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TIBIAL PLATEAU FRACTURES;

FUNCTIONAL OUTCOME OF HYBRID EXTERNAL FIXATOR IN SCHATZKER-V AND VI TIBIAL PLATEAU FRACTURES.

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ABSTRACT… Background: Tibial fractures is most common type of long bone fractures. High speed lifestyles with vehicles motorcycles as well as growing waves of violence, contributing increase occurrence of tibial fractures. Tibial plateau fractures continues to be a challenge for orthopedic surgeon. Treatment of these fractures have been plagued by complications. Recent improvements in the techniques and development of hybrid external fixator have revolutionized the treatment of such fractures. **Objective:** To evaluate the clinical outcomes of hybrid external fixator in high energy Schatzkar V and VI tibial plateau fractures. **Study Design:** Descriptive, Case series. **Period:** 27 June 2013 to 26 June 2016. **Setting:** Nishtar Hospital, Multan. **Material and methods:** A total of 125 patients with open and close tibial plateau fractures, 20 to 50 years of age of both genders were included in the study. Patients having history of pervious surgery or intervention tibial plateau fractures, and h/o malignancy were excluded. All the patients were operated by a consultant orthopedic surgeon. Outcome was assessed at 16 weeks by serial radiological x-ray by formation of callus and noting any grade of pin track infection. **Results;** Our study comprised of 125 patients having Schatzker V and Schatzker VI tibial plateau fractures who met our inclusion criteria. Mean age of 38.925 ± 7.09 years. Majority of the patients 47 (37.60%) were between 41 to 50 years of age. Mean duration since injury in our study was 13.18 ± 4.79 hours. Out of 125 patients, 102 (81.60%) were males and 23(18.40%) were females with male to female ratio of 1.2:5.4. Fifty three (42.4%) patients presented with Schatzker V and 72 (57.6%) had Schatzker VI type of tibial plateau fractures. In our study, non-union was seen in 10cases (8.0%) and pin track infection was noted to be present in 19 (15.20%) patients. So, the acceptable outcome (achievement of union without non-union or pin track infection during 16 weeks) was seen in 96(76.8%) patients. **Conclusion:** This study concluded that there is high rate of acceptable outcome (achievement of union without any non-union or pin track infection during 16 weeks) after hybrid external fixator of the open and closed fractures of tibial plateau among the patients having schatzker-V and VI.

Key words: Tibial Plateau Fractures, Hybrid External Fixator, Union, Infection.

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INTRODUCTION

Tibial fractures account for majority of fractures occurring in long bone.[1] Owing to rapid increase in life style modifications with automobiles particularly motorcycles, growing escalation due to social and ethnic distribution which gives rise to increased violence in the society are the major determinants for the tibial fractures in society. Plateau fractures comprising of proximal end of the tibia are usually serious and difficult to treat injuries.[2] These fractures of tibial plateau are categorized as serious and complex injuries as they may influence major weight bearing joints such as knee.[3] Schatzker developed a classification system which is being widely employed by orthopedic Surgeons and the classification system separates such fractures in 2 categories termed as “low energy fractures and high energy fractures” [4] and high energy Schatzker V and VI fractures of the tibial plateau.

High-energy Schatzker V and VI tibial plateau fractures may involve “articular depression, condylar displacement, dissociation of comminuted metaphysis and closed degloving injuries”.[4] Such fractures are regarded as

having increased proportion of complications because being covered with soft tissues, skin necrosis, underlying infections and also generally comminuted type of fracture.[5] While treating such cases, most of the Surgeons strictly adhere and focus on the anatomical reduction, early movement and rigid fixation. Among the available treatment modalities, dual plating has been proven as a biomechanical stabilization option, however it is associated with significant dissection of the tissues and also related with potentially high rates of post-operative complications.[3] Hence the use of a "minimal invasive technique", as an external fixator, while treating patients having S-V or S-VI fractures can offer acceptable reduction[6] and may give rise to the sufficient stability to achieve the alignment of fracture by avoiding significant dissection of the tissues. This will ultimately help to reduce underlying related soft tissue complications and may allow early joint mobilization.[3-6] This treatment option is a reliable choice for high energy fractures having gross intra articular combination.[7-9]

In a case series by N. Soucacos et al. of 33 patients, hybrid external fixator was used for management of S-V and S-VI tibial plateau fractures. All fractures except one (3%) healed at average of 3.4 months (3-7 months). On follow up three patients (9.1%) pin track infection was observed.[6] In another study, of 31 patients all fracture united within an average time of 14 weeks. Eight patients developed superficial pin track infection (25.8%) at the wires with proximal ring.[3]

The aim of current study was to evaluate the clinical outcomes of hybrid external fixator in high energy Schatzkar V and VI tibial plateau fractures. Two studies done at local level (Jamshoro University and at Shooda Hospital) but shows different results[3,7] so we planned to conduct such study in our setting among population of Southern Punjab which will enable us to provide better management for our patients.

MATERIAL AND METHODS

One hundred twenty five consecutive patients in aged more than 18 years having High energy Schatzker V and VI tibial plateau fractures, both open and closed fractures admitted in orthopedics unit-I via emergency department or through the outpatient department were included in the study. patients having Patient with vascular injury or compartment syndrome of affected limb, patients having previous surgery or intervention for tibial fracture determined by history, patients with fracture more than two weeks old on presentation, patients with chronic medical problems like valvular heart disease, CRF, CLD and poly trauma patients were excluded from our study.

Complete history and physical examination was carried out in all the patients. Investigations including complete blood count, serum creatinine, blood urea nitrogen, serum electrolytes, random serum glucose, liver function tests, anteroposterior and lateral x-rays of the proximal tibia of the affected knee joint was done in all the patients. CT scan may be done to assess the configuration of fracture. All the patients was operated by a consultant orthopedic surgeon (5 year experience) familiar with the procedure. Patients was kept and monitored for at least one week in the orthopedic unit-1 with daily wound examination to note any complications like pin track infections. Patient was discharged thereafter and was weekly followed up in outpatient department for 1st two visits then fortnightly. Outcome was assessed at 16 weeks by serial radiological x-rays, and pint track infection on local exam. Acceptable outcome was labelled as absence of pin track infection determined by local skin inflammation (swelling with reddish color of skin), pus and soft tissue involvement (dusky color of the muscles i.e., dead necrotic muscles) after 7 days of procedure and bony union "which was assessed clinically & radiologically at 16 wks.

By identifying consolidation at the fracture site. Clinically, there should be no pain or tenderness and the patient is able to walk without aids. Radiologically according to Hammer et al bone is said unite when minimum 3 out of 4 cortex have been bridged by callus in two views i.e. Antero-posterior and Lateral". All the data was entered in attached Performa. All the data was entered

in SPSS version 17.0. Mean, median, standard deviation was calculated for quantitative variables like age and duration since injury. Frequencies and percentages were calculated for qualitative variables like gender, type of fracture, class of fracture, union, presence or absence of pin track infection. Stratification was done with regards to age, gender, class of fracture, acceptable outcome and duration of fracture. Chi-square test was applied at level of significance of 0.05.

RESULTS

Our study comprised of 125 patients having Schatzker V and Schatzker VI tibial plateau fractures who met our inclusion criteria. Mean age of 38.925 ± 7.09 years. Majority of the patients 47 (37.60%) were between 41 to 50 years of age. Mean duration since injury in our study was 13.18 ± 4.79 hours. Out of 125 patients, 102 (81.60%) were males and 23(18.40%) were females with male to female ratio of 1.2:5.4. Fifty three (42.4%) patients presented with Schatzker V and 72 (57.6%) had Schatzker VI type of tibial plateau fractures. In our study, non-union was seen in 10 cases (8.0%) and pin track infection was noted to be present in 19 (15.20%) patients. So, the acceptable outcome (achievement of union without non-union or pin track infection during 16 weeks) was seen in 96(76.8%) patients.

Parameters		Outcome		P – value
		Acceptable	Unacceptable	
Gender	Male	81	21	0.165
	Female	15	08	
Age groups	Up to 40 Years	77	14	0.001
	> 50 Years	19	15	
Residential status	Rural	64	19	0.901
	Urban	32	10	
Diabetes	Yes	08	09	0.004
	No	88	20	
Hypertension	Yes	16	08	0.210
	No	80	21	
Obesity	Yes	13	24	0.001
	No	83	04	

Table-I. Cross-tabulation of outcome with different parameters. (n=125)

DISCUSSION

Tibial fractures is most common type of long bone fractures.[10,11] Owing to rapid increase in life style modifications with automobiles particularly motorcycles, growing escalation due to social and ethnic distribution which gives rise to increased violence in the society are the major determinants for the tibial fractures in society. Tibial plateau fractures continues to be a challenge for orthopedic surgeon. Treatment of these fractures have been plagued by complications.[12-15]

We have conducted this study to find out the functional outcome of hybrid external fixator in tibial plateau fractures Schatzker V and VI. The mean age of patients in our study was 38.925 ± 7.09 years with majority of the patients 47 (37.60%) were between 41 to 50 years of age which was very much comparable to studies Farooq et al[16] who had found a mean age of 36 years. Vekatesh Gupta[5] his study has found mean age of 40 years and Bardana et al reported mean age of 43.8 years.[17] On the other hand, Hisam Muhamad et al had found mean age of 44yrs in their studies which is higher compared to our study.[3] In our study, out of 125 patients, 102 (81.60%) were males and 23 (18.40%) were females with male to female ratio of 1.2:5.4. This high male gender proportion can be justified in terms of our male dominated society as most of the females are households and do their work while staying in their homes. However the male to female ratio given by Makhdoom et al[18] was 2.1:1. These results also coincide with results of many previous other studies which have shown the male predominance.

In our study, pin track infection was seen in 19 cases (15.2%) patients, Non-union was seen in 11cases (8.8%) and union was noted to be present in 95 patients (76.0%). So, the acceptable outcome (achievement of union without any non-union or pin track infection during 16 weeks) was seen in 95 (76%). patients. The incidence of infection, delayed union and non-union in our series were comparable with reports of hybrid external fixator in tibial plateau fractures.[6]

In another study, of 31 patients all fracture united within an average time of 14 weeks. Eight patients developed superficial pin track infection (25.8%) at the wires with proximal ring.[2]

In a case series by N Soucacos et' al, of 33 patients, hybrid external fixator was used for management of S-V and S-VI tibial plateau fractures. All fractures in the series except one (3%) healed at average of 3.4 months (3-7 months). All patients with open fractures (n=5) were treated immediately with wound irrigation, debridement and IV antibiotics. 18 of the close fractures were operated on the same day while 7 were treated with in the average of 5 days in order to allow soft tissue edema to subside. One patient had paroneal nerve damage at the time of injury while two of them had major knee instability with rupture of ACL and LCL. On follow up three patients (9.1%) pin track infection was observed. Compared to previously reported series of open reduction and internal fixation.[5]

Study conducted at liaqat university Jamshoro with 30 patients admitted, having close fractue 17(57.5%) and open fractures 13(42.5%) union time range 16-19 weeks .15 (50%) patients have pin site over granulation 12(40%) patients pin loosening, and 3(10%) patients pin loosening and 1 (3.3%) patient have deep pin track infection. management with hybrid external fixator is better method treating proximal tibial fractures. functional outcome of this method of treatment are more predictable, high rate of union with lower rate of complications.

CONCLUSION

This study concluded that there is high rate (76.0%) of acceptable outcome (achievement of union without non-union or pin tract infection during 16 weeks) non-union in 8.8% and infection in 15.20% patients, after tibial plateau fractures fixed with hybrid external fixator. So, we recommend that hybrid external fixator should be preferred in the treatment of open and close tibial metaphyseal fractures physiodiaphyseal fractures in order to achieve good outcome and reduce complications.

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
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2	Tariq Mahmood	Study planning, designing, data entry, data analysis, manuscript writing and editing.	
3	M. Imran Haider	Manuscript writing and editing. Final proofreading.	