

To Study the Functional and Radiological Results of Intramedullary Nail with Augmentation Plating in Distal Femur Fractures

SK Goyal*, Mayank Ganeshani and Akib Nisa

Department of Orthopaedics, S M.S. Medical College, Jaipur, India

***Corresponding Author:** SK Goyal, Department of Orthopaedics, S M.S. Medical College, Jaipur, India.

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Abstract

This prospective study was conducted on all the patients with extra articular distal femur fractures coming to casualty of Sawai Man Singh Medical College and Hospital Jaipur (Rajasthan) during the study period from July 2020 to September 2022. 29 cases with extra articular distal femur fractures (33A1, 33A2, 33A3) were selected for the study.

The present study includes 29 cases. Mean age was 32.82 years. Distal femur fractures were more common in young age group. Maximum patients were of third and fourth decade. Majority of the patients were males 22 (75.86%) and females 7 (24.14%). Most common mode of injury was road traffic accidents. Right side lower limb was more involved than left lower limb. Excellent results were seen equally in younger and older age patients. In our study we saw significant reduction in VAS score from 8.31 to 2.62.

From our study we conclude that intramedullary nailing with augmentation plate in extra articular distal femur fractures has its own advantages and disadvantages.

Keywords: Extra Articular Distal Femur Fracture; Young Adults; Road Traffic Accident; Dual Construct; Rotational Stability

Introduction

Fractures of the distal femur are common and severe. Due to the increase in number of motor vehicles exponentially the incidence of high energy trauma has increased drastically. The estimated frequency is 0.4% of all fractures and 3% of femoral fractures. A classic bimodal distribution is found with a peak in frequency in young men (in their 30s) and elderly women (in their 70s). The usual context is a high energy trauma in a young patient and a domestic accident in an elderly person. The gender ratio has changed and today women are more involved than men, and the population is also increasingly older; mean 61 years old at fracture and over 65 in more than half the cases. Sufficient stabilization to withstand static loading forces on bone and dynamic muscular forces can only be obtained with surgery. Conservative treatment is usually not advised, it is proposed in patients with reduced autonomy in fractures with little or no displacement [1].

Besides a clinical examination and a standard radiological examination, a CT scan is also required because 55% of these fractures are intra-articular. If vascular injury is suspected, appropriate tests should be performed. It should be remembered that the presence of a distal pulses does not exclude vascular injury. Femoral nerve block is indicated and recommended by same authors in the emergency room [2]. These fractures are serious with a high mortality rate in elderly populations same as that found in the proximal femur. It has been shown

that a delay in surgery by more than 4 days (whatever the cause) is associated with an increase in mortality. The known risk factors are dementia as well as cardiac and kidney disorders [3].

To reduce perioperative morbidity and mortality in this age group, Kammerlander, *et al.* advised appropriate initial medical management and taking measures to prevent complications that may compromise functional results. In a series of 43 patients in their 80s, they reported 50% mortality at the 5-year follow-up, a frequent loss of independence, and only 18% of patients who can walk without help [4]. Fractures of the distal femur are severe and difficult to treat. The 1988 SOFCOT symposium reported [4]. infection and septic non-union in 13% (29% of open fractures), aseptic non-union in 14%, residual knee stiffness in 35%, secondary post-traumatic osteoarthritis in 50%, with initial chondral injury as well as incomplete reduction [4]. The options for operative treatment are traditional plating techniques that require compression of the implant to the femoral shaft (blade plate, dynamic condylar screw, non-locking condylar buttress plate), ante grade nailing fixation, retrograde nailing, sub muscular locked internal fixation and external fixation. Fixation of these fractures with a lateral plate alone has historically been associated with non-union and/or mal union with varus collapse. Most surgical failures are caused by inadequate fixation of fracture fragments. A dual construct of intra medullary nail with augmentation plating provides better rotational stability in distal femur fractures.

Methodology

This prospective study was conducted on all the patients with extra articular distal femur fractures coming to casualty of Sawai Man Singh Medical College and Hospital Jaipur (Rajasthan) during the study period from July 2020 to September 2022. Patients were carefully evaluated and after applying inclusion and exclusion criteria, 29 cases with extra articular distal femur fractures (33A1, 33A2, 33A3) were selected for the study. Required permission of ethical committee and written consent from all the patients were taken.

Inclusion criteria:

- Patient above the age of 18 years.
- Recent history of trauma.
- 33A1, 33A2, 33A3 AO classification distal femur fractures.
- Closed fractures.
- Patients who will give informed consent and are willing to follow up.

Exclusion criteria:

- Patients with intra articular distal femur fractures.
- Open fractures.
- Patients with pre-existing neurological deficit.
- Patients who are unfit for anaesthesia and surgery.

Pre-operative care

All the patients were evaluated in the casualty and life-threatening conditions with underlying fractures were managed. Immobilization of affected extremity with groin to toe slab for pain relief was applied. After stabilization of vitals, X-ray and CT scan of the affected extremities were carried out. The fracture pattern was grouped according to classification/inclusion criteria. All the routine investigations and pre- anaesthetic examination was done.

Surgical technique

Femur nailing: Patient is placed on the fracture table in supine position. Nail length is obtained by palpating and measuring the contralateral limb from the greater trochanter to the top of the patella. Nail length is undersized by at least 20 mm. incision was made approximately 3 cm above the GT in line with the femur. Fascia-lata was sharply incised. Bone awl was used, and entry made at piriformis fossa. Position of awl was confirmed under fluoroscopy. Awl was advanced till the lesser trochanter. Soft tissue protector was placed. Perforator was inserted. Guide wire was inserted in the proximal fragment and fracture reduction was done with the help of traction and manipulation and guide wire passed through the distal fragment. Position of the guide wire was confirmed under fluoroscopy. Tissue protector was placed, and reaming started with 8 mm medullary reamer. Reaming was performed in sequential steps by increments of 1 mm each. Intramedullary nail of appropriate size was inserted, and guide wire removed. Distal locking was done with help of jig followed by proximal locking. Fracture reduction was confirmed again under fluoroscopy.

Distal femur plating: Keeping the patient on the fracture table a lateral skin incision was made, parallel to the shaft of femur, extending far enough to permit application of broad DCP with at least four holes above the most proximal fracture line. Longitudinal incision was made in the fascia-lata. Vastus lateralis was elevated anteriorly to reach the distal third of the femur. Minimal amount of soft tissue was stripped. Broad DCP was applied on the lateral aspect of femur and fixed with screws. Wound closure done layer by layer.

Postoperative care

Post operatively analgesics were given in the form of intramuscular injections. Intravenous antibiotics were given for 3 days post operatively for all the patients. Switch over to oral antibiotics was done on the 4th postoperative day.

After checking dressing on postoperative day, antibiotics were given according to the status of the wound. Skin sutures were removed on the 14th postoperative day.

Physiotherapy following fixation, early range of motion exercises were instituted depending on the union state of bone. The patients were mobilized with non- weight bearing walking with the help of a walker. Partial weight bearing was stated after 6 weeks once the x-rays show sufficient callus at the fracture site.

Further weight bearing was instituted depending on the evidence of union as visualized on radiographs. All patients were followed up, monthly for initial 4 months, thereafter 3 months for clinical and radiological evaluation of union status, knee range of motion and other complications.

Observations and Results

The present study includes 29 cases of ipsilateral extra articular distal femur fracture, treated in the department of orthopaedics at SMS Medical college and Hospital, Jaipur. The patients were followed up for a minimum period of 6 months and a maximum of 18 months. The following observations were made in the present study.

The youngest patient was 21 years old and oldest patient was 61 years. Mean age of 29 patients who underwent surgery for distal femur fractures was 32.82 years. Distal femur fractures were more common in young age group. Maximum patients were of third and fourth decade. Majority of the patients were males 22 (75.86%) and females 7 (24.14%), as males are more involved into outdoor activities as compared to females. Most common mode of injury was road traffic accidents. It was mainly because of increasing industrialization and increase in number of vehicles. Out of 29 patients in 13 patients left side lower limb was injured and in 16 patients' right side lower limb was injured. Right side lower limb was more involved than left lower limb. In our study 33A2 distal femur fractures were more (16) than 33A3(8) which were more than 33A1(5). In our study Mean range of motion was 91.96. Non- union was seen in 6 patients. Shortening

was seen in 3 patients. One patient developed infection. In our study favourable outcome was seen in 18 (62.07%) patients. Unfavourable outcome was seen in 11 (37.93%) patients. Excellent results were seen equally in younger and older age patients. In our study we saw significant reduction in VAS score from 8.31 to 2.62.

Discussion

Treatment of distal femur fractures is a cumbersome subject over the decade There have been changing principles towards surgical treatment of supracondylar fractures of femur. Closed management of these fractures was the treatment of choice until 1970. This was due to lack of proper techniques and scarcity in availability of appropriate implants. Conservative treatment at any age may be complicated by knee stiffness, mal-union and non-union.

Early surgical stabilization can facilitate care of the soft tissue, permit early mobility and reduce the complexity of nursing care. Open reduction and internal fixation has been advocated, using implants including intra medullary nails, buttress plate, locking compression plate. A locking plate decreases the screw-plate toggle and motion at the bone-screw interface and provide more rigid fixation. Rigid fixation is one of the key factors for successful treatment of these fractures. The conventional plates are associated with their own demerits such as screw pull out, implant failure and unstable fixation needing postoperative immobilization.

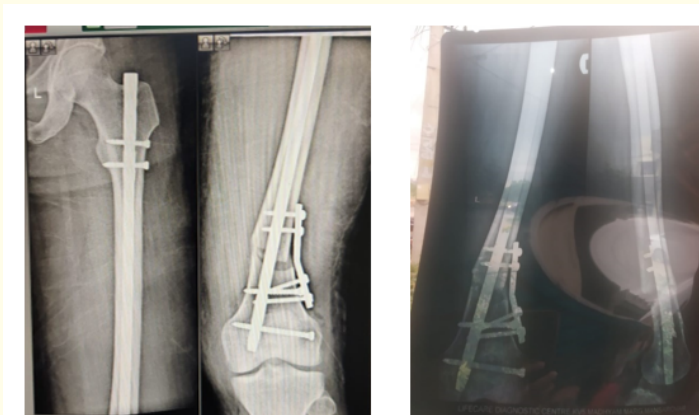
In the management of extra articular distal femur fractures, as the articular congruity is maintained and there is no involvement of articular cartilage. Fixation and early mobilization and rehabilitation can lead to excellent outcomes for the patients. Though distal femur fractures age being managed recently by locking compression plate, as far as extra articular distal femur fractures are concerned intramedullary nailing in addition to the plate is also an option. Plate in the presence of intramedullary nail provides addition rotational stability at the fracture site.

The study was done prospectively over a period 14 months from April 2021 to May 2022. The last patient included in the study was treated in April 2022. The minimum follow up period was 6 months and maximum period was 18 months.

In our study maximum patients were in the age group of 30 to 50 years. In our study mean age was 32.82 years. Male patients were more than female. in our study there was male predominance (76%) and female (24%).

In our study most common mode of injury was high velocity motor vehicle accident (79.31%). In 6 patients (21%) mode of injury was assault.

In our study 16 (55.17%) patients had injury in the right lower limb and 13(44.83%) patients had injury in the left lower limb. Right side lower limb was more commonly involved.



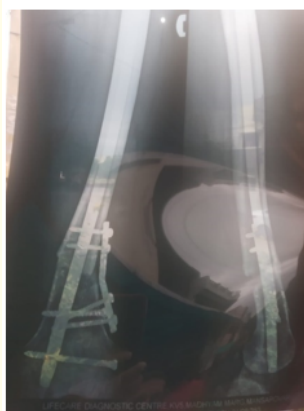


Figure 1: Xray showing post operative femur interlocking nail with augmentation with plate.



Figure 2: Clinical photograph showing complete recovery.

Conclusion

From our study we conclude that intramedullary nailing with augmentation plate in extra articular distal femur fractures has its own advantages and disadvantages.

Advantages

- Intramedullary nail with augmentation plate provides additional rotational stability in distal femur fractures.
- Nail *in situ* prevents bending load on the plate.
- Allows for early weight bearing.

Disadvantages

- Very few screws with bi-cortical purchase.
- Surgical time is significantly more as there are two procedures involved.
- Chances on non-union are higher as fracture hematoma is disturbed.

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