ORIGINAL ARTICLE

INTERNATIONAL JOURNAL OF RESEARCH IN PHARMACEUTICAL SCIENCES

Published by JK Welfare & Pharmascope Foundation Journal Home Page: www.ijrps.com

Study of outcome of knee joint in patients with fracture distal femur versus fracture ipsilateral femur and tibia

Ravindra B Gunaki, Chitresh Mehta*, Rahul Sharma, Swapnil Chitnavis

Krishna Institute of Medical Sciences, Deemed to be University, Karad– 415539, Maharashtra, India

Article History:

Received on: 10 Feb 2021
Revised on: 14 Mar 2021
Accepted on: 15 Mar 2021

Keywords:

Fracture Distal Femur, Ipsilateral Fracture Femur and Tibia, Neer's Score, Floating Knee

ABSTRACT

The posture on the two wheeler at the speed we travel, makes knee the vulnerable joint of all in any of the mishaps. We as orthopedic surgeons see the fractures around the knee joint as one of the most studied concept in the subject. This is a prospective study conducted, over 2 years, in Krishna Institute of Medical Sciences, Deemed to be University, Karad. In this study, 20 cases of fracture distal femur and 20 cases of ipsilateral fracture femur and tibia were studied to evaluate outcome of knee joint and post surgical stabilization of fractures. The fractured limb was stabilized with splinting the limb in Thomas splint or plaster slab. The type of fracture, type of fracture fixation, duration of hospital stay, time of union and time to start weight bearing are evaluated. According to Neer's score, Good outcome was found in both Fracture Distal femur and Ipsilateral Fracture Femur and tibia. The functional outcome was found to be better in diaphyseal fractures femur and tibia treated with intramedullary interlock nailing which allowed early mobilization and weight bearing than in intra-articular fractures treated with plating. Bony union occurred early in closed, diaphyseal and simple transverse or oblique fractures and delayed in open, intraarticular and comminuted fractures.

*Corresponding Author

Name: Chitresh Mehta
Phone: +917738107238
Email: mehtachitresh17@gmail.com

ISSN: 0975-7538

DOI: https://doi.org/10.26452/ijrps.v12i2.4651

Production and Hosted by

IJRPS | www.ijrps.com

INTRODUCTION

Man is a nomadic animal. Travelling is one of the pursuits of mankind since the early paleolithic era. Since the Industrial revolution, man has brought into use various machine to make the travel cheap and quick. With time the need for personalized travel wagons grew and then came the era of personalized and highly accepted versions of four wheelers. The development of people's interest in this travel industry led to a development of first petroleum based motorcycle in 1885. Since then mankind has not taken a step back in riding the two wheelers. Speed is now an integral part of riding. The posture on the two wheeler at the speed we travel, makes knee the most vulnerable joint of all in any of the mishaps. We as orthopedic surgeons see the fractures around the knee joint as one of the most studied concept in the subject. The injuries might present with deformities, loss of function and delayed knee mobility.

Ipsilateral fracture of femur and tibia or "Floating knee" includes a combination of Diaphyseal, metaphyseal and intra articular fractures of both Femur and/or Tibia, in various combinations. They usually associated with high energy trauma like road traffic accidents. Mostly, these injuries result in some permanent disability. The incidence of floating knee injuries was reported as 26 % of all fractures (Letts *et al.*, 1986). These high energy traumas are usually associated with other injuries like head Injury, chest

injury and abdominal injuries as shown by Veith *et al.* (1984).

Distal femur fractures – articular or non-articular; upto 9 cm above the distal articular surface of the femoral condyles on radiograph, are also the fractures associated with high energy trauma sustained around the knee joint. The distal femur fractures associated with intraarticular extension need to be managed with maintenance of articular congruency.

Objectives

1. To evaluate and categorize the patients with Fractures around Knee joint
2. To evaluate knee joint range of motion and deformity in patients of distal femur fracture and ipsilateral fracture of femur and tibia
3. To evaluate the time required for union clinically and radiologically in patients with fracture distal femur and ipsilateral fracture femur and tibia

Classification For Floating Knee

1. Fraser classification for floating knee injuries (Figure 1 and Table 1) (Fraser *et al.*, 1978).
2. Blake and Mcbryde's classification for floating knee injuries (Table 2) (Blake and Mcbryde, 1975).
3. Lett's classification for floating knee (Table 3) (Letts *et al.*, 1986).

MATERIALS AND METHODS

This is a prospective study conducted, from June 2018 to June 2019; with a year long follow up upto June 2020; in Krishna Institute of Medical Sciences Deemed to be University, Karad. The patients in the study presented to Casualty and Outdoor Patient Department (OPD)who fulfilled the criteria. The approval was given by institutional ethics committee.

This study is about the study of Functional Outcome of Ipsilateral Femur & Tibia Fractures (Floating Knee) and Distal Femur Fracture.

For this study 20 patients with ipsilateral femur and tibia fractures (Floating Knee) and 20 patients with distal femur fractures.

Inclusion Criteria

1. Cases of ipsilateral femur and tibia fractures and Distal femur fractures

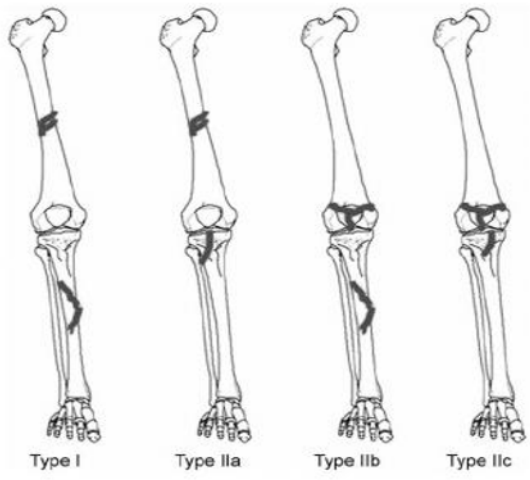

Figure 1: Fraser Classification of floating knee

2. Both closed and compound fractures

Exclusion Criteria

1. Skeletally immature patients.
2. Unwillingness to participate in the study.
3. Patients unfit for surgery.
4. Patients with pathological fractures

Management

Initial management

As the patient presented in hospital - in casualty or Outdoor Patient Department – complete head to toe assessment was done. Initial management involved resuscitation and hemodynamic stabilization of the patient. The fractured limb was stabilized with splinting the limb in Thomas splint or plaster slab. Skeletal traction applied for most of the patients. After the patients was hemodynamically stable, radiographs of the affected limb were done and all routine blood investigations were sent (Lundy and Johnson, 2001). Primary closure of the compound wound was done. Appropriate antibiotics were started and prophylactic tetanus toxoid was given. No patient was left untreated.

The subject was included into the study once a diagnosis of fracture was made. The plan of management for the given patient was made depending on the nature of fracture, location of fracture and associated soft tissue injuries.

Post operative evaluation

Physiotherapy was started from post op day 1 as quadriceps and hamstring strengthening exercises.

Table 1: Frasser's classification

Type	Description
Type I	Both fractures involve the shaft without articular involvement of knee
Type II	Articular involvement of knee
Type II A	Femoral shaft and tibial plateau fractures
Type II B	Fractures of distal femur and the shaft of tibia
Type II C	Fractures of distal femur and tibial plateau

Table 2: Blake and Mcbryde's classification for floating knee injuries

Type	Description
Type 1	True floating knee- knee joint completely isolated
Type 2	Variant floating knee
Type 2A	Knee joint alone involved
Type 2B	Involves hip or ankle joint

Table 3: Lett's Classification

Type	Location	Nature of fracture
A	Both diaphyseal	Both closed
B	One diaphyseal other metaphyseal	Both closed
C	Intraarticular extension in one	Both closed
D	Regardless of site	One open
E	Regardless of site	Both open

All patients were evaluated postoperatively at regular follow up of 6 weeks, 3 months, 6 months, 9 months and 1 year or till radiological union was confirmed. Radiographs and functional assessment of knee joint was carried out at each follow up outpatient clinic itself using the Neer score (Table 4). All the patients were assessed using a prediscussed and decided Proforma.

Knee exercises were started depending upon the fracture pattern and modality of fixation. Non weight bearing walking was started and gradually increasing to partial and full weight bearing depending upon the modality of fixation. The associated injuries and the type of fracture are prognostic indicators in the Floating knee (Rethnam *et al.*, 2007).

RESULTS AND DISCUSSION

In our study, for distal femur fracture the average age was 42.45 years whereas for floating knee was 47.8 years in Tables 5 and 6 and Figure 2. In a study done by Mohamaad Hadi Nouraei et al. in 2012, states that the most frequent age group was 20-29 years with 44.5 % patients of the study falling in the group (Nouraei *et al.*, 2013).

In our study, diaphyseal fractures of ipsilateral femur and tibia was 80%, where 20 % were intraarticular metaphyseal fractures, in Table 7. On the other, 60% of the Fracture Distal Femur were intraarticular; and 40 % were Diaphyseal Fractures, in Table 8 and Figure 3. The functional result was poor, as the femoral fracture associated with intaarticular extension and the femur fracture stabilized with internal fixation with plating (Bansal *et al.*, 1984).

All the patients were operated under spinal anesthesia. Average duration of surgery was 100 minutes with a range of 140 to 600 min.

The diaphyseal Ipsilateral Femur and Tibia Fractures were treated with Anterograde Intramedullary Interlocking Nailing; whereas Intraarticular Fractures were treated with Plating. Intramedullary Interlocking Nailing done after doing Intramedullary Flexible Reaming (Behr *et al.*, 1987).

In 1967, Neer et al. Closed treatment yielded satisfactory results in 84% of the patients. In our study, we used skeletal traction for initial stabilization of floating knee and Thomas splint with Anklet Traction for distal femur Fractures. In 1987, Kenneth D. Johnson et al., compared the results of non operative treatment and operative management of Fracture Ipsilateral Femur and Tibia with various implants

Table 4: Neer's Score

Functional (70 points)		Anatomical (30points)	
a) Pain(120points)		a) Gross Anatomy (15 points)	
No p a I n		Thickening only	15
Intermittent	16	5 degrees angulation or 0.5c.m shortening	12
With fatigue	12	10 degrees angulation or rotation, 2cm shortening	9
Limits function	8	15 degrees angulation or rotation, 3cm shortening	6
Constant or at exertion	4	Healed with considerable deformity	3
		Nonunion or chronic Infection	0
b) Walking Capacity (20 points)			
Same as before accident	20	b) Roentgenogram (15 points)	
Mild restriction	16	Near normal	15
Restricted stair sideways	12	5 degrees angulation or 0.5 cm displacement	12
Use crutches or other walking aids	4-0	10 degrees angulation or 1cm displacement	9
c) Joint Movement (2 0points)		15 degrees angulation or 2cm displacement	6
Normal or 135degrees	20	Union, but with greater deformity, spreading of condyles and osteoarthritis	3
Up to l00 degrees	16	Nonunion or chronic infection	0
Up to 80 degrees	12		
UP to 60 degrees	8	Excellent – more than 85	
Up to 40 degrees	4	Good – 70 to 85	
Up to 20 degrees	0	Fair – 55 to 69	
d) Work Capacity (1 0 points)		Poor – less than 55	
Same as before accident	10		
Regular but with handicap	8		
Alter work	6		
Light work	4		
No work	2-0		

Table 5: Age group of patients of distal Femur Fractures

Age Group (years)	No. of patients	Percentage
18-19	2	10%
20-29	2	10%
30-39	4	20%
40-49	6	30%
50-59	2	10%
60-69	4	20%
	20	100 %

Table 6: Age group of patients with Ipsilateral Femur and Tibia

Age Group (years)	No. of patients	Percentage
20-29	1	05%
30-39	8	40%
40-49	3	15%
50-59	2	10%
60-69	3	15%
70-79	3	15%
	20	100%

Table 7: Type of Ipsilateral Fracture Femur and Tibia

Type of fracture	No. of patients	Percentage
Diaphyseal	16	80%
Metaphyseal	4	20%
	20	100%

Table 8: Type of Distal Femur Fracture

Type of fracture	No. of patients	Percentage
Intraarticular	12	60%
Extraarticular	8	40%
	20	100%

Table 9: Duration of Hospital Stay in Fracture Distal Femur

Days of stay in hosp.	No. of patients	Percentage
0-7	7	35%
8-14	5	25%
15-21	4	20%
22-28	2	10%
29-35	2	10%
	20	100%

Table 10: Duration of Hospital Stay in Ipsilateral Fracture Femur and Tibia

Days of stay in hosp.	No. of patients	Percentage
0-7	6	30%
8-14	6	30%
15-21	5	25%
22-28	-	-
29-35	-	-
36-42	1	5%
43-48	1	5%
49-56	1	5%
	20	100 %

Table 11: Knee Flexion in Fracture Distal Femur

Knee flexion in fracture distal femur	No. of patients	Percentage
Less than 90 degrees	8	40%
90 to 120 degrees	12	60%
More than 120 degrees	-	-
	20	100%

Table 12: Knee Flexion in Ipsilateral Fracture Femur and Tibia

Knee flexion in fracture distal femur	No. of patients	Percentage
Less than 90 degrees	5	25%
90 to 120 degrees	14	70%
More than 120 degrees	1	5%
	20	100%

Table 13: Weight bearing walking in Fracture Distal Femur

Weight bearing walking in fracture distal femur	No. of patients	Percentage
0 to 3 months	1	5%
3 to 6 months	8	40%
6 to 9 months	11	55%
9 to 12 months	-	-
	20	100%

Table 14: Weight bearing walking in Ipsilateral Fracture Femur and Tibia

Weight bearing walking in ipsilateral fracture femur and tibia	No. Of patients	Percentage
0 to 3 months	3	15%
3 to 6 months	6	30%
6 to 9 months	9	45%
9 to 12 months	2	10%
	20	100%

and depending on the age of patient and type of the fracture. Good results were obtained with operative treatment. In this study, according to Neer's score, the outcome for both injuries stands Good with Distal Femur Fracture score 74 and for Floating knee score 78 in Figure 4. The management of the associated injuries, intramedullary nailing of both the fractures and post operative rehabilitation are necessary for good final outcome (Rethnam *et al.*, 2007).

In the present study, the average Duration of Hospital Stay for Distal Femur Fracture is 14 days where it is 15.7 days for floating knee in Tables 9 and 10 and Figure 5.

The average Bony Union is approximately 7 months(30 weeks) for distal femur fracture whereas 8 months (34 weeks) for floating knee injury, in Figure 6. The average final arc of motion of the knee was 107 degrees, ranging from 113 degrees to 99 degrees (Siliski *et al.*, 1989).

Distal Femur fracture are isolated injuries; whereas the Floating Knee injuries are high velocity injuries and are associated other bony injuries. Postoperative complications, like infection, knee stiffness, delayed union, non union, mal union, deformity and limb length inequality; are minimal with our hospital setup and regular follow up.

Postoperatively, the average knee flexion for distal Femur fracture was 83 degrees; whereas floating knee show 91.5 degrees flexion on an average, in Tables 11 and 12 and Figure 7.

The average time to start weight bearing for distal femur fracture was 6.65 months; for floating knee injury is 6.8 months, in Tables 13 and 14 and Figure 8.

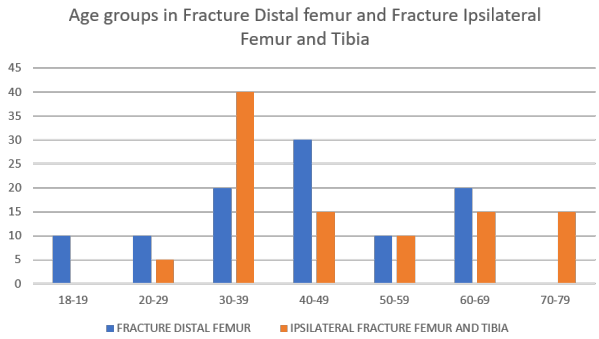

Figure 2: Age groups in Fracture Distal femur and Fracture Ipsilateral Femur and Tibia

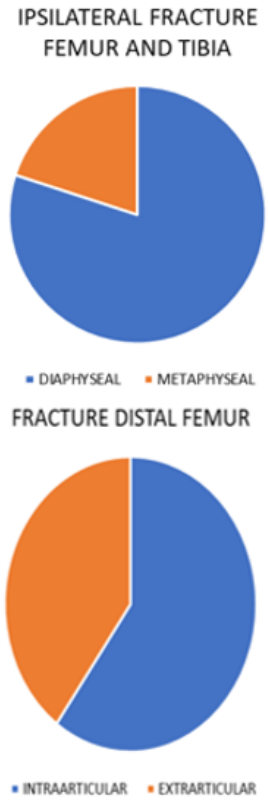

Figure 3: Types of fracture Distal Femur and Fracture Ipsilateral Femur and Tibia

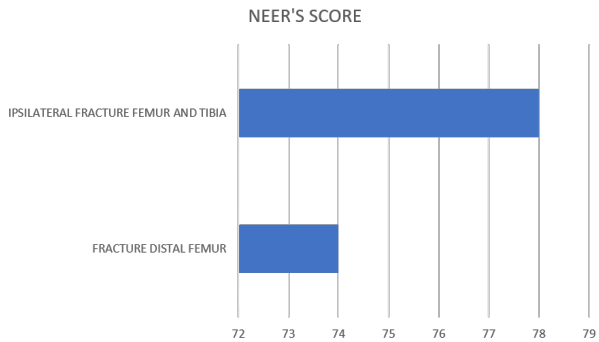

Figure 4: Neer Score for Fracture Distal Femur and Fracture Ipsilateral Femur and Tibia

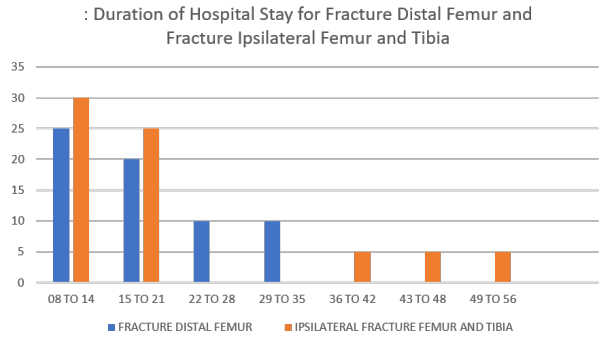

Figure 5: Duration of Hospital Stay for Fracture Distal Femur and Fracture Ipsilateral Femur and Tibia

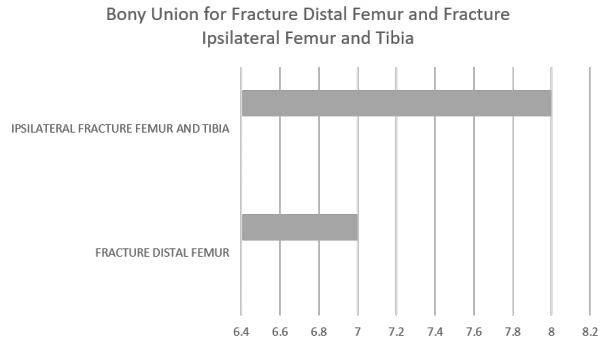

Figure 6: Bony Union for Fracture Distal Femur and Fracture Ipsilateral Femur and Tibia

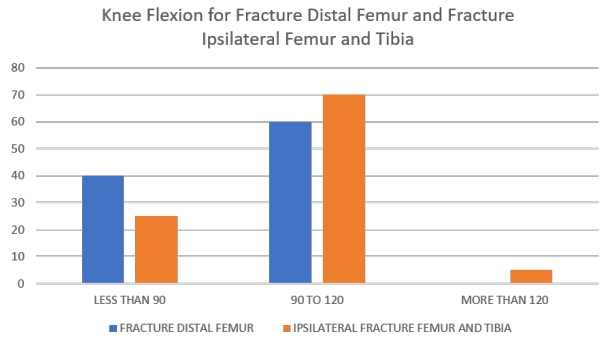

Figure 7: Knee Flexion for Fracture Distal Femur and Fracture Ipsilateral Femur and Tibia

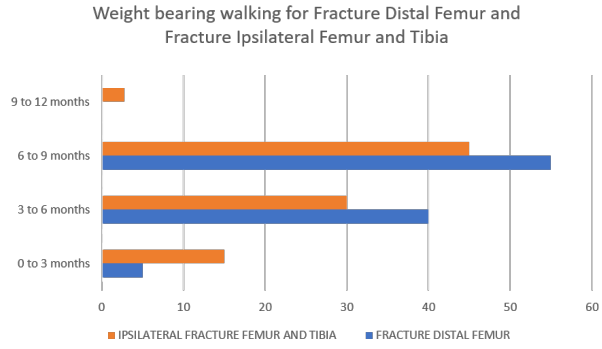

Figure 8: Weight bearing walking for Fracture Distal Femur and Fracture Ipsilateral Femur and Tibia

CONCLUSION

The functional outcome was found to be better in diaphyseal fractures femur and tibia treated with intramedullary interlocking nail which allowed early mobilization and weight bearing than in intra-articular fractures treated with plating. Bony union occurred early in closed, diaphyseal and simple transverse or oblique fractures and delayed in open, intra articular and comminuted fractures. According to Neer's score, the outcome of Knee joint is Good with Distal Femur Fracture and for Ipsilateral Femur and Tibia Fractures. The average time to start weight bearing for distal femur fracture was earlier than Ipsilateral Fracture Femur and Tibia.

Funding Support

The authors declare that they have no funding support for this study.

Conflict of Interest

The authors declare that there is no conflict of interest for this study.

REFERENCES

Bansal, V. P., Singhal, V., Mam, M. K., Gill, S. S. 1984. The floating knee. 40 cases of ipsilateral fractures of the femur and the tibia. *International Orthopaedics*, 8(3):183–187.

Behr, J. T., Apel, D. M., Pinzur, M. S., Dobozi, W. R., Behr, M. J. 1987. Flexible Intramedullary Nails for Ipsilateral Femoral and Tibial Fractures. *The Journal of Trauma: Injury, Infection, and Critical Care*, 27(12):1354–1357.

Blake, R., Mcbryde, A. 1975. The floating knee: Ipsilateral fractures of the tibia and femur. *Southern Medical Journal*, 68(1):13–16.

Fraser, R. D., Hunter, G. A., Waddell, J. P. 1978. Ipsilateral fracture of the femur and tibia. *The Journal of Bone and Joint Surgery. British volume*, 60-B(4):510–515.

Letts, M., Vincent, N., Gouw, G. 1986. The "floating knee" in children. *The Journal of Bone and Joint Surgery. British volume*, 68-B(3):442–446.

Lundy, D. W., Johnson, K. D. 2001. "Floating Knee" Injuries: Ipsilateral Fractures of the Femur and Tibia. *Journal of the American Academy of Orthopaedic Surgeons*, 9(4):238–245.

Nouraei, M. H., Hosseini, A., Zarezadeh, A., Zahiri, M. 2013. Floating knee injuries: Results of treatment and outcomes. *Journal of research in medical sciences: the official Journal of Isfahan University of Medical Sciences*, 18(12):1087–1091.

Rethnam, U., Yesupalan, R. S., Nair, R. 2007. The floating knee: epidemiology, prognostic indicators & outcome following surgical management. *Journal of Trauma Management & Outcomes*, 1(1).

Siliski, J. M., Mahring, M., Hofer, H. P. 1989. Supracondylar-intercondylar fractures of the femur. Treatment by internal fixation. *The Journal of Bone & Joint Surgery*, 71(1):95–104.

Veith, R. G., Winquist, R. A., Hansen, S. T. 1984. Ipsilateral fractures of the femur and tibia. A report of fifty-seven consecutive cases. *The Journal of Bone & Joint Surgery*, 66(7):991–1002.