failure is much more common with Jewett fixed angle nail plate. Although Dr. Dam (1986) reported a clinical failure rate of 8%, 92% of these patients had radiologically favorable unions, but he did not discuss mechanical or implant failure. Whatever the cause, the rates of mechanical failure with DHS in the present series show a strong connection with the rates of mechanical failure demonstrated in prior series, i.e., there is no statistically significant difference between the rates of mechanical failure in the present and previous series.

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

Wound infection occurred in 5 (13.8%) patients, 2 (5.5%) had just stitch infection and 3 (8.3%) had deep infection. Causative organism was *Staphylococcus aureus* in all the cases and was sensitive

to flucloxacillin. Stitch infection was controlled within 5 days of antibiotic therapy and removal of the infected stitches only but the antibiotic was continued up to 2 weeks. The deep infection was managed by open drainage and secondary closure associated with antibiotic therapy for 3 weeks.

The infection rate was 2.1 and 0.8 percent deep infection rate reported by Kyle *et al.*, and Larsson *et al.*, respectively. In our series, this high rate of infection even after prophylactic antibiotic may be due to prolonged operation time and lack of laminar flow operating room, etc.

Systemic complications not related to operation developed in 3 patients. One developed urinary tract infection and one developed pneumonia. These were managed by appropriate antibiotics.

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 [1]. 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 [2]. 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.

It is worthy to mention that no patient in this series developed thromboembolic complications, which are commonly reported in western literature, e.g., Larsson *et al.*, reported 4.1 percent deep vein thrombosis and pulmonary embolism without prophylactic dextran-70 and 1.2 percent with prophylactic anticoagulation medication [2]. This due to early post-operative mobilization.

In one hand our patients delayed to reach the hospital, on the other hand due to variety of reasons, like political unrest, lack of operating room facility, we cannot perform the operation on our patient in time, within 48 to 72 hours. Even then, the overall result is comparable to other series. It is felt that closed reduction and internal fixation of intertrochanteric 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 fractures of the femur using a dynamic hip screw considerably simplifies nursing care, permits early mobilization, and lowers mortality and morbidity, particularly in patients over the age of 50. After surgery, patients may experience certain movement restrictions and develop some illness due to certain factors but it can be decrease if we consider taking care of the issues. Internal fixation using a dynamic hip screw (DHS) has been proven to be the treatment of choice for both stable and unstable trochanteric fractures of the femur, particularly in patients over the age of 50 and those who have previously spent a few days immobile in bed.

This may be followed up in the future to obtain long-term findings, and the series can be expanded by adding more instances to establish more accurate results.

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