

Original research article

Interlocking Nail Treatment of Diaphyseal Femoral Fractures Performed in the Lateral Decubitus Position: a Clinical Assessment

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Abstract

Aim: clinical evaluation of diaphyseal femoral fractures operated in lateral decubitus position with interlocking nail.

Methods: A prospective observational was conducted in the Department of Orthopaedics, A.N. Magadh Medical College and Hospital, Gaya, Bihar, India for 1 year. Total 50 Patients with age group >18 years and diaphyseal femoral fractures (all types of closed/open diaphyseal variants). Assessment at regular intervals was done at 2, 4, 6, 8 and 12 weeks. At each follow-up visit, patient was evaluated clinically, radiologically if needed and complications were noted.

Results: In our study transverse (46%) was most common fracture pattern followed by Oblique fractures (26%), Oblique-transverse fractures (18%) and spiral fractures (10%). In our study 23 (46%) patients had Fluoroscopy time of 3.5-4 mins followed by 19 (38%) patients with Fluoroscopy time of 2.5-3 mins and 8 (16%) patients with Fluoroscopy time of 3-3.5 mins. The mean Fluoroscopy time was 3.26 mins. There were complications in 4 patients. 1 (2%) patient had limb length shortening by 1.5 cms, 1 (2%) patient had non-union and restriction of movement, 1 (2%) patient had delayed union and 1 (2%) patient had deformity ER and valgus deformity. For evaluation of results in our study Thoresen classification system was used. 58% patients had excellent results with full, pain-free, function of the extremity, 28% patients had good result, 12% patients had fair result and 2% patient had poor result.

Conclusion: Operating in lateral decubitus position significantly decreases operative time, fluoroscopy time and blood loss which further helps in early mobilization and weight bearing also allows resumption of knee range of movement exercises at early stage; so it is possible to give good knee range of movement at the end with decreased hospital stay.

Keywords: lateral decubitus position, diaphyseal, femoral fractures

Introduction

Closed repair of peritrochanteric fractures with cephalomedullary nail fixation with the patient in the lateral decubitus position on a flat table with manual traction may allow improved fracture reduction and fixation in comparison with what is possible in a supine setup. Three primary positioning strategies have been described for fixation of peritrochanteric femoral fractures: supine on a fracture table, supine on a flat radiolucent table, and the lateral decubitus position on a flat radiolucent table. Advantages of a supine position on a fracture table include the ability to operate without an assistant, sustained longitudinal traction, and circumferential access to the injured lower limb. Disadvantages of this setup include difficulty determining the starting point, inability to accommodate obese patients, and many complications that are

particular to the fracture table such as pudendal nerve injury, skin slough from the perineal post, and compartment syndrome of the uninjured lower limb.¹⁻³ Advantages of supine positioning on a flat radiolucent table for treating peritrochanteric femoral fractures are decreased operative time and increased versatility for treating a patient with multiple injuries. Disadvantages include difficulty obtaining lateral radiographic images and maintaining alignment over the course of the surgery.⁴⁻⁶ Advantages of cephalomedullary nail fixation of inter trochanteric and sub trochanteric fractures of the femur with the patient in the lateral decubitus position include easier access to trochanteric and piriformis fossa entry points. The above-mentioned complications associated specifically with a fracture table are also avoided. Conversion to an open approach may be easier, without substantial changes in patient positioning for most approaches to the hip and proximal part of the femur. Access to the injured limb for imaging and manipulation from both sides of the operating table are also easier, and may facilitate the management of obese patients. The lateral decubitus position allows soft tissue to fall away from the surgical field by the force of gravity, which can improve visualization, especially in obese patients with excessive soft tissue. The view of the peritrochanteric area is similar to that in a total hip arthroplasty performed with the patient in the lateral position, which aids in reduction by allow in ganexpanded view of the surgical field. During treatment of sub trochanteric hip fractures, the ability to freely manipulate the limb may aid in the reduction of the flexion deformity induced by the iliopsoas muscles.⁷ after the patient is placed in the lateral decubitus position on a radiolucent operating table, the fracture is reduced with traction, manipulation, and use of accessory devices as needed. The medullary canal entry point is determined radiographically, and then the canal is opened and reamed. The appropriate nail length is determined. The nail is then inserted and guide wires for the proximal cephalic lag screw are inserted under fluoroscopic guidance.

Material and methods

A prospective observational was conducted in the Department of Orthopaedics, A.N.Magadh Medical College and Hospital, Gaya, Bihar, India for 1 year. after taking the approval of the protocol review committee and institutional ethics committee. After taking informed consent detailed history was taken from the patient or the relatives. Total 50 patients with diaphyseal fractures of femur.

Inclusion criteria

Patients with age group >18 years and diaphyseal femoral fractures (all types of closed/open diaphyseal variants).

Exclusion criteria

Patients with grade-III Gustilo Anderson open fracture, polytrauma, associated with head injury, pathological fractures, old fracture non-union and delayed union; and preexisting stiffness, deformity, congenital anomalies of the involved limb were excluded.

Methodology

When the patient with femur shaft fracture was admitted to hospital all the necessary clinical details were recorded in study proforma prepared with for this study. Clinical and radiological examination was done followed by skin traction and limb elevated over Bohler Braun splint or Thomas' splint was used for the effected limb and the facture pattern was classified. Routine investigations were done, haemoglobin percentage, fasting blood sugar, pre-op serology. Electrocardiography (ECG), 2D echocardiography (echo) as needed. Distal neurovascular status was assessed. Instruments required were checked and sterilized beforehand.

This technique is applicable to all types of femoral shaft fractures. It is especially advantageous in obese patients, as the fat appendages tend to displace toward the floor and away from the starting point. Patient with the fractured side up is placed on a radiolucent flat top table in a lateral decubitus position. Side supports were used to hold the patient in position. Fluoroscopic compatibility of the position was assessed for any overlapping and obstructions for a clear view. The entire visualization of the thigh was done fluoroscopically followed by draping. An incision was taken 5 to 10 cm proximal to the tip of greater trochanter in lateral decubitus position with the hip flexed the damage to the gluteus medius was minimized by identifying its posterior edge. Proximal canal entered with entry awl by fluoroscopic visualization in anteroposterior (AP) and lateral views. A bulb-tipped guide wire was then passed into the proximal fragment. Fracture reduction was done under fluoroscopic guidance. The guide wire was further advanced through the distal fragment approximately 5 mm proximal to the intercondylar notch and centering was done. Sequential reaming was done after confirming the nail size and diameter the nail was connected to the standard insertion handle and introduced in the proximal fragment and was driven across the fracture site with attention given to alignment, rotation and length of the thigh. Femoral rotational alignment was analysed by rotating the flexed leg to 10 to 15 degrees internally on the thigh. The locking of the nail was done as per manufacturer recommendations. The proximal and distal locking is performed from lateral to medial and is facilitated by raising the C-arm as high as possible. Wound closure was done in layers. Compression dressing done and distal neurovascular status was checked.

Post-operative care

Post-operative radiographs were assessed and the wound was inspected on 3rd and 4th post-operative day. Exercises were started from the next day of surgery. Appropriate analgesics and antibiotics were given for first five days and advised to come for suture removal on 14th day. Patient was discharged with a walker and advise to be followed at home. Non-weight bearing ambulation on 5th to 7th day and partial weight bearing started at 4 weeks. Full weight bearing started by eight to twelve weeks depending on fracture configuration and radiological callus formation.

Follow up

Assessment at regular intervals was done at 2, 4, 6, 8 and 12 weeks. At each follow-up visit, patient was evaluated clinically, radiologically if needed and complications were noted. A detailed observation was recorded using attached study proforma.

Results

The present study was conducted over 50 adults for evaluation of diaphyseal fracture femur treated with intramedullary interlocking nail in lateral decubitus position.

Table 1: Classification of femur shaft fracture (AO type)

AO type	No. of patients	%
A	18	36
B	29	58
C	3	6
Total	50	100

Table 2: Intra-operative results- fluoroscopy time

Fluoroscopy time (min)	No. of patients	%
2.5–3	19	38

3-3.5	8	16
3.5-4	23	46
Total	50	100
Mean fluoroscopy time (min)	3.26	

Table 3: Intra-operative results - operative time

Operative time (min)	No. of patients	%
80-100	28	56
100-120	22	44
Total	50	100
Mean operative time (min)	98.25	

Table 4: Intraoperative problems

Intraoperative problems	No. of patients	%
Difficulty in entry point	1	2
Difficulty in reduction	3	6
Impaction of nail	-	-
Intraoperative fracture	1	2
Persisting deformity	-	-

Table 5: Commencement of non-weight bearing (NWB) ambulation

Non-weight bearing (days)	No. of patients	%
1-3	46	92
>5	4	8

Table 6: Complications.

Complications	No. of patients	%
Delayed union	1	2
Non-union and ROM	1	2
Shortening 1.5 cm	1	2
Deformity ER + valgus	1	2

Discussion

Lateral decubitus position obviates the need for fracture table, making it easier to establish an entry point for an intramedullary device. The complications reported following use of traction on a fracture table are pudendal nerve palsy, compartment syndrome and skin sloughs of the perineum.

In our present study of 50 patients the purpose of the study was evaluation of diaphyseal fracture of femur in adults treated with intramedullary interlocking nail in lateral decubitus position. The data collected in our study is assessed, analysed and compared to other series and the results are evaluated.

In our study transverse (46%) was most common fracture pattern followed by Oblique fractures (26%), Oblique- transverse fractures (18%) and spiral fractures (10%). Most common pattern of fracture reported in the study of Deepak et al.⁸ was comminuted and transverse fractures (63.33%). Our study is closely similar to the series of Deepak et al, comminuted(40.6%),

Butterfly (21.1%) and Transverse (16.4%) in 293 patients in series Klemm- Borner.^{8,9} In our study of 50 patients, 96% patients achieved union and the average time for healing of the fracture was 21.9 weeks. Dynamisation was required in 3 patients. Average time for dynamisation was 6.9 weeks with mean healing time of 30.4 weeks. White et al observed union rate of 99% and healing time of 16 weeks in his study.¹⁰

In our study 23 (46%) patients had Fluoroscopy time of 3.5-4 mins followed by 19 (38%) patients with Fluoroscopy time of 2.5-3 mins and 8 (16%) patients with Fluoroscopy time of 3-3.5 mins. The mean Fluoroscopy time was 3.26 mins. Ha et al observed that mean fluoroscopy time was 3.08 mins.¹⁷ In our study 28 (56%) patients had operative time of 80-100 minutes and 22(44%) patients had operative time of 100-120 minutes. The mean operative time was 98.25 mins. The operative time of patients in the study of Ha et al.¹¹

There were complications in 4 patients. 1 (2%) patient had limb length shortening by 1.5 cms, 1 (2%) patient had non-union and restriction of movement, 1 (2%) patient had delayed union and 1 (2%) patient had deformity ER and valgus deformity. Brumback et al in their study had 1 cm shortening in 2 patients and 1 patient had 2 cm shortening.¹² All were due to intraoperative fixation in a shortened position and not due to postoperative loss of fixation.

Final outcome according to Thoresen's criteria¹³

For evaluation of results in our study Thoresen classification system was used. 58% patients had excellent results with full, pain-free, function of the extremity, 28% patients had good result, 12% patients had fair result and 2% patient had poor result. Thoresen et al reported 63.8% excellent results, 17% good results, 15% fair results and 4.25% poor results.¹³

Our study had few limitations as surgeons are accustomed for operating femoral shaft fracture in supine position on fracture table whereas in lateral decubitus position intra operative orientation of anatomy and c-arm images is difficult and has a longer learning curve. Additional assistant is required for constant traction and maintaining reduction throughout the procedure, this problem can be overcome with use of femoral distractor.

Conclusion

In lateral decubitus position the access to the proximal femur was enhanced and making it easy to establish an entry point for an intramedullary device and it significantly eliminates the complications caused by other conventionally used methods. The hip is typically flexed during the nailing, which allows the nail to be placed posterior to the gluteus medius, thus minimizing abductor damage. Operating in lateral decubitus position significantly decreases operative time, fluoroscopy time and blood loss which further helps in early mobilization and weight bearing also allows resumption of knee range of movement exercises at early stage; so it is possible to give good knee range of movement at the end with decreased hospital stay.

With correct anatomical knowledge and proper positioning, preoperative planning and maintaining the reduction during nail insertion and confirming the rotational alignment, before fixing the interlocking bolts to avoid malrotation using AO principles, aseptic precaution, post-operative physiotherapy and counselling of the patient, diaphyseal femur fractures treated with intramedullary interlocking nail in lateral decubitus position gives excellent results.

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