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A prospective evaluation of posteromedial buttress plate as a tool for management of bicondylar fracture of tibia

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Abstract

Background: Tibial plateau is important component of knee joint and bicondylar fracture of tibial plateau is a complex fracture and challenges to orthopaedic surgeon. The lateral locking plate alone may not be sufficient to hold this fragment, because of the morphology and position of postero-medial fragment, leading to late varus collapse. To counter this problem, a separate posteromedial buttress plate is now been used by surgeons.

Method: This is a prospective study that included 36 patients with closed posteromedial tibial plateau fractures who had undergone open reduction and internal fixation through a posteromedial approach by plate and screws between August 2017 and December 2020. Open reduction was done for all patients with anterolateral and open posteromedial approach internal fixation was done with lateral and posteromedial buttress plate.

Result: As per Rasmussen's functional scoring 26(72.23%) patients have excellent outcome, in 8 (22.23%) patients and in two patients (5.56%) outcome was fair.

Discussion and Conclusion: Bicondylar fracture is more common in younger population with female predominance. Road traffic accident is more common than then fall and schatzker type 5 fracture was common than schatzker type 6 fracture. Rasmussen's functional scoring patients have excellent in more than 70 % patients. Posteromedial buttress plate is a good tool for management of bicondylar fracture of tibia.

Keywords: Posteromedial buttress plate, bicondylar fracture of tibia, posteromedial fragment

Introduction

Tibial plateau is important component of knee joint and bicondylar fracture of tibial plateau is a complex fracture and challenges to orthopaedic surgeon^[1,2]. The incidence of tibial fracture is 1% of all fracture and 18% to 39% of all tibial plateau fractures is bicondylar which is caused by moderate to high energy impact^[3,4]. Because of its association of high energy impact it is associated with neurologic and vascular compromise, additional orthopaedic injuries and compartment syndrome^[5].

Management of bicondylar fracture of tibia is a challenge as it has bimodal age distribution. In young patient it is due to high energy accident and in old age it is due to osteoporosis. Further anatomy of bicondylar region and compromise of the soft tissue envelope makes the surgical fixation challenging^[6]. So management of bicondylar fracture depends upon condition of patients and nature of fracture. For good prognosis and proper postoperative movement early post operative movement and adequate fixation is required. Tien-Ching Lee, Hsuan-Ti Huang, Yu-Chuan Lin, Chung-Hwan Chen *et al.* has reported that Buttressing of both the medial and lateral compartments with conventional double plating is the gold standard for managing bicondylar fractures. Bicondylar fracture of tibia with posteromedial posteromedial fragment is challenge and to treat that a separate posteromedial buttress plate is used.

Fracture line lies in the coronal plane leading to separation of a posteromedial fragment of variable size. The current imaging techniques improved, the better understanding of fracture anatomy and facilitated various fixation modalities. The lateral locking plate alone may not be sufficient to hold this fragment, because of the morphology and position of postero-medial fragment, leading to late varus collapse.

To counter this problem, a separate posteromedial buttress plate is now being used by surgeons. This study is aiming to spot light on posteromedial approach as new concept in treatment of tibial plateau fracture as regarding to clinical and radiological outcome and to assess its surgical efficacy and advantages in such cases and to show is it's beneficial to the patients. To study the functional and radiological outcome of Tibial plateau fractures, Schatzker type 5 and 6 treated surgically with plate osteosynthesis.

Method

Place and time of study: This study has been conducted in the department of orthopaedics, Konaseema institute of medical sciences, Amalapuram, Andhrapradesh from August 2017 and December 2020.

Type of study: This is a prospective observational study.

Ethics: Approval from institutional ethics committee was taken before start of study. A written informed consent was obtained from all patients before enrolling them for study.

Selection of patients

The patients admitted in the department of orthopaedics with Tibial plateau fractures, Schatzker type 5 and 6 were enrolled for this study as per following exclusion and inclusion criteria.

Exclusion criteria

- 1) Pathological fracture
- 2) Age below 18 years
- 3) Schatzker type 1 to 4
- 4) fracture already treated conservatively

Inclusion criteria

- Age above 18 yrs.
- Both sex
- Schatzker type 5 and 6 with posteromedial fragment

Method

This is a prospective study that included 36 patients with closed posteromedial tibial plateau fractures who had undergone open reduction and internal fixation through a posteromedial approach by plate and screws between August 2017 and December 2020.

After receiving patient in casualty and trauma department, first patient were stabilised and a thorough examination was done and proper history of patient regarding mode of injury basic demographic data and details were recorded. After stabilization radiological investigation was done to classify the fracture as per Schatzker classification. All patients were further evaluated by CT scan for details of fracture. After proper stabilization and preparation of the patient as per standard anaesthesia protocol patient were taken up for surgery. Open reduction was done for all patients with anterolateral and open posteromedial approach internal fixation was done with lateral and posteromedial buttress plate. Post operative radiological examination was done to know the condition of plate and patient was encouraged for early mobilisation and regular physiotherapy was done.

Rasmussen's radiological scoring was used for evaluation of outcome of treatment.



Fig 1: Pre operative and Post operative X-ray of bicondylar fracture of tibia

Result

During study period of three and half years 116 patients with fracture of tibial plateau were admitted in the department of orthopaedics. As per selection criteria 36(31%) patients with bicondylar fracture with posteromedial fragment were enrolled for this study.

Table 1: Characteristic of patients with bicondylar fracture of tibia

Variables	Number	Percentage (%)	
Age (Mean± SD, 48.32±8.39 years)	18 to 30	12	33.33
	31 to 45	14	43.75
	46 to 60	3	8.34
	More than 61	7	19.45
Sex	Male	28	77.78
	Female	8	22.23
Schatzker classification	Type 5	20	55.56
	Type 6	16	44.45
Mechanism of trauma	Road traffic accident	28	77.78
	Trivial fall	2	5.56
	Fall from height	6	16.67

As per table mean age of patient was 48.32±8.39 years. Number of patients below 30 years was 12(33.33%), between 31 to 45 years were 14(43.7%), between 41 to 60 years were 3(8.34%) and above 60 years were 7(19.45%). There was male predominance and male to female ratio was 28/8(77.78%/22.23%). Number of patients with schatzker type 5 fracture were 20(55.56%) and type 6 were 16(44.56%). Road traffic accident was common mode of injury, 28(77.78%) patients have high impact road traffic accident. Trivial fall was present in 2(5.56%) and fall from height was cause of fracture in 6(16.67%) patients.

Table 2: Rasmussen's functional scoring of patients with bicondylar fracture of tibia treated with posteromedial buttress plate

Result	Number	Percentage (%)
Excellent	26	72.23
good	8	22.23
fair	2	5.56
poor	0	0

As per Rasmussen's functional scoring 26(72.23%) patients have excellent outcome, in 8 (22.23%) patients and in two patients (5.56%) outcome was fair.

Discussion

Bicondylar fracture of tibia is a complex fracture with bimodal age distribution and associated with high energy trauma. In our study mean age of incidence was 48.32±8.39 years with male predominance. Elsoe R, Larsen P, Nielsen NP, Swenne J, Rasmussen S, Ostgaard SE *et al.* has reported that the mean age of patients incurring tibial plateau fractures is 52.6 years and is more common in man this finding support our study [8]. Albuquerque RP, Hara R, Prado J, Schiavo L, Giordano V, do Amaral NP *et al.* has reported that mean age of incidence in their study was 44.15± 14.4 years with male predominance. Regarding mode of injury road traffic accident and fall from height is common mode of injury. These finding support our study [9]. In our study schatzker type 5 fracture was common than schatzker type 6 fracture which is supported by the work of Kumar G, Peterson N, Narayan B *et al* and Dr. Nisarg Patel, Dr. Ridham P Baria, Dr. Piyush S Mittal and Dr. Neil Rohra *et al.* [10, 11]

Rasmussen's functional scoring of patients with bicondylar fracture of tibia treated with posteromedial buttress plate Rohra N, Suri HS, Gangrade K *et al.* has reported that good scoring was more common than excellent but in our study excellent outcome was common than good which contradict our finding [12]. Raghulraj Sundaramoorthy, Senthilnathan Arumugam and Prabhakar Ramabadrhan has concluded that among 26 patients, functional score were excellent in 20, Good in 3, Fair in two and poor in one patient which support

our study [13]. Our finding is supported by the study of Zhang Y, Fan D, Ma B, Sun S *et al.* and Oh CW, Oh JK, Kyung HS, Jeon IH, Park BC, Min WK, *et al.* [14, 15]

Conclusion

Based on our study we can conclude that bicondylar fracture is more common in younger population with female predominance. Road traffic accident is more common than then fall and schatzker type 5 fracture was common than schatzker type 6 fracture. Rasmussen's functional scoring patients have excellent in more than 70 % patients. Posteromedial buttress plate is a good tool for management of bicondylar fracture of tibia.

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