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ORIGINAL ARTICLE

PROXIMAL FEMORAL NAIL IN THE MANAGEMENT OF INTERTROCHANTRIC FRACTURES: A PROSPECTIVE STUDY

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ABSTRACT: Intertrochanteric fractures are commonly seen in elderly patients. The various modalities of treatment have been evolved. Today the treatment of choice is surgery. The implant of choice in recent times for whatever may be the type of fracture is proximal femoral nail. Here we have done a study to know the outcome and advantages of the proximal femoral nail in the management of the Intertrochanteric fractures. **MATERIALS AND METHODS:** Thirty Intertrochanteric fractures were operated by closed reduction and internal fixation with proximal femoral nail between May 2011 and November 2014 were studied. Post-operative follow up done at intervals of 6, 12, 16 and 20 weeks and final results were evaluated using Kyle's criteria at 24 weeks. **RESULTS:** We achieved excellent results in 93.34% of the cases and good in 6.67%.
KEYWORDS: Proximal femoral nail, Evans classification, Kyle's criteria, Intertrochantric fracture.

INTRODUCTION: Intertrochanteric fractures are commonly seen in elderly patients. The various modalities of treatment have been evolved. Today the treatment of choice is surgery. The implant of choice in recent times for whatever may be the type of fracture is proximal femoral nail. Here we have done a study to know the outcome and advantages of the proximal femoral nail in the management of the Intertrochanteric fractures.

MATERIALS AND METHODS: The study was performed on 30 cases of Intertrochanteric fracture classified according to the Evans classification (Fig. 1) who were admitted in Department of Orthopedics, between May 2011 and November 2014. We included patients above 50 years of their age. We excluded patients with pathological fractures, compound fractures and who are medically unfit and at extremely high anesthesia risk. All the patients, operated by closed reduction and internal fixation with proximal femoral nail. And follow up done at intervals of 6, 12, 16 and 20 weeks. And the anatomical and functional outcome was assessed at 24 weeks using Kyle's criteria (Table 1).

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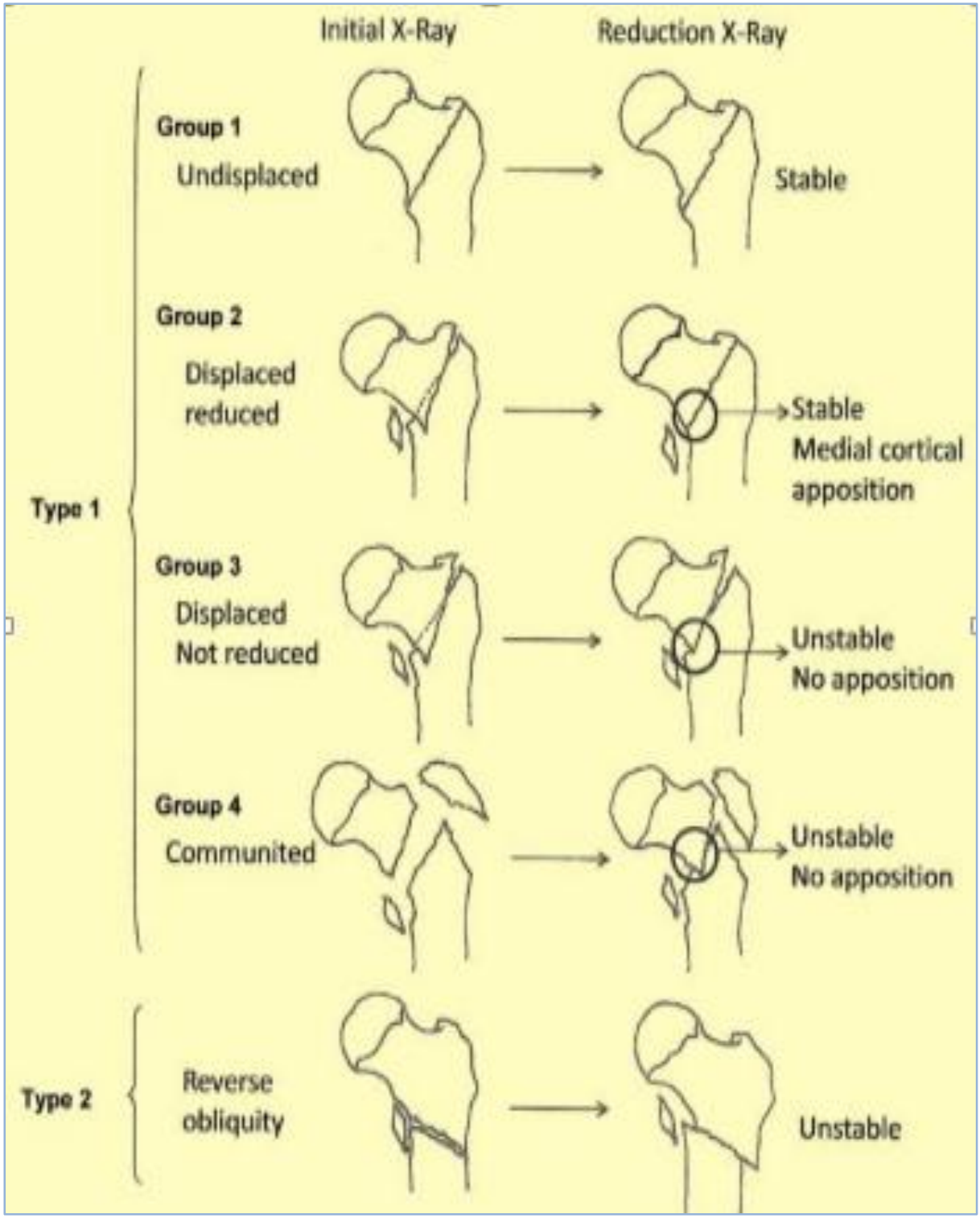

Fig. 1: Evan's Classification

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Table 1: Kyle's Criteria

1. Excellent	2. Good
a. Fracture united. b. No pain. c. No infection. d. Full range of motion at hip. e. No shortening. f. Patient able to sit crossed legged and squat. g. Independent gait.	a. Fracture united. b. Occasional pain. c. No infection. d. Terminal restriction of hip movements. e. Shortening up to half inch. f. Patient able to sit crossed legged and squat. g. Use of cane back to full normal activity.
3. Fair	**4. Poor**
a. Fracture united. b. Moderate pain in hip. c. No infection. d. Flexion restricted beyond eighty degrees. e. Noticeable limp shortening up to one inch. f. Patient not able to sit crossed legged. g. Patient walks with support of walker. h. Back to normal activities with minimal adjustments.	a. Fracture not united. b. Pain even with slightest movement at hip or rest pain. c. Infection d. Range of movements at hip restricted flexion restricted beyond sixty degrees. e. Shortening more than one inch. f. Patient not able to sit crossed legged or squat. g. Patient cannot walk without walking aid. h. Normal activities not resumed.

Procedure of the study:

Pre- operative: Patients admitted with Intertrochanteric fractures were admitted and Thomas splint was applied routinely in all cases. Parental analgesics were given to relieve pain. Following investigations were done in all the cases: Complete hemogram, urine routine, bleeding and clotting time, blood urea, serum creatinine, random blood sugar, Electro cardiograph (ECG), and chest X-rays were obtained routinely.

Pre anesthetic evaluation was done for all cases using American society of Anesthesiologist (A. S. A) Grading system used prior to surgery. Injection Cefotatime based on kg bodyweight was administered 1 hour prior to surgery. Shaving and scrubbing was done on table after spinal anesthesia.

Operative Procedure: All patients were operated under spinal anesthesia, under aseptic precautions using fracture table and image intensifier. Skin incision was made about 3-5 centimeters long starting from the tip of the greater trochanter and continued proximally. Awl was introduced from the tip of the trochanter in to the medullary canal. Guide wire was passed in to the medullary canal. Graduated reaming done over the guide wire. Proximal femoral nail was introduced using Jig in to the medullary canal in all our cases 25 centimeters/9, 10, 11mm nail was introduced under image intensifier

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guidance. By using 6.5 and 8mm screws proximal locking done and distal locking by 4.5mm bolts. Normal saline wash was given to the wound and closed under layers.

Postoperative: Adequate analgesics, IV antibiotics given up to 5th post-operative day, oral antibiotics till tenth day. Postoperatively check X-rays done, assessed for the position of the screw, nail, neck shaft angle and the fracture reduction. Suture removal done on 14th day.

Physiotherapy: Patient was made to sit up on bed and Static quadriceps exercises started from 2nd day. Hip and knee flexion exercises from 3rd day, patient allowed non-weight bearing walking from 3rd day, partial weight bearing started when radiological signs of union were present at an average of 4th week post-operative, full weight bearing after clinical and radiological union. Cases included in the study were followed up regularly.

Radiographic assessment was done at each visit for Radiologic union, Implant failure and Infection.

Clinical evaluation for pain, swelling, and mobility, deformity, wound status limb length, walking ability determined on follow up.

Observations: Thirty patients with Intertrochanteric fractures admitted in our institution during May 2011 to November 2014 were selected and studied. Patients were in the age group of 55 to 85 years with a mean of 67.5 years. 22(73.33%) cases were males and 8(26.66%) were females. Among the 30 cases, 70% of the patients had sustained the fracture on right side and 30% on left. 80% of the patients sustained fracture due to fall and the rest in road traffic accidents.

Most of the patients in our study were in type 1 group 1 of Evans classification.

Type	No. of Patients	%
Type 1,Group I (Undisplaced)	22	73.34
Type 1,Group II (Displaced reduced)	6	13.34
Type II	2	6.67
Total	**30**	**100**

In most of the patient's level of osteoporosis were either 3 or 4 confirming that Intertrochanteric fractures usually occur in osteoporotic bone.

Quality of bone according to Singh's Index

Singh's Index	No. of patients	%
6	1	3.3
5	4	13.3
4	11	36.7
3	11	36.7
2	3	10
1	0	0

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Intraoperative: The incision length was 3-5 centimeters, blood loss ranged from 50 to 80ml, intraoperative fluoroscopic exposure approximated 10 to 15 times and total duration of the surgery ranged from 30 minutes to 45 minutes.

Postoperative: In our study immediate postoperative X-ray was done to assess the position of screws and nail, all were in satisfactory position. Neck shaft angle was ranging from 132 to 135 degrees.

All the patients were allowed to sit up on bed on 2nd day, static quadriceps exercises started from 2nd day, hip and knee flexion exercises from 3rd day, patient allowed non-weight bearing walking form 3rd day, partial weight bearing started 4th week post-operatively, full weight bearing after clinical and radiological union. At 8 weeks all patient's achieved full range of motion at the hip joint, 28 patients were completely relieved of pain and 2 patients had occasional pain. Radiological union is seen in 19 patients by 12 weeks, 6 by 16weeks and remaining by 20 weeks (Fig 3). At 24weeks follow up all patients were assessed using Kyle's criteria for anatomical and functional outcome. Results were excellent in 93.34 % and the remaining 6.67% having good result.

Complications: Superficial infection was noted in our study in two cases, healed by regular dressings and based on culture and sensitivity antibiotics.

Distribution of patients according to the Kyle's criteria

All patients after fracture union or after 20 weeks were grouped and the anatomical and functional results evaluated as follows.

	Excellent	**Good**
Fracture united.	30	
No pain.	28	2
No infection.	28	2
Full range of motion at hip.	28	2
No shortening.	30	
Patient able to sit crossed legged and squat.	30	
Independent gait.	30	

Results by Kyle's Criteria:

	No. of cases	**%**
Excellent	28	93.34
Good	02	6.67
Total	**30**	**100**

Most of the cases fall into the category of excellent outcome i.e. 93.34%, and the remaining 6.67% cases as good outcome.

DISCUSSION: The incidence of intertrochantric fractures is most common in elderly. They are most commonly seen in elderly patients and in our series the average age was 67.5 years.

Cauley JA et al stated that the usual mechanism of injury is due to a fall in osteoporotic patients; our study confirmed this as 80% of our patients give a history of fall.[1] Males (73.33%) are

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most commonly involved in our study, according to Dimon Hughston females were most commonly involved (75%).[2] Patients usually presents with history of fall, with complaints of pain, swelling in hip and inability to walk. Examination reveals ecchymosis, tenderness over the trochanter and external rotation with shortening of the limb. Anteroposterior and lateral x-ray of the hip confirms the fracture and type based on Evan's classification as stable or unstable, in our study we selected all stable fractures.[3,4] Conservative treatment of the trochanteric fractures is abandoned due to the high morbidity and mortality, by Madsen JE et al (50%). Surgical stabilization and early mobilization is the treatment of choice for intertrochanteric fractures.

Various intramedullary devices have been used for fixation of these fractures – Ender's nail, the Russel Taylor reconstruction nail, the Gamma nail, proximal femoral nail and the AMBI nail. Studies comparing the gamma nail and sliding hip screw have found higher incidence of complications and re-operation rates with the gamma nail and no difference in long term functional outcomes.[5]

Shorter operating times, fewer blood transfusion and shorter hospital stay have been found while using intramedullary nails as compared to the 95 fixed angle screw plate for unstable intertroachanterics fractures. Intramedullary nails have been advocated for reverse oblique fracture of the inter-trochanteric region in the elderly.[6] Kyle in his study described the results of intertrochantric fractures and proximal femoral nail.[7]

Closed reduction and internal fixation with proximal femoral nail has got the advantages of small incision, less blood loss, minimal radiation exposure and less operative time by Yang E, Qureshis, in our study the incision was 3 to 5 centimeters, blood loss ranges from 50 to 80ml, intraoperative radiographic shooting ranges from 10-15 times and total duration of the surgery ranges from 30 minutes to 45 minutes. Postoperatively, in the check x ray the position of the screw and nail should be in position. The neck shaft angle preferred is valgus by Parker MJ and in our series it ranged from 132 to 135 degrees [6]. Post operatively physiotherapy started on 3rd day with non-weight bearing ambulation, partial weight bearing by 4th week and full weight bearing after radiological signs of healing by 12 to 16 weeks.

Complications: The infection rate is 1.5% by the Jansen report; we had 6% of superficial infection in our series. Implant failure rate is 16.5% by Davis, no implant failures noted in our study. 1-2 centimeters of shortening is accepted by Hornby et al, six patients had 1cm of shortening in our study. Results are comparable to the standard study by L.J. Domingo.[8]

CONCLUSION: Intertrochanteric fractures are essentially fractures of middle age and elderly, with osteoporotic bones. Closed reduction and internal fixation with proximal femoral nail was the implant of choice. The study showed that using proximal femoral nail for the Intertrochanteric fractures has the advantage of minimal blood loss, reduced operative time and hence reduction in infection rates to the patient and surgical team, needs technical experience bit costly implant to the patient and negligible complications.

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