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### **A study on clinical and radiological outcome following surgically managed intertrochanteric fractures using PFN-A**

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#### **Abstract**

**Background:** Intertrochanteric fractures is the fracture of the proximal femur, in which the fracture line extends from the greater trochanter to lesser trochanter<sup>1</sup>. Intertrochanteric fractures are common in patients above 60 years of age, however it may also occur in young adults. Nine out of ten intertrochanteric fractures occur in elderly, which is usually of a low velocity trauma occurring with the female to male ratio of 3:1. We studied the clinical outcome of unstable intertrochanteric fracture surgically managed by PFN-A.

#### **Materials & Methods:**

Design: A preliminary study.

Duration: August 2015 - December 2016

Sample: 30 patients with unstable intertrochanteric fractures were treated surgically by PFN-A.

#### **Inclusion criteria**

Age –All patients after skeletal maturity.

Cases of intertrochanteric fractures based on AO system of classification

#### **Exclusion criteria**

Patients with sub-trochanteric fractures.

Non-ambulatory patients before injury.

Patient unfit for anaesthesia.

Patients with Osteoarthritis of hip before injury

They were followed up for a minimum period of 1 year by the senior author and evaluated for clinical outcome using X-RAYS, SALVATTI and WILSON HIP SCORE.

**Results:** Out of 30 cases 28 cases had excellent results without complications. 1 case had helical blade backed out, and did not come for follow up other case had superior migration of the helical blade, but the fracture is united.

**Conclusion:** In our study of 30 cases of unstable intertrochanteric fractures, were effectively treated surgically with PFN-A gave excellent results & to be considered the best surgical modality for unstable Intertrochanteric fracture management.

**Keywords:** Intertrochanteric fractures, PFN-A, SALVATTI and WILSON HIP SCORE

#### **Introduction**

Intertrochanteric fractures occur commonly in elderly patients. Incidence of these fractures has increased primarily due to increased life span and more sedentary life style brought by urbanization. In elderly population it is most often due to trivial trauma. More than 20000 fractures occur every year and the incidence is expected to double by year 2020 <sup>[2]</sup>. Intertrochanteric fractures can be managed conservatively or operative methods. Conservative methods were treatment of choice until 1960 before the introduction of fixation devices, as conservative management results in complications like decubitus ulcer, urinary tract infections, pneumonia, thromboembolic complications.

To avoid these complications internal fixation is advised.

Internal fixation can be done by Extramedullary devices (eg-DHS) or Intramedullary devices (eg-PFN)

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In unstable fractures, Intramedullary devices are biomechanically stronger and more rigid when compared to extramedullary devices [3].

In intramedullary devices PFN (proximal femoral nail) has showed complications like implant failures, screw cutout.

In 2003 AO/ASIF introduced PFN-A which claimed to have better rotation, and angular stability with single helical blade and better functional outcome in treating unstable intertrochanteric fractures when compared to PFN [4].

### Materials and Methods

A preliminary study, was carried out between August 2014 - February 2016 in SS Institute of Medical Sciences & Research Centre, Davanagere, Karnataka

Where 20 patients with unstable intertrochanteric fractures were treated surgically by PFN-A. They were followed up for a minimum period of 1 year by the senior author and evaluated for clinical outcome using X-RAYS, SALVATTI and WILSON HIP SCORE.

A written consent for participation in this prospective study was obtained from all patients.

A total of 30 cases were included in this study group with age group between 60-80 years. Patients with acute, unilateral, non-pathological, fractures without any co-morbidity were included in this study.

All fractures were fixed by closed reduction and internal fixation on fracture table under fluoroscopic control.

A standard postoperative protocol is maintained which included partial weight bearing for 2 months, assisted weight bearing for another 1 month with calcium and vitamin D supplementation.

Post op follow up period was done at 4-6 weeks interval for a period of 1 year.

In all cases antithrombotic prophylaxis was administered using LMWH for 3-5 days and antibiotic prophylaxis was administered in peri-operative period.

The quality of fractured reduction was graded as good and acceptable, if the reduction has (5-10 degrees of varus/valgus and maintaining neckshaft angle, and graded as poor if >10 degrees of varus/valgus and neckshaft angle not maintained, other parameters like tip apex distance, screw placement were noted.

The clinical results were assessed using SALVATTI AND WILSON HIP SCORE

### Inclusion criteria

- Age –All patients after skeletal maturity.
- Cases of intertrochanteric fractures based on AO system of classification

### Exclusion criteria

- Patients with sub-trochanteric fractures.
- Non-ambulatory patients before injury.
- Patient unfit for anaesthesia.
- Patients with Osteoarthritis of hip before injury

### Operative Technique

Patient placed supine on traction table, with affected limb attached to the traction boot, opposite limb is placed in flexion at hip and knee joint over, an incision is made over the lateral aspect of the thigh, soft tissues dissected, tip of greater trochanter is palpated, an entry point is made medial to the tip of the greater trochanter, a guide wire is passed, proximal femur is reamed and with the help a jig, a guide wire is passed into the femoral head under C-ARM guidance, its position is

confirmed by c-arm, and the lateral cortex of the femur is reamed, with the help of depth gauge, depth is measured and appropriate length of helical blade is taken, initially helical blade is unlocked and inserted into the femoral head, and after satisfactory positioning in the head, the helical blade is locked, there by causing intra-operative compression at the fracture site which is visualised with the help of C-ARM. Distal locking is done with the help of the jig, distal locking can be a static locking or a dynamic locking. Wound is closed in layers.

### Results

Out of 30 cases 28 cases had excellent results without complications. 1 case had helical blade backed out, and did not come for follow up other case had superior migration of the helical blade, but the fracture is united.



**Fig 1:** A 70 year old female with history of trivial fall sustained left intertrochanteric fracture.

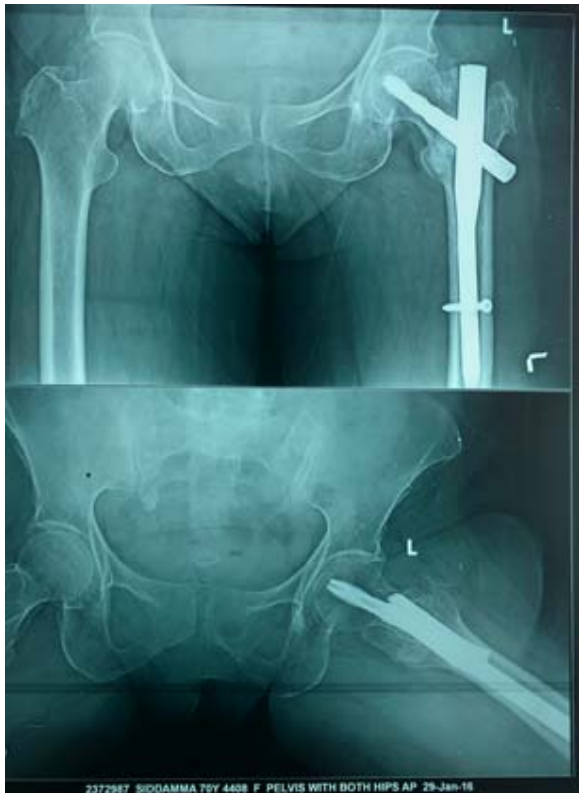


**Fig 2:** Post op check xray showing reduction of the fracture with PFN-A insitu.





**Fig 3:** 4 weeks old postop xray showing good reduction of the fracture with satisfactory callus formation with implant insitu.



**Fig 4:** 3 months old postoperative period xray of PBH in AP and FROGLEG view shows signs of union.



**Fig 5:** 6 months old with implant in good position and signs of fracture union.



**Fig 6:** A 75 year old female with history of trivial fall, presented with intertrochanteric fracture.



**Fig 7:** Post operative xray shows reduction of the fracture with PFN-A insitu



**Fig 8:** 4 weeks post op xray showing backing out of the helical blade.





**Fig 9:** 8 weeks postop xray showing superior migration of the helical blade with callus formation.



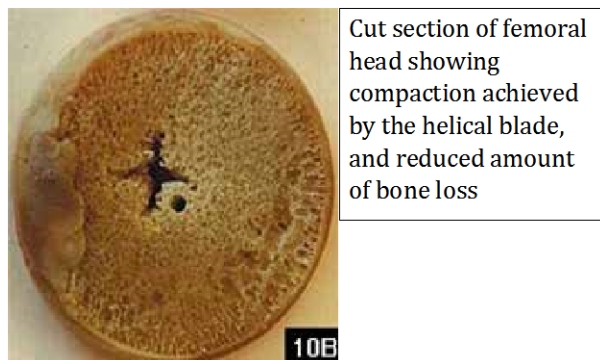
**Fig 10:** 12 months postoperative xray showing fracture union with superiorly migrated helical blade.

### Discussion

Intramedullary nails act as internal splints and helps in indirect healing these devices causes minimal trauma to the vascular supply to the bone [5].

The PFN-A designed by the AO/ASIF group, it is designed to improve rotational and angular stability using a single helical blade.

The innovative helical blade design provides better compaction of cancellous bone, there will be increased contact area between implant and the femoral head, which will give better hold in cancellous bone.



**Fig 11**

The PFN-A improves the fixation stability by decreasing the reaming of the bone stock of proximal femur.

Biomechanically PFN-A has greater resistance to cut out, better rotational stability achieved with one single element,

large surface and increased core diameter guarantee the maximum compaction and optimal hold in bone.

It has showed improved resistance to varus collapse resistance to femoral head rotation, longer fatigue life [6].

The 11.0mm helical blade reduces the amount of bone removed in the neck.

The tip of the PFN-A is flexible which reduces the stress on the bone.

### Conclusion

In our preliminary study, of 30 cases with intertrochanteric fracture, which were effectively treated surgically with PFN-A gave excellent results & to be considered the best surgical modality for intertrochanteric fracture management.d

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