

A comparative study of tibial plafond fractures managed by hybrid external fixation versus final plate fixation

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Abstract

Background: Tibial plafond fractures are comminuted fractures of the distal tibia, which involve a traumatic axial load mechanism that leads to destruction of the joint surface. The present study compared tibial plafond fractures managed by hybrid external fixation versus final plate fixation. **Materials & Methods:** 40 patients of plafond fractures were divided into 2 groups. Group I were patients treated with hybrid external fixation and group II patients with open reduction and internal fixation. Results were compared between both groups. **Results:** The mean fixation time in group I was 5.2 days and in group II was 10.4 days, weight bearing time in group I was 10.2 days and in group II was 48.2 days, radiological union time was 112.4 days in group I and 156.2 days in group II. Superficial infection was seen in 4 in group I and 3 in group II and deep infection was seen in 1 in group I and 4 in group II. The difference was significant ($P < 0.05$). **Conclusion:** Hybrid external fixation as a definitive procedure involve a faster union as compared to open reduction internal fixation.

Key words: Hybrid external fixation, Open reduction internal fixation, Tibial

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Introduction

Tibial plafond fractures are comminuted fractures of the distal tibia, which involve a traumatic axial load mechanism that leads to destruction of the joint surface. These fractures are usually associated with massive swelling of the foot and ankle, as well as with open wounds[1]. The swelling may cause a significant decrease in the blood flow and the state of the soft tissues is detrimental for the therapeutic indication and the type of implant. The surgeon's preference and experience also plays an important role in the choice of treatment[2]. A pilon fracture is a fracture that involves articular surface of the distal tibia with proximal extension from the ankle articular surface. Pilon fractures are due to rotational or axial-loading forces as a result of high-energy trauma. Plafond means ceiling or dome[3]. The Talus has tibial plafond as a dome or ceiling and articulates with the distal tibia with its smooth surface. Destot described pilon fractures as 'explosive injuries.' Rotational force may produce spiral fractures it may be extra-articular or intra-articular[4]. Usually, rotational force produce less soft tissue injuries whereas axial compressive force produce intra-articular fractures with more soft tissue injuries. Unopposed plantar flexion produce fracture at the posterior articular surface.⁵ There is broad consensus that status of the soft tissue is the first priority because it is the basis

Results

for fracture healing and good long-term outcomes. Surgical intervention can be managed as a one- or multi-stage procedure, with internal or external fracture fixation[6]. The present study compared tibial plafond fractures managed by hybrid external fixation versus final plate fixation.

Materials & Methods

The present study was conducted among 40 patients of plafond fractures of both genders. All patients were informed regarding the study and their consent was obtained.

Patients information such as name, age, gender etc. was recorded in case history proforma. All patients were divided into 2 groups. Group I were patients treated with hybrid external fixation and group II patients with open reduction and internal fixation. Anteroposterior and lateral views and computed tomography (CT)-scan were performed. Fracture type was classified according to the AO/OTA classification. Open fractures were classified according to the Gustilo and Anderson classification. Author (1) performed all the cases together with references search and proof read of the manuscript while Author (2) did the data analysis, review of literature and proof reading of the manuscript. Results were compared between both groups. P value less than 0.05 was considered significant.

Table 1: Distribution of patients

Groups	Group I	Group II
Method	Hybrid external fixation	Open reduction and internal fixation
M:F	12:8	11:9

Table 1 shows that group I had 12 males and 8 females and group II had 11 males and 9 females.

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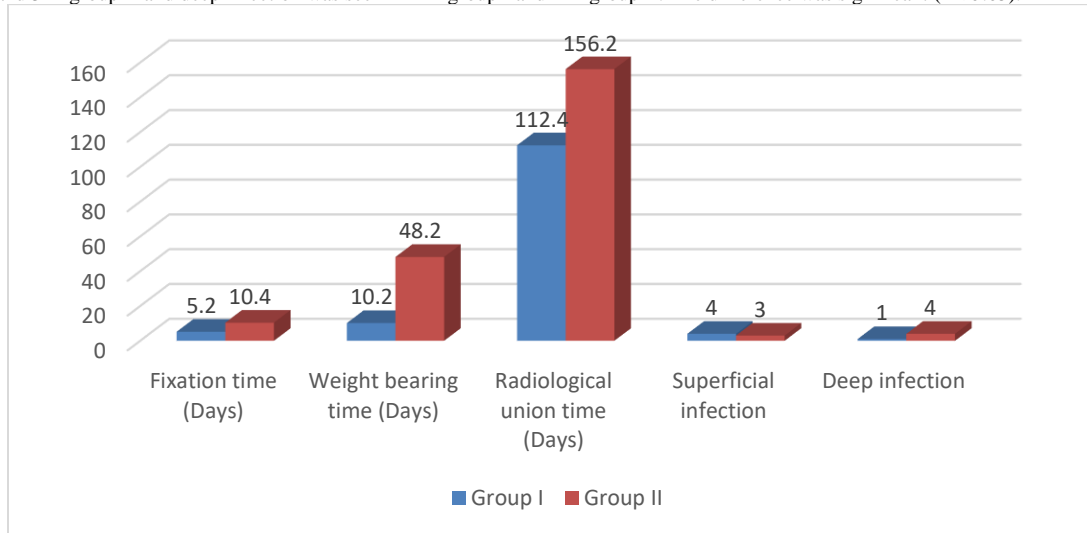
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Table 2: Comparison of parameters

Parameters	Group I	Group II	P-Value
Fixation time(days)	5.2	10.4	0.02
Weight bearing time(Days)	10.2	48.2	0.01
Radiological union time(Days)	112.4	156.2	0.05
Superficial infection	4	3	0.91
Deep infection	1	4	0.01

Table 2, Fig 1 shows that mean fixation time in group I was 5.2 days and in group II was 10.4 days, weight bearing time in group I was 10.2 days and in group II was 48.2 days, radiological union time was 112.4 days in group I and 156.2 days in group II. Superficial infection was seen in 4 in group I and 3 in group II and deep infection was seen in 1 in group I and 4 in group II. The difference was significant ($P < 0.05$).

**Fig 1: Comparison of parameters**

Discussion

Tibial plafond fractures are challenging to treat because of their subcutaneous location and minimal soft tissues [7]. Managing comminuted fracture, displaced fragments, fracture at metaphyseal region are always complex to treat [8]. Several surgical methods have been suggested for the treatment of pilon fractures which includes external fixation with limited fixation, open reduction and internal fixation with plates and screws [9]. In these days many surgeons started treating pilon fracture with external fixation combined with limited fixation and leaving the fixators in place until bone union achieved. Pin tract infections are most likely to occur as a complication in external fixation [10]. The present study compared tibial plafond fractures managed by hybrid external fixation versus final plate fixation. In present study, group I had 12 males and 8 females and group II had 11 males and 9 females. Cisneros et al [11] in their study tibial plafond fractures managed with a hybrid external fixation as a definitive procedure versus those managed with a two stage strategy with final plate fixation. Thirteen patients had been managed with a hybrid external fixation and 18 with a two-stage strategy with the final plate fixation. There were 14 males and 17 females with a mean age of 48 years (range 19–82 years). The mean followup was 24 months (range 24–70 months). The mean time from surgery to weight bearing was 7 ± 6.36 days for the hybrid fixation group and 57.43 ± 15.46 days for the plate fixation group ($P < 0.0001$); and the mean time from fracture to radiological union was 133.82 ± 37.83 and 152.8 ± 72.33 days respectively ($P = 0.560$). We found that mean fixation time in group I was 5.2 days and in group II was 10.4 days, weight bearing time in group I was 10.2 days and in group II was 48.2 days, radiological union time was 112.4 days in group I and 156.2 days in group II. Superficial infection was seen in 4 in group I and 3 in group II and deep infection was seen in 1 in group I and 4 in group II. Prabhu et al [12] included 15 patients with pilon fractures of Reudi Allgower type I, II, III, treated by either LFWF or ORIF. Their clinical and functional outcome and

radiological outcome were compared. They were evaluated for the degree of involvement of articular surface and the condition of the soft tissue envelop around the fracture for surgeries. Before surgery, all patients were evaluated clinically and radiologically. All patients were followed up till the achievement of fracture union and soft tissue healing. Evaluation was done based on anatomical articular reduction, achievement of union in time and function of the ankle joint using AOFAS ankle scoring system. The mean average time of union was 17 weeks (range 12–21 weeks) for all the fractures after fixation. 12/15 of cases had near anatomical restoration of the articular surface, representing 80% of cases. Acceptable alignment seen in 14/15 cases, representing 93.6% of cases in this study. In my study two cases showed limitation of range of movements (2/15 cases), representing 13.3% of cases. Only one case showed deep soft tissue infection (1/15) representing 6.6%. The results of external fixation combined with limited fixation is more effective in terms of soft tissue management, early union and superficial or deep infections than ORIF.

Conclusion

Authors found that hybrid external fixation as a definitive procedure involve a faster union as compared to open reduction internal fixation.

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