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Functional outcome in tibia plateau fractures treated with open reduction and internal fixation

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Abstract

Introduction: Tremendous advance in mechanization and fastness of travel have been accompanied by steep increase in number and severity of fractures and those of tibia plateau are no exception. Knee being one of the major weight bearing joints of the body, fractures around it will be of paramount importance. This study is to analyze the functional outcome of CRIF of ORIF with or without bone grafting in tibia plateau fractures in adults.

Methods: 30 cases of tibia plateau fractures treated by various modalities were studied from 1-6-11 to 30-07-13 at our institution and followed for a minimum of 9 months.

Results: The selected patients evaluated thoroughly clinically and radiologically, after the relevant lab investigations were taken for surgery. The indicated fractures were treated as per the SCHATZKER'S types, accordingly with CRIF with percutaneous cannulated cancellous screws, ORIF with buttress plate with or without bone grafting. Immobilization of fractures continued for 3 weeks by POP slab. Early range of motion was then started. Weight bearing up to 6-8 weeks was not allowed. The full weight bearing deferred until 12 weeks or complete fracture union.

Conclusion: Functional outcome is better in operatively treated tibia plateau fractures in adults, because it gives excellent anatomical reduction and rigid fixation to restore articular congruity and early motion thereby preventing knee stiffness.

Keywords: Tibia plateau fractures, Schatzkar classification, Open reduction and internal fixation, closed reduction and internal fixation.

Introduction

In early days, treatment of fractures were guided by those people who set themselves up as healers. Some were good observers and passed it on to the later generation. The management of fractures thus began. Because of radiography it was possible to visualize the position of fractures, major changes in management took place and led to the fixation of fractures. Internal or external and later-to rigid fixation of anatomically reduced fractures.

Tibia plateau fractures are one of the commonest intra-articular fractures. They result from indirect coronal or direct axial compressive forces. This makes about 1% of all fractures and 8% of the fractures in elderly. Most injuries affect lateral tibia condyle (55 to 70%) and isolated medial condyle fractures occur in 10 to 30% of the reported series^[1, 2].

These fractures encompass many and varied fracture configurations that involve medial, lateral or both plateaus with many degrees of articular depressions and displacements. Each fracture type has its own characteristic morphology and response to the treatment. It is essential to determine the force of injury since high energy trauma is associated with considerable soft tissue and neurovascular damage. Apart from tibia plateau bony injury, meniscal tear and ligament injuries should also be assessed^[3].

High velocity injury sustained in automobile disasters and increase in road traffic accidents as a whole is creating an ever-growing problem. Since man has taken to traveling at high speeds in the sitting position with the loading edge composed of flexed hind limbs, when the machine in which the subject is traveling stops suddenly, most of the impact is taken at first upon the patella, then the tibia and femur in varying proportions and at various positions. The stationary lower limb may be struck by a moving object; this is the common pedestrian injury, the so called 'Bumper Fracture', since the bumper of most vehicles being placed roughly at knee height^[4]. Due to advancement, especially in orthopedic trauma, a better understanding of biomechanics, quality of implants, principles of internal fixation, soft tissue care, antibiotics

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And asepsis have all contributed to the radical change. Thus we have advanced from the conservative approach to internal fixation in fractures as an acceptable mode of treatment. Nevertheless, tibial plateau fractures remain challenging because of their number, variety and complexity. Despite a plethora of articles, written in the past 50 years that have addressed the problems of classification and results of various treatments the optimal method of management remains controversial.

Methodology

This is a study of surgical management of tibial plateau fracture conducted in the department of orthopaedics for a period of 2 years and during this period 30 patients were treated for tibial plateau fractures in which all patients were treated by internal fixation, out of which, 8 with percutaneous cancellous screw fixation method, 10 with ORIF with buttress plate and 12 with ORIF with buttress plate and bone grafting. All the required data was collected from the patients during their stay in the hospital, during follow up at regular intervals and from the medical records.

The Inclusion Criteria

1. Patient who has been diagnosed as closed unstable tibial plateau fracture.
2. Age group of 20-60 years of both sexes.

The Exclusion criteria

1. Skeletally immature individuals.
 2. Open fractures of tibial plateau.
 3. Fracture associated with knee dislocation.
 4. Patient associated with ipsilateral femur and tibia and foot fractures.
- All patients are selected on the basis of history, clinical examination and radiography.
 - The Schatzker's classification was used to classify these fracture. The patients were followed up for an average period of 9 months.
 - Fractures will be defined as unstable if any of the following are present:

Depression > 4mm

Displacement > 10mm

Instability > 10°

- All cases will be treated with open reduction and internal fixation.
- Fixation can be done by
Canulated cancellous screw fixation
A O type T or L-plate or hockey stick shaped plate
- Follow up and assessment will be performed using modified rasmussen's clinical and radiological criteria.

Results

Table 1: Frequency of Side of Injury

Side	Frequency	Percentage
Right	21	70
Left	09	30
Total	30	100

In this study 70% of the patients sustained injury on the right side and 30% on the left side. In our study, there was right sided predominance, compared to the left side.

Table 2: Frequency of Type of Fracture

Type of Fracture	No. of Cases	Percentage
I) Pure cleavage	06	20.0%
II) Cleavage with depression	03	10.0%
III) Central depression	03	10.0%
IV) Medical condyle fracture	01	03.34%
V) Bicondylar fracture	05	16.66%
VI) Bicondylar fracture Metaphysio-diaphyseal dissociation	12	40.0%

In our study, the majority of the fractures were found to be of type VI fracture type i.e., bicondylar fracture with metaphysio-diaphyseal dissociation.

Table 3: Frequency of method of treatment

Type of Fracture	No. of Cases	Percentage
Percutaneous cancellous screw fixation	03	10
ORIF with cancellous screws and bone graft	03	10
ORIF with buttress plate	21	70
ORIF with buttress plate and bone graft	03	10
Total	30	100

Table 4: Clinical results

Clinical results	No. of Cases	Percentage
Excellent	12	40.0
Good	13	43.3
Fair	04	13.4
Poor	01	3.3
Total	30	100

Table 5: Radiological results

Radiological results	No. of Cases	Percentage
Excellent	09	30.0
Good	11	36.6
Fair	07	23.4
Poor	03	10.0
Total	30	100

Out of 30 cases treated with surgical procedure, clinically 12 cases gave excellent result, 13 cases came out with good result, fair in 4 cases and 1 cases had poor result, mainly due to the severity of the injury and varus deformity. Retrospectively it was found that high velocity injuries (type V-VI) have poor outcome than low velocity injuries (type I-IV)

Discussion

Tibial plateau fractures, one of the commonest intra articular fractures and are major traumatic injuries occurring as a result of RTA, fall from height, violence etc. the management of tibial plateau fracture has always been a subject of debate because of their variety and complexity. Any fracture around the joint (especially weight bearing knee joint in the lower limb) is of paramount importance as it would result in significant morbidity and quality of life may be affected. High energy intraarticular fractures of the tibial plateau cause on going management problems and remains challenging for orthopedic surgeons even to date.

Aim of study is to evaluate functional outcome in operatively treated tibial plateau fractures in 30 cases, the analysis of the results were made in terms of – Age of the patient, sex distribution, occupation, mode of injury, side of fracture, analysis of the types, modalities of treatment, complications

associated injuries and the functional outcome.

Tibial plateau fractures are more commonly seen in the active productive age group (31-50 years) due to high-energy trauma. Closed treatment of these injuries has had little success in reducing depressed or displaced fracture fragments, this necessitates open treatment in most displaced and unstable fractures. It is extremely important to do a stable fragment fixation and ligament repair in order to regain the complete range of motion.

In our series majority of the patients were males (90⁰). This can be attributed to the fact that males are more prone to road traffic accidents in the Indian scenario ^[5]. So the significance of tibial plateau fracture-related sex distribution was not available to comment on them.

Occupationally tibial plateau fractures were seen in people with high level of activity, movement and travel. It is most commonly seen with people who high mobility like businessman (30%), employee (30%) and laborers (20%) ^[6].

In our study, there was right sided predominance, compared to the left side with right side being 70% and left side 30%.

In this series we studied 30 cases of tibial plateau fractures treated only by surgical methods. Different authors use different criteria for the surgical management of these fractures. Seppo E. Honkonen conducted 130 tibial plateau fractures taking into consideration the following ^[7]:-

- Condylar widening of >5mm
- Lateral condyle step off >3mm
- All medical condylar fractures for the surgical management.

In our study, the indications for the surgery were the same standard indications as for the tibia plateau fractures. 3mm depression was considered as an indication for surgery in our series ^[8].

In our study, majority of the fractures were found to be of type VI and type I fracture types i.e., bicondylar fractures with metaphysio diaphyseal dissociation and pure cleavage fracture account for about 60%, and least is type IV (medial condyle fracture) which is about 3%.

Conclusion

Displaced condylar fractures of tibial plateau those belonging to Schatzker's type I and II, the treatment of choice is CRIF/ORIF with PCSF results are excellent to good by this method Schatzker's type III can be managed operatively with ORIF with Buttress plate and bone grafting give good to fair results.

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