

## A PROSPECTIVE STUDY OF 97 CASES TO ARRIVE AT TREATMENT PROTOCOLS FOR FLOATING KNEE

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### HOW TO CITE THIS ARTICLE:

V. K. V. Prasad, J. Satyanarayana, T. Narasimha Rao, P. Satish, G. V. S. Moorthy. "A Prospective Study of 97 Cases to Arrive at Treatment Protocols for Floating Knee". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 21, March 12; Page: 3608-3613, DOI: 10.14260/jemds/2015/520

**ABSTRACT: BACKGROUND:** Floating knee is an injury in which fractures are present both above and below isolating it. It's a high velocity injury<sup>1</sup> frequently associated with multiple fractures and injuries to other organs.<sup>2</sup> The management i.e., timing of surgery, no of incisions and the type of implants is still a gray area as several protocols have been advocated. **MATERIALS AND METHODS:** This study comprises of 97 cases and was conducted in the two tertiary care hospitals of Hyderabad, during a period of 6 yrs i.e., between 2007-2013. The average of the patients is 28.2 years and the Male to Female ratio is 6:1, there were 68 open fractures. Each case is individually assessed and managed. Different implants are used to fix these fractures depending upon the situation and fracture type. **RESULTS:** All the cases are evaluated after fracture union based on criteria Karlstrom and Olerud. Sixty five patients had union of femoral and tibial fractures with 90 degrees of knee flexion falling into the category of excellent and good results. Complications encountered were Infection, Knee-stiffness, nonunion, malunion, injury to nerves. **CONCLUSIONS:** There is no fixed protocol in the number of incisions, choice of fixation device, and timing of surgery in the management of floating knee injuries. Each case should be dealt with basing on its merits. The management should be tailor-made for that particular case.

**KEYWORDS:** Floating knee, Ilizarov ring fixator, High velocity injury, Grey area.

**INTRODUCTION:** Floating knee injuries may include a combination of diaphyseal, metaphyseal, and intra-articular fractures of both femur and tibia ipsilaterally. Floating knee injuries are commonly associated with RTA and falls from height and are usually due to high-energy trauma. They are generally a part of polytrauma and are often associated with life threatening injuries like Head injury, injuries to Thoracic and Abdominal organs. The management includes resuscitation as most of the patients are haemotologically unstable at the time of admission after the initial assessment of the injured patient.

In most of the cases the fractures are compound in nature, the common combination is a closed fracture of femur and a compound tibial fracture.<sup>3</sup> They may be associated with injuries to Vessels and nerves. The common pattern is injury to popliteal artery at the knee joint. Instability of the knee joint is a common occurrence in these injuries due to ligamentous injury,<sup>4</sup> which should be assessed properly and treated accordingly to get back the knee function.

Fractures of Ipsilateral humerus and clavicle are also not uncommon and should be excluded along with the examination of the spine. Fraser classification<sup>5</sup> is useful in the management of these complex injuries.

Routine hematological investigations should be undertaken and blood transfusion may be needed in most of the cases. The usual modalities of radiological investigations include radiographs in both planes, sometimes CT scan and MRI can give additional information needed in managing the particular fracture. Angiograms and Nerve conduction studies are needed in special situations.

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But the necessary surgical treatment should not be delayed for want of some investigations. Time is of essence in treating these injuries. Early stabilization of the fractures and mobilization of the joint are the essential things in the management of these injuries and the treatment protocols should aim for it. Several implants are available to fix these fractures and care must be taken in choosing the appropriate device to fix these fractures. In case of compound fractures after initial stabilisation of the fractures, procedures to cover the soft tissue loss can be undertaken at a later date. If the patient's general condition prevents both fractures to be fixed, then femur should be fixed first and tibia can be dealt with subsequently or treated conservatively.

**MATERIALS & METHODS:** This study is done in Gandhi Hospital and Osmania Hospital in Hyderabad, both tertiary care centers over a period of 6 years from 2006- 13. Over all 97 patients are included in this study. Males are 74 and females 23, and the patients are between 20-60 yrs in age, the majority i.e., 71 patients are between 20-40 yrs and are male, showing that RTA is the leading cause of these injuries. Inclusion criteria are all the patients of age 20-60yrs with ipsilateral fracture of femur and tibia, Patients with associated chest and pelvic injuries, who are treated surgically.

Exclusion criteria are Patients with associated injuries to other limbs, Patients associated with Fracture of patella and patients in whom one of the fracture is treated conservatively.

Majority of patients are of Fraser type I -55, Type A – 16, Type B -15, and Type C – 11 (Fig 1).

There are about 38 open fractures majority of them being Grade II.

**OPERATIVE PROCEDURE:** If the fractures are simple or Grade I compound and are amenable Inter Locking Nail fixation for both femoral and tibial fractures is the treatment of choice in our study. Both the fixations are done at the same time, femoral fixation done as the first procedure as a routine. We used two separate incisions for both fractures and did not use retrograde nail for femur in our series. If one of the fractures is situated in the metaphyseal region with an intra-articular extension then Locking plate is used to fix the fracture, as rigid stabilisation and immediate mobilization can be done. The use of biological plating / MIPPO/ has revolutionized the treatment modalities of these difficult fractures. (Fig. 2)

In the treatment of Grade II Compound fractures the Ilizarov apparatus is quite useful and we routinely resorted to this procedure. The advantage of using it as an external fixator for initial stabilization and as a definitive treatment option scores over other devices. The ease with which we can cover the soft tissues by grafting or flap cover with this apparatus on is utilized in treating these complex injuries (Fig. 3) We used Ilizarov apparatus to treat both femoral and tibial fractures in 2 patients.

The availability of biological plating/MIPPO and the frequent use of Ilizarov apparatus in these difficult fracture patterns have given us a real boost in our endeavor in managing Floating Knee cases.

All the patients are given Thrombo-prophylaxis post-operatively and early mobilization and physiotherapy started as early as pain allowed.

The patients are followed up regularly to detect complications and to monitor the fracture union with serial clinical and radiological examinations.

The patients are advised to bear partial weight after 8-12 wks when there is evidence of bridging callus and are allowed full weight bearing after clinical and radiological confirmation of fracture consolidation.

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Evaluation of the clinical results is done by using Karlstrom and Olerud,<sup>6</sup> s criteria.

**RESULTS:** The average follow up ranged from 10 yrs to 10 months. The rate of union of femur and tibia depends on the age of the patient, type, location of the fracture and the implant used.

65 of our 97 patients have excellent to good results basing on the union of both femur and tibia, and flexion of knee around 90 degrees.

25 patients have acceptable results while 7 patients had poor results, out of which 1 patient had a below-knee amputation.

By far the commonest complication is knee stiffness. Lack of awareness about importance of physio-therapy, pain associated with infection, severity of the fracture is the frequent causes of this complication.

Non-union and Mal-union are also seen in this series, Foot-drop occurred in one of our cases which gradually resolved over a period of time.

Our results are comparable with the study conducted by Ulfin Rethnam,<sup>7</sup> Rajam S, Yesupalan & Rajagopalan Nair, who reported 15 cases as having Excellent results, good results in 11 cases, acceptable results in 1 and poor result in 3 cases , the total cases being 30.

The complication rate and the rate of poor results are related to the presence of associated injuries as emphasized by the study by Feng-Chen Kao,<sup>8</sup> MD; Yuan-Kun Tu, MD; Kuo-Yao Hsu, MD; Juin-Yih Su, MD; Cheng-Yo Yen, MD et al. In our study also the bad results and the complications occurred when there are associated injuries.

**DISCUSSION:** The management of Floating knee is a challenge to the treating surgeon. As it is a high velocity injury there will be multiple fractures and severe damage to soft tissues and injuries to several organs. The mortality and morbidity associated with this injury is quite high hence several treatment protocols were advocated over a period of time leading to confusion.

Floating knee should be suspected in all poly-trauma patients and a thorough examination should be done in the casualty to rule out this. A secondary survey should be undertaken to look for associated injuries. After ascertaining that immediate threat to the life is not there due to associated Head injury, thoracic or abdominal injuries, the fractures should be evaluated and definitive care is started. The definitive fracture management should start from casualty itself to have a favorable outcome.

The usual complications associated with Poly-trauma like Fat Embolism Syndrome should be looked for and if found treated effectively.

There is lot of confusion over the management of these injuries vis-a-vis, type of fixation devices, number of incisions etc, leading to many complications in the post-operative period ranging from Infection, Knee stiffness, Non-union and Mal-union.

With the selection of appropriate fixation device the complications can be minimized and the quality of life of the patient after this serious injury can be improved.

As a general rule we select the implants depending upon individual case as a tailor made solution depending upon the location, type of fracture, age of the patient, presence of associated injuries and other co-morbidities. If both fractures are diaphyseal then Inter locking nails are used for fixation of both femur and tibial fractures.

If one fracture is diaphyseal and another metaphyseal then Inter locking plate is used for diaphyseal fracture and biological plating is done for the other fracture.

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If both fractures are metaphyseal and extend into intra-articular region either both locking plates or one locking plate mainly for femur and Ilizarov apparatus for the tibia is done.

As most of the fractures are compound with various fracture configurations the use of Versatile Ilizarov apparatus helped us in fixing these difficult fractures (fig. 4) and getting them united, thereby preventing the complications.

**CONCLUSION:** As floating knee injuries are complex and difficult to treat there is no single option to treat all cases. Each case has to be dealt with on its merits taking into consideration the fracture patterns, age of the patient, associated injuries, co-morbid conditions, availability of different fixation devices and the ability of the surgeon.

### REFERENCES:

1. Rethnam U, Yesupalan RS, Nair R. Impact of associated injuries in the floating knee: a retrospective study. *BMC Musculoskelet Disord*. Jan 14 2009; 10: 7. [Medline]. [Full Text].
2. Blake R, McBryde Jr A. The floating knee: ipsilateral fractures of the tibia and femur. *South Med J*. Jan 1975; 68 (1): 13-16. [Medline].
3. Van Raay JJ, Raaymakers EL, Dupree HW. Knee ligament injuries combined with ipsilateral tibial and femoral diaphyseal fractures: the "floating knee". *Arch Orthop Trauma Surg*. 1991; 110 (2): 75-7. [Medline].
4. Hung SH, Lu YM, Huang HT, Lin YK, Chang JK, Chen JC, et al. Surgical treatment of type II floating knee: comparisons of the results of type IIA and type IIB floating knee. *Knee Surg Sports Traumatol Arthrosc*. May 2007; 15 (5): 578-86. [Medline].
5. Fraser RD, Hunter GA, Waddell JP. Ipsilateral fracture of the femur and tibia. *J Bone Joint Surg Br*. Nov 1978; 60-B (4):510-5. [Medline].
6. Karlström G, Olerud S. Ipsilateral fracture of the femur and tibia. *J Bone Joint Surg Am*. Mar 1977; 59 (2): 240-3. [Medline].
7. Rethnam U, Yesupalan RS, Nair R. The floating knee: epidemiology, prognostic indicators & outcome following surgical management. *J Trauma Manag Outcomes*. Nov 26 2007; 1 (1): 2. [Medline].
8. Yue JJ, Churchill RS, Cooperman DR, et al. The floating knee in the pediatric patient. Nonoperative versus operative stabilization. *Clin Orthop Relat Res*. Jul 2000; (376): 124-36. [Medline].

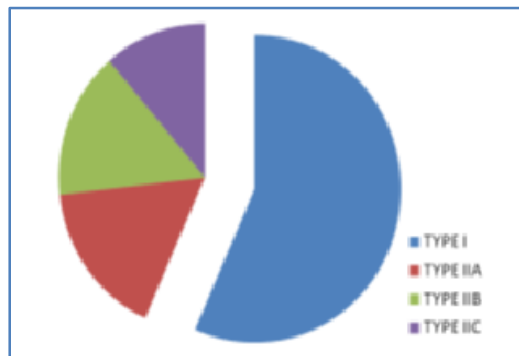


Fig. 1: Classification of patients



Fig. 2: Pre-operative ILN for femur & Plating for Tibia



Fig. 3: Ilizarov for Tibia



Fig. 4: Ilizarov for both femur and Tibia

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**FINANCIAL OR OTHER**

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Date of Submission: 16/02/2015.  
Date of Peer Review: 17/02/2015.  
Date of Acceptance: 28/02/2015.  
Date of Publishing: 10/03/2015.