The Professional Medical Journal
www.theprofesional.com

ORIGINAL PROF-2229

CLOSED TIBIAL PLATEAU FRACTURES;

Comparative study of conservative (pop cast) versus percutaneous screw fixation for the treatment

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Article received on:
13/03/2013
Accepted for Publication:
21/02/2014
Received after proof reading:
31/05/2014

ABSTRACT… Objective: The aims & objectives of the study are to compare the results of tibial plateau fracture treated by plaster of paris cast and percutaneous screw fixation. **Study design:** Comparative study. **Place and duration of study:** Study was carried out at the Orthopaedics Unit-II, Liaquat University Hospital Hyderabad / Jamshoro , from January February 2010 to october 2011. **Methodology:** Between February 2010 to october 2011, 31 men and 9 women aged 20 to 40 years with means 28.25 years underwent plaster of paris and percutaneous screw fixation for schatzkar type I closed tibial plataue fracture in Orthopaedics Unit-II, Liaquat University Hospital Hyderabad / Jamshoro. Data was analyzed through SPSS software version 16.0. **Results:** In both groups 31(77.5%) men and 9(22.5%) women with male: female ratio of 3.4:1 and aged 20 to 40 years with means 28.25 years. Union time range 10 to 24 weeks in both groups(p value 0.001). The mean healing time in PSF group was 11.6 weeks while in POP group it was 13.9 weeks. The complications seen in this study were pain during walking (5 (25%) patients in POP VS 3 (15%) patients in PSF group), knee stiffness (4(20%) patients in POP VS 2 (20%) patients in PSF group), ankle stiffness (3(15%) patients in POP VS 1(5%) patients in PSF group), delay union (2(10%) patients in POP VS 1(5%) patients in PSF group), non union (2(10%) patients in POP VS 0(0%) patients in PSF group) P value 0.040. The longer duration of hospital stay about -10-20 days in 13(65%) of POP patients as compared to PSF cases where majority 16(80%) were discharged within 1 to 10 days(p value 0.148). The patients with complications had still longer stay in both group. The mean hospital stay in POP group was 14.6 days and PSF group was 8.4 days. The clinical results seen in this study were excellent (5(25%) patients in POP VS 13(65%) patients in PSF group), good (8(40%) patients in POP VS 5(25%) patients in PSF group), fair (5 (25%) patients in POP VS 2 (10%) patients in PSF group) and poor (2(10%) patients in POP VS 0 (00%) patients in PSF group. **Conclusions:** We conclude that percutaneous screw fixation gives better results in type I schatzkartibial plateau fracture compared to plaster of paris cast. The complications were seen higher in POP cast.

Key words: Bone screws; Fracture fixation; Tibial fractures, Schatzkar type I.

Article Citation: Memon SA, Laghari MA, Mahar IK, Baloch NA, Pirwani MA. Closed tibial plateau fractures; comparative study of conservative (pop cast) versus percutaneous screw fixation for the treatment. Professional Med J 2014;21(3): 544-549.

INTRODUCTION

The tibial plateau is the serious load-bearing areas in the individual body; of plateau fractures have an effect on knee alignment, stability and movement. Early detection and suitable treatment of these fractures are critical in minimizing patient disability[1]. The most common mechanisms of trauma are divided into falls, traffic accidents and sports injuries. Some Studies showed that car accidents is cause of 40% - 60% of tibial plateau fractures[2,3].

The mechanisms of injury involve a combination of axial loading and valgus/varus forces[4]. Tibial plateau fractures are difficult to handle, as they are often associated with severe soft tissue injuries like open wounds, crushing, marked swelling, bruising, blebs formation and compartment syndrome, while high-energy traumas cause comminutive fractures with larger soft parts and neurovascular injuries[5].

The treatment goals are to reduce morbidity to an already traumatized soft tissue envelope[6], in addition to the anatomical restoration of the

articular surface and axial limb alignment. Nonoperative methods like closed reduction and casting showed poor results and are not suitable for complex fractures of the tibial plateau[7]. The surgical management of tibial plateau fracture is a difficult and challenging task. Tibial plateau fractures involve the articular surface of the tibia resulting from a combination of axial loading with varus or valgus stress. Inadequate and inappropriate treatment may result in significant functional loss[8]. Indirect reduction and percutaneous fixation of tibial plateau fractures would be an attractive method because of the known soft-tissue complications associated with standard open techniques[9].

Most of the patients from surrounding of Hyderabad city are illiterate and do not follow the instructions of conservative treatment, so in the follow-up most of the patients return with the displacement of Schatzkar type I. therefore this study has been conducted to determine the better method of treatment with minimal complications in our setup.

MATERIAL & METHODS

Between February 2010 to october 2011, 31 men and 9 women aged 20 to 40 years with means 28.25 years underwent plaster of paris and percutaneous screw fixation for schatzkar type I closed tibial plataue fracture in Orthopaedics Unit-II, Liaquat University Hospital Hyderabad / Jamshoro.

Inclusion criteria were that all patients after counseling for study and taking written consent were included in this study irrespective of sex and age ranging from 20 – 40 years admitted in Orthopaedics Unit-II through outpatient department came within 10 days old fractures as well as from casualty department and diagnosed as schatzkar type I closed tibial plataue fracture came on the basis of clinical examination and X-rays. In Exclusion criteria ; Schatzker type II, III,IV,V and VI, infected fractures, Open farctures, associated with severe chest or abdominal injuries, pathological fractures, malunited fractures and fractures with neurovascular compromise i,e. compartment syndrome.

Follow up of all these patients was done .1st four visit after every week , then alternet week upto 3rd month then monthly upto 6 month to assess any complication . Results were prepared with help of tables and graphs.Data was analyzed through SPSS software version 16.0.

RESULTS

The 40 cases of schatzkar type I , men (15(75%) patients in POP VS 16(80%) patients in PSF group) while women (5(25%) patients in POP VS 4(20%) patients in PSF group), male to female ratio seen in POP group was 3:1 as compared to PSF group where it was 4:1 . Aged 20 to 40 years with means 28.25 years. The most common causes of injury included high-velocity road traffic accident (RTA). There were 25(62.5%) patients who sustained fractures of the tibial following road traffic accidents. Nine (22.5%) cases had schatzkar type I closed tibial plataue fracture after fall from height and 6 (15 %) cases had closed tibial plataue fracture after assault. Union time range 10 to 24 weeks in both groups(p value 0.001). The mean healing time in PSF group was 11.6 weeks while in POP group it was 13.9 weeks. The complications seen in this study were pain during walking (5 (25%) patients in POP VS 3 (15%) patients in PSF group), knee stiffness (4(20%) patients in POP VS 2 (20%) patients in PSF group), ankle stiffness (3(15%) patients in POP VS 1(5%) patients in PSF group), delay union (2(10%) patients in POP VS 1(5%) patients in PSF group), non union (2(10%) patients in POP VS 0(0%) patients in PSF group) P value .0402. The longer duration of hospital stay about -10-20 days in 13(65%) of POP patients as compared to PSF cases where majority 16(80%) were discharged within 1 to 10 days(p value 0.148). The patients with complications had still longer stay in both group. The mean hospital stay in POP group was 14.6 days and PSF group was 8.4 days. The clinical results seen in this study were excellent (5(25%) patients in POP VS 13(65%) patients in PSF group), good (8(40%) patients in POP VS 5(25%) patients in PSF group), fair (5 (25%) patients in POP VS 2 (10%) patients in PSF group) and poor (2(10%) patients in POP VS 0 (00%) patients in PSF group.

	Treatment procedure			
	POP Group		PSE Group	
	No. of patients	%age	No. of patients	%age
Gender				
Male	15	75%	16	80%
Female	05	25%	04	20%
Mode of injury				
Fall	03	15%	06	30%
R.T.A	12	60%	13	65%
Assault	05	25%	01	05%

Table-I. Patients demeographic profile

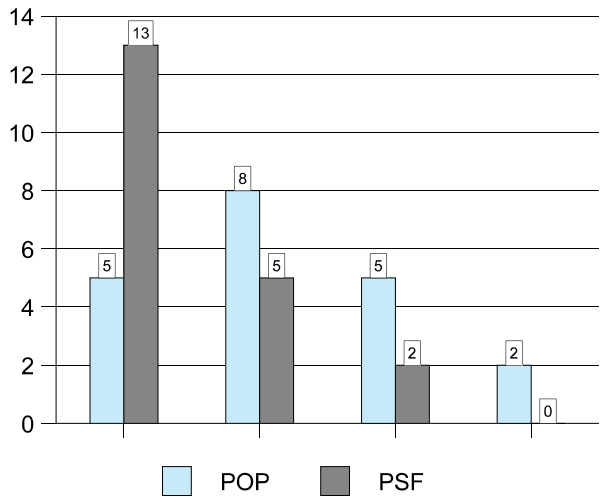

Fig-1. Clinical results

Variable	Operative procedure				
	POP Group		PSF Group		
	No. of patients	%age	No. of patients	%age	P-value
Time to achieve union					
10 to 12 Weeks	6	55%	10	50%	<0.001
13 to 16 weeks	9	40%	8	25%	
17 to 20 weeks	3	5%	2	15%	
21 to 24 weeks	2	-	-	10%	
Post Operative Complication					
Wound Infection	-	-	2	10%	0.402
Screw loosening	-	10%	4	20%	
Pain during walking	5	25%	3	15%	
Knee stiffness	4	20%	2	10%	
Ankle stiffness	3	15%	1	5%	
Delay union	2	10%	1	5%	
Non union	2	10%	-	-	
Hospital Stay					
1-10 days	7	35%	16	80%	<0.001
11-20 days	13	65%	4	20%	

Table-II. Postoperative variable

DISCUSSION

Tibial plateau fracture, one of the commonest intra articular fractures are major traumatic injury occurring as a result of RTA, fall from height, violence etc. It is sometimes associated with other bony or soft tissue injuries. Any fracture around the joint (especially weight bearing knee joint in the lower limb) is of paramount importance as would result in significant morbidity and quality of life. Hence the treatment of upper tibial fractures with intra articular extension have become a challenge for the orthopaedic surgeon.

Nowadays methods of percutaneous fixation of tibial plateau fractures are available. Percutaneous fixation offers its best in isolated undisplaced fractures, split unicondylar (lateral) fractures, elderly osteoporotic and in badly comminuted ones. The advantages are decreased operative time , less blood loss, smaller incision, short hospital stay and early rehabilitation.

In the early half of the 20th century an author reported two studies having satisfactory percentage of good to excellent short and long term results with surgical methods[10,11].

In an other published study of 159 cases of tibial plateau fracture of all types treated by conservative 46% and surgery 54%, evaluated by hohl and luck method, reported better good-excellent results in surgery 84% than conservative 62% methods[12].This study was carried out to compare the out come of tibial plataue fracture treated by plaster of paris cast and percutaneous screw fixation.

The male to female ratio seen in POP group was 3:1 as compared to PSF group where it was 4:1.In our series majority of patients were males. This can be attributed to our Pakistani setup where the female population largely work indoor or in agricultural field and do not travel much. The higher rate of fracture in male clearly correlated with the life style of male, especially , in our part of world. The males are more involved in outdoor activities and the young male are more enthusiastic about life and careless dirvers. Female usually have sedentary life style and less involved in driving which is a common cause. However the male to female ratio given by Camacho[13] is 4:1 and Ozturkmen Y[14] is 2.1:1 .

The age ranged from 20 to 40 years in both groups with mean age of 28.25 years. The fractures were most common in the 2nd and 3rd decades in our study. The other series also show higher incidence of fractures in younger age groups. However Kataria H showed age range from 20 to 60 year with the mean age was 32 years[15] and Shrestha BK[16] showed average age was 37 years.

The road traffic accident is the most common cause of fracture of tibia[17]. Due to limited sources of income ,motorbile is the main conveyance of middle class in its accidents, tibia is commonly affected.The farmers, house wives, retired people have a comparatively lesser fracture rate as they do not travel frequently, where as workers and labourers tend to have violent injuries commonly due to industrial accidents, automobile accidents, housewives sustaining fractures through fall from height, when they climb up ladder or stool to pickup objects from the shelves.

The present study showed the most common mechanism of tibial plateau fractures as road traffic accidents with 25(62.5%) patients followed by fall from height 9(22.5%) and assault included 6 (15 %). In the study of Ngim NE[17], road traffic accident (RTA) was the leading cause of limb injury accounting for 76.8% of cases (53 patients). Most of the RTAs (52.8%) involved motorcycles with the patient either as rider or passenger. Assault was the cause of injury in 10.1% (7 patients), fall in 4.3% (3 patients) and gunshot in 5.8% (4 patients) and other causes (hit by an object, trampled upon) in 2.9% of patients.

In our study majority of postoperative complications were found higher in POP group as compared to PSF group. Infection is virtually confined to PSF group in which the wound is contaminated by organisms carried in from outside the body. Exceptionally, a closed fracture may become infected when it is converted into

open fracture by operative intervention. Wound infection occasionally remains superficial and the bone escapes but more often the infection extends to the bone and gives rise to osteomylitis[18].

In the present study we had 2(POP=0% VS PSF=10%) case of infection. The infection might be attributed to nosocomial infection. However frequency of wound infection given by Shrestha BK in a series of 81 patients of tibial plateau fractures , there 6 (7.4%) had superficial wound infections[16].

Other complications observed in our study were screw loosening (0(0%) patients in POP VS 4(20%) patients in PSF group), pain during walking (5 (25%) patients in POP VS 3 (15%) patients in PSF group), knee stiffness (4(20%) patients in POP VS 2 (20%) patients in PSF group), ankle stiffness (3(15%) patients in POP VS 1(5%) patients in PSF group), delay union (2(10%) patients in POP VS 1(5%) patients in PSF group), non union (2(10%) patients in POP VS 0(0%) patients in PSF group) where as some similar studies nearer to this data[19-21].

Longer the duration of hospital stay, greater the burden on the patient financially and psychologically. Ideal treatment should therefore minimize the duration of hospital stay. The hospital stay in this study ranged from 1 to 20 days in both groups with mean length of hospitalization as 14.6 days in POP and 6.4 days in PSF group. It is comparable to other studies given by author Camacho SP, the mean hospitalization period is 21.25 days[13].

Inspite with all these associated boney fractures and complication we able to achieve excellent results in (5(25%) patients in POP VS 13(65%) patients in PSF group), good (8(40%) patients in POP VS 5(25%) patients in PSF group), fair (5 (25%) patients in POP VS 2 (10%) patients in PSF group) and poor (2(10%) patients in POP VS 0 (00%) patients in PSF group. However Shrestha BK[16] showed results were excellent in 44(54.3%) cases , good in 21(25.9%) cases , fair in 5(6.1%) cases and poor in 11(13.5%) cases.

CONCLUSIONS

Percutaneous screw fixation is a safe and effective procedure for treatment of schatzkar type I closed tibial plataue fracture. We conclude that percutaneous screw fixation gives better results in type I schatzkartibial plateau fracture compared to plaster of paris cast. The complications were seen higher in POP cast.

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> Fashions have done more harm than revolutions.
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> Victor Hugo