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ORIGINAL RESEARCH

A STUDY OF FUNCTIONAL OUTCOME OF IPSILATERAL FEMUR AND TIBIA FRACTURES (FRASER'S TYPE II)

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ABSTRACT:

Background: As a result of high-speed traffic accidents, the frequency of ipsilateral femur and tibia fractures has risen. Because of the complicated fracture pattern and concomitant soft tissue damage, predicting the surgical prognosis of floating knee injuries is challenging. The goal of this research is to examine the functional outcome of a Frasers type II floating knee injury following surgery.

Methods: This is a prospective study done at NIMS, Hyderabad between Nov 2019 and May 2020. The sample size is 20 patients between the age group 20-60 years. The clinical, radiological and functional outcome of these injuries were evaluated using Karlstrom and Olerud criteria.

Results: With a mean age of 35.5 years, there were 18 (90%) males and 2 (10%) females. In our study, 50% of the injuries were type IIC (both were intra-articular), 25% were type IIA, and 25% were type IIB. According to the Karlstrom and Olerud criteria, there were 2 (10%) outstanding, 7 (35%), good, 6 (30%) fair, and 5 (25%), bad outcomes after an average of 12.7 months (range 8 to 18 months) of follow up.

According to Chi square analysis, there is no significant relationship between the factors utilised and functional result, and the strength of the relationship is weak.

Conclusion: Ipsilateral femur and tibia fractures are a more difficult injury that has a higher risk of sequelae.Prognostic indications include concomitant injuries, fracture type (open, intra-articular, comminution), and accompanying patellar fractures. For a satisfactory functional result, early stabilisation and intensive rehabilitation are essential.

Key words: Floating knee, Polytrauma, Fraser's, Karlstrom criteria, Knee injuries, ipsilateral femur and tibia.

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INTRODUCTION:

High velocity trauma resulting in severe bone and soft tissue injuries has become quite prevalent as a result of amazing changes in life pace, such as transportation, industrialization, and urbanisation, as well as an ever growing occurrence of accidents. The rising prevalence of open and difficult lower-limb injuries is a significant challenge for trauma surgeons. Multiple fractures in the same extremity are common, adding significant complications to the care of these injuries. Ipsilateral femur and tibia fractures cause a flail joint known as a floating knee, which can involve a mix of diaphyseal, metaphyseal, and articular fractures.Fraser et.al1 classified these injuries into two types with type II subdivided into three subtypes (Table 1).

FRASERS classification

Extraarticular femur and tibia fractures are type I.

The three kinds of Type II are as follows:

Type IIA involves femoral shaft and tibial plateau fractures.

Type IIB fractures include those of the distal femur and the shaft of the tibia.

Type IIC fractures include distal femur and tibial plateau fractures, as well as proximal tibial fractures with intra-articular extension.

This complex has grown in tandem with population expansion, automobile traffic, and high-speed transportation. The actual cause of floating knee is unknown, however it is a rather uncommon ailment.A femoral or tibial fracture can result in treatment difficulties, complications, and permanent functional disability; but, when these fractures occur in the same leg, the chance of complications and poor results increases significantly.

The most prevalent cause of this injury is high-speed trauma, and the soft tissue trauma is typically severe. There is also a considerable danger of fat embolism and life-threatening head, chest, or stomach injuries. According to reports, the number of associated life-threatening injuries is as high as 74%, with death rates ranging from 5% to 15% indicating the severity of these injuries.In 59 to 67 percent of instances, open fractures of one or both bones occur, showing that the energy supplied to the soft tissue is significant. Amputation has also been reported to be necessary in up to 20% of instances.

The treatment of this injury has been reported in numerous ways in the literature. Because they were subjected to high-energy trauma, they may have suffered serious damage to other organ systems. Individuals with solitary femoral or tibia fractures are more likely to be badly wounded trauma patients with a greater rate of concomitant injuries. Patients who have ipsilateral femoral and tibial fractures are more likely to sustain vascular damage than those who have isolated fractures of either bone. Open fractures are more common when the ipsilateral tibia and femur are shattered together than when either bone is damaged alone. An open tibial fracture and a closed femoral fracture are more prevalent. As is usual with significant trauma, this constellation of injuries is more frequent in younger persons.

High-energy trauma, such as that caused by motor vehicle, vehicle-versus-pedestrian, and motorbike accidents, is the most common type of injury.The floating knee lesion has a variety of treatment options. Because of the unpredictability of internal fixation procedures and concerns about infectious consequences, early studies favoured nonoperative therapy.However, more recent research have shown that non-operative therapy for this combination of fractures has considerable complications. This technique frequently results in

malunion, delayed union, and nonunion. Furthermore, the need of stabilising long bone fractures in polytrauma patients to avoid systemic consequences has been proven. Both fractures need currently be stabilised aggressively and quickly.

PATIENTS AND METHODS:

Between November 2019 and September 2020, a prospective clinical trial was conducted in the department of orthopaedics at Nizam's Institute of Medical Sciences. After receiving clearance from the Ethics Committee (EC/NIMS/2456/2019), all patients with Fraser's type II injuries were enrolled. Prior to enrollment, all patients gave their informed permission.

SAMPLE SIZE

As per formula

N=4PQ/d2 ~20 patients

where p=prevalence from previous studies, Q=100-P, and d= allowable error (5- 20%),

Duration of study : Patients were followed up for one year. Inputs were collected at immediate post-op 1st, 3rd, 6th and 12th month.

INCLUSION CRITERIA

Age group more than 20 years those patients with Fraser type II floating knee injuries treated with surgical fixation.

EXCLUSION CRITERIA

Neglected floating knee injuries with non-union, those patients with pathological fractures and periprosthetic fracture, patients with vascular injuries with type IIIC open injuries (Gustilo-Anderson Classification)

METHODOLOGY

All patients got a complete clinical follow-up evaluation utilising the Karlström and Olerud[2] grading system.

PROTOCOL ON ARRIVAL

When the patients arrived, the ATLS method was used to resuscitate them (maintenance of airway with cervical spine control, breathing and circulation).The patient's general state was examined for hypovolemia, related orthopaedic or other systemic ailments. If a systemic injury was discovered, it was treated first.

A pop slab and below knee traction on a pillow or a Bohler Braun splint were used to immobilise the fractured femur and tibia. Analgesics were given intramuscularly and antibiotics were given intravenously to all of the patients. In the instance of open fractures, anaesthetic was used to perform prompt debridement and the application of an external fixator. Primary closure was performed after thorough debridement when the wound was clean cut and not infected. Secondary closure, skin grafting, or local flaps were used when the incision was big and there was a lot of skin loss.

All patients had routine examinations. Anteroposterior and lateral views of the radiographs were collected. Patients were pre-operatively prepared, and intramedullary interlocking

nailing was performed wherever possible. Intra-articular fractures were reduced anatomically and repaired with plates and screws. The patients were operated on while under spinal or general anaesthesia.

Interlocking nailing was utilised to repair shaft femur and tibia fractures. Distal femoral fractures were treated using distal femoral locking plates/Condylar buttress plates. Proximal tibial fractures were treated with locking compression plates/Buttress plates with Cancellous screws. Ilizarov and external fixation were employed to treat open fractures.

All closed fractures received intravenous antibiotics for three days after surgery. After the check dressing and drain removal on the fourth postoperative day, oral antibiotics were started. In the case of open fractures, antibiotics were administered based on the condition of the wound. On the 12th postoperative day, the skin sutures were removed. The patient was mobilised using a walker and non-weight bearing walking. At 6 weeks, limited weight bearing was introduced when x-rays revealed adequate callus at the fracture site.

Additional weight-bearing was started based on the presence of unions as shown on radiography. All patients were evaluated clinically and radiologically for union status, knee range of motion, and other problems on a monthly basis for the first four months, then three times a month after that. Following a minimum of four months after the injury, the patient's functional recovery was assessed using Karlstrom Olerud2 criteria.

The connection between functional outcomes and potential predictors was investigated using a chi square test, which was performed individually for each predictor. The dependent variables were stated as either a S or a US outcome, with the S result allocated to the dummy variable '0,' and the US result assigned to the dummy variable '1.' We picked the following factors as explanatory variables since they were expected to impact the functional outcome: Fraser type (I or II), AO fracture grade in the femur and tibia, and associated injuries Kaplan-Meier Analysis was used for the event (radiological union) in AO fracture type femur and tibia.Although treatment procedures for both femoral and tibial fractures were found to be significant variables influencing the functional outcome of floating knee injuries, their variability perplexed the study, thus they were omitted. SPSS 20.0 was used to summarise and analyse the distribution of dummy variables in the categorical data below. Individual predictors of functional results were assessed, and a p value of 0.05 was considered significant.

RESULTS:

Our study includes 20 patients with Frasers Type II floating knee injuries. 40 fractures from 20 patients are followed regularly until bony union.

Age	**No. Of Patients**	**Percentages**
18-28	8	40%
29-38	3	15%
39-48	5	25%
49-58	2	10%
59-68	2	10%
Gender		

Male	18	90%
Female	2	10%
Side		
Right	17	
Left	3	
Open/closed fracture		
Open	17	85%
Closed	3	15%
Type		
Type IIA	5	50%
Type IIB	5	25%
Type IIC	10	25%

The average age was 35.5 years old, with a broad range (18 to 60 years).There were 18 men and only two women among the patients. The right side was responsible for 85 percent of the injuries. All of the instances were one-sided. In all of the cases, the mode of injury was a high-speed road traffic accident. In half of the cases, the patient was riding a two-wheeler when it was hit by another two-wheeler.

In our series of 20 cases of Frasers Type II injuries, 5 cases were Type IIA, 5 were Type IIB and 10 were of Type IIC. Mean time to admission was 4.25 days, range (8 hrs to 20 days.) Mean time to surgery was 10.7 days from date of injury. In the case of femur it was 9.95 days, range (3 to 34 days). In case of tibia it was 11.5 days, range (1 to 24)

Table-2: Open fractures Gustuilo Anderson classification

Gustuilo Anderson class	Femur alone	Tibia alone	Combined
Type I	1	3	1
Type II	2	0	1
Type IIIA	2	0	0
Type IIIB	2	2	1

85% of injuries were open injuries. Both femur and tibia fractures were closed in 3 patients. 10 cases of tibia are and 13 cases of femur are open fractures. Both femur and tibia fractures were open in 5 cases. Type III B open fractures were common 32% (8) cases than Type II open fracture 26% (6) cases. There were 5 Type III open fractures (2 cases of femur, 3 cases of tibia) of which one case needed local flap cover.

There were two closed fractures in Type II A and one closed fracture in Type IIC. All were open fractures Type II B and all except one are open in Type II C most commonly Gr II and Gr III open fractures.

Table-3: Fixation method in present study

Fixation method of femur	Number of patients
DFLP	11
CBP	4
ILN	5

DCS	0
EX FIX	0
Fixation method of tibia	
Locking compression plate	6
Buttress plate	8
CSF	1
ILN	3
Ilizarov	1
Ex Fix	1

(ILN: Interlocking Nailing, DFLP: Distal Femur Locking plate, CBP: Condylar Buttress Plating, DCS: Dynamic Condylar screw, CSF: Cancellous Screw Fixation, Ex Fix: External Fixator)

Internal fixation was done in 20 cases. Supracondylar fractures with severe comminution and with intercondylar extension (AO type C3) were managed by distal femur locking plate in 11 cases and with Condylar buttress plate in 4 cases. Interlocking nailing was done in 5 cases of shaft femur. Internal fixation was done in 18 cases.

Interlocking was done in three cases. Eight proximal tibia cases were managed by buttress plates and six by locking compression plating. Biplanar external fixation was done in one case which needed soft tissue reconstruction. Primary Ilizarov was done in one case due to severe metaphyseal comminution. Cancellous screw fixation was done in one case as the fracture in medial tibial condyle was undisplaced.

Figure-1:

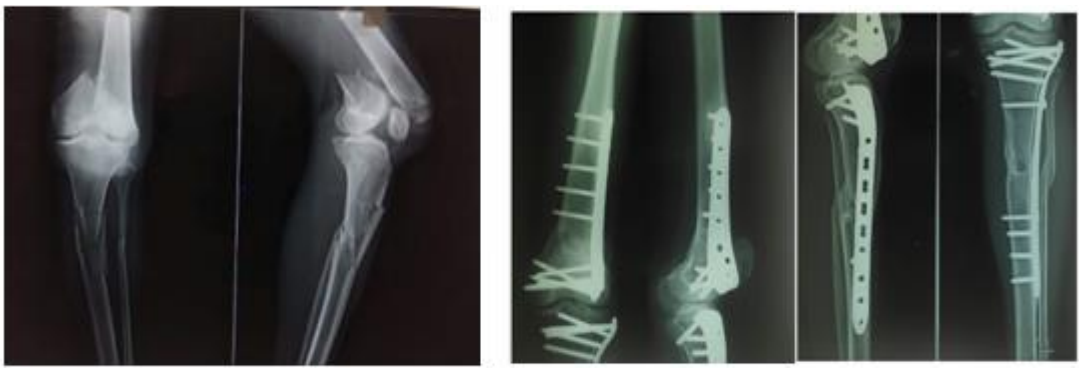

Figure-2:

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MEAN TIME TO UNION

The mean time to union for femoral fracture was 19.4 weeks, range (16 to 28 weeks) and that for tibia was 21.9 weeks, range (18 to 30 weeks). The average knee ROM achieved was 104 degrees in Type IIA injuries, 96 degrees in Type II B injuries and 76 degrees in Type II C injuries

Table-4: Average knee ROM achieved

Loss of ROM IN KNEE	Type IIA	Type IIB	Type IIC
0	0	0	1
<20°	2	1	1
20-40°	2	4	4
>40	0	0	4

PROCEDURES DURING FOLLOW UP

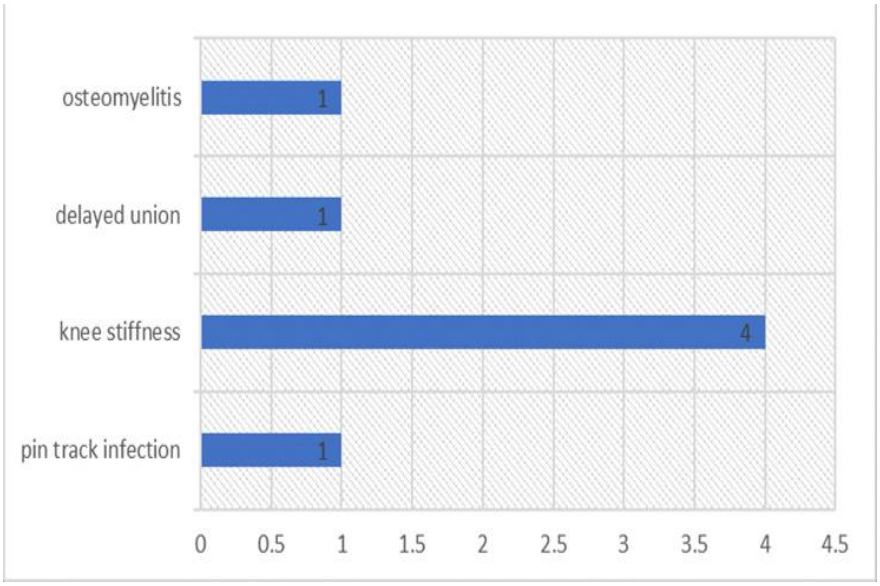
Dynamization was done in one case of femoral nailing. Local debridement was done and antibiotics given in a case of infection.

The mean follow up period was 12.7 months, range (8 to 18 months.)

Figure-3: Functional Results

Functional results were measured according to KARLSTROM criteria after complete clinical and radiological union. There were 9 patients who had excellent/good outcomes, 6 who had acceptable results, and 5 who had bad results.Among the poor results, one case was Type IIA and 4 cases were Type IIC.

Figure-4: Complications in present study



The ultimate functional outcomes were as follows: two exceptional, seven good, six acceptable, and five bad.Overall, 45 percent (9/20) of the results were satisfactory.

There is no significant association between the variables used and functional outcome as analysed by Chi square, and the strength of association is poor. Moreover, there is no significant difference between different AO fracture types of both femur and tibia involved in floating knee and mean time to radiological union. Despite contradiction to existing literature, at conclusion there could be possibly a critical study flaw by clubbing individual groups into simpler groups and there is need to survey more patients due to heterogeneous nature of injury pattern and longer follow up is required to show significant correlation.

Table-5: Fraser type * Karlstrom criteria

			Karlstrom criteria		Total	P-Value
			0	1		
Fraser type * Karlstrom criteria Cross tabulation	0	Count	5	5	10	0.500
	1	Count	4	6	10	
Total		Count	9	11	20	
Associated injuries	0	Count	4	3	7	0.370
	1	Count	5	8	13	
Total				20		
AO fracture type femur	0	Count	3	2	5	0.396
	1	Count	6	9	15	
Total		Count	9	11	20	
AO fracture type tibia	0	Count	2	3	5	0.604
	1	Count	7	8	15	
Total		Count	9	11	20	

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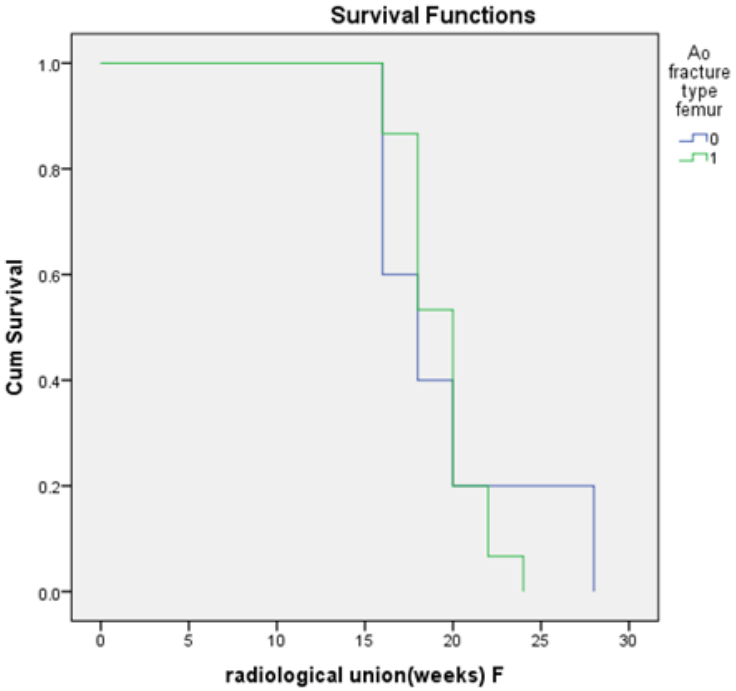
There is no significant association between the Fraser type for fracture and functional outcome as analysed by Chi square, and the strength of association is poor.

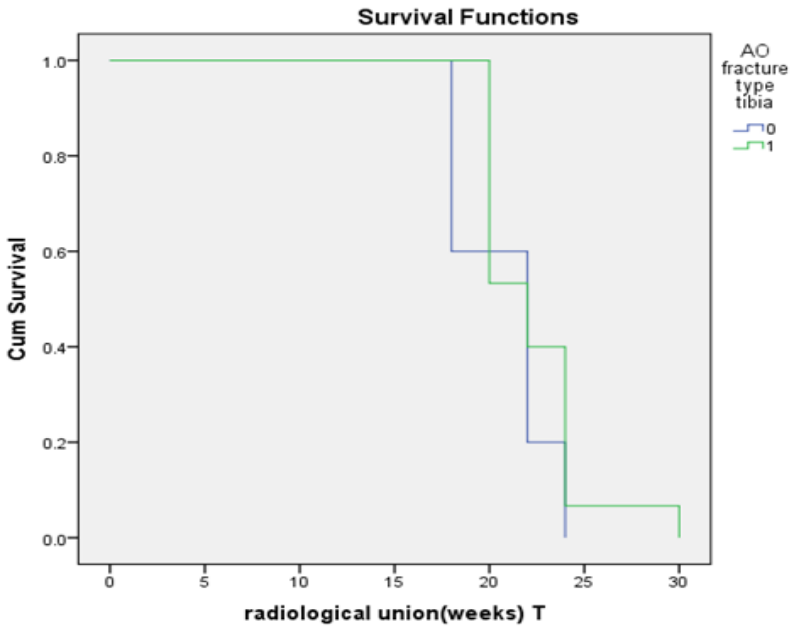
Figure-5: Kaplan-Meier Analysis for the event (radiological union) in AO fracture type



Mean Time Estimate For Radiological Union in Type 0:: 19.600(2.227) CI = (15.235 – 23.965) Mean Time Estimate For Radiological Union in Type 1:: 19.333(0.575) CI = (18.207 – 20.460)

The Log Rank (Mantel-Cox) test revealed no significant differences between different AO fracture types of the femur. p Value = 0.825

Figure-6: Kaplan-Meier Analysis for the event (radiological union) in AO fracture type tibia



Mean Time Estimate For Radiological Union in Type 0:: 20.800(1.200) CI = (18.448 – 23.152) Mean Time Estimate For Radiological Union in Type 1:: 22.267(0.727) CI = (20.842 – 23.691)

The Log Rank (Mantel-Cox) test revealed no significant differences between distinct Ao fracture types tibia. p Value = 0.283

DISCUSSION:

We report on our experience with Fraser's Type II floating knee injuries in 20 patients treated at our centre. The outcomes of 20 floating knee injuries treated with various internal, external, and combination fixation procedures are discussed here. Road traffic accidents were more common among men (18/20, 90%) and those aged 18 to 38 (11/20, 55%), respectively (20/20). A male majority, a younger age group, and high-energy road traffic events resulting in this injury have been discovered, as in previous study Dwyer et al[3], Vieth et al.[4].In our study 11 (55%) patients were between 18 to 38 years which is almost productive age group, result in productive life year loss. Right side is more commonly involved. There were no bilateral injuries. As observed in previous study by Vieth et al[4], in our study also most (85%) cases are right sided. The preponderance of right sided fractures is explained by collision with vehicles coming from the opposite side. In our study 50% of injuries are type IIC (both are intra-articular), 25% cases were type IIA and 25% cases were Type IIB, which would be associated with poor outcome compared to previous studies which are more of type I injuries. The likelihood of open fractures is higher when the ipsilateral femur and tibia are shattered together than when either bone is damaged alone. An open tibial fracture and a closed femoral fracture are the most prevalent combinations. According to Paul et al[5], 17 of 21 patients had open fractures of one or both bones, with type II or type III fractures accounting for 76% of the cases. Many treatments were required to treat these injuries, and five individuals required amputations. There were 17 open femoral fractures and 29 open tibial fractures among the 57 people investigated by Veith et al[4]. Thirteen people had both fractures open. In their 26 patients with ipsilateral femoral and tibial fractures, Gregory et al6 identified 16 open fractures. These figures show the amount of violence associated with this type of injury.

In our analysis, open fractures accounted for 85 percent of all injuries. Type I and IIIB open fractures are the most prevalent (63 percent). All are open fractures in Fraser Type IIB, with the exception of one, which is closed in Fraser Type IIC and most often Gustilo-Anderson Type II and Type III B. Only three instances had closed fractures.

The average time to admission was 4.25 days, which is a longer duration when compared to previous studies in developed countries. So, we need early referral for better management of this kind of patients which will improve the final outcome. Immediate fracture fixation stabilises the patient's condition and allows early movement, lowering the risk of acute respiratory distress syndrome (ARDS) by one-fifth, promoting soft tissue healing, allowing early evaluation of the knee joint, and preventing knee stiffness. Early femur fixation reduces respiratory consequences such ARDS and fat embolism syndrome, as well as hospitalisation time and days spent in the critical care unit.The average time to surgery in case of femur fractures was 9.95days, and for the tibial fractures it was 11.5 days. This delay indicates delayed presentation of patients and time to recover from open wounds. In our study,

simultaneous fixation of both fractures was done in 9 cases. In 1 case of open tibia, fracture fixation was done on an emergency basis and femur fracture was managed by internal fixation once the patient was stabilized. In 3 cases patients become unstable after surgery and the remaining surgeries are delayed till the patient improves. The remaining injuries that required surgery were treated with the same anaesthetic.

The average length of stay in our study was 12.7 days, which was consistent with the findings of DeLee et al[7].When both fractures were treated operatively, Karlstrom and Olerud[2] reported an average stay of 11.5 weeks, and 19 weeks when both fractures were treated nonoperatively. Hospitalisation more than 4 weeks is needed in those patients with associated injuries to other systems.

There are 20 associated injuries, patellar fractures are highest (4, 26%) because of more Type II injuries. No patient developed fat embolism before or after surgery. 3 patients had head injury managed by conservative management. Two patients had blunt injury chest managed conservatively. One patient needed laparotomy due to blunt injury abdomen and urethral injury. One patient has an ipsilateral upper limb fracture managed by surgical fixation, one case of ipsilateral and one case of contralateral talus fractures fixed surgically. One case has contralateral proximal tibia fracture with vascular injury managed by vascular repair and trans-articular external fixation.

Many published series have not consistently recorded the presence of compartment syndrome with this injury; nevertheless, Fraser et al[1] found a 1.4 percent frequency. No one in our research experienced compartment syndrome. In 40% of the patients, ligamentous injuries were evident (8).According to Szalay et al[8], anterolateral instability is the most prevalent, with 53 percent of patients demonstrating knee ligament laxity compared to 27 percent of patients with isolated femoral fractures. According to the data, ipsilateral femoral and tibial fractures do not protect the knee ligaments, and the increased prevalence of knee ligament injuries indicates that these persons have been subjected to a great deal of stress.According to Salazy et al.[8], the force imparted to the extremities likely ruptures the knee ligaments first, and the remaining energy is released via femur and tibia fracture. According to other study, up to 50% of knee ligament injuries in the floating knee occur, with the majority of these injuries being misdiagnosed after the initial evaluation. Although the efficacy of this treatment is debatable, a thorough assessment of the knee at the time of injury is strongly encouraged.

Primary ligament restoration after surgical stabilisation of both fractures under the same anaesthetic was described by Retham et colleagues (2007)[9] with satisfactory outcomes. In our investigation, we postponed ligament restoration and repair until the patient's skeletal damage had fully recovered. Large-drill holes and tunnels into the intercondylar notch of the femur for ligament repair are generally not recommended. They may induce additional fracture comminution and jeopardise the integrity of internal fixation. Because of the fixation hardware, this might be technically challenging.Primary ligament repair or reconstruction increases the risk of postoperative infection, intra-articular adhesions, and loss of knee joint mobility by lengthening the surgical duration. It is advised that mid-substance cruciate ligament rips be treated non-operatively first. Protected motion combined with a knee brace and vigorous rehabilitation may eliminate the need for late reconstructive surgery in some patients; however, late ligament reconstruction can be performed once the fracture has healed

and the hardware can be safely removed in those patients who have persistent functional disability.

It is preferable to nail femoral fractures on a radiolucent table than than a fracture table in a variety of conditions, including the treatment of floating knee. McFerran and Jhonson10 presented a femoral nailing technique that incorporated the use of a femoral distractor to secure the reduction. The distractor has also been used to hold reduction during intramedullary tibial fracture repair.Karpos et al.[11] used manual traction alone to show femoral nailing without the assistance of a fracture table. They said that this method enabled them to treat polytraumatized patients more quickly and effectively. Wolinsky et al[12] examined the time spent on and off the fracture table nailing femoral fractures. To treat fractures in the supine position, we commonly use a radiolucent table. On the radiolucent table, the patient is normally reclining supine, with a bump of two wrapped sheets beneath the pelvis on the afflicted side.

Percutaneous fixation with completely threaded cancellous screws and K-wires and early range of motion exercises may be the best treatment for undisplaced fractures in the knee. Complications are less common in displaced intra-articular fractures that need open reduction and internal fixation.Internal fixation was employed to treat all femoral fractures in our research. Although just one patient acquired a serious infection, internal fixation was employed to heal all of the femoral fractures.In three cases, the femur was interlocked, six cases had distal femur locking plating, and eight cases had condylar buttress plating.

In case of tibial fractures, locking nail in 3 cases, buttress plating in 14(T buttress plate or hockey plate) cases, and percutaneous cancellous screw fixation in one case were performed. Primary Ilizarov fixation was done in one case, external fixation done in another case and one undisplaced tibial condylar fracture was managed conservatively. We managed one tibial fracture by external fixation, due to open fracture, segmental pattern and more comminution. Tibial fractures are more prone to complications, necessitating extra soft tissue treatments during the initial inpatient period.

All interlocking nail fixations were statically and dynamically locked. There was no incidence of fat embolism after reamed interlocking of femur and tibia. The average time to union for femur fracture is 20.2 weeks and in case of tibia it was 22weeks. These are comparable to previous studies by Veith et al[4] and Dwyer et al. [3]The difficulties that emerged are comparable to those seen in prior research. There were no patients with more than 5 degrees of varus and valgus angulation, 10 degrees of procurvatum, or recurvatum malunion. There were no implant complications. There was no further bone grafting. After surgical fracture repair, no amputations were performed in our research. In our research, no one died. Because open fractures with segmental bone loss and soft tissue injuries were handled with heel and sole rise footwear, there was a shortening of more than 2cm in two cases. In this series, there is no evidence of fat embolism.Early fracture fixation, particularly with intramedullary nailing, did not appear to enhance the incidence of fat embolism. After femoral intramedullary nailing, no patient in our series had fat embolism, even those whose surgeries were performed on the same day as the accident. Furthermore, early fixation made the pulmonary therapy much easier.

There were no implant complications. Early consequences included superficial wound infection in three patients and DVT in one case, both of which were similar to prior

findings.Two patients developed alcohol withdrawal syndrome. Late complications include delayed union in one case, deep infection in one case, knee stiffness in four cases, pin tract infection in one case. One case of interlocking femur developed deep infection which subsided with repeated debridement and prolonged appropriate antibiotics. One patient who developed pin tract infection was managed by local injection of gentamycin. In our study we did not do manipulation under GA, adhesiolysis or quadricepsplasty. All patients were advised aggressive physiotherapy and CPM.

Complications of ipsilateral femoral and tibial fractures include loss of knee mobility and discomfort.The average knee mobility in the reported series ranged from 92 to 131 degrees.In the Fraser et al[1] trial, half of the patients experienced persistent knee discomfort. The severity of these injuries is compounded by the high occurrence of knee issues. Early knee ROM and awareness of this condition may assist to reduce the onset of this complication.In our study the average knee ROM 89 degrees, range (130 to 20 degrees). The low values are due to 50% of injuries in our study being Type IIC injuries which carry poor prognosis. The results are comparable to previous studies like Adanson et al.[13]

Individuals with ipsilateral femoral and tibial fractures typically required further orthopaedic treatments. To aid tibial and femoral fracture union, bone grafting, exchange nailing, and dynamization may be required. Severe soft tissue injuries and open fractures with segmental bone loss are the most common causes of delayed union.In our study, we performed primary bone grafting in five cases, dynamization in one case, and exchange nailing in none of the cases.In several studies, amputation following ipsilateral femoral and tibial fractures is deemed inevitable. According to Paul et al[5], 5 of their 21 patients required amputation. The amputations were supposed to have occurred as a direct result of the victims' traumatic traumas. The great majority of amputations are the consequence of severe open tibial fractures that cannot be repaired despite the presence of an ipsilateral femoral fracture. Amputation was not required in our study. In a study of 34 people with ipsilateral femoral and tibial fractures, Adanson et al[13] observed a 32% infection rate. The high infection rate reflects the severity of the damage pattern.In our series we had 3 patients with superficial infection and one patient with deep infection which was controlled with antibiotics.

Adult respiratory distress syndrome is a common consequence of polytrauma and long bone fractures, especially ipsilateral femoral and tibial fractures. Death and pulmonary embolism are other potential outcomes. In the Veith et al [4] study, 7 (13%) of the 54 patients developed fat embolism syndrome, 3 had pulmonary emboli, and one died. Karlstrom and Olerud[2] presented 31 patients with ipsilateral femoral and tibial fractures who were treated using various techniques.Six people were diagnosed with fat embolism syndrome, and four of them died as a result of their injuries. Due to early surgical repair of the fractures and the use of low molecular weight heparin (LMWH) in both the pre- and post-operative periods, no patients in our research had fat embolism.There were no deaths in our series.

In our study there were 9 patients with excellent/good results, acceptable results in 6 patients and poor results in 5 cases, among which 4 cases are Fraser type IIC and one case is type IIB which were comparable to previous results. The average knee ROM in Type IIA injuries is 104 degrees, in Type IIB injuries 96 degrees and Type IIC injuries is 76 degrees. This indicates intra-articular fracture of the femur will significantly impair knee ROM. Proximal tibial fractures with articular extension have less effect on knee ROM. Fraser The results of

type II injuries are frequently worse than those of type I injuries. Adanson et al[13] investigated the severity of this damage pattern in 34 patients with type 2 (intra-articular) ipsilateral femoral and tibial fractures. Almost one-third of these persons suffered intra-articular femur and tibia fractures. In 21 (61%) of the extremities, the fractures were open, and 7 (21%) of the fractures were accompanied with vascular damage. Three (9%) of the patients required amputation above the knee. The average knee range of motion was just 96 degrees, and 26 patients (76 percent) had fair or poor results. Type II floating-knee injuries, according to the researchers, have a much poorer prognosis than type I fractures.

In our study of 20 cases of type II Frasers fractures, half the cases (10) are type II C. The average knee ROM achieved was 76 degrees. The knee ROM is less compared to previous study by Adanson et a[13] due to higher incidence of open fractures in our study (85%) as more compared to 62% in Adanson et al[13] study. This indicates that associated soft tissue injury will influence the management options and final outcome.

In 60% of Fraser type IIA injuries the outcome is good, in 20% of cases acceptable and20% are poor results, and outcome in Type II B is acceptable in 60%, excellent in 20% and good in 20%. In 40% cases of Fraser type II C and in 10% of type IIA injuries the outcome was poor. Early range-of-motion exercises and protected weight bearing are essential for a best result following intra-articular fractures, regardless of displacement.In our study we used the hinged knee brace for early mobilisation of patients with intra articular fractures. Delayed mobilisation in 3 cases by more than 6 weeks resulted in knee stiffness. The delay in mobilisation was due to late follow up in one case, less rigid fixation of the intercondylar fracture femur in two cases and Ilizarov fixation of the proximal tibia in another case which did not allow the use of a hinged knee brace.

In our study there were four comminuted fractures of patella which are stellate type. Patellar fractures are frequently missed during initial evaluation and most of the times they are diagnosed intraoperatively. Most of them are undisplaced and they are missed in initial radiographs and associated tears in quadriceps are difficult to diagnose preoperatively. We repaired the quadriceps tendon and retinacular tears through the same incision for supracondylar fracture femur. Because of the associated soft tissue injury, undisplaced fracture we managed them conservatively with slab support for 6 weeks this resulted in delayed mobilisation of patients, which affected final functional outcome.

In this investigation, we used completely threaded cancellous screws rather than partially threaded cancellous screws to reduce the intercondylar element.The advantage of fully threaded cancellous screws is, in floating knee injuries condylar fractures are very comminuted and these screws will hold each and every fragment in compression mode and they have better pull-out strength.

In the management of supracondylar femur fractures with comminution and intercondylar extension we used a locking compression plate in 11 cases as it is a fixed angle device which prevents varus or valgus collapse and has improved fixation in osteoporotic bone. No need for intraoperative contouring as its distal end is countered anatomically to match the distal femoral femur. The screws do not rely on plate bone compression and multiple screws in distal femoral condyle allow improved fixation in comminuted fractures. Four cases of supracondylar fractures with intercondylar extension were fixed with condylar buttress plate and we have no cases of varus or valgus collapse as described in literature with use of this

plate, which is not a fixed angle device. This is owing to effective medial pillar repair using indirect reduction procedures and little soft tissue stripping of bone fragments while conserving as much bone as possible medially. We utilised locking compression plates whenever feasible since they offer greater advantages. The mainstay of treatment is intramedullary femur nailing, and patients in this group fared the best. Mobilization was not hampered by intramedullary nailing, Ilizarov fixation, or external fixation of a fractured tibia, and their average union rates were comparable.

CONCLUSIONS:

Ipsilateral femoral and tibial fractures are a complicated injury with a high rate of related injuries.Prognostic indications include concomitant injuries, fracture type (open, intra-articular, comminution), and accompanying patellar fractures.Functional outcome in Frasers Type IIC is poor compared to the other types. Early stabilization and aggressive rehabilitation are key elements for good functional outcome.

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