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## Outcome of external fixation for intertrochanteric neck femur fracture in high risk elderly patients

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### Abstract

Intertrochanteric neck femur fractures are the most severe of all fragility fractures. In this prospective study, Between oct 2016 and nov 2018, 30 elderly patients within inclusion criterion were treated using stainless steel uniplanar external fixator by same surgeon with similar protocol for every case. These patients followed up for 1 year subsequently. The present study was conducted using the minimally invasive technique of external fixation for the management of intertrochanteric fracture in high risk elderly patients.

In our study 88 percent of the cases were above 60 years. Our study involved 60% of female cases indicating that this fracture is more common in females due to osteoporosis in Indian population. Our study involved stable type of fracture more commonly. 72% of cases were of EVANS stable type.

In conclusion, as life span of people increases incidence of intertrochanteric fracture increases in elderly patients. Open reduction and internal fixation of intertrochanteric fractures is a treatment 'gold standard', but the morbidity and mortality rates are high in elderly patients with significant co-morbid factors. Nonoperative treatment involves prolonged immobilization and hospitalization, With many concomitant problems and high mortality obtaining a perfect reduction of the intertrochanteric fracture may not be the main objective for this high-risk group but to operate with the least blood loss in the shortest time and an anaesthetic technique of low risk, which ultimately facilitates early mobilization in the postoperative. In our study we shows that Closed reduction and external fixation is an alternative procedure, which minimizes these complications.

**Keywords:** Intertrochanteric neck femur fractures, external fixator

### Introduction

Regardless of the quality of surgical treatment, hip fractures remain a major cause of disability. The incidence of intertrochanteric fractures is gender- and race-dependent and varies from country to country. Intertrochanteric fracture are one of the commonest fractures which are age & sex related commonly seen in patients >60 years of age. With advancing age & incidence of osteoporosis its incidence rise and with increase in life expectancy these fractures are likely to show an exponential increase in incidence in next few decades contributing to significant mortality and morbidity in elderly. In the United States, the annual rate of intertrochanteric fractures in elderly females is about 63 per 100,000, in males 34 per 100,000<sup>[1]</sup>. Some of the factors found to be associated with a patient sustaining an intertrochanteric rather than a femoral neck fracture include advancing age, increased number of co morbidities, increased dependency in activities of daily living, and a history of other osteoporosis related<sup>[2]</sup>.

Intertrochanteric fractures are considered 1 of 3 types of hip fractures. The anatomic site of this type of hip fracture is the proximal, upper part of the femur or thigh bone. Gold standard for treatment of intertrochanteric femur fracture is dynamic hip screw which may not be practical in very morbid patients due to risk of anaesthesia involved for relatively long procedure and blood loss involved. External fixator is viable option in these groups of patients with acceptable functional and anatomical results.

In developing countries, many patients with intertrochanteric fractures are unsuitable for treatment by conservative means or by conventional open reduction and internal fixation For

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the elderly patients the treatment of choice for intertrochanteric is surgical because non-operative treatment involves high morbidity general condition of these.

patients is often poor due to the accompanying cardiovascular, pulmonary, liver diseases. In the majority of geriatric patients, walking ability is limited before the fracture, and co-existing anaemia and malnutrition make significant intra-operative blood loss intolerable. A surgical procedure that achieves minimal surgical blood loss, short operative and hospitalization time, minimal anaesthetic risk, the least morbidity and mortality rates, and early weight bearing is favored. This study was conducted to assess using external fixator in the management of intertrochanteric fractures in high-risk elderly patient.

Goal of treatment remains restoration of patient to his / her pre-operative status as early as possible with low morbidity and mortality. External fixator performed under sedation and local anesthesia, offers significant advantages in high-risk geriatric patients in the form of minimal blood loss, minimal surgical trauma, preservation of fracture hematoma, a shorter hospital stay, early ambulation of patients as compared to patients treated conservatively, and removal of implant as easy outpatient procedure<sup>[3, 4]</sup>. Conservative treatment by means of skeletal traction in bed leads to complications of recumbence like bed sores, infections, renal stones, wasting of muscles, equinus deformity at ankle and thromboembolic disease apart from increasing their hospital stay and expenditure. In our study we shows that Closed reduction and external fixation is an alternative procedure, which minimizes these complications. We present our results in a group of patients who were selected because of their high surgical risk.

## Methodology

**Ethics Approval:** A prospective study conducted at a tertiary care centre of B. J. Medical College and Sassoon Hospital, Pune and approved by the regional ethical committee.

**Study Area:** Department of Orthopaedics, B.J. Govt. medical college & Sassoon General Hospital, Pune.

**Sample Size Calculation:** A total of 30 cases with intertrochanteric neck femur fracture diagnosed on X-Ray coming in orthopaedics department of our hospital and fulfilling inclusion criteria were selected for study.

## Aims & Objectives

1. To study the effects of external fixator in treatment of intertrochanteric fracture in terms of union.
2. To study the advantages of external fixation in treatment intertrochanteric fracture.
3. To study the complication of external fixation in treatment of intertrochanteric fracture.

## Inclusion Criteria

The selection of the patients for the procedure was based on a poor state of general health, producing a moderate or high surgical and anesthesia risk in prolonged or invasive surgery. The rating system of the American Society of Anaesthesiologists (ASA) was used.

1. Elderly patient aged  $\geq 60$  years
2. Confirmed radiographic diagnosed intertrochanteric fracture
3. AO fracture classification A1 and A2
4. American society of Anesthesiology grade 3 and 4

## Exclusion Criteria

1. compound fracture
2. A fracture secondary to a malignant tumor
3. Hard or soft-tissue infection at the fracture site
4. Patient on chemotherapy
5. Multiple fractures (polytrauma)
6. Fracture with subtrochanteric extension
7. Reverse oblique fracture

## Anaesthesia

All patients were operated under regional anaesthesia through femoral nerve and lateral cutaneous nerve of thigh blocks. Few patients were given local anaesthesia with sedation as they were unfit.

## Position

1. All patients were given supine position following anaesthesia, on a radiolucent table top to facilitate the use of image intensifier.
2. The unaffected extremity was abducted and flexed and fixed to the post of fracture table.

## Closed Reduction

A closed reduction of the fracture was performed under image intensification in both the anteroposterior (AP) and lateral planes before application of the fixator. Closed reduction was usually accomplished by applying traction and internal rotation to the slightly adducted injured limb. Foot of the affected extremity was rotated to obtain correct rotational alignment with respect to anteversion of the hip as determined by image intensifies

## Criterion For Reduction

The reduction was considered anatomical if the neck-shaft angle was between  $120^\circ$  and  $140^\circ$  and the distraction at the fracture site was less than 2 mm. Minor valgus angulations ( $<10^\circ$ ) and a distraction of less than 5 mm were considered acceptable if an anatomical reduction could not be obtained. The fixator was applied using the AO principles and technique.

## Procedure

Two stab incision taken on the skin at the level of lesser trochanter for passing femoral neck pins. PIN Insertion - Upper pin inserted from the flare of greater trochanter with the help of chuck after drilling with 4mm drill bit under image intensifier guidance. Lower pin inserted around 1.5cm to 2cm below first one using same technique. Pins are inserted till within 1cm of subchondral bone. Neck pins were of cancellous thread & shaft pins were of cortical thread. Another two Schanz screws were inserted at right angles into the middle half of the femoral shaft. Clamps were tightened and the final position was checked radiologically.

## Post Operative Management

IV antibiotics in the form of third generation cephalosporins, aminoglycosides were given. Oral antibiotics started from third post op day for five days.

## Rehabilitation

1. On the first postoperative day, the patients started sitting on a bed or a chair
2. from the second postoperative day, walking on a walker frame was started allowing full weight bearing as tolerated by the patient.

3. Static quadriceps exercises started preoperatively & continued during postoperative period
4. Active straight leg raising test started after pain is reduced usually third post-op day

### Pin Track Care

Alternate day care of the Schanz screws and the surrounding skin using povidone iodine solution was applied meticulously. After seven days if there is no evidence of pin tract infection whole fixator is packed & dressed weekly initially and thereafter fortnightly.

### Follow Up

1. All patients were followed up for a mean of  $12 \pm 4.5$  months.
2. The patients were evaluated clinically and radiologically, bi-weekly for the first month, then monthly for the next 5 months, and subsequently every 6 months. The radiological evaluation of all patients was made with AP and lateral radiographs of the proximal femur.
3. Clinical examination included range of motion of the hip, knee and limb- length discrepancy.

### Radiology Assessed For

1. Signs of union
2. Loss of fixation
3. Failure of implant

Operative time, units of transfused blood, duration of hospitalization, complications, post-operative walking ability, healing time, and mortality were recorded for a minimum of six months.

### Observations & Results

We treated 30 patients of intertrochanteric femur fracture with External fixator. Assessment data is as follows.

### Age

In our study 88 percent of the cases were above 60 years. Mean age in our study was 67 years"

**Table 1:** Sex Incidence

1	Female	18	60%
2	Male	12	40%

**Table 2:** Pre & Post Operative Hemoglobin

Sr.No	Preoperative Hb Level (Mg%)	Postoperative Hb Level (Mg%)
1	10.5	10.1
2	9.4	8.9
3	8.6	8.0
4	11.3	10.9
5	10.7	9.9
6	9.1	8.6
7	9.7	9.1
8	8.6	8.0
9	10.0	9.8
10	8.8	8.7
11	9.2	9.0
12	8.1	7.6
13	9.7	9.3
14	9.9	9.2
15	8.2	7.8
16	11.1	10.9
17	10.0	9.6
18	9.7	9.1
19	9.0	8.6
20	8.5	8.1
21	9.3	9.0
22	7.9	7.5
23	9.4	9.0
24	10.5	10.0
25	8.4	8.0
26	10.6	10.2
27	9.8	9.4
28	7.9	7.5
29	9.6	9.1
30	9.7	9.0

Preoperative & postoperative Hb indicates that the blood loss was negligible did not require blood transfusion in any of the patients

**Table 3:** Functional outcome as per system used by Fridman & Wyman

Outcomes	No. Of Patients	Percentage
Good	12	40
Fair	16	53.34
Poor	2	6.66

**Table 4:** Early postoperative complication

Sr no	Complications	No of patients
1	Shortening >2 cm	3
2	Rotation deformity	2
3	Superficial infection	10
4	Deep infection	0
5	Bed sores	1
6	Mortality (within 30 days post-op)	0
7	Pin loosening	1
8	Pin breakage	0

**Table 5:** Late complication

Sr no	Complications	No of patients
1	Malunion in >15 varus	3
2	Non union	2
3	Delayed union	1
4	Knee stiffness	7
5	Spontaneous refracture	0

## Discussion

To avoid classic open surgery, many mini-invasive techniques have been introduced for treatment of such fractures, arguing that they offer better clinical outcome at no extra expense and with minimal complications. Previous reports on external fixation for the management operating and hospitalization time, high fracture union rates, and minimal surgical blood loss.

## Age Incidence

In our study 88 percent of the cases were above 60 years. Mean age in our study was 67 years. Age group in our study matches with study published in VP PATHANIA, M BALAKRISHNAN<sup>[12]</sup> & Dahl A, Varghese M, Bhasin VB (1991)<sup>[4]</sup> Thus intertrochanteric fracture is common above 60 year of age.

**Table 6:** Comparison of age incidence with other studies

AGE GROUP	60-70	71-80	81-90
VP Pathania <i>et al</i>	10	10	0
Dhal <i>et al.</i>	100	33	31
Our study	14	14	2

## Sex Incidence

Our study involved 60% of female cases indicating that this fracture is more common in females due to Osteoporosis in Indian population. Melton JL, Ilstrup DM, Riggs BL, *et al.*<sup>[9]</sup> Koval Aharonoff GB, Rokito AS, *et al.*<sup>[13]</sup>

**Table 7:** Comparison of sex incidence with other studies

	Male	Female
VP Pathania <i>et al</i>	18	2
Dhal <i>et al.</i>	131	33
Our study	14	16

**Table 8:** Some of the complication as listed in our study

Complications	Number	Percentage
Deep pin-track infection	0	0
Pin breakage	0	0
Pin loosening	1	3.3
Superficial pin infection	10	33.34

**Table 9:** Complication in George W. Boghdady & Mohammed Shalaby *et al.*

superficial pin tract infection	35%
radiological loosening of these pins	7.5%
deep pin tract infection	21%
varus malunion	15%

## Delayed union

Union was delayed to 16 weeks with comminuted fractures as noted by other studies.<sup>[3, 4, 10, 12]</sup> Dhal *et al.* (18 weeks) for comminuted fractures & 28 weeks for open fractures. In our study delayed union occurred in 2 pts.

## Malunion

We noticed varus of 15° occurred in three patients and shortening of more than 2.5 cm occurred in three patients. This patient walked with difficulty despite assisted means. However, the rate of deep infection occurring in the present study is less than that reported by other studies. The incidence of loss of reduction and varus malunion [10-with shortening [2 cm in the present set of patients (6 patients) is comparable to that reported by many previous studies<sup>[4, 8, 10, 12]</sup> All of these patients suffered unstable intertrochanteric fractures, five suffered superficial pin tract infections, and 1 suffered deep pin tract infection. The varus and shortening was due to either fixation in varus or to collapse of the neck shaft angle on weight bearing. In this study, none of the fractures were fixed in varus. However, Kourtzis *et al.*<sup>[8]</sup> suggested that the low demands of the elderly permit this degree of shortening to be of no significant functional compromise.

## Death

We did not record any death as a result of operative or postoperative complication. In contrast to Dobbs *et al.*, no deaths occurred within the first 30 postoperative days. The overall 1-year mortality rate is comparable to other studies. The mean age and the preexisting diseases account for the mortality in this patient group.

## Functional outcome as per system used by Fridman & Wyman

As compare with George W. Boghdady *et al* study, our study shows better functional outcomes as per Fridman & Wyman

## Conclusion

Intertrochanteric fracture of femur is one of the commonest fracture in elderly. We studied the management of these fractures by using external fixator in patients having poor anaesthetic risk. These elderly group of patients may not tolerate the risk of anaesthesia & blood loss resulting from surgery. Aim of our study was early mobilization with minimum risk of surgery, anaesthesia & with negligible blood loss. Our study included patients with coexisting morbidities which makes standard treatment difficult. We used simple AO monolateral tubular fixator as it is cheap & easily available, at the same time gives sufficient stability & rigidity for fracture healing. We passed two pins in the neck & shaft respectively and kept fixator for around three months. Patients followed up with clinical & radiological evaluation to look for union and complications. Complications were dealt at timely & appropriately. Data collected over a period of two years, analysed, compared with previous studies & conclusion drawn as follows.

### Within the limitations of the present study shows following advantages

1. Negligible blood loss
2. Rapid union rate
3. Early mobilization, and reasonable minor complications reported with the use of a uniplanar AO external fixator under regional anaesthetic block are comparable to those obtained with standard fixation techniques.
4. It offers the major advantages of mini-invasive surgery and can allow fast and good functional recovery.
5. The overall morbidity and mortality rates are reasonable enough to recommend this technique for the high-risk elderly patients.

### It is good modality of treatment in

1. stable intertrochanteric fracture with good anatomical & functional outcome.
2. In unstable type of fractures it gives functionally acceptable outcomes with some degree of varus & shortening.

Complication of fixator are minor which can be avoided by taking good care of pin tract & are easily manageable without any further operative procedure or risk of anaesthesia.



**Fig 1:** Preoperative and post-operative radiograph

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