

# To Compare Plating Versus Ilizrov External Fixation Approaches in the Management of Schatzker Type VI Tibial Plateau Fracture

Plating Versus Ilizrov  
External Fixation  
Approach in the  
Schatzker Tibial Fracture

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## ABSTRACT

**Objectives:** To compare plating versus Ilizrov external fixation approaches in the management of Schatzker type VI tibial plateau fracture.

**Study Design:** Cross sectional study.

**Place and Duration of Study:** This study was conducted at the Department of Orthopaedics at Liaquat Medical University Hospital Hyderabad/Jamshoro from 25.07.2015 to 24.06.2016.

**Materials and Methods:** All the relevant patients will be admitted to the orthopaedic unit I with schatzker Grade VI tibial plateau fractures, either through casualty or throughout patient department, then divided into two groups (Group 1: Plating management, Group 2: Iliazrov. Schatzker grade I TO V, Open fractures of tibia that requires any kind of flap to cover the naked bone and pathological fracture were excluded from this study.

**Results:** 40 patients of Schatzker type VI fractures were evaluated from which (70%) were male and (30%) were female patients mean age of study subjects was  $40.22 \pm 11.19$  years, with range 18–60 years. Mean age for plating group were  $39.22 \pm 5.19$ . 32 (80%) patients had their fracture due to Road Traffic Accident (RTA). The mean time of partial weight bearing (in weeks) was  $6.50 \pm 2.68$  weeks (range 6-8 weeks). The mean time of full weight bearing (in weeks) was  $15.50 \pm 3.20$  weeks (range 12-30 weeks). The mean time of union was  $10.15 \pm 2.50$  weeks (range 5-20 weeks). The mean time of follow up for the outcome assessment from primary surgery was  $25.50 \pm 3.50$  months (range 17-53 months). The mean hospital stays (in days) was  $24.12 \pm 4.15$  days (range 10 – 30 days). 24 (60%) patients had excellent functional outcome, 10 (25%) patients from plating group and 14 (35%) from Ilizrov group, 12 (30%) patients had good functional and 4 (10%) patients had poor functional results 2 (%) patients from plating group and 2 (5%) patients from Ilizrov group. Over all 13 (32.5%) patients had developed complications, 2 (5%) patients had infected original wound, 4 (10%) patients had pin tract or screw site infection, 9 (22.5%) patients complain pain during walking.

**Conclusion:** Both modalities of treatment have good functional results in different circumstances.

**Key Words:** Tibial plateau Fracture, Schatzker Type VI, fracture, Buttress plates, Ilizrove, external fixator.

**Citation of article:** Soomro MA, Memon FA, Ahmed I, Memon A, Laghari MA. To Compare Plating Versus Ilizrov External Fixation Approaches in the Management of Schatzker Type VI Tibial Plateau Fracture. Med Forum 2017;28(4):26-29.

## INTRODUCTION

The tibia is a long bone, the anterior third of which is placed subcutaneously in the leg throughout most of its length, where it is covered only by skin and a thin layer of subcutaneous tissue, with no muscle cuff around.<sup>1</sup> The tibial plateau is one of the most critical load-bearing areas in the human body.<sup>2</sup> Tibial plateau fractures affect knee alignment, stability, and motion.<sup>2</sup>

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Received: February 11, 2017; Accepted: March 15, 2017

Although tibial plateau fractures compose approximately 1% of all fractures, a unified treatment has not yet been established.<sup>3</sup> 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<sup>4</sup>.

Tibial plateau fracture usually occurs due to certain types of exertion of forces i.e. medial, lateral or axial. The fractures due to medially exerted force are also called bumper fracture and the main cause is motor vehicles or pedestrian accidents. The mechanism of tibial plateau fracture involves the combinations of both valgus and axial directed forces. In majority of the cases of tibial plateau, the medial or lateral force condyle acts as an anvil imparting a combination of both shearing and compacting force<sup>5,6</sup>. Tibial plateau fractures may take place with meniscal and ligamentous injuries to the knee. Even though, some kinds of injury

may recommend a predominantly osseous injury, others may also recommend significant soft-tissue injury to the knee. The cause of standard tibial plateau fractures which involve the displacement of the articular surfaces of the proximal tibia without concomitant significant injury to the ligaments of the knee<sup>7,8</sup>.

High-energy tibial plateau fractures are difficult to manage, as they are often associated with severe soft tissue injuries (open wounds, crushing, marked swelling, bruising, blebs formation and/or compartment syndrome). The mechanisms of injury involve a combination of axial loading and valgus/varus forces<sup>8</sup>.

The radiographic findings assess the prevalence of ligament injury of tibial plateau fractures is approximately 20%–30%<sup>7,9</sup>. Accordingly there has been much advancement in the classification, evaluation, prognostication and especially treatment of these fractures<sup>10</sup>.

The classification based on Schatzker focuses on standard tibial plateau fractures. On the other hand, the higher rankings of Schatzker fracture represent fracture-dislocations and also significantly associated soft-tissue injury. The classification of Schatzker is based on the idea that “certain pathoanatomic and etiological factors as well as therapeutic features demand that certain injury types be grouped together”.<sup>7,9</sup> In the Schatzker classification, each increasing numeric fracture category indicates increasing severity, reflecting not only increased energy imparted to the bone at the time of injury but also an increasingly worse prognosis. Therefore, orthopedic surgeons find the Schatzker classification useful in assessing the initial injury, planning management, and predicting prognosis. Many authors have reported that initial Schatzker rankings and surgical plans based on plain radiographic findings were modified after preoperative computed tomography (CT) or magnetic resonance (MR) imaging<sup>11</sup>.

Based on these considerations this study aims to compare the results of plating versus Ilizarov method in the management of Schatzker VI tibial plateau fracture as per time to heal hospital stay and complications. Early reorganization and evaluation of the patients will save the patients to acquire life threatening complications.

## MATERIALS AND METHODS

This study was conducted in Department of Orthopaedics at Liaquat Medical University Hospital Hyderabad/Jamshoro Pakistan. Duration of study was one year between 25 July 2015 to 24<sup>th</sup> June 2016.

Total 40 patients of either gender with age between 18 to 60 years admitted to orthopedic unit with Schatzker type VI fractures were evaluated to compare plating versus Ilizarov external fixation approaches in the management of Schatzker type VI tibial plateau fracture. All the relevant patients were admitted to the orthopaedic unit I with Schatzker Grade VI tibial

plateau fractures, either through casualty or through OPD, direct arrivals or those mishandled by potters and quacks selected according to the selection criteria appropriate for intervention decision for either plating management or Ilizarov was taken by the consultant orthopedic surgeon of the ward have  $\geq 05$  years clinical experience group. Schatzker grade I TO V, Open fractures of tibia that requires any kind of flap to cover the naked bone and pathological fracture were excluded from this study.

## RESULTS

The frequency of gender in which 28 (70%) patients were male and 12 (30%) patients were female. In mode of injury 32 (80%) patients had their fracture due to Road Traffic Accident (RTA) (two and four-wheeler versus pedestrian in 15 (37.5%) cases, fall from two wheeler in 8 (20%) cases, and car versus two wheeler in 9 (22.5%) cases), 4 (10%) due to fall from height, 2 due to sports, and rest of the 2 (5%) had fracture due to machine injury.”

“Mean duration between the arrival and the surgery was  $41.64 \pm 15.13$  hours (range 12 hours-10 days). Mean time b/w arrival and primary surgery for plating group was  $40.34 \pm 15.13$  hours and for Ilizarov group  $40.34 \pm 13.13$  hours. Mean time of union was  $10.15 \pm 2.50$  weeks (range 5-20 weeks). The mean time of union for plating group was  $8.65 \pm 1.25$  weeks and for Ilizarov group  $9.50 \pm 1.50$  weeks. Mean time of follow up for the outcome assessment from primary surgery was  $25.50 \pm 3.50$  months (range 17-53 months). Mean time of follow up for plating group was  $25.00 \pm 2.13$  months and for Ilizarov  $23.15 \pm 2.50$  months.. The mean hospital stays (range 10 – 30 days) for plating groups was  $21.25 \pm 2.53$  days and for Ilizarov group  $23.52 \pm 3.83$  days.”

**Table No.1: Demographic Variable**

Variable	No.Patients	Percentage
<b>Gender</b>		
• Male	28	70%
• Female	12	30%
<b>Mode of Injury</b>		
• Road Traffic Accident	32	80%
• Fall from height	04	10%
• Sports	02	5%
• Others	02	5%

“Over all 13 (32.5%) patients had developed complications in both groups, 6 (15%) patients from plating groups and 7 (17.5%) from Ilizarov group. Total 2 (5%) patients had infected original wound one (2.5%) patients in plating groups and one (2.5%) in Ilizarov group; both patients were treated with 5 days course of intravenous antibiotics before procedure. 4 (10%) patients had pin tract or screw site infection. Total 9

(22.5%) patients complain pain during walking in initial follow-up days and become finished latter on.”

“Functional outcomes was compared and evaluated in two groups. Total 24 (60%) patients had excellent functional outcome, 10 (25%) patients from plating group and 14 (35%) from Ilizrov group. Total 12 (30%)

patients had good functional results 8 (20%) from plating group and 4 (10%) from Ilizrov group with p- value. Only 4 (10%) patients had poor functional results 2 (%) patients from plating group and 2 (5%) patients from Ilizrov group .”

**Table No.2. Comparison of different variables between two groups.**

Variables	Plating n=20	Ilizrov n=20	P-value
	mean±SD	mean±SD	
Mean Time b/w Arrival & Primary Procedure (hour)	40.34±15.13	40.34±13.13	.798
Mean Time b/w Primary Procedure & Fixation (hours)	3.8±1.8	3.5±2.1	.385
Mean Time of partial weight bearing (in weeks)	5.15±1.68	4.98±1.12	.060
Mean Time of full weight Bearing	15.15±1.20	14.75±2.20	.778
Mean Time of union	8.65 ±1.25	9.50 ±1.50	.219
Mean follow up time (months)	25.00±2.13	23.15±2.50	.186
Mean Hospital stays (in days)	21.25±2.53	23.52±3.83	.017
Comparison of different complications in two groups.			
• “Infected original wound”	1 (2.5%)	1 (2.5%)	1.00
• “Infected Surgical wound”	0	0	----
• “Non union”	0	0	----
• “Delay union”	0	0	----
• “Infected Entry point”	0	0	----
• “Screw site infections”	2 (5%)	0	.154
• “Pin tract infection”	0	2 (5%)	.154
• “Pain during walking”	4 (10%)	5 (12%)	.714
• “Pin site osteolysis”	0	0	----
• “Pin loosening”	0	0	----
• “Pin site hyper-granulation”	0	0	----

**Table No.3. Comparison of functional outcomes in two groups.**

Functional outcomes	Total N(%)	Plating N(%)	Ilizrov N(%)	P-value
Excellent	24 (60%)	10 (25%)	14 (35%)	.065
Good	12 (30%)	8 (20%)	4 (10%)	.011

## DISCUSSION

The tibia is a long bone, the anterior third of which is placed subcutaneously in the leg throughout most of its length, where it is covered only by skin and thin layer of subcutaneous tissue, with no muscles cuff around. 1 High energy tibial plateau fractures of Schatzker VI are complex fracture often associated with sever soft tissue injury and high risk of wound complication following formal open reduction and internal fixation<sup>2</sup>.

In present study the frequency of gender in which 28 (70%) patients were male and 12 (30%) patients were female in each group. Statistics of gender of our study is comparable with a study by Prasad GT et al.<sup>12</sup> Twenty one patients were assessed with a minimum follow up of 1 year. There were 20 (95%) males and 1 (5%) female in the study group.

In our study mean age was 40.22±11.19 years, with range 18–60 years. Mean age for plating group were 39.22±5.19 while for Ilizrov group were 41.21±6.19. Statistics of age of present study is comparable with a

study by Pun TB et al<sup>13</sup> the mean age of the group was 43.85 years (range 22-61 years). In another study by Prasad GT et al<sup>12</sup> The age of the patients varied from 22 to 61 years (mean 40 years).

In current study showed mode of injury in which 32 (80%) patients had their fracture due to Road Traffic Accident (RTA) (two and four-wheeler versus pedestrian in 15 (37.5%) cases, fall from two wheeler in 8 (20%) cases, and car versus two wheeler in 9 (22.5%) cases), 4 (10%) due to fall from height, 2 due to sports, and rest of the 2 (5%) had fracture due to machine injury. Results were compared with a study done by Kavin Khatri et al<sup>14</sup> showing that The mechanism of injury was motor vehicle accident (RTA) in 53 (81.5%) patients , pedestrian struck by vehicle.

In this study mean time of full weight bearing (in weeks) was 15.50±3.20 weeks (range 12-30 weeks). When we compare Results of this study with a study by Osman A et al<sup>15</sup> showing that Full weight bearing was allowed at a mean of 14.4 weeks (range, 12 to 24 weeks) another study by Pun TB et al<sup>13</sup> showed that the mean time of full weight bearing (in weeks) was 12.5±1.2 weeks (range 6-15 weeks). In this study mean time of union was 10.15 ±2.50 weeks (range 5-20 weeks). Results were comparable with a study by Prasad GT et al<sup>12</sup> showed that patients had union in 8-22 weeks (average 14 weeks). Another study from Malaysia by Ranatunga IR et al<sup>16</sup> in which Mean union

time was recorded at 3.72 months. All fractures were united within four months. Ten patients required additional casting and eight patients did not require any other form of supports. Another study from Pakistan by Khan MA et al<sup>17</sup> reporting that All the fractures united with an average time of 3.6 months.

In this study mean hospital stays (in days) was 24.12±4.15 days (range 10 – 30 days). Results were comparable with a study by Prasad GT et al<sup>12</sup> showed that Hospital stay varied from 5 to 14 days (mean 6 days). In current study overall rate was 13 (32.5%) patients had developed complications, 2 (5%) patients had infected original wound, 4 (10%) patients had pin tract or screw site infection, 9 (22.5%) patients complain pain during walking in initial follow-up days and become finished latter on, a study from Malaysia by Ranatunga IR et al<sup>16</sup> in which Four patients had pin site infection. These infections were treated with a one-week course of antibiotics and daily dressings. There were no other recorded complications of septic arthritis, osteomyelitis, amputation or knee laxity. Another study by Khan MA et al<sup>17</sup>, showing the same complication There were two pin tract infections which did not involve the bone. Deep venous thrombosis was diagnosed in one patient with the help of ultrasound. Another study by Sheshagiri V et al<sup>18</sup> showing complications observed were pin track infections in 5 patients and non-compliance in 1 patient.

## CONCLUSION

We concluded from this study that both therapies have a positive effect of the functional range as the Locked plating offers good treatment option for heavy for difficult bicondylar tibial plateau fractures. Compared with external fixation, locking plates is to provide high levels of healing and restoration of the articular surface and reducing problems including knee stiffness and reoperation. While on other hand external fixation provide

**Conflict of Interest:** The study has no conflict of interest to declare by any author.

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