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#### ABSTRACT

This study was conducted with the objective to see whether results of combined use of ender's nail and cannulated cancellous screw will provide best functional recovery in case of intertrochanteric fracture in elderly. In our study 20 elderly patients were selected on random basis from those attended the outpatient department and emergencies during December 2013 to October 2015 having intertrochanteric fracture of less than two week duration, intertrochanteric fracture with subtrochanteric extension, multiple fractures, and associated medical comorbidities that can be controlled before surgery. In our study among 20 patients 75% of the patients were in the age group more than60 years and 25% of the patients were in the age group less than 60 years with mean age of approx. 65 yr. The male: female ratio in our study was 1.86:1 with 65% patients were male and both right and left side were equally involved. 50% had pre-existing comorbidities; of which diabetes and hypertension were most frequently associated comorbidities and low velocity trauma (LVT) were most common (70%) mode of injury. In our study majority (75%) of the fracture were of type 31A2. Fractures with lateral wall comminution i.e. type 31A3 were excluded from inclusion criteria. 45% patients were operated within a week and 55% patients were operated after a week those had associated medical comorbidities. All the patients were counselled and informed consent was taken. All the patients were operated under spinal anaesthesia and aseptic condition. All patients were received preoperative inj. Cefuroxime 1.5 gm. Operative procedure done under image intensifier control with minimum number of exposures and close reduction were done. During intraoperative period no

difficulties and complications were occurred and the average intraoperative blood loss was of 42 ml. In the post-operative period antibiotic and analgesic coverage for atleast seven days were given. Hip and knee physiotherapy were started from next post-operative day. All the patients were discharged after assessment of wound at first postoperative dressing. Sutures were removed after two week. Non weight bearing walking with bilaterally axillary crutch were allowed after first dressing i.e. after 48 hrs. In our study the range of follow up period was 6 to 17 month with the mean of 10.55 month. The patients were followed up regularly at 4 weeks interval for the first 6 month and then at 3 months interval. At each follow up patient is assessed clinically, radiological and functionally. Radiological assessment done by digital X- ray of pelvis with both hip AP view and Lateral view of the operated hip with femur. Functional assessment done by modified Harris hip score. In our study all fractures were united with an average period of 13 weeks with range 10-16 weeks, 20% of the patients had accurate anatomical reduction and the neck shaft angle was same as on unaffected side, 65% of the patients had 3 to 5 degree of variations in the neck shaft angle compared to unaffected side, and 15% patients had more than 10 degree of in the neck shaft angle compared to unaffected side. The average neck shaft angle of the fractured hip in the last follow up X-ray was 128.55 degree with the range 115 to 135 degree. The average difference between the neck shaft angle of fractured side and the normal side, in the last follow up X-ray was 4.80 degree. In our study none of the patients had any systemic complications and complications related to local soft tissues). Regarding complications related to fracture and their union, in our study all the fractures were united but two of them united

with external rotation deformity and three of them have varus deformity). In this study 50% of the patients had no leg length discrepancy, 45% of the patients had leg length discrepancy less than one cm, and 5% of the patients had leg length discrepancy of 1.5 cm). The functional assessment was done with modified Harris hip score and the mean was 86.3 with the range from 73 to 95 and eight patients were excellent, 10 patients were good and two patients were fair with respect to total score. The analysis of this study fulfils the objectives of a good functional out come.

*Keywords:* internal fixation, intertrochanteric fracture, ender's nail, cannulated cancellous screw

#### **INTRODUCTION**

Intertrochanteric fracture of femur involves those occurring in the region extending from the extracapsular basilar neck region to the region along the lesser trochanter proximal to the development of the medullary canal. Injury creates a spectrum of fractures in the proximal metaphyseal region of bone, with damage to the intersecting cancellous compression and tensile lamellar networks and the weak cortical bone. This results in displacement of the fracture fragments and attached muscle groups. Intertrochanter are among the most devastating injuries in the elderly and the most frequently operated fracture type, have the highest postoperative fatality rate of surgically treated fractures, <sup>(1)</sup> and have become a serious health resource issue due to the high cost of care required after injury. The Intertrochanter femoral fractures make up approx. 34% of all hip fractures <sup>(1)</sup> and the largest number of fractures occurs in female older than 65 year. <sup>(2)</sup> Low energy falls from a standing height account for approximately 90% of community hip fractures in elderly with a higher proportion of female, and is probably due to osteoporosis. Higher-energy hip fractures are relatively rare, more common in males under 40 years of age. Intertrochanteric fracture patients are biologically older than those who sustain a femoral neck fracture and that they had lower haemoglobin level

at hospital admission, poorer prefracture ambulatory ability, and a higher number of associated medical condition that affect the fracture management. Pogrund et al. (3) reported that osteoporotic female patients who fractured their proximal femur as a result of a fall were more likely to sustain an intertrochanter fracture than a femoral neck fracture. According to them four factors contribute to determining whether а particular fall results in a fracture of hip region-(a) The faller must be oriented to impact near the hip;(b) Protective responses must fail: (c) Local soft tissues must absorb less energy than necessary to prevent fracture, and (d) The residual energy of the fall applied to the proximal femur must exceed its strength. Fall with a rotational are component more common with extracapsular hip fracture.

The treatment of intertrochanter fracture evolves from nonoperative to operative over decades. Nonoperative treatment should only be considered in nonambulatory or severely demented patients with controllable pain, or patients with terminal disease with less than 6 weeks of life expected. An exception to this consideration is incomplete pertrochanteric fractures diagnosed by MRI, which have shown to heal with conservative measures in selective patients. Operative management, which allows early rehabilitation and offers the best chance for functional recovery, is now the treatment of choice for virtually all intertrochanteric fractures. The goal of operative treatment is strong, stable fixation of the fracture fragments. The type of implant used has an important influence on complications of fixation. Sliding devices like the dynamic hip screw have been extensively used for fixation. However, if the patient bears weight early, especially in comminuted fractures, these devices can penetrate the head or neck, bend, break or separate from the shaft.

Intramedullary devices like the proximal femoral nail have been reported to have an advantage in such fractures as their placement allowed the implant to lie closer

to the mechanical axis of the extremity, thereby decrease the lever arm and bending moment on the implant. They can also be inserted faster, with less operative blood loss and allow early weight bearing with less resultant shortening on long term follow up. In 1930's, Jewett<sup>(4)</sup> introduced the triflanged nail, which allowed the surgeon to achieve immediate stability of the fracture and early mobilization of the patient. However, use of the Jewett nail for the fixation of unstable intertrochanteric fractures has been problematic and loss of fixation has been common. The shortcomings of fixed nail-plate devices were recognized in the mid-1960's, and techniques were developed. These techniques combined the use of rigid devices with various types of osteotomies. In the mid-to-late 1970's, flexible intramedullary devices for the fixation of intertrochanteric fractures were introduced in the form of the Ender nail and the condylocephalic nail. The advantage of devices due these was to their intramedullary position, which places them closer to the resultant force across the fracture and reduces the bending moment on the device. In addition, the use of distal sites of insertion to decrease operative time and loss of blood, compared with the use of proximal sites, was reported. (5,6) This operative technique was made possible by the use of image intensification and was promoted as a closed method for the fixation of intertrochanteric fractures. However, a high prevalence of varus deformity, as well as pain in the knee caused by distal migration of the pins, were reported in association with this procedure. These problems led to a high rate of reoperation for extraction of the pins and correction of deformity. A high rate of failure due to loss of reduction, shortening, and external rotation resulted both from Ender nails and from condylocephalic nails. The first-generation nail for treatment of intertrochanteric fractures, the Gamma nail, was associated with a relatively high incidence of peri-implant fracture of 2.2%

to 17% approximately 4 times greater than seen with compression hip screws). <sup>(7,8)</sup> The current third-generation nails such as the proximal femoral nail (PFN), which incorporate multiple screws into the femoral head, The cutout rates of 0.6% to 1.4%, whereas the tendency to varus displacement was low in comparison with other implants. <sup>(9-11)</sup>

The longest experience has been with the use of Ender's nail.. The two main problem complicate the treatment of elderly patients, first the poor general condition renders an immediate and extensive open reduction and fixation very risky, second, the location of fracture-in the area of the femur where bending stress is highest. Because of their fan shaped positioning in the femoral head, the Ender's nail guarantees a good grip in the proximal fragment and transfer the force during weight bearing process to the entire length of femoral shaft. Ender's nail allow good surface contact of the fracture site by collapsing the fragments along the nails; this may cause their ends to back out by a few mm at the entrance hole, without, however causing knee pain. Mechanically, this system is advantageous because of the medial course of the nails and the low bending stress imposed on them. Biodynamically, it is advantageous because the fracture site takes an active part in the weight bearing process because of the telescoping effect and is brought under physiologic compression because of the muscle tension and weight bearing. The are remote reduction and advantages atraumatic intramedullary fixation through a small opening far distal from fracture site, decreased blood loss, deceased mortality, minimal surgical trauma secondary to not opening the fracture site, and decreased anaesthetic and operative time; and was associated with significant incidence of complications, including rotational deformity, supracondylar femur fracture, proximal migration of the nail through femoral head, and back out of nail with resultant knee pain and stiffness. The

Ender's nailing alone cannot provide secure elderly patients fixation in with osteoporosis. The insertion of cannulated cancellous screw after ender nail is introduced resulted in controlled collapse of the fracture in which the cannulated cancellous screw acts as guide and directs the collapse of fracture in its direction. So the neck shaft angle remains maintained and the varus malunion resulting from ender nail alone can be prevented. Hence we conducted a study to evaluate the results of closed reduction and internal fixation using ender's nail and 6.5 mm cannulated screw cancellous for intertrochanteric fractures.

AIMS- Evaluation of results of Ender's nail and cannulated cancellous screw in case of intertrochanteric fracture of femur in elderly.

OBJECTIVES- To see whether the results of combined use of Ender's nail and cannulated cancellous screw will provide best functional recovery in case of intertrochanteric fracture of femur in elderly.

**BIOMECHANICS:** Extracapsular proximal femoral fractures primarily involve cortical and compact cancellous bone. Because of the complex stress configuration in this region and its nonhomogenous osseous structure and geometry, fractures occur along the path of least resistance through the proximal femur. The amount of energy absorbed by the bone determines whether the fracture is a simple [two-part] fracture or is characterized by a more extensive comminuted pattern. Normal activities load hip area with bending, torsional and axial forces. These forces are resisted by greater trochanter, which also resists tension generated by major muscle groups attached to it. Gluteus medius contributes to axial compressive force along the femoral neck, which may be three times the body weight. These powerful muscular forces and those generated by body weight in one direction are counteracted by hip joint reaction force of equal magnitude in opposite direction to keep the hip joint in equilibrium. Direction of force varies with activities and for practical purposes the resultant load may be taken to lie in frontal plane at an angle of approximately 15 degrees to the vertical plane.

Resultant load acting on the fracture has two major components: 1. Compressive 2. Bending .

1. Physical qualities of bone- a] Bone density. b] Communition . a] Bone density:three parameters of good bone density are i] Singh index grade 4 to 6 ii] Cancellous bone density of 1250 CT units iii] Fixation screw insertion torque of greater than 18.9 Nm. b] Communition: - Degree of communition affects stability. Lesser directly the communition more the resistance offered to deforming forces by enhancing compression shear resistance response. and In comminuted fractures stresses on fracture are greater because bone does not support any load. 2. Fracture configuration. 3. Mechanical basis of reduction technique and fixation device.

#### CLASSIFICATION

A useful classification not only identifies the fracture pattern but serves as a definite guide to treatment and prognosis. In 1949 BOYD and GRIFFIN described the first treatment recommendation classification, predictive of the difficulty of achieving, securing, and maintaining the reduction in four fracture types

#### **EVANS CLASSIFICATION:**

#### COMPREHENSIVE (AO/OTA ALPHANUMERIC) FRACTURE CLASSIFICATION (55)

This classification is the most referenced in recent scientific articles and is a derivative of the Muller classification. <sup>(12)</sup> This classification has nine main types, however correlation is best with only level 3 designation: 31A1, 31A2, and 31A3. Generally, the 31A1 fracture is stable, 31A2 is more unstable, and the 31A3 is the most unstable.

#### **REVIEW OF LITERATURE**

1. Chapman MW, Bowman WE, Csongradi JJ, Day LJ, Trafton PG, Bovill EG Jr (1981) <sup>(13)</sup> done a prospective study in October 1976 comparing the compression sliding hip screw with Ender's pins in the treatment of extracapsular hip fractures at San Francisco General Hospital. The results in 100 patients with a minimum follow-up of six months showed that Ender's procedure required less operative time, had less blood loss, and had a lower postoperative incidence of medical complications. There were no deep infections in the patients with Ender's pins but a 6 per cent incidence of deep infection was seen in those with the hip screws. There were no non-unions in either group. Although hip function at follow-up was equal in both groups, there was a 41 per cent incidence of postoperative pain and stiffness of the knee in the group with Ender's pins surge. It is our opinion that Ender's pins are a valuable addition to the armamentarium of on treating extracapsular fractures of the hip and are ideally suited for elderly patients with stable fractures, particularly if the surgical risk is high. They must be used with caution in unstable fractures and postoperative protection in traction may be necessary. However, the occasional external rotation deformity and the high incidence of problems with the knee makes their use in younger, more active patients less desirable than the compression hip screw unless their unique advantages justify their use.

2. G.F. McCOY, G.R. DILWORTH and (14) YEATES (1983)done H.A. а prospective study between June 1981 and May 1983, on trochanteric fractures of the femur treated with Ender's nails. Operative time and blood loss were much less than with internal fixation with a standard blade plate. There were two cases of superficial wound infection, but none of deep infection. Four cases remain as in-patients awaiting geriatric placement. Thirteen patients were ultimately discharged home (12 of these patients were pre-operatively socio-mobility Grade(1).. This incidence of rotational

deformity, although transient, was considered cosmetically unacceptable in the vounger patient, and, because of this, we restricted Ender's nail fixation to those over 70 years with suitable fractures. Time to full weight bearing was much shorter with Ender's nails and allowed unprotected weight bearing (from day three postoperatively) even in unstable fractures. They proposed the Ender method as a useful addition to the armamentarium for the treatment of trochanteric fractures of the femur specially in elderly patients.

3.C H Marsh (1983) <sup>(15)</sup> studied the Use of-Ender's nails in unstable trochanteric femoral fractures in eighty consecutive patients with unstable trochanteric femoral fractures. Fracture stability was assessed using Jensen's modification of the Evans system; image. The Trojan manoeuvre and anteversion bending were only occasionally used.. Assessing at 3 month, he found the 57 surviving patients were assessed at 3 months. Eighteen were fully mobile and 39 (69%) still needed walking aids; 27 (47%) patients had returned to their previous levels of mobility. Twenty-four (42%) patients complained of severe knee pain; a limited flexion range was found in 20. Subsequent nail removal for pain relief was necessary in 6 patients. 15 patients had a limited flexion range of the affected hip.Fragmentary collapse and femoral shortening at the fracture site was found in most patients and corresponded closely with the clinicallymeasured amount of leg shortening. Varus deformity was found in 11 patients and did not exceed 20 degree .He concluded that although Ender's nails can provide an attractively quick and reliable method of treating stable trochanteric fractures, their continued use in unstable types must be questioned.

4. Sidhartha Gangadharan and MR Nambiar(2010)<sup>(16)</sup> done a prospective study on 76 intertrochanteric fractures without subtrochanteric extension in high risk elderly cases using intramedullary Ender nails and cannulated compression screw

between Jan 2004 and Dec 2007. Using the Evan's system of classification 49 were stable and 27 unstable fractures. Inclusion criteria was high risk elderly patients (age > 70 years) with intertrochanteric fracture. The exclusion criteria included patients with pressure sores over the trochanteric region. All patients were treated within four days of the fracture. The two Ender nails of 4.5mm each were passed across the fracture site into the proximal neck. This was reinforced with a 6.5 mm cannulated compression screw passed from the sub trochanteric region, across the fracture into the head. The average blood loss during the surgery was 20 cc (range 15 to 40 cc). The average surgery time was 35 minutes (range 25 to 45 minutes). The average time taken for fracture union was 10 weeks (range 6 to 16 weeks), and the mean follow-up was 14 months (range 9-19 months). None of the fractures united in varus. There were no cases of the compression screw backing out or the nail cutting out proximally oldest being 105 years. The pre-operative and the post-operative mean modified .Harris hip scores were 63 and 72 respectively with an appreciable change in score of 9. The mean knee ROM was  $130^{\circ} (\pm 5^{\circ})$ . They concluded that the Ender nailing combined with compression screw fixation in cases of intertrochanteric fractures in high risk elderly patients could achieve reliable fracture stability with minimal complications

5.Cemil ERTURK, Bilal CAGMAN, Akif ALTAY, Ugur Erdem Mehmet ISIKAN (2011) <sup>(17)</sup> done a study regarding the use of Ender nail in intertrochanteric with fractures supported external fixation.Thev used Ender nails and unilateral external fixators simultaneously in 39 patients with non-pathological closed intertrochanteric fractures from 2003 to 2009d .The preoperative mean American Society of Anesthesiologists (ASA) score for all the patients was 1.84 (range: 1-4). Only patients with a minimum follow-up of 12 months were included. Because the Ender nails were not applied sufficiently, the fixation was inadequate, resulting in a varus slippage (5%). These were analyzed as technical errors. In these patients, shortenings of 2 cm were measured (5%). External rotation failure occurred in 1 patient. In 2 of the patients (5%), the Ender nails were removed because of irritations that developed in the knee during the follow-up period. In these patients, the external fixator had been removed previously. Ender nails were removed from the thigh when the fractures demonstrated union. Average Harris score and the average Parker-Palmer score of the 14 patients at the time of the most recent follow-up were 64 (range: 44- 82) and 6.8 (range: 5-8), respectively. They concluded that this method demonstrated several advantages, in that it allows the patient to put weight on the extremity after a shorter period of time and enables the fracture to heal rapidly without any serious complications

6 .Bhavik Dalal, Tarkik Amin, Archit Gandhi, Rohit Shah(2013) (18) done a retrospective study between year 2009 to 2011 on 50 patients (Male - 62% and Female -48%) the youngest one was of 18 years old and the oldest one was of 80 years old, average age of presentation is 59 years having intertrochanteric fracture of femur operated with ender's nailing and cannulated cancellous screw with follow up of 9-12 months.. They concluded that use of Ender nail and cannulated cancellous screw results in fracture union in more anatomical position with better patient compliance and early mobilization.

7. Ankit Syal, Yash Bharat Shah, Chintan Suryaprakash Vinod Desai, Pitamber Chandani (2014) <sup>(19)</sup> 76 patients were operated using any of the three modalities. the rest 6 were medically unfit for surgery and were treated conservatively by giving skeletal traction using Steinmann pin. Patients were divided in a random basis and allotted to any of the three groups. Patients were operated 2 to 4 days after the day of presentation. Complication rates were much higher in case of Ender's nail except that implant breakage was absent. Functional

recovery was measured along various parameters.

#### **MATERIALS AND METHODS**

**STUDY AREA:** Dept. of Orthopedics, IPGMER and SSKM Hospital, Kolkata.

**STUDY POPULATION:** Patient with intertrochanteric fractures of femur attending orthopaedics outdoor and emergency dept in this hospital.

**STUDY PERIOD:** From December 2013 – October 2015.

**STUDY DESIGN:** Prospective randomised Study.

SAMPLE SIZE: 20 cases.

**STUDY VARIABLES:** Age of patients, quality of bone, osteoporosis, pre-existing comorbidities like diabetes , hypertension, COPD, Asthma, and multiple fractures.

### PATIENT SELECTION CRITERIA: INCLUSION CRITERIA.

1. Patients age greater than 50 years.

2.Intertrochanteric fracture less than two week.

3.patients with multiple fractures.

4. Patients with pre-existing co-morbidities like diabetes, hypertension, COPD, Asthma, which can be controlled before surgery.

#### EXCLUSION CRITERIA:

1. Patients age less than 50 years i.e. young active patients

2. Patients with Intertrochanteric fracture more than two week.

3. Patients with lateral wall comminution fracture.

4. Patients with open fractures.

5. Presence of infection.

6. Anaesthetically unfit due to medical comorbidities 7. Death or loss of follow-up within six months of operation.

#### PROTOCOL

1. Patient's history was taken and name, age, gender recorded.

2. Patients were evaluated regarding preinjury mobility status on the basis of their ability to walk within their place of residence, their ability to walk outside and their ability to go shopping and each activity was assigned a score on the basis of its level of difficulty.

3. History of any other co-morbid disease was obtained.

4. Mode and time of injury were noted. Thorough clinical examination of patient was done to rule out associated intraabdominal, intrathoracic, head and neck injuries and to rule out other associated osteoporosis related fractures such as a distal radius or proximal humeral fracture. The affected limb was thoroughly examined to rule out vascular or neurological injury. Ipsilateral knee examined for associated injury.

5. Anteroposterior radiograph of pelvis showing both hips and lateral view of involved proximal femur obtained, though it was not possible always to take true lateral view preoperatively.

6. To minimize discomfort of displaced fracture, affected limb was immobilized by giving upper tibial skeletal traction of 15 - 20 pounds.

7. Prior to surgery all patients were evaluated medically for hypertension, heart disease, diabetes, chronic obstructive pulmonary disease, cerebral vascular disease, urinary tract infection to minimize any potential risk for surgery.

8. Analgesics, antibiotics and proper care of any associated fracture or injury and associated comorbidities, if any, were taken.

All patients admitted and selected for the operative method of treatment underwent the preoperative work up as the standard protocol.

# IMPLANT USED FOR FRACTURE FIXATION

1. 4.0/4.5 mm Ender's nails.

- 2. 6.5mm cannulated cancellous screws.
- 3. Instrumentation set.



FIGURE 1

### SURGICAL TECHNIQUE (20,21)

After proper anaesthesia, patients are positioned on a fracture table in supine position. Both the legs are widely abducted and feet are fixed in the boots of the traction device of the fracture table. The symphysis pubis rests on the perineal post of the slightly laterally fracture table, and eccentrically. Closed reduction of the fracture was done under image intensifier control, and done by a combination of traction and rotation in both anteroposterior and lateral views. For Ender's nailing in elderly patients, the primary aim is not to achieve exact anatomic reduction, but to induce the greatest possible surface contact in the fracture site. The limb to be operated was prepared thoroughly by scrubbing with povidone iodine scrub and savlon, mopped with spirit, and painted with the solution of povidone iodine and drapped with sterile sheets. Preoperatively inj. Cefuroxime given i.v.

The surgeon stood between the abducted legs of the patients. A longitudinal skin incision 7 cm long, beginning just distal to the medial epicondyle and extending proximal ward was made. Split the deep fascia just anterior to the medial intermuscular septum, and reflect the vastus medialis anteriorly to expose the femur subperiosteally just above the superior medial geniculate artery. Identify and protect the superior medial geniculate artery because this is the landmark to the entry site for the pins. Then introduce a drill through the medial cortex approximately one cm proximal to the medial femoral epicondyle or the landmark superior medial geniculate artery, and open the medullary cavity with a curved awl, taking care to avoid the lateral femoral cortex as the awl is aimed proximally up the canal. The opening should be longitudinal and at least 15 mm wide to accommodate two 4.0/ 4.5 mm Ender nails side by side.

The nail length can be determined under image intensifier control by inserting a forceps into the distal end of the entrance hole as a landmark, and then placing the nail on the anterior aspect of the thigh with the tip directly over the femoral head. The nail length will be correct when the tip touches or is just slightly distal to the subchondral bone of the weight-bearing portion of the femoral head and the flange of the nail rests on the cortex immediately distal to the entry hole. The first nail, tip being slightly anteverted, then inserted along the medial femoral neck just past the fracture site, with certainty that it is firmly located in the proximal fragment, but do not insert it to its full depth until all of the nails are in place. Next, a second nail inserted, making an effort to fan the nails in the femoral head on both the AP and lateral views. Once both the nails are into the head and neck fragment, they can be sequentially driven as a group to within 5-7 mm of the subchondral bone of the head. Distally, the nails should lie flush with the medial cortex of the femur, above the epicondyle.

The greater trochanter was then opened with small longitudinal incision, and the base of which was drilled over the guide wire, and then one or two 6.5 mm cancellous cannulated screw are introduced from base of greater trochanter in the head of femur under image intensifier control.



FIGURE 2

## POST-OPERATIVE MANAGEMENT PROTOCOL:

1. ANALGESICS:- First 2 to 3 days parenteral followed by oral NSAIDs/ Tramadol upto 1 week depending upon the patients's tolerance and the as per need basis.

2. ANTIBIOTIC:- Inj. Cefuroxime(1.5 gm) i.v. for 3 days followed by oral Cefuroxime(500mg) for 1 week.

3. POST OPERATIVE HOSPITAL STAY:-Most of the patients discharged after first post-operative dressing, done after 48 hours.

HARRIS HIP SCORE(MODIFIED)

4. Hip and knee physiotherapy started in bed from second post-operative day.

5. Sutures are removed on 14th post-operative day.

6. Patients are advised to non weight bearing walking with bilateral axillary crutch or walker after first dressing i.e. after 48 hrs.

7.) Full weight bearing walking was allowed after assessing for radiological and clinical union usually at 6 to 8 weeks.

8. FOLLOW UP:- The patients were followed up regularly at 4 weeks interval for the first 6 month and then at 3 months interval. At each follow up patient is clinically, radiological assessed and functionally. Radiological assessment done by digital X- ray of pelvis with both hip AP view and Lateral view of the operated hip with femur. Knee is also x-rayed as and when indicated. Functional assessment done by modified Harris hip score. Total Harris hip score is interpretated as excellent when score is 90 to 100, as good when score is 80 to 89, as fair when score is 70 to 79, and as poor when score is less than 70.

Patient name Patient ID follow Up period		Side: Left/Right Date of review	
Pain None or ignores it (44) Slight, occasional, no compi Mild pain, no effect on avei with unusual activity; may t Moderate pain, tolerable bu limitation of ordinary activit pain medicine stronger thar Marked pain, serious limitat	romise in activities (40) rage activities, rarely moderate pain ake aspirin (30) it makes concessions to pain; some y or work; may require occasional a aspirin (20) ion of activities (10)	Sitting Comfortably in ordinary cha On a high chair for <sup>1</sup> / <sub>2</sub> hour Unable to sit comfortably in Enter public transportation: Flexion contracture: Leg-length discrepancy:	air 1 hour (5) (3) a any chair (0) : Yes (1) No (degrees) (cm)
Totally disabled, crippled, pr Limp None (11) Slight (8) Support	<ul> <li>Moderate (5)</li> <li>Moderate (5)</li> <li>Severe (0)</li> </ul>	Absence of Deformity (all <30 degrees fixed flexion cont <10 degrees fixed adduction: <10 degrees fixed internal rota in extension: Limb-length discrepancy <3.2 d	Yes = 4; <4 = 0)
None (11) Cane for long walks (7) Cane most of the time (5) One crutch (3) Distance Walked Unlimited (11) Six blocks (8) Two or three blocks (5)	<ul> <li>Two canes (2)</li> <li>Two crutches (0)</li> <li>Not able to walk (0)</li> <li>Indoors only (2)</li> <li>Bed and chair (0)</li> </ul>	Range of Motion (*Norma Total degree measurements, th Flexion (*140 degrees):	I) nen check range to obtain score External rotation (*40 degrees): Internal rotation (*40 degrees):
Stairs Normally without using a railing (2) In any manner (1) Unable to do stairs (0)	illing (4)	Range-of-Motion Scale 211-300 degrees (5) 161-210 degrees (4) 101-160 degrees (3) Range-of-Motion Score:	61-100 degrees (2) 31-60 degrees (1) 0-30 degrees (0)
Put on Shoes and Socks With ease (4) With	difficulty (2) 🗌 Unable (0)	Total Harris Hip Score: Readmission to Hospital: Date of Readmission: Implant Removal Date:	□ Yes □ No //
Comments:			
Investigator Signature:			Date:// (mm/dd/yy

#### **RESULT AND ANALYSIS**

This study, evaluation of results of closed reduction and internal fixation of intertrochanteric fracture with ender's nail and cannulated cancellous screw in elderly, conducted at department of orthopaedics, IPGMER&SSKMH with the objective to see whether results of combined use of ender's nail and cannulated cancellous screw will provide best functional recovery in case of intertrochanteric fracture in elderly. In our study 20 elderly patients were selected on random basis from those attended the outpatient department and emergencies during december2013 to October 2015 having intertrochanteric fracture of less than two week duration, intertrochanteric fracture with subtrochanteric multiple extension. fractures. and associated medical comorbidities that can be controlled before surgery.

The outcome of this study concluded that Ender's nail and cannulated cancellous screw fixation in intertrochanteric femur provides good functional recovery particularly in elderly.

Та	ble1:	Age	group	distribution	of	all	patients
		0	0		_		

Age (Years)	Frequency	Percent
≤60	5	25.0%
61-70	12	60.0%
>70	3	15.0%
Total	20	100.0%

The mean age (mean  $\pm$  s.d.) of the patients was 65.10  $\pm$ 6.18 years with range 55 - 79 years and the median age was 65.0 years.

Test of proportion showed that proportion of patients in the age group 61-70 years (60.0%) was significantly higher than the other age groups. The Z-Score is 2.2389. The p-value is 0.0251. The result is significant at p < 0.05.



Diagram 1: Age group distribution of all patients

The above table and bar diagram shows that 75% of the patients were in the age group >60 years and 25% of the patients were in the age group <60 years.

Ta	Table 2: Sex distribution of all patients			
	SEX	Frequency	Percent	
	Female	7	35.0%	
	Male	13	65.0%	
	Total	20	100.0%	

The Z-Score is 1.8974. The p-value is 0.05744. The result is *not* significant at p <0.05.



Diagram 2: Sex distribution of all patients

The above table and bar diagram shows that 65% of the patients were male and 35% of the patients were female. The male: female ratio is 1.86:1.



**Diagram 3: Distribution of CO-MORBIDITIES in all patients** 

The above table and diagram shows that 50% had pre-existing comorbidities, of which diabetes and hypertension were most frequently associated.

RTA	6	30.0%
Total	20	100.0%

The Z-Score is 2.5298. The p-value is 0.0114. The result is significant at p < 0.05.



Diagram 4: Distribution of MODE\_OF\_INJURY in all patients

The above table and diagram shows that low velocity trauma (LVT) were most common (70%) mode of injury.



The above table and diagram shows that majority (75%) of the fracture were of type 31A2.

Table 3: Distribution of INTRAOP BLOOD LOSS  $\left( ML\right)$  in all patients

INTRAOP BLOOD LOSS(ML)	Frequency	Percent
30	5	25.0%
40	6	30.0%
50	9	45.0%
Total	20	100.0%

The mean intra-op blood loss (mean  $\pm$  s.d.) of the patients was 42.00  $\pm$ 8.33 ml with range 30 - 50 ml and the median intra-op blood loss was 40 ml. The Z-Score is 0.9798. The p-value is 0.32708. The result is *not* significant at p <0.05.



Diagram 6: Distribution of INTRAOP BLOOD LOSS (ML) in all patients

The above table and diagram shows that 55% of the patients had intraoperative blood loss less than 50 ml.

 Table 4: Distribution of FOLLOW UP PERIOD (MONTHS)

 in all patients

FOLLOW UP PERIOD(MONTHS)	Frequency	Percent
6	1	5.0%
7	2	10.0%
8	3	15.0%
9	3	15.0%
10	3	15.0%
11	2	10.0%
12	1	5.0%
14	2	10.0%
15	1	5.0%
16	1	5.0%
17	1	5.0%
Total	20	100.0%

The mean follow-up (mean  $\pm$  s.d.) of the patients was 10.55  $\pm$ 3.17 months with range 6-17 months and the median follow-up was

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10 months. The Z-Score is 0.4781. The p-value is 0.63122. The result is *not* significant at p < 0.05

 Table 5: Distribution of Radiological Period Of Union (Weeks)
 in all patients

RADIOLOGICAL PERIOD OF UNION(WEEKS)	Frequency	Percent
10	2	10.0%
12	7	35.0%
14	9	45.0%
16	2	10.0%
Total	20	100.0%

The mean Radiological Period Of Union (mean  $\pm$  s.d.) of the patients was 13.10  $\pm$ 1.65 weeks with range 10 – 16 weeks and the median Radiological Period Of Union was 14 weeks. The Z-Score is 0.6455. The p-value is 0.5157. The result is *not* significant at p <0.05.



Diagram 7: Distribution of radiological period of union (weeks) in all patients

The above table and bar diagram shows that 90% patients had radiological period of union was within 14 weeks.

Table 6: Distribution of NECK SHAFT ANGLE (F-N) in all patients

ents		
NECK SHAFT ANGLE(F-N)	Frequency	Percent
0	4	20.0%
3	2	10.0%
4	4	20.0%
5	7	35.0%
12	2	10.0%
15	1	5.0%
Total	20	100.0%

The mean NECK SHAFT ANGLE (F-N) (mean  $\pm$  s.d.) of the patients was 4.80  $\pm$  4.0341 with range 0.0000 – 15.0000 and the median NECK SHAFT ANGLE (F-N) was 4.5000. The Z-Score is 1.0623. The p-value is 0.28914. The result is *not* significant at p <0.05.



Diagram 8: Distribution of Neck Shaft Angle (F-N) in all patients

The above table and diagram shows that 20% of the patients had accurate anatomical reduction and the neck shaft angle was same as on unaffected side, 65% of the patients had 3 to 5 degree of variations in the neck shaft angle compared to unaffected side, and 15% patients had >10 degree of in the neck shaft angle compared to unaffected side.

 Table 7: Association between Type Of Fracture vs Remarks in all patient

TYPE OF FR	ACTURE		
REMARKS	31A-1	31A-2	TOTAL
Excellent	4	4	8
Row %	50.0	50.0	100.0
Col %	80.0	26.7	40.0
Fair	0	2	2
Row %	0.0	100.0	100.0
Col %	0.0	13.3	10.0
Good	1	9	10
Row %	10.0	90.0	100.0
Col %	20.0	60.0	50.0
TOTAL	5	15	20
Row %	25.0	75.0	100.0
Col %	100.0	100.0	100.0



**Diagram 9: Association between Type Of Fracture vs Remarks** in all patient

The above table and diagram shows that fixation with ender's nail and cannulated cancellous screws gives good functional

outcome in cases of intertrochanteric fracture of femur



Fig A,B,Cand D(clinical photograpgh showing functional activity)



Fig.E Pre OP X-ray AP



Fig-F & G (Post OP X ray at final follow up AP & Lateral view)



Case No.18 Fig H,I and J(clinical photograpgh showing functional activity)



Fig.K Pre OP X-ray AP and Lateral



Fig-L and M (Post OP X ray at final follow up AP & Lateral view)

#### **CONCLUSION**

The Ender's nail for the treatment of pertrochanteric fractures have been used since long time and the early results were very promising but subsequently the complication associated with its use decreases the popularity among the surgeons and new systems of intramedullary and extramedullary fixations were gained popularity. The intramedullary implants are acceptable biomechanically more particularly regarding bending stress at weight bearing site. In our study, combining the use of intramedullary implant ender's nail and cannulated cancellous screw and after analysing the result of this study and comparing with other studies, conclusion are as follow- 1)This method of closed reduction and internal fixation provide good functional recovery in elderly patients. 2)This method of operation is technically minimal invasive. taking easy, less intraoperative time, and having less intraoperative blood loss and other complications. 3). This method of operation have less postoperative infections.4) The use of Cannulated Cancellous Screws passed along with Ender's nail helps in Controlled Collapse of the fracture and keeps the fracture reduced and fixed in anatomical position method provide good axial and rotational stability. Thus for these fractures in elderly the combined use of ender's nail and cannulated cancellous screw may provide good fracture reduction and stability and good functional outcome.

Abbreviation	Full form
М	Male
F	Female
Sl. No.	Serial number
LLD	Limb Length Discrepancy
L	Left
R	Right
Е	Excellent
G	Good
Fr	Fair
Р	Poor
LVT	Low velocity trauma
RTA	Road traffic accident
DM	Diabetes Mellitus
HTN	Hypertension
COPD	Chronic Obstructive Pulmonary Disease
F-N	Fractured-Normal
Cm	Centimetre
ER	External Rotation
MHHS	Modified Harris Hip Score

#### REFERENCES

- 1. Rockwood and Green's Fracture in adults, 8<sup>th</sup> edition: vol.2:2075-2130.
- 2. Brown CA, Starr AZ, Nunley JA. Analysis of past secular trends of hip fractures and predited number in the future 2010-2050. J Orthop Trauma.2012;26(2):117-122.
- 3. Pogrund H, Makin M, Robin G, et al. Osteoporosis in patients with fractured femoral neck in Jerusalem. Clin Orthop 1977; 124:165-172.
- Jewett EL. One-piece angle nail for trochanteric fractures. J Bone Joint Surg. 1941;23:803-10.
- 5. Aprin H, Kilfoyle RM. Treatment of trochanteric fractures with Ender rods. J Trauma. 1980;20:32-42.
- 6. Waddell JP, Czitrom A, Simmons EH. Ender nailing in fractures of the proximal femur. J Trauma. 1987;27:911-6
- 7. Lorich DG, Geller DS. Nielson JH. Osteoporotic pertrochanteric hip fractures.

Management and current controversies. J Bone Joint Surg. 2004;86A:398–410.

- Robinson CM, Adams CI, Craig M. Implant-related fractures of the femur following hip fracture surgery. J Bone Joint Surg. 2002;84A:1116–22.
- Domingo U. Cecilia D. Herrera A Resines C. Trochanteric fractures treated with a proximal femoral naiL Int Orthop 2001; 25: 298-301.
- Schwab E. HOntzsch K.. Weise K. Die V ersorgung instabiler per- und subtrochantiirer Femu.rfral-ruren mit dem Proximalen Femurnagel (PFN'). Ak"t Traumatol1999: 28: 56-60.
- 11. L Simmermacher RK. Bosch AM. Van der Werken Chr. The AO/ ASIF-proximal femoral nail (PFN): a new device for the treatment of unstable proximal femoral fractures. Injury 1999: 30: 327-332.
- Classification /AO OTA. Orthopaedic trauma association fracture and dislocation compendium. J Orthop Trauma. 2007; 21(10): S31-S32.
- 13. Chapman MW, Bowman WE, Csongradi JJ, Day LJ, Trafton PG, Bovill EG Jr. The use of Ender's pins in extracapsular fractures of the hip. .(JBJS Am. 1981 jan;63(1): 14-28).
- 14. G. F. McCoy, G. R. Dilworth, and H. A. Yeates The treatment of trochanteric fractures of the femur by the Ender method. Ulster Med J. 1983; 52(2): 136–141.
- 15. C H Marsh. Use of Ender's nails in unstable trochanteric femoral fractures. Journal of the

Royal Society of Medicine Volume 74 July 1983.

- Sidhartha Gangadharan and MR Nambiar. . Intertrochanteric fractures in elderly high risk patients treated with Ender nails and compression screw. Indian J Orthop. 2010 Jul-Sep; 44(3): 289–291.
- 17. Cemil ERTURK, Bilal CAGMAN, Mehmet Akif ALTAY, Ugur Erdem ISIKAN. The use of Ender nail in intertrochanteric fractures supported with external fixation. Turkish Journal of Trauma & Emergency Surgery . 2011;17 (5):407-412.
- Bhavik Dalal, Tarkik Amin, Archit Gandhi, Rohit Shah. Study of results of ender nailing and cannulated cancellous screw in the treatment of intertrochanteric fracture femur. ijmsph.2013.2.469-473.
- Ankit Syal, Yash Bharat Shah, Chintan Vinod Desai, Suryaprakash Pitamber Chandani. Comparison of Different Modalities of Treatment for Extra-Capsular Proximal Femur fracture. Volume: 3, Issue: 7; July 2014.
- 20. Michael W. Chapman. Operative orthopaedics, second edition. Vol. 1.
- 21. Campbell's Operative Orthopaedics, seventh edition. Vol. 3

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