A Prospective Study Of Management of Fracture Shaft Femur by Closed Interlocking Nail in adults

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Goyal Ankesh[1], Beniwal Brijmohan[2], Marotia Anilkumar[3]

1. Associate Professor, Department of orthopaedics, Jaipur National University institute of medical sciences and research centre, Jaipur, Rajasthan

2. Consultant, Beniwal Ortho and Maternity Centre, Hanumangarh, Rajasthan

3. Senior resident, Department of orthopaedics, Jaipur National University institute of medical sciences and research centre, Jaipur, Rajasthan

Corresponding Author:Dr. Ankesh Goyal, Department of orthopaedics, Jaipur National University institute of medical sciences and research centre, Jaipur, Rajasthan

ABSTRACT:

Introduction: Fractures of femoral shaft are among the most common fractures that orthopedic surgeons encounter. Femoral shaft fractures can be managed conservatively or surgically. The surgical treatment has gone into revolutionary changes over the period of time and with advent of new antibiotics and better surgical procedures, even open fractures can be fixed internally. The method studied for this research is Surgical Management of Fracture Shaft of Femur with Intramedullary Interlocking Nail.

Aim : to study the effectiveness of interlocking intramedullary nailing of diaphyseal fracture of femur in adults. We also studied complications of interlocking intramedullary nailing.

Methods : This prospective short term study was done from October 2018 to December 2019 in 20 patients with 20 diaphysis fracture of femur who were admitted in SDM Hospital, Jaipur and who were treated with A.O. femoral interlocking nail. The patients were followed for about 1 year.

Results : Majority of fractures were oblique-8(40%), comminuted fractures in 5(25%), spiral fractures in 4 (20%) and transverse in case of 3(15%) of fractures. Excellent result were obtained in 10 cases (50%), good result were obtained in 7 cases (35%) and fair result in 3 cases (15%).

Keywords : Femur shaft, fracture, Intramedullary nail, Diaphysial fracture

INTRODUCTION :

Fractures of femoral shaft are among the most common fractures that orthopedic surgeons encounter. Advances in mechanization and acceleration of travel have been accompanied by an increase in the number and severity of fractures. Since the femur is the largest bone of the body and one of the principal load-bearing bones in the lower extremity, femoral shaft fractures are associated with considerable mortality and morbidity whether they are caused by high- or low-energy trauma. Femoral shaft fractures resulting from high-energy trauma are often associated with concomitant injury of internal organs1.

Femoral shaft fractures can be managed conservatively or surgically. Conservative management in the form of skeletal traction followed by hip spica or cast brace has limited indication. Since most patients are poly traumatized, it has become essential to treat these patients surgically unless and until it is contraindicated. The surgical treatment has gone into revolutionary changes over the period of time and with advent of new antibiotics and better surgical procedures, even open fractures can be fixed internally. The method studied for this research is Surgical Management of Fracture Shaft of Femur with Intramedullary Interlocking Nail.

Internal fixation is done by different methods like:

Dynamic compression plate and screws

Intramedullary nailing with or without interlocking

Among all different methods of internal fixation, intramedullary fixation has become popular during the last few decades, due to the following attributes:-

The nail provides internal stabilization along the axial line of forces; as nail lies in the axis of femur, Predictable realignment of bone, Rapid regeneration of bone and union of fracture allows intermittent dynamic axial compression with weight bearing, which promotes fracture consolidation2, Early functional use of limb, Prevention of excess dissection of fracture site and protection of surrounding soft tissue envelope when done biologically, resulting in abundant callus with less need for bone grafting ,Minimal potential for contamination.

The aim of the current study is to study the effectiveness of interlocking intramedullary nailing of diaphyseal fracture of femur in adults. We also studied complications of interlocking intramedullary nailing.

MATERIALS & METHODS

This prospective short term study was done from October 2018 to December 2019 in 20 patients with 20 diaphysis fracture of femur who were admitted in SDM Hospital, Jaipur and who were treated with A.O. femoral interlocking nail. The patients were followed for about 1 year. Selections of these cases were at random.

Inclusion & Exclusion Criteria:

Inclusion Criteria:

- All patients with fracture femur between inferior margin of lesser trochanter and upper border of a square containing the distal end of the femur.
- Closed and grade I open fracture (Gustilo Anderson classification.
- Winquist & Hansen Classification of fractures comminution grade I, II & III
- segmental fracture

Exclusion Criteria:

- Age < 18 yrs.
- Open grade II and III fractures
- Pathological fractures
- Patients lost in follow up.

On admission, all patients were clinically assessed for general condition and skeletal and soft tissue injuries. Haemodynamic instability was treated with appropriate fluids and blood replacement. All essential laboratory investigations were done. Interlocking nails used are AO femoral nails (Indian version). These nails are universal in type i.e. left and right side nails are same. They are made up of 316L stainless steel. Radiographs of femur with knee in AP and lateral view & hip in AP view taken are used to access comminution. The diameter of nail is selected by measuring the width of medullary canal at level of isthmus.

Length of nail was selected by measuring the normal femur from tip of greater trochanter to knee joint line. Nailing was done under spinal, epidural and general anaesthesia on fracture table. Results were evaluated using modification of Klaus, W. Klemm et al criteria for the results of treatment.

RESULTS

The study consists of 20 patients with diphyseal Fracture of femur treated surgically by interlocking nailing. Patients were followed up a period ranging from 6 months to 12 months.

Maximum incidence of fractures was between 20-40 years age group. We found that fracture of femur was most common in 2nd, 3rd and 4th decade of life (60%) with mean age of 38.3 yrs, ranging from 18 to 80 yrs. 16 patients were male (80%) and 4 patients were female (20%).

Among the type of fractures, 19 were closed fractures and 1 were of grade-I open fracture. Majority of fractures were oblique-8(40%), comminuted fractures in 5(25%), spiral fractures in 4 (20%) and transverse in case of 3(15%) of fractures.

Majority of fractures (90%) were united and nearly ¾ (80%) of fractures united within 4 to 6 months.

Table 1: Associated injuries with the injury of femur.

Associated injury	No. of case
C/L intercondylar Femur	1
Fracture at knee joint	1
Ankle and foot injury	1
Upper limb injury	3
Head injury	1
Maxillo facial injury	1
Total	8

Eight cases had associated injury; most common associated injury was upper limb. [table 1]

Complications:

No Complications during surgery accord.

Postoperative complications: There were no case of deep infections but there were two case of superficial infection, which settled down after obtaining the culture sensitivity and starting on appropriate antibiotics.

Delayed complications: There were no cases of nail bending or breakage of bolt. Delayed union in 2 cases. Restricted knee motion < 90 °in 1 case.

Time of Discharge: Patients were discharged at an average of 9 days with range from 4 to 22 days.

Follow up period: The patients were followed up in OPD regularly and were assessed clinically and radiologically at 6 weeks, 12 weeks, 18 weeks and 24 weeks.

The result were assessed on clinical examination and radiological appearance based on Donald A. wiss criteria3.

Fracture Union: was defined as the period between operation i.e. interlocking nail and painless full weight bearing without external support and a radiological signs of healing of fracture (trabeculation seen to cross the fracture in three of four cortices).

Delayed union: was considered when the radiograph, failed to demonstrate progressive consolidated between 16-24 weeks after nailing.

Malunion: was considered when there was shortening of limb length of more than 1cm, angulations in any plane of more than 7 ° and malrotation more than 10 °

Functional outcome was assessed based on modification of **Klaus, W. Klemm et al criteria.**

An excellent result were defined as full hip and knee motion, no muscular atrophy of thigh and normal anatomical alignment of radio graphically.

In good result, only slight loss of hip or knee motion, with <2cm of muscle atrophy and angular deformity <5 °.

A fair result meant loss of 25% of hip and knee motion, with more than 2 cm of quadriceps atrophy and angulations in any plane between 5 ° to 10 °.

A poor result was with marked restriction of hip and knee motion and gross muscle atrophy and shortening and deformity >10 °.

Excellent results were obtained in 10 cases (50%), good result was obtained in 7 cases (35%) and fair result in 3 cases (15%).

Table 2: Result post treatment of fracture shaft femur

Result	Features	No.	%
Excellent	Full hip and knee motion No muscle atrophy Normal Radio Graphic alignment	10	50
Good	Slight loss of hip and knee motion Less than 2cm muscle atrophy Angular deformity less than 5 °	7	35
Fair	Moderate (25%) loss of hip and knee motion More than 2 cm of muscle atrophy Angulations in any plane between 5 ° to 10 °	3	15

Table 3: Degree of various complications reported

Excellent		Good	Fair	Fair
Malalignment of femur (degrees)				
Vaurs or valgus	<5°	5°	10°	> 10°
Antecurvatum or recurvatum	5°	10°	15°	> 15°
Internal rotation	5°	10°	15°	> 15°
External rotation	10°	15°	20°	> 20°
Shortening of femur (cm)	1 cm	2 cm	3 cm	> 3 cm

Range of motion of knee (degrees)				
Flexion	> 120°	120°	90°	< 90°
Extension deficit	5°	10°	15°	> 15°
Pain or swelling	None	Sporadic, minor	Significant	Severe

DISCUSSION:

We found that fracture of femur was most common in 2nd, 3rd and 4th decade of life (60%) with mean age of 38.3 yrs, ranging from 18 to 80 yrs. Winquist et al[4]. in his series reported 3rd , 4th and 5th decade as a common age group i.e. 70 % middle age group population , with mean age 29 years age group. White et al.[5] observed mean age of 28 years but same age distribution in 68 % of his patients. Males were predominantly prone to fracture shaft of femur due to high incidence found in motor vehicular accidents. 80% (16 patients) of our patients were male. Wiss – Fleming3 (1986) Male predominance (83.7%) found in his 111 patients series. Alho et al[6] (1991) reported 55% male predominance in 120 patients Our study included 1 compound fracture, (5%) which were Gustillo Anderson Grade1.

Treated by closed intramedullary interlocking nail. Christie et al[7] showed 16.6% open of which 6.6% were Grade I. 3.3% were Grade II 6.6% in 117 cases. Alho, Stromsoe[6] (1991) had 12.2% open, of which 6.5% were Grade I, 4% were Grade II and 1.6% were Grade III in 120 cases.

Complications

Intraoperative complications

In our study No Intraoperative complications accord. Christie et al[7] reported intra operative comminution in 6 patients out of 117 patients (5.1 %) due to wrong entry point. Alho et al[6] reported 9 patients(7.5 %) in 120 cases with splintering of proximal fragment. We had excellent knee range of movement in our cases. Early resumption of range of movement exercises were started after surgery as per patient tolerance. Six patients had restricted range of movement of knee. Two patients had 150° range of movement and two patients had 120° range of movement and one patient had 110° range of movement and one patient had <90° range of movement. Wiss et al3 reported average knee flexion 125° with only 3 patients had less than 90° flexion.

In our study 1cm shortening was noted in one patient (10%). Christie et al[7] reported 2 patients (1.7 %) with more than 2 cm shortening both had spiral fractures, which were dynamically locked, study of 117 patients. Brumback in his study of 133 patients treated with Russel Taylor or Brooker Willis Nail had 1 cm shortening in 2 patients and 1 patient had 2 cm shortening. All were due to intraoperative fixation in a shortened position and not due to postoperative loss of fixation. Wiss3 1985 reported 2.5% cases showing shortening in 117 patients. Johnson[8] reported shortening of 1-2 cm in 13% of cases. Lhow9 reported 7% cases with 1-2 cm shortening.

In this series there was no case of nonunion. Alho et al[6] had 0% rate with Grosse-Kempf nail in120 patients. White et al[10] has 1.1 % of nonunion with Brooker-Willis nail.

In this series delayed union was seen in 2 patients. Christie et al[7] reported delayed union in 2 patients (i.e.1.7 %) in 117 patients. Klemm, Borner[11] had 0.7% delayed union in 293 fractures.

There was no case of femoral neck fracture, nail breakage, screw breakage, lengthening, and medical complications like ARDS or pulmonary embolism intraoperatively. There was no perioperative mortality.

CONCLUSION

Interlocking intramedullary nailing is a very effective and successful method of definitive primary treatment, in most types of fractures of the shaft of the femur. Interlocking nail provides strong fixation, rotational stability and earliest return to functional status, as the rate of healing is good with this method.

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