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Original Research Article.

A Prospective Study of Functional Outcome of Surgical Management of Ipsilateral Tibia and Femur Fracture (Floating Knee Injuries)

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ABSTRACT

Background: Floating knee injuries are due to high velocity trauma. Due to increase in incidence of high velocity trauma their incidence is also increasing. The aim of this study to evaluated the functional outcome in patients sustaining floating knee injuries.

Materials & Methods: Primary care was given to all these patients and then they were operated. The 38 patients were classified according to Fraser's classification.[3] Of these 24 were type I, 6 were type IIA, 4 were type IIB and 4 were type IIC. Out of the thirty eight patients three patients ended up in amputation. So they were excluded from the study. Of the reaming thirty five patients, thirty patients came back for follow up. Five patients were lost in follow up, so the final study comprised of thirty patients. Follow up study was done at 6 weeks, 12 weeks, 6 months and 1 year.

Results: Our study showed that the age distribution ranged from 18 yrs to 75 yrs. Out of the 30 Patients, 28 (93.33%) were due to road traffic accident and the rest 2 (6.6%) were due to fall from height. The results show four patients (13.3%) with EXCELLENT, nine patients (30.0%) with GOOD, ten patients (33.3%) with ACCEPTABLE and seven patients (23.3%) with POOR outcome (graph 3). The FRASER classification and the functional outcome were statistically SIGNIFICANT as p value was 0.012 ($p<0.05$).

Conclusion: We concluded that the most important factors which determine the functional outcomes were the type of fractures (open or closed), nature of communition including intraarticular extensions, timing of fixations and post operative infections.

Keywords: Floating Knee Injury, FRASER Classification, Gustilo and Anderson Classification, Functional Outcome.

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INTRODUCTION

Floating knee injury is a term used to denote ipsilateral femoral and tibial metaphyseal injuries. But recent literature has however expanded this term to include ipsilateral fractures of the femur and tibia. They usually occur due to very high energy trauma. Due to increase in incidence of high velocity trauma their incidence is also increasing. These are always associated with high morbidity. Most of these injuries result in some permanent disability.

There are no specific guidelines for the management. The implant choice needs to be determined depending on nature of fracture and soft tissue injuries. A specific pattern of management can often not be determined. The incidence of floating knee injuries was reported as 2.6 % of all fractures by Letts et al in 1986.[1]

These injuries were associated with life threatening injuries such as head injury, chest injury and abdominal injuries as shown by Veith.[2] Other skeletal injuries were also seen in these patients. Injuries were often a combination of different fracture patterns. There was extensive soft tissue damage of the limb as well. The soft tissue injuries can also be variable from minor abrasions to grade III open injuries. Injuries to the neurovascular structures add a treacherous component to the whole picture. This often perplexes even the most experienced clinicians in the choice of management. The aim of this study to evaluated the functional outcome in patients sustaining floating knee injuries.

MATERIALS & METHODS

When the patients presented in casualty primary survey of airway breathing and circulation was done. The patients were resuscitated accordingly. Once the patient was hemodynamically stable necessary primary investigations were done. All fractures were splinted in Thomas splint and plaster of paris slab.

Open fractures and wounds were documented properly. Adequate wound wash and irrigation was done with minimum of

5L of sterile normal saline. Appropriate antibiotics and prophylactic tetanus toxoid were injected. The subject was included into the study once a diagnosis of floating knee injury was made in the Emergency room.

Floating knee was classified according to Fraser classification.[3] Open fractures were classified according to Gustilo and Anderson classification.[4] The plan of management for the given patient was made depending on the nature of fracture, location of fracture, associated soft tissue injuries and wound.

A primary management was done and x-rays were taken to image the entire femur and tibia with the adjacent articulations of the knee hip and ankle. Primary care was given to all these patients and then they were operated. The patient was subjected to mobilization schedule according to associated injuries and general condition. The 38 patients were classified according to Fraser's classification.[3] Of these 24 were type I, 6 were type IIA, 4 were type IIB and 4 were type IIC. Out of the thirty eight patients three patients ended up in amputation. So they were excluded from the study. Of the reaming thirty five patients, thirty patients came back for follow up. Five patients were lost in follow up, so the final study comprised of thirty patients.

Follow up study was done at 6 weeks, 12 weeks, 6 months and 1 year. Serial x-rays and functional assessment were carried out at each visit in outpatient clinic itself using the Karlstorm and Oleruds criteria.[5] Out of the 30 patients who were followed up type I was nineteen patients, type IIA was five patients, type IIB was three and type IIC was three patients. The details of pre-operative status like mode of injury, fracture patterns, closed or open injuries and any associated injuries were also evaluated.

Inclusion Criteria

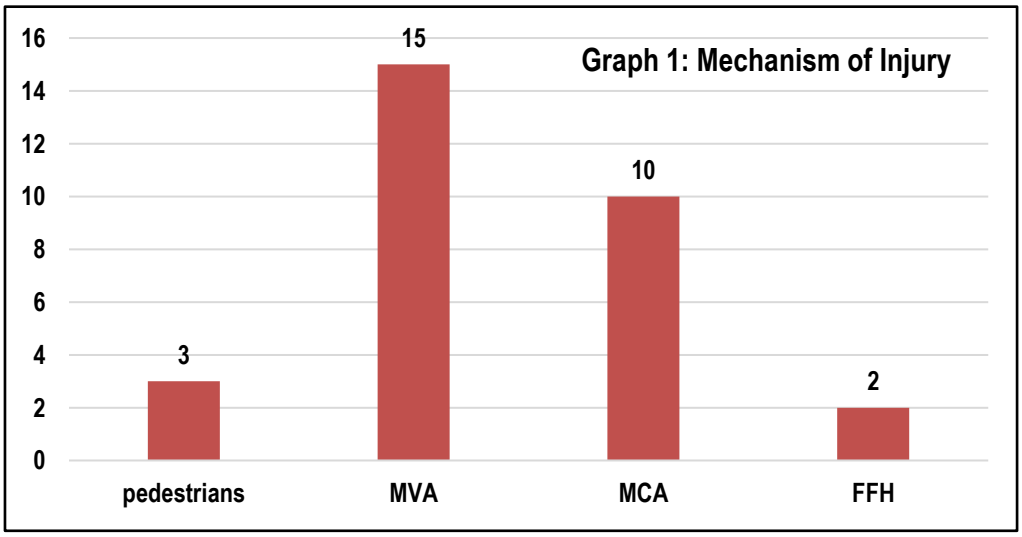
- All ipsilateral femur and tibia fractures in adults.
- Both closed and open fractures.

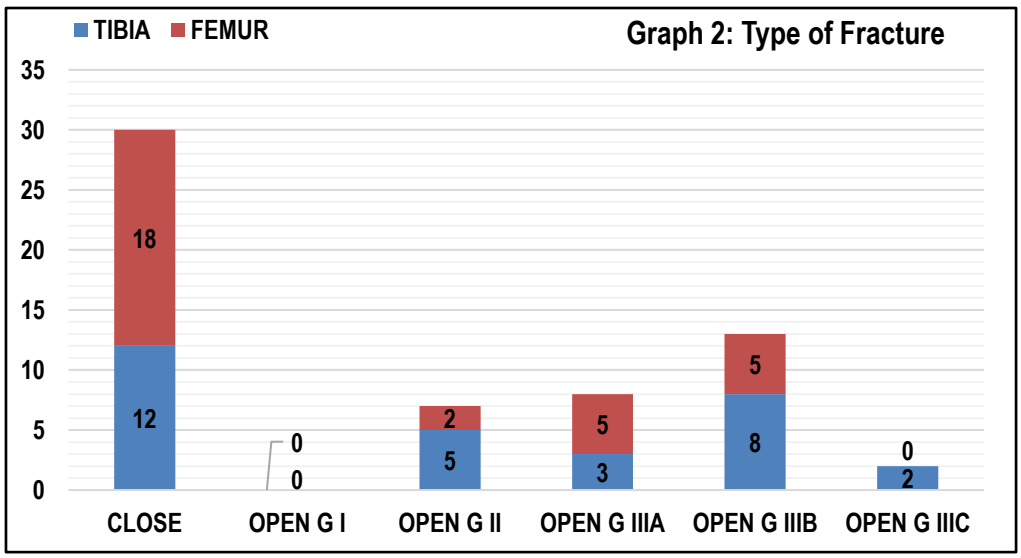
Exclusion Criteria

- Children with ipsilateral femur and tibia fractures – skeletally immature patients.
- Associated neurological injuries such as paraplegia or quadriplegia resulting from spinal injuries.
- Patient medically unfit for surgery.

Table 1: Age Distribution

Age Group	No of Patients	Percentage
<20	2	6.6%
21 – 30	9	30%
31 – 40	7	23.3%
41 – 50	7	23.3%
51 – 60	2	6.6%
61 – 70	2	6.6%
>70	1	3.3%





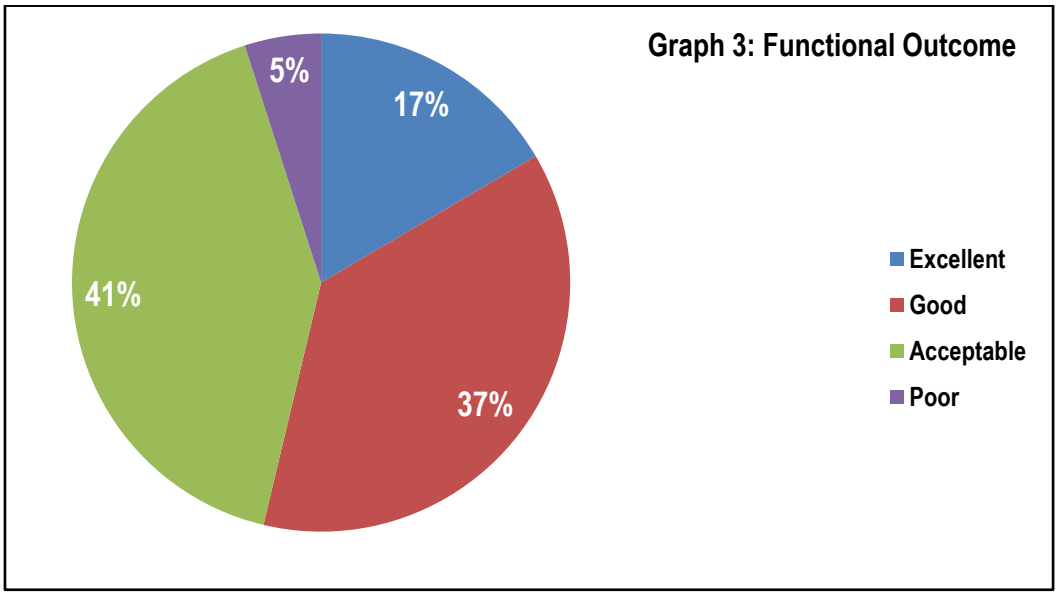


Table 2: FRASER Type and Functional Outcome

FRASER Type	Functional Outcome				Total
	Excellent	Good	Acceptable	Poor	
TYPE I	3(15.8%)	8(42.1%)	6(31.6%)	2(10.5%)	19(63.3%)
TYPE II A	0(0%)	2(40.0%)	1(20.0%)	3(60.0%)	5(16.7%)
TYPE II B	1(33.3%)	0((0%)	2(66.7%)	0(0%)	3(10.0%)
TYPE II C	0(0%)	0(0%)	1(33.3%)	2(66.7%)	3(10.0%)
TOTAL	4(13.3%)	9(30.0)	10(33.3%)	7(23%)	30(100.0%)

r=0.02, p =0.24, significant

Fig 1: Pre-Op

Fig 3: 6 Months

Fig 2: Post-Op

Fig 4: One Year

RESULTS

Our study showed that the age distribution ranged from 18 yrs to 75 yrs (table 1). Out of the 30 Patients, 28 (93.33%) were due to road traffic accident and the rest 2 (6.6%) were due to fall from height (graph 1). Out of the 30 open fractures. There were 12 femur and 18 tibial open fractures. The fractures were classified according to Gustilo and Anderson classification. Among the total open fractures grade I accounted to zero, grade II accounted to seven (23.3%), grade III-A accounted to eight (26.6%), grade III-B accounted to thirteen (43.3%) and grade III-C accounted to two (6.6%) (graph 2). The results show four patients (13.3%) with Excellent, nine patients (30.0%) with Good, ten patients (33.3%) with Acceptable and seven patients (23.3%) with Poor outcome (graph 3). The FRASER classification and the functional outcome were statistically Significant as p value was 0.012($p<0.05$) table 2.

Fig 5: Removal at Two Years

Fig 6: Functional Outcome

Table 3: Comparison with Other Studies

Name of Study	Total Number patients	Excellent	Good	Acceptable	Poor
Fraser et al 1978[3]	63	3	15	30	15
Schiedts et al 1994[8]	18	4	7	-	7
Hee et al 2001[6]	89	6	53	25	4
Anoop Kumar et al 2006[9]	42	7	14	14	7
Ulfin Rethnam et al 2007[10]	29	15	9	2	3
Present Study	30	4	9	10	7

DISCUSSION

Floating knee injury occurs usually due to high velocity trauma. There is an increase in the incidence of floating knee injuries due to the increase in incidence of road traffic accidents. These are always associated with high morbidity. Most of these injures results in some permanent disability (malunion, infection, delayed union, knee instability & stiffness).

The age distribution was from 18 years to 75 years. Skeletally immature paediatric age group was not included in the study. Hee et al[6] in their study described almost the same age group. Left sided injuries (53.33%) were more common than right sided injuries (46.67%).

In our study the most common mechanism of injury was road traffic accidents (93.33%). The rest (6.6%) were due to fall from high. Among the road traffic accidents motor cycle accidents (Two wheeler accidents) (50%) accounted the most. Four wheeler accidents accounted to about 33.3% and 10% were pedestrians.

The more number of road traffic accident cases were due to the fact that our hospital is a tertiary referral centre. Hayes JT[7] suggested that automobile passengers with floating knee injury braced their feet firmly against the sloping floor of the front seat just prior to the collision, their legs getting crumpled under the massive decelerating forces produced by the impact. Pedestrians were frequently catapulted some distance from the point of impact and were further injured by stricking the pavement. In a study of 222 cases of floating knee by Fraser[3] all cases were due to road traffic accidents. Thirty patients were included in this study, males predominated in our study (86.6% male, 13.3% female). Other similar studies in literature also describes the similar gender distribution by Karlstrom et al[5] and Fraser et al.[3]

There were four (13.3%) patients with fat embolism among which three patients required prolonged intensive care. Infection was seen in most of the open type of fractures. There were ten

(33.3%) cases with infection out of which four patients required implant removal. Four Patients were MRSA positive. One patient (3.3%) had an implant failure. Delayed union was seen in eleven patients (36.6%) who required bone grafting. Malunion was seen in eight (26.6%) patients, among these three patients had femur and tibia deformities and five patients had only tibial deformities. Six (20%) patients required wound coverage in the form of flaps. Split skin grafting was done in seven (23.3%) patients; bone grafting was done in nine patients among whom four patients had good outcome. This study was compared with various studies in the literature and results were in table 3.

CONCLUSION

We concluded that the most important factors which determine the functional outcomes were the type of fractures (open or closed), nature of communition including intraarticular extensions, timing of fixations and post-operative infections.

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