ORIGINAL ARTICLE

A STUDY ON COMPARISON OF OPEN REDUCTION INTERNAL PLATE FIXATION (ORIF) AND MINIMALLY INVASIVE PERCUTANEOUS PLATE OSTEOSYNTHESIS (MIPPO) TECHNIQUE ON SCHATZKER IV-VI TIBIAL PLATAEU FRACTURES

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ABSTRACT

Background: Tibial condyle fractures in young adults or in old age are difficult to manage conservatively and often require operative management. The present study was conducted with an objective to compare the results of Open Reduction Internal Plate Fixation (ORIF) Technique and Minimally Invasive Percutaneous Plate Osteosynthesis (MIPPO) technique for S**chatzker** IV-VI tibial plateau fractures.

Methods: The case records of 42 cases of schatzker IV-VI type tibial fracture were analyzed retrospectively. Among these 42 patients 21 received surgical treatments in the form of ORIF with plate fixation and other 21 cases received MIPPO after 7-10 days after injury. The surgical time, complication, length of hospital stay and cost of hospitalization were analyzed and compared between two groups.

Results: There was no significant differences in time required for operation between 2 groups ($p>0.05$) while there was significant differences observed ($p<0.01$) for duration of stay in hospital and cost of hospital stay. After 9-24 months follow up (average12 months), no difference was found between two groups in terms of complication, healing time or hospital for special surgery score (HSS). No deep infection was found in both groups however superficial infection was found in 5 patients in group 2.

Conclusion: It is concluded from the present study that under certain conditions MIPPO for complex tibial plateau fractures is feasible as it can shorten the length of stay, decrease cost of hospitalization and promote early functional rehabilitation.

Keywords: Tibial Fractures, SCHATZKER Classification, Minimally Invasive Percutaneous Plate Osteosynthesis (MIPPO), Open Reduction Internal Fixation (ORIF)

INTRODUCTION

Tibial condyle fractures which are many times due to high energy trauma in young adults or trivial trauma in old age are difficult to manage conservatively only and often operative management is required. Operative management is usually internal fixation with plates (T or L buttress plates or locking plates) reduction of fractures accurate or rigid fixation.[1] Early mobilization is the key for getting good results. Open reduction and internal fixation gives good results provided major complications like compartment syndrome, soft tissue envelope damage, infection, knee instability or stiffness can be avoided.[2] Often above knee slab or temporary knee spanning fixator is required to allow soft tissue condition to improve.[3]

Purpose of our study was to evaluate the overall outcome by adopting MIPPO technique in a single installation and to find whether it is better than open technique of fixation for schatzker type IV-VI fractures of tibial condyle.

METHODOLOGY

The present study was a retrospective review of all type IV V VI proximal tibial fractures operated at our institution from April 2005 to April 2015. We collected the data of patients from the hospital records. We excluded the patients who had open fractures, pathological fractures, pediatric & extra articular fractures of proximal tibia & those with neurovascular injury. Preoperative condition, X-rays operative notes postoperative complications, clinical &

functional outcome over period of 3 months & 12 months post surgery were collected for all the cases. Fractures were classified according to schatzker classification system. Most of the patients in the study were operated about 7-10 days after trauma.

Patients in group 1 were operated by Minimally Invasive Percutaneous Plate Osteosynthesis (MIPPO) technique while those in group 2 were operated by Open Reduction and Internal Fixation (ORIF) with plates (T or L buttress) single approach. While 1 incision was done for type IV and double approach via lateral and medial incision was for type V & VI fractures in MIPPO technique. In group 2 type V & VI fractures, one incision was done for both lateral and medial platting. Post operative patients were give antibiotics, analgesics. Physiotherapy with unloaded walking with crutches was given, weight loading after union was allowed.

Statistical Analysis: The data was analyzed using epi-info software. Measurement of continuous variable was expressed as mean ± Standard deviation. The continous variables were compared using student's T test. Dichotomous variable were compared using chi-square test and statistical significance was noted at $p<0.05$.

RESULTS

There were 42 cases included in this study. Gender distribution shows that there were 30 males and 12 females. There were 21 cases each in Group 1 (MIPPO) and Group 2 (ORIP). The demographic distribution of cases was as shown in table 1. There was no significant association between the groups with age and gender distribution of cases ($p>0.05$). Distribution of SCHATZKER comparison of fracture type between 2 groups was as seen.

Average follow up duration was 12 months ranging from 9 months to 2 yrs. Neither nonunion nor deep infection was found in 2 groups. At early period (3 months) after operation, HSS score was found to be significantly different between 2 groups ($p>0.05$) (table 3).

There were no complications seen intra operatively among the cases. No deep infection was found in both groups however superficial infection was found in 5 patients in group 2 which were treated by giving i.v. antibiotics. There was no significant differences in time required for operation between 2 groups ($p>0.05$) (Table 4). There was significant differences observed between 2 groups ($p<0.01$) for duration of stay in hospital and cost of hospital stay. (Table 4) After 9-24 months follow up (average12 months), no difference was found between two groups in terms of complication, healing time or hospital for special surgery score (HSS).

Table 1: Demographic distribution of cases (n=42)

Group	Age yrs (mean ± SD)	Gender	
		Male	Female
Group 1 **(n=21)**	45.33±11.24	16 (76.2)	5 (23.8)
Group 2 **(n=21)**	45.76±11.72	14 (66.7)	7 (33.3)
P value	0.904	0.495	

Table 2: SCHATZKER comparison of fracture type between 2 groups

Group	Type IV	Type V	Type VI
Group 1 (n=21)	7 (33.3)	9 (42.9)	5 (23.8)
Group 2 (n=21)	4 (19)	10 (47.6)	7 (33.3)

P value 0.548

Table 3: Comparison of the results of follow up between groups

Groups	HSS score post op	
	(3 months)	(12 months)
Group 1 MIPPO	68.33 ± 7.65	86.111 ± 7.05
Group 2 ORIF	62.71 ± 6.44	85.63 ± 5.93
P value	0.014	0.824

Table 4: Comparison of operation time, hospital stay, hospital cost

Groups	Operating time	Hospital stay	Hospital cost (Rs 10,000)
Group 1	116.3 ± 12.01	7.43±2.04	28.015±2.587
Group 2	121.76±-11.89	14.76±1.84	30.744±3.444
P value	0.149	0.64	0.006

DISCUSSION

Tibial condyl fractures schatzker type IV-VI generally managed by operative technique of platting (T OR L buttress 4.5 mm plates of locking compression plates). Conventional open reduction and internal fixation has been considered as gold standard for management but complications like compartment syndrome, soft tissue envelope damage, infections, knee instability or stiffness are well known. In the present study, we found out that through major complications like deep infection or compartment syndrome were not seen in our study patients who were operated by open techniques there was significant differences in function as evaluated by HSS score at 3 months. However this difference is not significant at 1 year of follow up. In comparison with conventional plate fixation technique, in MIPPO incision & operative exposure is small and thus less soft tissue envelope damage leading to early bone healing and less joint stiffness in HSS at 3 months. Also it has been shown that MIPPO greatly shorten hospitalization time and cost.

During open reduction, the fracture site is not always easily approached because of the open wound and the need to avoid further damage to already injured

soft tissues. Moreover, disturbance of blood supply to the fracture site cannot be avoided, and thus, non-union and infection occur with high incidence. In the present study 11.9% cases had superficial infection. Most authors have reporting rates of 18% or more for deep infection. [4,5]

As a result of the problems associated with open reduction and plating described above, recent studies have addressed the use of external fixators,[6,14,15)] but although the incidence of infection is clearly better than that of plating, it is not always easy to reduce and adequately maintain fractures, especially fractures with articular involvement or comminuted proximal tibial fractures. Furthermore, mal-union, joint motion limitations, and patient inconvenience are main concerns when an external fixator is used, and pin tract infections remain problematic.

Finally we underline that this study is retrospective analysis & number of cases is small and so the results may need further verification.

CONCLUSION

It is concluded from the present study that under certain conditions MIPPO for complex tibial plateau fractures is feasible as it can shorten the length of stay, decrease cost of hospitalization and promote early functional rehabilitation.

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