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PROSPECTIVE ANALYSIS OF INTRA-ARTICULAR FRACTURE OF PROXIMAL TIBIA MANAGED BY PLATE FIXATION

Orthopaedics

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ABSTRACT

Background: Proximal tibial involvement is one of the most common intra-articular fracture, comprising 1% of all fractures, mostly seen in high-velocity road traffic accidents involving two-wheelers. Till date, definitive protocol of complex tibial plateau fractures has not developed. **Objective: A.**To study the management of the proximal tibia fractures by Tibia Plating to obtain a stable, pain free, mobile joint. B.To assess outcome of management in terms of knee stiffness and early mobilization of joint. C-To assess the efficacy of this method in terms of functional result. **Material And Methods:** This prospective comparative study was done in LLR Hospital, GSVM Medical College Kanpur on 33 patients, with Intra-articular proximal tibia fracture of less than 3 weeks duration. After doing Schatzker classification, management was done by Plate fixation. **Results:** Assessment of patients (33 by Plate fixation) showed predominantly male involvement with mean age of 35.72 years. Regular follow-up showed mean functional knee score by modified Rasmussen criteria for Plate fixation was 24.08. Complications seen in two cases each of knee stiffness and surgical site infection. **Conclusion:** Plate fixation is more effective than any other modalities in most of intra-articular fractures, due to maintenance of articular congruity and finally better functional outcome.

KEYWORDS

INTRODUCTION

Intra-articular proximal tibia fractures i.e., tibial plateau fractures, account for almost 1% of all fractures and usually result from axial loading combined with some varus and valgus forces[1]. These fractures present in a wide range of patterns, with varying degrees of displacement, depression of articular surface and the predominance of involvement of the tibial condyle, either medial, lateral or both. Presently, the majority of the proximal tibia fractures are secondary to high- speed motor vehicle accidents and fall from height. There are various methods of surgical management ranging from internal fixation to external fixation with extensile to minimally invasive exposure using implants such as plate, nail, k-wires, screws, external fixators, etc[2]. In this study, the management of proximal tibia fractures by plate fixation was studied prospectively.

AIM AND OBJECTIVES-

A. To study the management of the proximal tibia fractures by Tibia Plating to obtain a stable, pain free, mobile joint.
B. To assess outcome of management in terms of knee stiffness and early mobilization of joint.
C. To assess the efficacy of this method in terms of functional result.

MATERIAL AND METHODS

This study was carried out in the Department of Orthopedics, L.L.R. and associated hospitals, G.S.V.M. Medical College, Kanpur in the casualty and out-patient department. It was a prospective comparative study conducted between December 2019 to October 2021 over total of 33 patients.

Inclusion Criteria

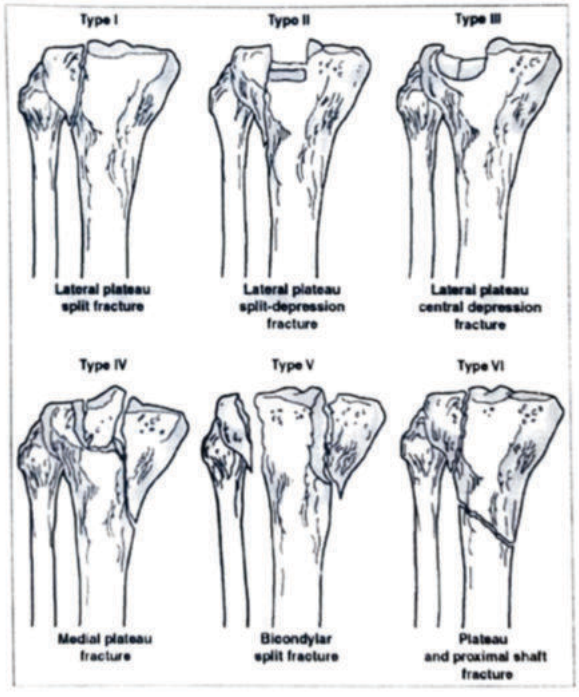
- All acute proximal tibia fractures of <3 weeks duration including tibial plateau fractures
- Fractures of < grade 3b Gustilo-Anderson classification
- Intact neurovascular status
- Skeletally mature individuals (>18 years age)
- Patients giving consent for intervention and willing to come for regular follow-up.

Exclusion Criteria

- Patients of >3 weeks duration
- Fractures of grade 3c Gustilo-Anderson classification
- Patient unfit for surgery
- Pathological fracture

Method

Injury classification according to Schatzker classification system[3]



o Follow — up

The follow up was done at 2 weeks, 6 weeks, 3 months, 6 months. Assessment at 6 months is done using **modified Rasmussen's**

criteria[4].

It has Clinical and Radiological assessment components. In our study we used Clinical assessment.

Clinical assessment.	
Pain	
None	6
Occasional	5
Stabbing pain in certain position	3
Constant pain after activity	1
Significant rest pain	-3
Walking capacity	
Normal walking capacity for age	6
Walking outdoors more than one hour	5
Walking outdoor 15 mins – 1 hour	3
Walking outdoor <15 mins	1
Walking indoor only	0
Knee extension	
Lack of extension <10°	2
Lack of extension <10°	0
Lack of extension >20°	-2
Total range of motion	
Full	6
At least 120°	5
At least 90°	3
At least 60°	1
<60°	-3
Stability	
Normal stability in extension and 20° flexion	6
Abnormal instability in 20° flexion	4
Instability in extension <10°	2
Instability in extension >10°	0
Power of quadriceps	
Grade 5	2
Grade 3-4	1
Grade <3	-2
Maximum score	30
Excellent	28-30
Good	24-27
Fair	20-23
Poor	<20

DISCUSSION

In open fixation methods, anterolateral and posteromedial incisions are used either singly or in combination, depending on the type of modality used. Intra-articular alignment is obtained by elevation of depressed articular fragment and fixation with plates and screws. Thus, open reduction and internal fixation by plate osteosynthesis should be the treatment of choice for all tibial plateau fractures with significant displacement.

In this study, implant selection was based on the type of fracture, the skin condition, surgeon's preference, and the financial condition of the patient.

A total of **33 patients** of Intra-articular fracture of proximal tibia were included in this study, categorized by **Schatzker classification** and were followed up for a minimum period of 6 months. This was similar to the study by Biswas et al (2014)[5], Herode et al (2016)[6] but contrasted with studies by Z Yu et al (2009)[11], CC Chan et al (2012)[10], Shah et al (2017)[11].

Study	Sample size	Classification used
Biswas et al (2014)[5]	30	Schatzker
Harpreet Singh et al (2015)[7]	20	Schatzker
Herode et al (2016)[6]	50	Schatzker
	Sample size	**Classification used**
Z Yu et al (2009)[8]	65	AO
CC Chan et al (2012)[10]	82	AO
Shah et al (2017)[11]	70	AO

33 patients were treated by Plate fixation. Studies with similar and contrasting treatment modalities are shown tabulated below.

Study	Treatment Modality
Herode et al (2016)[6]	Various modalities (CCS, Buttress plating, LCP)
Yu et al (2009)[8]	Double buttress plating
Ramesh Chand et al (2015)[9]	Intramedullary Nailing (IMN) versus Proximal tibia plating (PTP)
Harpreet Singh et al (2015)[7]	JESS
CC Chan et al (2012)[10]	Hybrid External fixation versus Internal fixation

Patients were clinically assessed by **modified Rasmussen score**[4] for functional assessment at regular intervals (2 weeks, 3 months, 6 months) for minimum period of 6 months.

This was similar to the study by CC Chan et al (2012)[10], Biswas et al (2014)[5], Herode et al (2016)[6], Shah et al (2017)[11]. However, certain studies assessed the outcome by different scoring variable too.

Study	Outcome variable
CC Chan et al (2012)[10]	Rasmussen score
Biswas et al (2014)[5]	
Herode et al (2016)[6]	
Shah et al (2017)[11]	

Majority of the patients in our study **(84.84%) have road traffic accident** (especially two-wheelers) as the mode of injury with mean age of **35.72 years**. This can be explained, as in these age group activities of livelihood, job opportunities and vehicular mobility predispose them to high energy vehicular accidents. This was consistent with the study by Herode et al(2016)[6], Cole PA et al (2004)[14], Ricci WM et al(2004)[15] and Stannard JP et al (2003)[16]

Herode et al(2016)[6]	38.50 years
Cole PA et al (2004)[14]	35 years
Ricci WM et al(2004)[15]	40 years
Stannard JP et al(2003)[16]	37 years
Sreenath Rao et al(2018)[13]	85% RTA
Herode et al(2016)[6]	73.3% RTA

In our study, we found **males are affected more (87.8%)** as compared to females (12.2%). The reason could be males being the earning member of the family causing the need to travel more, thereby increasing the chances of accidents.

This was consistent with the study by Herode et al (2016)[31], Biswas et al (2016)[36], Lee et al (2007)[49], Albuquerque et al (2013)[50].

Out of the 33 cases in our study, **23 cases were closed** fracture and rest **10 were open fractures** based on Gustilo-Anderson typing similar to study by Shah et al (2017)[11].

In our study, majority of fractures were Schatzker type 6(57.57%) followed by type 5(18.18%) which was similar to study by Yu et al (2009)[8] and Ruslan GS et al (1998)[19].

The mean full weight bearing time in Plating group was 17.8 weeks similar to study by Yu et al (2009)[8] of 18.7 weeks weight bearing time.

We observed mean Rasmussen score at 2 weeks was 17.04+1.106, at 6 weeks was 19.56+1.308, at 3 months was 21.34+1.584, at 6 months was 22.91+1.345, at latest follow-up was 24.08+1.806. We observed that the difference in mean Rasmussen score was highly significant with p value of <0.001.

The major problem faced by us during the study was **Knee stiffness** in 3 cases due to prolonged immobilization. surgical site infection in 2 cases of Plate fixation with 1 leading to wound dehiscence and other resolving on regular dressing and intravenous antibiotic administration. There was 1 case of neuropraxic nerve injury which recovered in subsequent follow-up.

Study	Complication
Herode et al (2016)[6]	Infection(n=1), Knee stiffness(n=1)
Shah et al (2017)[11]	Infection(n=3), Malunion(n=6)
Patel et al(2017)[12]	Infection(n=2)
Harpreet Singh et al (2015)[7]	Pin tract infection(n=2), Nonunion(n=1)

In our study, plate fixation group (33 cases), we found on the basis of Rasmussen scoring at regular follow-up- excellent results in 0 cases, good results in 27 cases, fair results in 6 cases, and poor results in 0 cases.

No problem in fracture union was reported in our series. Non-union is very rare in this fracture due to its metaphyseal location and abundant blood supply.

Hence in our study, we found that , Plate fixation patients had significantly better final functional outcome ($p<0.05$).

CONCLUSION

Plate fixation is an effective method in most of the intra-articular fractures, due to maintenance of articular congruity and finally better functional outcome. Our results showed better functional outcome in plate fixation as compared to other modalities.

Our study had some limitations. Firstly, we had to include patients of wide age group. Secondly, the absence of long-term follow-up.

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