ORIGINAL ARTICLE

PATTERN OF TIBIAL PLATEAU FRACTURE TREATED BY PERCUTANEOUS SCREW FIXATION

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ABSTRACT

Background: The objective of the study was to determine the distribution, determinants and complications of tibial plateau fracture treated by percutaneous screw fixation.

Material & Methods: This cross sectional study was conducted in Orthopedics department, Dow OJHA Hospital and Civil Hospital Karachi, from July 2014 to December 2015. Sample size was 58 patients admitted through the outpatient department and casualty department of Orthopedics. The tibial plateau fractures were treated by percutaneous screw fixation. All patients underwent for base line investigation. Inclusion criteria were tibial pltteau fractures which were of closed type, age 20 to 65 years, both gender and fresh fracture. Exclusion criteria was age below 20 years, patients not willing for surgery, patients not medically fit for surgery due to associated severe chest or abdominal injuries. Demographic variables were gender, age, age groups (20-30, 31-40, & 41-50 years). Research variables were mode of injury (road traffic accident, history of assault, injury following fall), complication (infection, screw loosening, pain during walking, knee stiffness, ankle stiffness and delayed union). Data was analyzed by using SPSS version 20.

Results: Out of 58 patients, 89.65% were males and 10.34% were females showing male preponderance because of traveling and working in fields and factories. In our study, 69.35% of patients sustained injury following road traffic accident, history of assault 20.96% cases and 9.67% patients sustained injury following fall. Complications seen in this study were wound infection in 2 patients, screw loosening in 2 patients, pain during walking in 12.90%, knee stiffness in 12.90%, ankle stiffness in 3.22% and delayed union in 3.22% patients.

Conclusion: Tibial fractures are common in young males. RTA is common cause; Knee stiffness and ankle stiffness are the common complications of tibial fractures treated by percutaneous screw fixation.

KEY WORDS: Fracture; Percutaneous screw fixation; Tibia.

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INTRODUCTION

Increasing number of road traffic accidents (RTAs) and firearm injuries have significantly raised the number of tibial fractures. Tibial plateau fracture account for 1% of all fractures and 8% of fractures in the elderly. Out of these10-23% cases involve medial condyle, 55-70% involves lateral condyle and 11-30% involve both.[1] Mode of treatment is important in management of tibial fractures as inappropriate methods can lead to skewed consolidation, failure of consilidation and even re-operation. Most exposed fractures are treated by external fixation as this method carries greater versatility and can be adequately installed. They provide good stability and are associated with minimal damage to soft tissue and vascular structures. They can be used for both exposed fractures and closed fractures. External fixaton is the treatment of choice for orthopedist in the emergency department as they are easy to install and do not require involvement of subspecialties.[2] For tibial plateau fractures, it is suggested that the anatomical restoration of articular surface should be established. Approach to tibial plateau fractures is defined as follows: First step is to evaluate the mechanism and energy of trauma. High energy trauma and advanced age are associated with poor prognosis. Evaluate the level of soft tissue trauma and rule out any associated neurovascular injuries. CT scan can be obtained for understanding the fracture. CT scan can reveal patterns of fragments and fracture lines.

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For complex injuries multiple surgical approaches may be necessary.[3,4]

Tibial plateau fractures carry whole range of complications which can be divided into early and late stage complications. Early complications include loss of range of motion, meniscal tears or ligamental tears, knee instability, pseudoarthritis and post traumatic osteoarthritis. Other complications include deep and superficial infections, soft tissue trauma, compartment syndrome, septic arthritis, deep venous thrombosis and need of extensive surgical procedures.[5] Post-traumatic osteoarthritis usually develops 6-8 years after injury.[6] The objective of the study was to determine the distribution, determinants and complications of tibial plateau fracture treated by percutaneous screw fixation.

MATERIAL AND METHODS

This cross sectional study was conducted in Orthopedics department, Dow OJHA Hospital and Civil Hospital Karachi, from July 2014 to December 2015. Sample size was 58 patients admitted through the outpatient department and casualty department of Orthopedics.

The tibial plateau fractures were treated by percutaneous screw fixation. All patients underwent for base line investigation. Inclusion criteria were tibial plateau fractures which were of closed type, age 20 to 65 years, both gender and fresh fracture. Exclusion criteria was age below 20 years, patients not willing for surgery, patients not medically fit for surgery due to associated severe chest or abdominal injuries. Follow up of all these patients was done. Demographic variables were gender, age, age groups (20-30, 31-40, & 41-50 years). Research variables were mode of injury (road traffic accident, history of assault, injury following fall), complication (infection, screw loosening, pain during walking, knee stiffness, ankle stiffness and delayed union). Data was analyzed by using SPSS statistical package version 20.

RESULTS

Out of 58 patients, 52 (89.65%) patients were males and 6(10.34%) patients were females showing male preponderance because of traveling and working in fields and factories. Minimum age of the patient was 20 years and the maximum age was 65 years. Mean age of the patient in the study was 33.4 $\pm$2.2 years. In our study, 43 (69.35%) of patients sustained injury following road traffic accident, history of assault was in 13 (20.96%) cases and six (9.67%) patients sustained injury following fall (Table 1). Complications seen in this study were wound infection in 2 patients, screw loosening in 2 patients, pain during walking occurred in 4 (12.90%) patients, knee stiffness was observed in 4 (12.90%) patients, ankle stiffness in 1 (3.22%) patient, delayed union in 1 (3.22%) patients (Table 2).

Table 1: Demographic distribution of tibial plateau fracture (n=58).

Variable	No. Patients	Percentage
Gender		
Male	52	89.65%
Female	6	10.34%
Age		
20-30 years	19	30.64%
31-40 years	33	53.22%
41-50 years	10	16.12%
Mode of injury		
Fall	6	9.67%
R.T.A	43	69.35%
Assault	13	20.96%

Table 2: Post operative complication of tibial plateau fracture (n=58).

	No. of Patients	%age	
Wound Infection	2	6.45	P value 0.004
Screw loosening	2	6.45	
Pain during walking	4	12.90	
Knee stiffness	4	12.90	
Ankle stiffness	1	3.22	
Delayed union	1	3.22	

DISCUSSION

In our study 90% of patients were males as being the dominant member of family for financial support males spend most of their time working outdoors. The mean age group of our study was 33.4 $\pm$2.2 years. Some studies have suggested that the incidence of tibial plateau fractures carry bimodal distribution pattern. It is common in young individuals following high energy trauma such as RTAs. Second age group prone to tibial fractures is elderly in which even low evergy trauma can lead to fractures.[3] Many other studies also report similar pattern i.e. most patients were males with injuries being more common in third decade. Females in our society are mostly involved in house chore's and are less prone to such injuries. The most common mode of tibial plateau fractures was road traffic accidents (RTAs) accounting for 69% of cases followed by assault (20.96%) and least common cause was fall injuries (9.67%). In the past, the most common cause of tibial plateau fractures was fall injuries but now RTAs have taken the lead.

Elsoe Ramsus et al treated 28 patients with minimally invasive bone tamp reduction, allograft and percutaneous screw fixation. Complication rate in his study was 3.5%. The usual complication rate

following operative treatment lies between 3-5.6%. This study also assessed quality of life following management which were good following minimally operative procedures. However this is a small study with limited time until follow up.[5]

Schtzker et al reports 70 cases of tibial plateau fractures of all types. 56% of these cases were treated conservatively and 44% surgically. The average follow up of his study was 28 months. Successful management was obtained in 58% of patients with conservative managment and 78% with open surgical management.[7] Roberts et al reports 159 cases with tibial plateau fractures of all types, 62% were managed conservatively and 84% with surgery.[8]

Another study reports 39 patients with tibial condylar fractures among individuals aged 37-74 years. Mean age was 54 years. The average time until follow up was 12 months. Fifteen cases had <5mm tibial depression and were managed conservatively. Surgery was performed in 23 patients. Good functional results were obtained in all cases except 2 cases due to previous degenerative joint changes in these patients.[9]

Studies have reported that the management of tibial plateau fractures with articular surface depression of >5mm is difficult to acheive. Surgical management in presence of traction and early knee mobilization have promised good outcome in fate of tibial plateau fractures. The management option for tibial plateau fractures should be considered keeping in mind the age of patient, level of injury, range of motion and non-union. Sen et al treated 4 different cases of intra-articular non-union tibial plateau fractures with four different modalities and saftisfying results were obtained. First patient refused surgery hence POP cast was applied and full range of motion was acheived despite the patient having malalignment. Second patient was treated with open reduction and internal fixation (ORIF) with bone grafting, third patient belonged to old age group and hence total knee arthroplasty was done. Fourth patient presented with infected non-union and arthrodesis was done.[10]

Vasanad, et al reports 32 cases of tibial plateau fractures in patients with ages between 24-60 years with mean age of 41 years. Percutaneous cancellous screw fixation was done in 8 cases, cancellous screw and bone grafting in 2 cases, ORIF with buttress plate and screws in 15 cases, ORIF with buttress plate and bone graft in 6 cases and ORIF with buttress plate and external fixator in one patient. Excellent results were obtained in 44% cases, good results in 44% cases, fair results in 6% cases and poor results in 6% cases. Complications found in patients include: knee stiffness in 3 patients, malunion in 2, infection and wound dehiscence in 3 patients, extensor lag in 1 patient, redepression in 1 patient.[11]

CONCLUSION

Tibial fractures are common in young males. RTA is common cause; Knee stiffness and ankle stiffness are the common complications of tibial fractures treated by percutaneous screw fixation.

REFERENCES

1. Jacofsky DJ, Haidukerwych GJ. In sall & Scott Surgery of the knee. Philadelphia: Churchill Livingstone; 2006. Tibia plateau fractures. Scott WN; pp.1133-46.
2. Giannoudis PV, Papakostidis C, Roberts C. A review of the management of open fractures of the tibia and femur. Bone Joint J 2006;88:281-9.
3. Yoon RS, Liporace FA, Egol KA. Definitive fixation of tibial plateau fractures. Orthop Clin North Am 2015;46:363-75.
4. Molenaars RJ, Mellema JJ, Doornberg JN, Kloen P. Tibial plateau fracture characteristics: computed tomography mapping of lateral, medial, and bicondylar fractures. J Bone Joint Surg Am 2015 ;97:1512-20.
5. Elsoe R, Larsen P, Nielsen NP. Population-based epidemiology of tibial plateau fractures. Orthopedics 2015;38:e780-6.
6. Volpin G, Dowd GS, Stein H. Degenerative arthritis after intra-articular fractures of the knee. Long-term results. J Bone Joint Surg Br 1990;72:634-8.
7. Schatzker J, McBroom R, Bruce D. The tibial plateau fracture: the Toronto experience 1968-1975. Clin Orthop 1979;138:94-104.
8. Roberts JM. Fractures of the condyles of the tibia: an anatomical and clinical end-result study of one hundred cases. J Bone Joint Surg 1968;50:1505-2l.
9. Jensen DB, Rude C, Duus B, Bjerg-Nielsen A. Tibial plateau fractures. A comparison of conservative and surgical treatment. Bone Joint J 1990;72:49-52.
10. Sen RK, Soni A, Saini UC, Singh D, Yuan T. Internal fixation and bone grafting for intraarticular nonunion of tibial plateau: a report of four cases. Chin J Traumatol 2011;14:371-5.
11. Vasanad GH, Antin SM, Akkimaradi RC, Policepatil P, Naikawadi G. Surgical management of tibial plateau fractures - a clinical study. J Clin Diagn Res 2013;7:3128-30.

CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

Conception and Design:	SK, NUH, SBA, MA, SAR
Data collection, analysis & interpretation:	SK, NUH, HU, SBA, SAR
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