

## ORIGINAL ARTICLE

### Single locked plating versus double plating for bicondylar tibial plateau

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#### ABSTRACT:

**Background:** Bicondylar tibial plateau fractures are complex injuries necessitating a restoration of both articular congruity. The present study was conducted to compare the single locked plating (SP) versus double plating (DP). **Materials & Methods:** 70 cases of type C tibial plateau fractures were divided into 2 groups of 35 each. Group I were treated with single locked plating (SP) and group II with double plating (DP). Outcome of the treatment was recorded and compared. **Results:** Type of fracture was C1 in 15 and 16, C2 in 12 and 13, C3 in 8 and 6, soft tissue injury was Tscherne C0 in 13 and 9, Tscherne T1 in 10 and 12, Tscherne T2 in 7 and 8 and Tscherne T3 in 5 and 6. Average time of surgery (Days) was 8.2 and 9.0, mean operation time was 113.4 minutes and 136.2 minutes, mean reduction time was 45 minutes and 43 minutes in group I and group II respectively. Malalignment was seen in 4 in group I and 1 in group II, mal reduction in 3 in group I and 2 in group II and implant irritation 5 in group I and 6 in group II. **Conclusion:** Double plating through two incisions resulted in a better limb alignment and joint reduction.

**Key words:** Bicondylar tibial plateau, Limb alignment, Joint reduction.

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#### INTRODUCTION

Bicondylar tibial plateau fractures are complex injuries necessitating a restoration of both articular congruity as well as axial alignment of lower extremity and frequently associated with soft tissue injury. The treatment of bicondylar fractures is challenging and ideal method still controversial with risk of unsatisfactory results if not treated properly. Many different techniques of internal and external fixation are used to treat these fractures.<sup>1</sup>

Treatment goals include preservation of soft tissues, restoration of articular congruity, and correction of anatomic alignment in the lower extremities.<sup>2</sup> Adequate fixation and early achievement of postoperative range of motion are important for a good prognosis and adequate postoperative functioning. Buttressing of both the medial and lateral compartments with conventional double plating is the gold standard for managing bicondylar fractures because this may provide sufficiently rigid fixation to prevent medial collapse and subsequent varus deformity.<sup>3</sup> However, this may require excessive dissection through injured soft tissue, leading to wound complications or compromised osteosynthesis. Nonlocked unilateral buttress plating with lag screw fixation has the advantage of less stripping of soft tissue. However, poor bony purchase by lag screws

due to comminution and the natural characteristics of cancellous bone lead to further widening of the joint surface and displacement of fragments.<sup>4</sup>

The two-incision approach theoretically enables the surgeon to sufficiently visualize and both reduce tibial condyles and apply dual plates if desired, avoiding the soft tissue complications associated with anterior midline exposures.<sup>5</sup> The present study was conducted to compare the single locked plating (SP) versus double plating (DP).

#### MATERIALS & METHODS

The present study was conducted among 70 cases of type C tibial plateau fractures of both genders. All were informed regarding the study and their consent was obtained.

Data such as name, age, gender etc. was recorded. Preoperative biplanar radiographs and CT scans were obtained in all patients. Soft tissue injury was graded with Tscherne grading. Patients were divided into 2 groups of 35 each. Group I were treated with single locked plating (SP) and group II with double plating (DP). Postoperatively patients were put in a long knee brace for 2 weeks. Outcome of the treatment was recorded and compared. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

**RESULTS**

**Table I Distribution of patients**

Groups	Group I	Group II
Methods	Single locked plating	Double plating
M:F	20:15	25:10

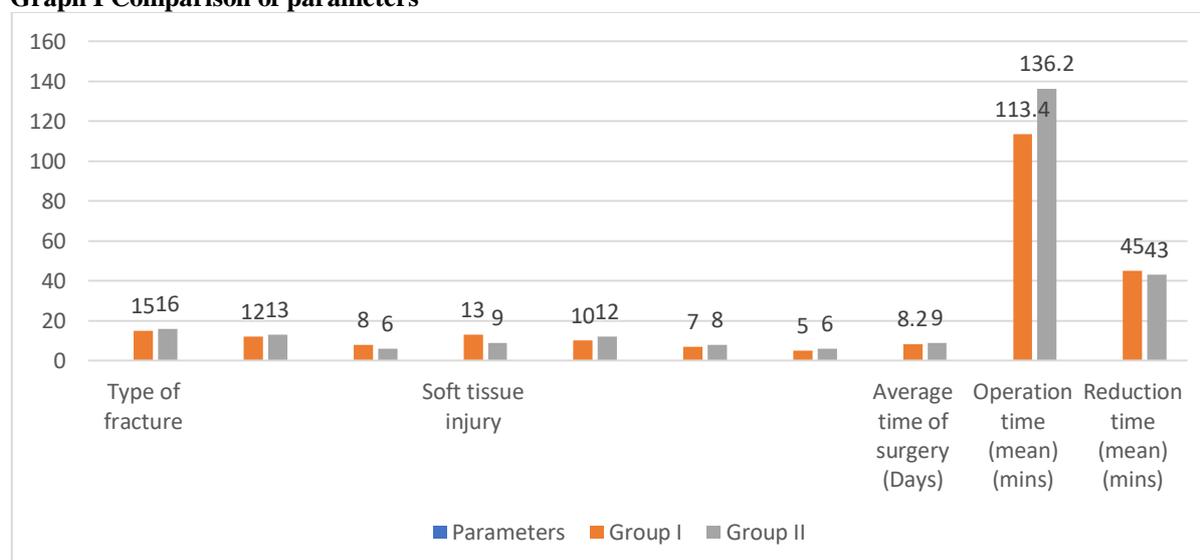
Table I shows that group I had 20 males and 15 females and group II had 25 females and 10 females.

**Table II Comparison of parameters**

Variables	Parameters	Group I	Group II	P value
Type of fracture	C1	15	16	0.05
	C2	12	13	
	C3	8	6	
Soft tissue injury	Tscherne C0	13	9	0.02
	Tscherne T1	10	12	
	Tscherne T2	7	8	
	Tscherne T3	5	6	
Average time of surgery (Days)		8.2	9.0	0.14
Operation time (mean) (mins)		113.4	136.2	0.05
Reduction time (mean) (mins)		45	43	0.12

Table II, graph I shows that type of fracture was C1 in 15 and 16, C2 in 12 and 13, C3 in 8 and 6, soft tissue injury was Tscherne C0 in 13 and 9, Tscherne T1 in 10 and 12, Tscherne T2 in 7 and 8 and Tscherne T3 in 5 and 6. Average time of surgery (Days) was 8.2 and 9.0, mean operation time was 113.4 minutes and 136.2 minutes, mean reduction time was 45 minutes and 43 minutes in group I and group II respectively. The difference was significant (P< 0.05).

**Graph I Comparison of parameters**



**Table IV Complications**

Complications	Group I	Group II	P value
Malalignment	4	1	0.01
Malreduction	3	2	0.05
Implant irritation	5	6	0.91

Table III shows that malalignment was seen in 4 in group I and 1 in group II, mal reduction in 3 in group I and 2 in group II and implant irritation 5 in group I and 6 in group II. The difference was significant (P< 0.05).

## DISCUSSION

Introduction of advanced instrumentation, such as locking plate systems, and techniques for internal fixation, such as minimally invasive plate osteosynthesis (MIPO), have changed the nature of treatment for these fractures over the last decade.<sup>6</sup> MIPO, with its key benefit of preserving the intact soft tissue envelope, is the representative biological plate technique.<sup>7</sup> The less invasive stabilization system (LISS) developed by Synthes is representative of locking plates that offer multiple points of fixed-angle contact between the plate and screws, aiming to decrease the tendency toward angular deformity.<sup>8</sup> A lateral locking plate can provide adequate stability for comminuted or osteoporotic plateau fractures and may offer an alternative to additional medial buttressing, thus avoiding further stripping of soft tissue. Nevertheless, these series revealed a higher rate of malreduction and fixation with unilateral locked plating using the LISS technique than with conventional double plating.<sup>9</sup> The present study was conducted to compare the single locked plating (SP) versus double plating (DP).

In present study, group I had 20 males and 15 females and group II had 25 females and 10 males. Lee et al<sup>10</sup> the average follow-up duration was 16.2 months and the average age of the patients was 43 years. All fractures were Orthopaedic Trauma Association type 41- C. Postoperative radiographic alignment was evaluated immediately and at 2-4 weeks, 8-12 weeks, 5-7 months, and 11-13 months. Both Oxford knee score and Hospital for Special Surgery knee score were used to evaluate functional outcomes. The average duration within which union was achieved was 4.8 months. One patient incurred wound dehiscence; however, there was no case of deep infection. Mal reduction occurred in one patient (6.7%) while fixation loss occurred in three patients (20%) with subsidence of the posteromedial fragment and varus malalignment. Despite the mal reduction rate being lower in our study than in previous studies involving unilateral locked plating, a high rate of fixation loss was recorded.

We found that type of fracture was C1 in 15 and 16, C2 in 12 and 13, C3 in 8 and 6, soft tissue injury was Tscherne C0 in 13 and 9, Tscherne T1 in 10 and 12, Tscherne T2 in 7 and 8 and Tscherne T3 in 5 and 6. Average time of surgery (Days) was 8.2 and 9.0, mean operation time was 113.4 minutes and 136.2 minutes, mean reduction time was 45 minutes and 43 minutes in group I and group II respectively. Neogi et al<sup>11</sup> in their study 61 cases of type C tibial plateau fractures were included in this prospective study. All cases were operated either by single lateral locked plate by anterolateral approach or double plating through double incision. All cases were followed for a minimum of 24 months radiologically and clinically. Twenty- nine patients in a single lateral locked plate and 32 patients in a double plating group were followed for minimum 2 years. All fractures healed,

however there was a significant incidence of malalignment in the single lateral plating group. Though there was a significant increase in soft tissue issues with the double plating group; however, there was only 3.12% incidence of deep infection. There was no significant difference in Hospital for special surgery score at 2 years follow up.

We observed that malalignment was seen in 4 in group I and 1 in group II, mal reduction in 3 in group I and 2 in group II and implant irritation 5 in group I and 6 in group II. Barei et al<sup>12</sup> using a computed tomography (CT) scan study demonstrated the presence of the posteromedial fragment in nearly 33% of bicondylar fractures. Historically, medial or posteromedial plating through a single midline incision resulted in high wound complication rates and deep sepsis, prompting an exploration of alternative techniques of stabilization, including a two- incision surgical approach.

## CONCLUSION

Authors found that double plating through two incisions resulted in a better limb alignment and joint reduction.

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