Study of Clinical Presentation of Tibial Plateau Fractures Presenting to a Tertiary Healthcare Institute: A Cross Sectional Study

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ABSTRACT

Introduction: Tibial plateau are a diverse group of fractures which includes a wide spectrum of clinical presentation and severity which was previously known as car bumper fractures. Clinically tibial plateau fractures ranges from simple injuries most commonly to the complex fracture often offers challenges for successful management even to the most experienced surgeons globally. The present study was conducted to study the clinical presentation of tibial plateau fractures presenting to a tertiary care center.

Material and methods: It was a cross sectional study conducted among 13 patients with tibial plateau fractures during January 2016 to December 2016 admitted under department of orthopedics in a tertiary healthcare institute in northern Maharashtra.

Results: The majority of fracture (69%) was the consequence of road traffic accidents. This clearly explains the synonym for tibial condylar fractures as "bump fractures", caused by hit by bumper f vehicle. Fall from height was the second major cause.

Conclusions: Tibial plateau fractures were observed to be more common among males, in 30-40 years of age group. Road traffic accident being the most common cause.

Keywords: Tibial Plateau Fractures, Road Traffic Accidents, Shaktzer's Classification, Bump Fractures, Clinical Presentation

INTRODUCTION

Tibial plateau are a diverse group of fractures which includes a wide spectrum of clinical presentation and severity which was previously known as car bumper fractures.[1] Clinically tibial plateau fractures ranges from simple injuries most commonly to the complex fracture often offers challenges for successful management even to the most experienced surgeons globally.[2]

Tibial plateau fractures are among the most common intra-articular fractures that results from indirect coronal or direct axial compressive forces. When we look for the epidemiological statistics of the tibial plateau fractures, it mainly constitutes about 1% of all the fractures and 8% fractures in the elderly age group.[3] These types of fractures usually involves the medial condyle approximately among 10-23% cases, lateral condyle among 55-70% cases or both (11-30%) with variable degrees of associated articular depression and displacement. If managed inaccurately, restored improperly, the plateau surface and the axis of the leg, these fractures may complicate to the development of premature osteoarthritis, ligamental injuries, as well as persistent pain and disability.[4] It may be associated with meniscal and ligamentous injuries to the knee also.[5]

Schatzker classification system is widely used for the evaluation and initial assessment of the injury, assessment of its severity, planning of further management and prediction of prognosis. This classification system divides tibial plateau fractures into six types. Each increasing number of the class shows increased level of energy imparted to bone, hence increasing severity of fracture.[5] First four types of the fractures are unicondylar and type V, VI are bicondylar types of fractures. Hence, every pattern of fracture according to Schatzker classification helps orthopeadic surgeons to decide, direct and adopt appropriate loine of management and to choose appropriate surgical modality.[6]

The present study was conducted to study the clinical presentation of tibial plateau fractures presenting to a tertiary care center.

MATERIAL AND METHODS

It was a cross sectional study conducted among 13 patients with tibial plateau fractures during January 2016 to December 2016 admitted under department of orthopedics in a tertiary healthcare institute in northern Maharashtra. The criteria for selection of a case were a fracture of tibial plateau (Shatzker's type I to type IV) with displacement or depression more than 8mm.

The data was collected with the help of pre-validated case record proforma. The data is entered with the help of Microsoft Excel software. The data was tabulated for frequency distribution.

RESULTS

The present study was conducted among cases of tibial plateau fracture, admitted under deparment of orthopedics, in a tertiary medical institute in northern Maharashtra. In the present study it was seen that tibial plateau fractures are more common in adults below 50 years, which is the

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most active period of life. The youngest patient in our series was 24 years old and oldest patient was 60 years old. Majority of our cases was males. Probably due to frequent exposure to high velocity injuries and trauma. (Table 1) (Chart 1).

The majority of fracture (69%) was the consequence of road traffic accidents. This clearly explains the synonym for tibial condylar fractures as "bump fractures", caused by hit by bumper f vehicle. Fall from height was the second major cause. (Table 2)

In this study only tibial plateau fractures Shatzker's type I to type IV were included. Majority of our cases was Shatzker's type I and type II. There was no case of Shatzker's type III fractures. All the cases selected were having displacement or depression of more than 8 mm. (Table 3) Closed fracture (93%) was more common as compared to open fractures in our series. (Chart 2)

Sr. No.	Age Group (Years)	No. of Patients	Percentage
1	21-30	3	24
2	31-40	5	38
3	41-50	3	24
4	51-60	2	14
	Total	13	100

Table-1: distribution of cases according to age

Sr. No.	Mode of Injury	No. of Cases	Percentage%
1	Road traffic accident	9	69
2	Fall from height	3	24
3	Other (Blow, assault, sport injuries etc)	1	7
	Total	13	100

Table-2: Mode of Injury

Sr. No.	Type of fracture (According to shatzker's) classification	No. of cases	Percentage%
1	Type I	5	38
2	Type II	5	38
3	Type III	-	-
4	Type IV	3	24
Total		13	100

Table-3: Type of Fracture

Sr. No.	Series	Average age (Years)
1.	David et al[7]	48
2.	Edward A et al[8]	45.5
3.	Present study	40

Table-4: Comparison of Age Distribution with various studies

Sr No	Series	Male	Female	Total	Ratio
1.	Edward A et al[8]	19	3	22	6.3:1
2	David et al[7]	70	38	108	1.8:1
3.	Present study	10	3	13	3.1:1

Table-5: Comparison of Sex Distribution in various studies

Chart-1: Sex Distribution

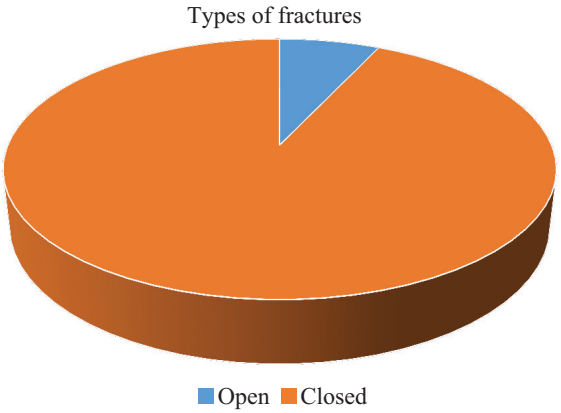

Chart-2: Closed and Open Fractures

Sr. No.	Series	RTA	Fall	Assault	Sport Injuries	Other
1	M. Hohl et al[9]	45%	17%	-	13%	12%
2	Edward et al[8]	40%	45%	-	-	15%
3	P.Keogh et al[10]	38%	38%	-	8%	16%
4	Present series	69%	24%	-	-	7%

Table-6: Comparison of Mode of Injuries between various studies:

Sr. No	Series	Tibial plateau fractures (Shatzker's classification)			
		Type I	Type II	Type III	Type IV
1.	Barringtons[12] (1965)	27%	9%	37%	12%
2.	Rombold[13] (1960)	20%	20%	22%	20%
3.	Present series	38%	38%	-	24%

Table-7: Comparison of types of fracture reported in various studies:

DISCUSSION

The knee joint is one the commonly injured joint. It is the largest and most complex joint, exposed to exterior. It helps in mobility and stability of the lower limb and hence locomotion. The functional capacity of any person depends on its integrity. The fractures around the knee joint are on an increase.

Fractures of the tibial condyles account for 1% of all fractures and 8% of the fractures in the elderly groups. The ideal outcome after a tibial plateau fracture is stable, pains-free, non-osteoarthritic knee joint with a range of motion that is adequate for functional requirements.

The average age of 40 years was observed in our series. This is due to the fact that this is the working age group with increased mobility. Hence they are more exposed to the exterior and consequently more injured. Nearly similar kind of age distribution was observed in two of the studies cited in table 4.

In present series of 13 patients; there were 10 male and 3 female patients. A male to female ratio was 3.1:1. The increased incidence of fracture of tibial plateau in males may attribute to active outdoor lifestyle of males. Comparison of sex distribution between various studies is given in table number 5.

Bakalim and Wilppula; Portar; Rasmussen and Roberts all have noted that automobile accident accounts to 40-60% of tibial plateau fractures. This clearly explains the synonym for tibial condylar fracture as bump fractures-caused by hit by bumper of vehicle.[11]

In the present series it was observed that road traffic accident were most common cause of tibial plateau fractures (69%). Fall from height (24%) was the second common cause. The high incidence of tibial plateau fractures due to road traffic accidents is comparable to other series. However, no case of tibial plateau fracture was observed due to sports injury. This may be attributed to the fact that this being rural area, people have lesser inclination towards sports activities.

Comparison of mode of injuries observed in various studies in mentioned in table number 6.

In our series of 13 patients, only tibial plateau fractures Shatzkers type-I to type-Iv was included. Split fractures (38%) and mixed fracture (38%) of lateral tibial plateau constituted majority of our cases. We did not come across wit any case of Shatzker's type-III tibial plateau fracture, during our study period of 3 years.

In studies done by Rasmussen, Batalim and Wilpplula, Rinoapali lateral plateau fractures account for 55-70% medial plateau fractures 8-19.2% and bicondylar fractures accont for 18-31% the reason that lateral plateau fracture were common, is weaker trabecular pattern under the lateral condyle (as more weight transmission takes place through medial condyle) and frequent valgus injuries affecting the knee. As varus force is less common, medial plateau fracture is less.

Comparison of type of fractures as reported in various studies is mentioned in above table number 7.

Closed or open fractures

13 cases of fresh fractures of tibial plateau, we encountered one (7%) case of grade – I compound fracture. The wound was minimally contaminated. Thorough debridement done and washed with hydrogen peroxide and normal saline. It become healthy after 3 daily dressing, after that patient was operated for definitive fixation.

As our series is small and consisting of selected cases of tibial plateau fractures suitable for percutaneous fixation with cannulated cancellous screws, the Shatzker types fractures (close or open) can not be compared with other series consisting of non selected cases.

CONCLUSIONS

Tibial plateau fractures were observed to be more common among males, in 30-40 years of age group. Road traffic accident being the most common cause. Majority of the fractures were of closed type and Type I and Type II fractures were observed to be commonest of all in the current study (Shatzker's classification).

REFERENCES

1. Cotton FJ, Berg R. Fender fractures of the tibia at the knee. N Engl J Med. 1929;201:989–95.
2. Marsh JL. Tibial plateau fractures. In: Bucholz RW, Heckman JD, Court-Brown CM, Tornetta P, McQueen MM, Ricci WM, editors. 7th ed. Philadelphia: Lippincott Williams & Wilkins; 2010. pp. 1780–831. Rockwood and Green's fractures in adults.
3. Jacofsky DJ, Haidukerwych GJ. Insall & Scott Surgery of the knee. Philadelphia: Churchill Livingstone; 2006. Tibia plateau fractures. In: Scott WN; pp. 1133–46.
4. Wang SQ, Gao YS, Wang JQ, Zhang CQ, Mei J, Rao ZT. Surgical approach for high-energy posterior tibial plateau fractures. Indian J Orthop. 2011;45:125–31.
5. Markhardt BK, Gross JM, Monu J. Schatzker Classification of Tibial Plateau Fractures: Use of CT and MR Imaging Improves Assessment. Radio Graphics. March 2009;29:585–97.
6. Zeltser DW, Leopold SS. Classifications in brief: Schatzker classification of tibial plateau fractures. Clin Orthop Relat Res. 2013;471:371–74.
7. Zeltser David W, Leopold SS. Classifications in brief: Schatzker classification of tibial plateau fractures. Clin Orthop Relat Res. 2012;471:371–374.
8. Hohl M. Tibial condylar fractures. JBJS. 1967;49:1455–1467
9. Edwards ER, Chin TYP, Bardana D, Bailey M, Williamson OD, Miller R, et al. Func-tional outcome of tibial plateau fractures treated with the fine-wire fixator. Injury. 2005;36:1467–75
10. P. Keogh, C. Kelly, W.F. Cashman, A.J. McGuinness, S.K. O'Rourke, Percutaneous screw fixation of tibial plateau fractures, Injury 1992;23:387-389.
11. Bakalim G, Wilppula E. Fractures of the tibial condyles. Acta Orthop Scand. 1971;42:429–430.
12. Barrington, T.W., and Dewar, F.P. Tibial plateau fractures, Can. J. Surg 1965;8:146-152.
13. Rombold C. Depressed fractures of the tibial plateau, treatment with a rigid internal fixation and early

mobilization: a preliminary report. J Bone Joint Surg Am 1960;42:783–797

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