

Original Research Article

Surgical management of diaphyseal fracture of femur with closed intramedullary interlocking nail

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Received: 21 June 2019

Revised: 07 July 2019

Accepted: 08 July 2019

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ABSTRACT

Background: A femoral fracture is a bone fracture that involves the femur. They are typically sustained in high-impact trauma, such as car crashes, due to the large amount of force needed to break the bone. The objective of the study was to evaluate the functional outcome of fractures of the shaft of the femur treated with closed intra-medullary interlocking nailing.

Methods: The present study was carried out between June 2015 to May 2016 in Orthopedic Department, Vydehi institute of medical sciences and research centre, Bengaluru. Antegrade nailing using the standard intramedullary interlocking nail was performed on 50 cases who presented with shaft fractures of the femur.

Results: In the present study maximum number of patients belongs to 18 to 27 years age group (24 cases) followed by 28 to 37 years age group (12 cases), maximum number of patients sustained femur fracture due to RTA (42 cases) followed by fall (08 cases), maximum number of patients sustained closed/simple femur fracture (40 cases), followed by open / compound tibia fracture (10 cases), 32 patients had excellent functional results and 10 patients had good functional outcome, while only 5 patients had fair functional outcome.

Conclusions: A femur fracture is always considered a medical emergency requiring immediate evaluation and treatment in a hospital. The treatment is largely dependent on the location of the fracture and the pattern and extent of the break.

Keywords: Surgical management, Diaphyseal fracture, Femur, Closed intramedullary interlocking nail

INTRODUCTION

A femoral fracture is usually sustained in high velocity accidents, such as motor vehicle accidents, fall from height, due to the large amount of force needed to break the bone. Fractures of the diaphysis, or middle of the femur, are managed differently from those at the head, neck, and trochanter.

The femur fracture may be classified as closed fracture and open fracture, which occurs when the bone fragments protrude through the skin, or there is an overlying wound which penetrates to the bone. These types of fracture

cause more damage to the surrounding tissue, are less likely to heal properly, and are at much greater risk of infection.

Femoral shaft fractures: Femoral shaft fractures can be classified with the Winquist and Hansen classification, which is based on the amount of comminution.¹

Distal femur fractures: Fractures of the inferior or distal femur may be complicated by separation of the condyles, resulting in misalignment of the articular surfaces of the knee joint, or by hemorrhage from the large popliteal artery that runs directly on the posterior surface of the

bone. This fracture compromises the blood supply to the leg (an occurrence that should always be considered in knee fractures or dislocations).²

Cochrane review found that available evidence for treatment options of distal femur fractures is insufficient to inform clinical practice and that there is a priority for a high-quality trial to be undertaken.³ Open fractures must undergo urgent surgery to clean and repair them, but closed fractures can be maintained until the patient is stable and ready for surgery.⁴

Many studies prove that treatment depends on the part of the femur that is fractured. Traction may be useful for femoral shaft fractures because it counteracts the force of the muscle pulling the two separated parts together, and thus may decrease bleeding and pain. Traction should not be used in femoral neck fractures or when there is any other trauma to the leg or pelvis. It is typically only a temporary measure used before surgery. It only considered definitive treatment for patients with significant co-morbidities that contraindicate surgical management.⁵

External fixators can be used to prevent further damage to the leg until the patient is stable enough for surgery. It is most commonly used as a temporary measure. However, for some select cases it may be used as an alternative to intramedullary nailing for definitive treatment.

For femoral shaft fractures, reduction and intramedullary nailing is currently recommended. The bone is re-aligned, and then a metal rod is placed into the femoral bone marrow, and secured with nails at either end. This method offers less exposure, a 98%-99% union rate, lower infection rates (1%-2%) and less muscular scarring.

Objective

To evaluate the functional outcome of fractures of the shaft of the femur treated with closed intra-medullary interlocking nailing.

METHODS

Study design: Cross sectional study

Study place and period

The present study was carried out between June 2015 to May 2016 in Orthopedic Department, Vydehi institute of medical sciences and research centre, Bengaluru. Antegrade nailing using the Standard intramedullary interlocking nail was performed on 50 cases who presented with shaft fractures of the femur.

Study procedure

50 cases of femur fracture, which are more than 18 years with acute isolated fracture involving the diaphysis of

femur and closed and Grade I, II Gustillo Anderson compound fracture were selected.

Ethical approval

Ethical approval obtained from institutional ethical committee.

Statistical analysis: SPSS version 16.

Surgical technique

Under spinal anaesthesia with appropriate aseptic precautions, using fracture radiolucent table. Lateral approach was used. The incision from the tip of the greater trochanter extended proximally about five centimetres. The tensor fascia lata was split, the abductors are separated. The awl was put from the pyriform fossa in to the medullary canal. Beaded guide wire was passed in to the medullary canal and closed reduction was done under the guidance of the image intensifier. And the guide wire was passed in to the distal fragment. Reaming done, using flexible reamers. The nail length was measured using the identical length guide wire. Exchange the guide wire through Teflon tube that is to the non-beaded one. Nail was passed over the guide wire. Distal locking done using image intensifier by bull's eye technique and proximal locking with the help of the zig. All four bolts were put in all our cases. The wound was washed with normal saline and closed over layers, sterile dressing done. Postoperatively check X-ray was taken to know the fracture reduction and fixation of the fracture.

RESULTS

In the present study maximum number of patients belongs to 18 to 27 years age group (24 cases) followed by 28 to 37 years age group (12 cases).

Table 1: Age and sex wise distribution of cases.

Age (in years)	Male	Female	Total
18 to 27	16	08	24
28 to 37	07	05	12
38 to 47	04	04	08
>47	03	03	06
Total	30	20	50

Table 2: Distribution of cases based on mode of injury.

Mode of injury	Number of patients
RTA	42
FALL	08
Total	50

In the present study maximum number of patients sustained femur fracture due to RTA (42 cases) followed by fall (08 cases).

Table 3: Distribution of cases based on type of fracture.

Type of fracture	Number of patients
Closed / simple	40
Open / compound	10
Total	50

In the present study maximum number of patients sustained closed/simple femur fracture (40 cases), followed by open / compound tibia fracture (10 cases).

Table 4: Distribution of cases based on outcome.

Functional outcome	Number of patients
Excellent	32 cases
Good	10 cases
Fair	05 cases
Poor	03 cases
Total	50

In our study 32 patients had excellent functional results and 10 patients had good functional outcome, while only 5 patients had fair functional outcome.

DISCUSSION

In the present study maximum number of patients belongs to 18 to 27 years age group (24 cases) followed by 28 to 37 years age group (12 cases). According to a hospital based prospective study of 40 adult patients admitted in SSMC Hospital, the common age group involved was from 18-65 yrs. with mean age of 33.5, 36 patients were males, 4 were females. 16 fractures were on right side, 24 were on left side. Two (5%) fractures was in proximal third, 26 (65%) were in the middle third and 12 (30%) were in the lower third. Surgery was done at an average 3 days ranging from 2-5 days. There was one case of distal bolt backing out and there were three cases of superficial infection. Excellent to good result were seen in 75% of cases.⁶

In the present study maximum number of patients sustained femur fracture due to RTA (42 cases) followed by fall (08 cases). A total of 30 patients of fracture shaft of femur admitted in the Orthopedic Department of Kempegowda Institute of Medical sciences Bangalore treated with closed intramedullary interlocking nailing. The most common cause for femur fracture is road traffic accident followed by fall from height, 23 patients were male and 7 were females and age group ranged from 18-49 years with mean age 30 yrs. right side fractures encountered in 18 cases and 12 left side. 24 fractures were closed and 6 fractures were open type. 5 fractures were in proximal third, 19 fractures were in the middle third and 6 in distal third of femur. Duration of study was 2 years. Excellent to good result was seen in 90% cases.⁷

In the present study maximum number of patients sustained closed/simple femur fracture (40 cases),

followed by open / compound tibia fracture (10 cases), 32 patients had excellent functional results and 10 patients had good functional outcome, while only 5 patients had fair functional outcome. Thirty cases of closed diaphyseal fracture of femur were managed with closed reduction and internal fixation using intramedullary interlocking. Based on the Friedman and Wyman scoring, they achieved 83.34% good, 6.67% fair and 10% poor results.⁸

A study was planned to study surgical management of fracture shaft of femur with intramedullary interlock nail. For this purpose, a total of 20 patients falling in sampling frame were enrolled in the study. Management of diaphyseal femur fractures has seen a fundamental shift from non-surgical to surgical management and within surgical management from external to internal fixation using intramedullary nailing, plates and screws. Today, intramedullary nailing has become a standard for management of diaphyseal femur fractures and has been reported to be useful for all the age groups and in unilateral as well as bilateral fractures. The surgical management of fracture diaphysis of femur has taken a march ahead with the advent of interlocking nail, which has widened the range of indications for medullary osteosynthesis. The transverse interlocking bolts control the length, rotational alignment of the limbs.⁹

Patients who were admitted with fracture shaft of femur to the department of Orthopaedics in R.L. Jalappa Hospital & Research Centre, In their series age was between 16-70 years, the mean age was 43 years and the incidence was high in the age group of 21-30 years. 57 fractures were in men and 3 fractures were in females. 52 fractures were as a result of road traffic accident, 4 cases were due to direct trauma to the femur and 4 cases were due to fall from height. 40 patients had fracture on the right side and 20 patients had fracture on the left side. Based on Razaq et al modification of Thoresen et al criteria results were graded as excellent in 47 cases (78.3%), good in 12 cases (20%) and poor in 1 case (1.7%).¹⁰

CONCLUSION

A femur fracture is always considered a medical emergency requiring immediate evaluation and treatment in a hospital. The treatment is largely dependent on the location of the fracture and the pattern and extent of the break. Equally as important is the health status of the individual, including the strength and density of the affected bone. So the aim of fracture treatment is to obtain union of the fracture, in as near anatomical position, with minimal impairment of function. The spectrum of injury is so great that no single method of treatment is relevant to all diaphyseal fracture femur.

The type and location of fracture, degree of comminution, age of the patient and patient's social and economic demands and other factors influence the method of

treatment. The technique chosen should cause minimal soft tissue and bone damage.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Kumar BSV. Surgical management of diaphyseal fracture of femur with closed intramedullary interlocking nail. *Int J Res Orthop* 2019;5:879-82.