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## Study of surgical management of unstable trochanteric fractures using trochanteric supporting/stabilization locking compression plate

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### Abstract

**Aim:** This study has been undertaken to study surgical management of unstable trochanteric fractures using trochanteric supporting/stabilization locking compression plate.

**Materials and methods:** 20 patients (15 male and 5 female) underwent closed reduction and internal fixation with Trochanteric Stabilisation Plate at Department of Orthopaedics J.J.M. Medical College, attached to Chigateri District Hospital, Davangere and Bapuji Hospital, Davangere during the period of October 2019 to October 2021. Patients were followed up regularly.

**Results:** The average age was 66.25 (range of 42 to 80yrs). Excellent results were obtained in 10 cases (50%), good results in 7 cases (35%) and fair in 2 cases (10%) poor in 1 case (5%). In the study the average time for union was 14 weeks. Most common complications encountered were abduction limitation on clinical examination which no patient complained directly and limping.

**Conclusion:** The study showed Trochanteric stabilization locking compression plates is a versatile, stable, acceptable implant fixation in unstable trochanteric fractures and osteoporotic patients.

**Keywords:** Unstable trochanteric fractures, femur, hip fracture, TSP

### Introduction

Intertrochanteric fractures constitutes for nearly 50% of fractures around hip. They have become a major cause of disability leading to reduced quality of life and also death. 90% Intertrochanteric fractures of femur in elderly occurs commonly through osteoporotic bone due to simple fall <sup>[1, 2]</sup> where as in young individuals it may be a result of high energy injury such as motor vehicle accident or fall from height <sup>[2]</sup>.

Fractures of the proximal femur, generally are classified first based on their anatomical location. There is no standard classification which is universally accepted. Evan's <sup>[3]</sup> classification is based on dividing fractures into stable and unstable groups. Boyd and Griffin <sup>[5, 6]</sup> classification helps in planning treatment and estimating prognosis of the patient. Other classifications include Kyle classification <sup>[7]</sup>, Tronzo classification <sup>[8]</sup> and AO classification <sup>[9]</sup>. Fractures of proximal femur, i.e., intertrochanteric fractures are common in women (3:1) as osteoporosis is prevalent among them. The primary goal in the treatment of an elderly patient with Intertrochanteric fracture is to return the patient to his / her pre - fracture activity as early as possible. Early mobilization of these elderly patients reduces the morbidity and mortality rate in geriatric patients. The trochanteric fractures can be managed by conservative methods. If suitable precautions are not taken the fracture undergoes mal-union, leading to varus and external rotation deformity at the fracture site and shortening and limitation of hip movements. It is also associated with complications of prolonged immobilization like deep vein thrombosis, respiratory infections, joint contractures, and Decubitus ulcers. For these reasons, the treatment of intertrochanteric fracture by reduction and internal fixation has become the standard method of treatment. Rigid fixation with early mobilization of the patient is the goal of treatment in intertrochanteric fracture of femur. Restoration of mobility in patients with intertrochanteric fracture ultimately depends on strength of surgical construct. Although many devices can achieve rigid fixation the Dynamic Hip Screw is the most commonly used device for intertrochanteric fracture of femur<sup>1</sup>. The DHS lag screw easily glides within DHS plate barrel for controlled collapse and impaction of fragments leading to uneventful healing and early mobilization <sup>[4]</sup>.

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Unstable intertrochanteric fractures (A2 & A3) are best treated with intramedullary implant as well as side plates such as DHS or TSP. The largest meta-analysis comparing intramedullary nails with side plate devices from the Cochrane database concluded that side plates are superior to intramedullary nails in the treatment of intertrochanteric fractures. Studies have shown reduced fracture collapse with the use of TSP compared to stand alone side plate fixation, and similar performance to Intra medullary fixation.

### Materials and methodology source of data

The proposed study is a prospective study centered in Bapuji Hospital and Chigateri General Government Hospital attached to Jagadguru Jayadeva Murugarajendra Medical College, Davangere carried out from October 2019 to October 2021 where 20 patients diagnosed with unstable trochanteric fractures admitted in orthopaedic department were evaluated clinically and radiologically.

### Inclusion criteria

- Age group: > 18 years
- Gender: Both male and female
- All types of Trochanteric fractures under Boyd Griffin classification.
- Patients who are willing to participate in surgery.
- Patient fit for surgery.

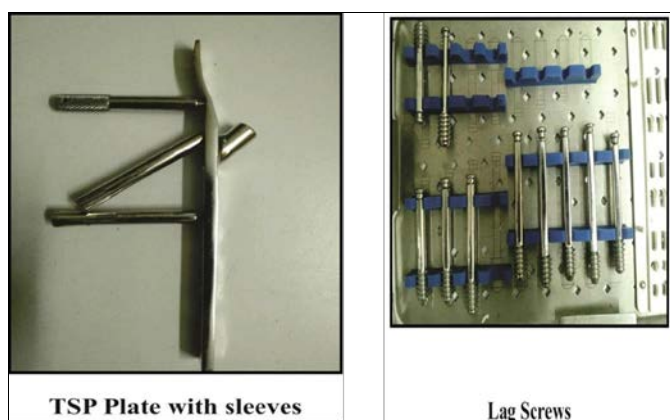
### Exclusion criteria

- Below 18 years
- Shaft of femur fracture
- Head of femur fracture
- Fracture associated with neurovascular deficit
- Patient not fit for surgery
- Fracture associated with dislocation of hip and knee
- Pathological fractures
- Old malunited fractures

### Surgical techniques

#### Instrumentation details

The whole implant assembly of trochanteric stabilization locking compression plate is a single unit assembly together with 6.5 mm anti rotation screw, 5 mono axial cancellous 4mm locking screws into the trochanteric buttress and plate shaft with combi hole facility of 5mm locking cortical screws.



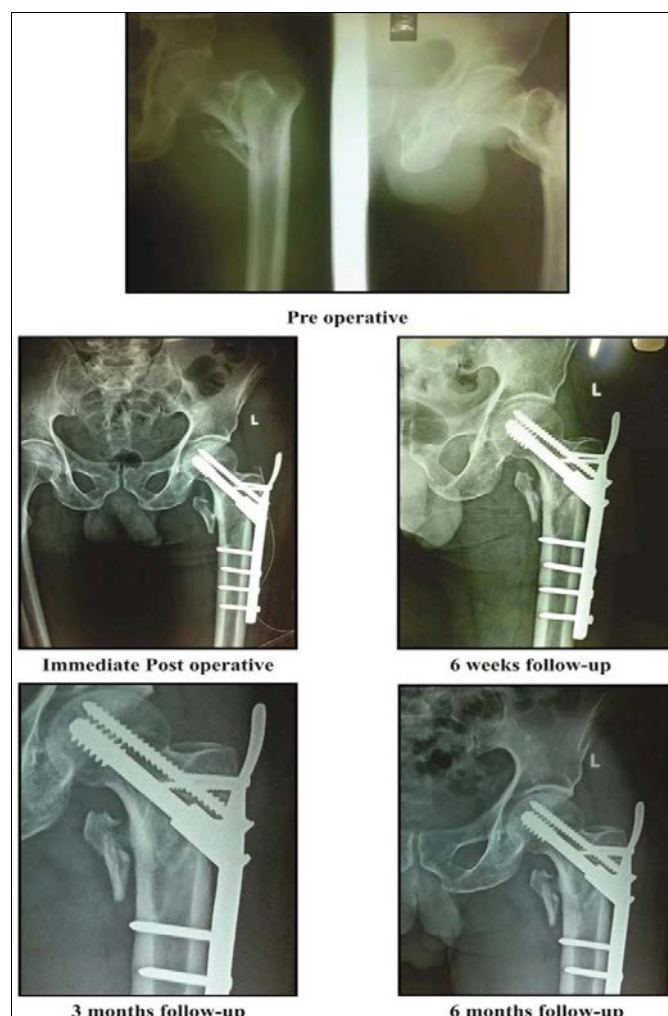
### Surgical procedure

Under spinal anaesthesia patient was made to lie in supine position in traction table with affected limb in traction and unaffected limb in lithotomy position in leg holder to have

space for image intensifier. Parts scrubbed, painted and draped. Closed reduction done and checked under C Arm. Skin incision of 5 cm was taken along tip of greater trochanter extending 8cm distally along shaft of femur. Incise fat, deep fascia and split the fibers of Vastus lateralis and elevate to expose fracture. Guide wire was inserted on lateral aspect of shaft of femur 3cm distal to GT flare using dynamic angle guide of 135°. Reaming of femur done and lag screw and plate of appropriate size selected and assembled on insertion wrench and introduced into reamed hole under c arm guidance. Plate attached to shaft of femur with 5mm locking cortical screws. Release the traction and fracture compression was achieved. Monoaxial cancellous 4mm locking Trochanteric screws were fixed. A 6.5 mm anti rotation locking screw of same length of lag screw was inserted. Through wash was given, Drain was inserted wound was closed in layers.

### Post operative care

- Post surgery patient was shifted to post operative ward.
- Post operative antibiotics and analgesics were administered.
- Post operative wound dressing was done on day 2,5 and 10.
- All patients were allowed to flex the knee from post op day 2 and physical ambulatory was started from the day of suture removal
- Radiological evaluation was done with post op and serial follow up xrays.





**Discussion**

Concepts in the management of trauma in orthopedics are rapidly changing to keep pace with the increasing severity and complexity of fractures. The management of intertrochanteric fractures in elderly persons with osteoporotic bones is extremely challenging as they frequently lead to complications like screw cut out, varus collapse, shortening etc. The aim of treatment in these fractures is to achieve union without shortening by providing a favorable environment for bone and soft tissue healing. Most intertrochanteric fractures are treated by Sliding Hip Screw system these days. There has been a shift towards intramedullary devices but still, Dynamic Hip Screw holds its way. It has yielded enormous success rate when used with expertise after following all protocols. Our study out 20 cases was comparable to Madsen JE [10], Naess L Babst R [11], Renner N who conducted their study in 1998 Nuber S [12], Schonweiss T, Ruter A who published their study in 2003.

Study	Good results	Fair results	Poor results
Madsen JE, NasseL	63.75%	9%	5.9%
Babst R	87%	13%	-
Nuber S	88%	12%	-
Present study	85%	10%	5%

In our study out of 20 cases, right hip fractures were seen in 12 cases and Left side were 8 cases. Studies conducted by R C Gupta [13] right sided fractures were more common, whereas

in studies made by Cleveland M *et al.* [14] Left side fracture were common.

In the present study there was one case of screw cut through with Varus Malunion. N.D Chatterjee *et al.* [15] reported coxa vara in 3 cases due to cutting of implants through head & neck of femur and also proximal migration of DHS

Jonnes C, Sm S, Najimudeen [16] carried out a prospective comparative study on 30 alternative cases of type II intertrochanteric fractures of hip using PFN or DHS and concluded that the amount of blood loss and hospital stay post operatively after fixation was less in cases of PFN compared to DHS in our study average hospital stay was 16.8+5.72.

Babst R [11] carried out an study To evaluate whether the implantation of the modular trochanter stabilizing plate (TSP) in addition to the dynamic hip screw (DHS) prevents excessive telescoping and limb shortening in four-part and selected three part trochanteric fractures.

Madsen JE [10] in 1998 carried out a study to compare the results after operative treatment of unstable per and sub trochanteric fractures with the Gamma nail, compression hip screw (CHS), or dynamic hip screw with a laterally mounted trochanteric stabilizing plate (DHS/TSP). In their study 170 patients with unstable trochanteric femoral fractures were followed up for a period of 6 months. 85 patients were randomized to treatment with the Gamma nail or the compression hip screw and compared with a consecutive series of 85 patients operated with the dynamic hip screw with a laterally mounted trochanteric stabilizing plate (DHS/TSP

group). In their results they concluded that 18% of the patients in the Gamma group, 34% in the CHS group, and 9% in the DHS/TSP group suffered significant secondary fracture dislocation during the 6 months follow-up, leading to a varus malunion, lag screw cutout, or excessive lag screw sliding with medialization of the distal fracture fragment.

In our study there was no intraoperative complication by using TSP in means of excessive blood loss but Iatrogenic lateral cortex comminution was seen for 2 cases. Average blood loss was 280ml due to a longer incision and extensive soft tissue dissection R N Singh<sup>[17]</sup> Pre and Post op stay.

In 2003 Nuber S<sup>[12]</sup> concluded on stabilization of unstable trochanteric femoral fractures. Dynamic hip screws (DHS) with trochanteric stabilization plate vs. proximal femur nail (PFN) and stated that a significantly shorter in-patient stay (18.6 vs. 21.3 days) with PFN and TSP respectively was noted. In 1979 Richard F Kyle<sup>[18]</sup> stated that in their study the mean duration of stay was 18.0. Our study showed that the mean duration of hospital stay was 16.8 which is comparable. Madu Sridhar<sup>[19]</sup> in 2014 concluded that in their study the mean.

Harris hip score was 85.02. The mean Harris hip score was 85.02 (PFN – 88.25, DHS – 83, PFLCP – 86.25, DCS – 82). In our study mean Harris hip score was 86.5 which was comparable. Varus Malunion with screw cut out and shortening of 2cm was seen in one case. Weight bearing In our study the mean duration for full weight bearing was 14 +/- 2.91 weeks.

#### Hip evaluation on follow ups

**Shortening:** In the present study 2 cases (10%) had 1cm shortening 1 case (5%) showed shortening of 2cm. No case had more than 3cm of shortening. Up to 1cm of shortening can be accounted to the collapse at fracture site. 2 cases developed limp after full weight bearing of surgery due to shortening of 1cm. 1 case developed limp, occasional pain and screw cut out. The reasons for cut out was

- Early weight bearing in spite of proper instructions given by us during the Post op follow up
- Immediate post op x-ray showed superior placement of lag screw
- TAD >25mm

Most of our findings, including union rates, functional outcome, and complications are comparable with the studies where dynamic hip screw alone or with anti-rotation screw and trochanteric stabilization plate used to treat intertrochanteric fractures.

#### Conclusion

Unstable Trochanteric fractures today are one of the most controversial and complicated fractures in terms of treatment modalities with latest advancements. TSP has an advantage of additional trochanteric buttress extension with screw fixation and an anti-rotation screw which prevented backing and cut out of lag screw and excessive collapse at fracture site which would have Lead to shortening and varus malunion.

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