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## Original Research Article

## Evaluation of tibial condyle fractures treated with primary Ilizarov with a modified technique

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## ABSTRACT

**Background:** Tibial condyle fractures become more challenging when they present with damaged soft tissue. Our aim is to evaluate such fractures with Ilizarov ring fixator along with our modified technique to give better outcome.

**Materials and Methods:** Our study included 54 cases with proximal tibia fracture treated with Ilizarov by same surgeon and team from December 2017 to May 2021.

**Results:** Mean time for radiological union was 24.37 weeks (15 to 35 weeks). Ilizarov fixator we have removed 21 days after radiological union. Functional score was calculated using two scores: Hohl and Luck score, and Lyshom's score. 12 has excellent, 28 good, 14 were fair and no patient with poor result. Mean Lyshom's score was 81.73. Knee range of movement in maximum patients were 0 to 110 degree. There was few complications, like, Extensor lag which got corrected with physiotherapy. Pin tract infection which healed with few dressings.

**Conclusion:** Ilizarov ring fixator is an excellent option for Tibial Plateau fractures as a definitive surgery especially with damaged soft tissue. And with our modification we can achieve perfect joint alignment and early weight bearing.

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## 1. Introduction

Proximal tibia fracture is one of the most common fractures that we deal in the emergency department. With the increment of high speed vehicles the cases of compound fractures and fractures with impending compartment syndrome has increased. The mechanism of the injury contributes to a high rate of complications and it also tends to cause severe soft tissue damage.<sup>1-6</sup>

The aim of periarticular fracture fixation include restoration of articular congruity, joint stability and metaphyseal alignment. Open reduction internal fixation with plating is the usual treatment for such fractures.

However, these plates, especially when placed under thin or damaged soft tissue, may compromise wound healing.<sup>6-9</sup> Plate irritation occurs with a bone- plate distance of as little as 5mm. Even with staged external fixation and careful soft tissue handling, complication rates of high energy proximal tibia fractures range from ten to thirty percent. Ten percent patients experience hardware related complications, including pain and mechanical symptoms associated with prominent screws and plate.

The Ilizarov ring fixator offers a minimally invasive approach where multiple stab incisions are required for adequate intervention with minimum soft tissue destruction and blood loss. Other advantages of this technique is that adjustments during and after surgery are possible, also it allows early weight bearing.

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## 2. Materials and Methods

This study was conducted between December 2017 and May 2021 at a tertiary Centre in 54 patients with tibial Condyle fracture. All patients admitted either via Emergency or Out Patient Department were included in this study. Informed consent was taken from all patients. Inclusion criteria were patient more than 20 years, both sexes, all tibial condyle plateau fracture including severely comminuted fractures. Exclusion criteria were pathological fracture of tibia and patient lost for follow up. All patients were evaluated for musculoskeletal and neurological injuries. Time period between trauma and surgery varied from 8 hours to 5 days. Most of the cases were operated in regional anaesthesia.

Aim of our treatment for articular fractures is anatomical restoration of joint surface and absolute stability at the fracture site. At the metaphyseal region we need relative stability.

### 2.1. Our modification

For achieving anatomical restoration of joint surface we give a minimal incision and try to make the joint surface as normal as possible. If a fragment is depressed we lift it up and then we fix the fracture fragment with 4.5mm cannulated cancellous screws. Through these screws we can put the Ilizarov Kirshner wire and fix them with the ring. By this method we can achieve absolute stability at the joint surface. Rest of the frame is applied in usual manner to achieve relative stability at the epiphyseo-metaphyseal region.

Joint range of movement, isometric exercises and non-weight bearing walk is started from post-operative day one. Partial weight bearing walk at 6 weeks and full weight bearing at 8 weeks.

### 2.2. Case 1



**Fig. 1:** Pre-op clinical



**Fig. 2:** Pre-op



**Fig. 3:** Lifting fragment



**Fig. 4:** Intra op



**Fig. 5:** Immediate post-op AP



**Fig. 8:** SLR



**Fig. 6:** ROM extension



**Fig. 9:** 1 month lateral



**Fig. 7:** Rom flexion



**Fig. 10:** 1 month IAP



**Fig. 11:** 3 month AP



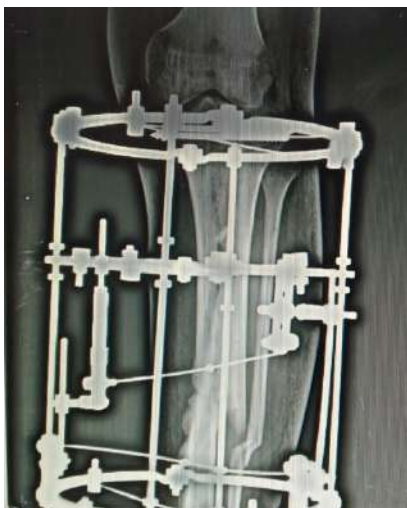
**Fig. 14:** 6 month lateral



**Fig. 12:** 3 month lateral



**Fig. 15:** 7 month AP



**Fig. 13:** 6 month AP



**Fig. 16:** 7 month lateral

2.3. Case 2



**Fig. 17:** Pre-op



**Fig. 18:** Pre-op lateral



**Fig. 19:** Clinical post-op



**Fig. 20:** 1 month AP



**Fig. 21:** 1 month lateral



**Fig. 22:** 3 month AP



Fig. 23: 3 month lateral



Fig. 24: 4 month AP



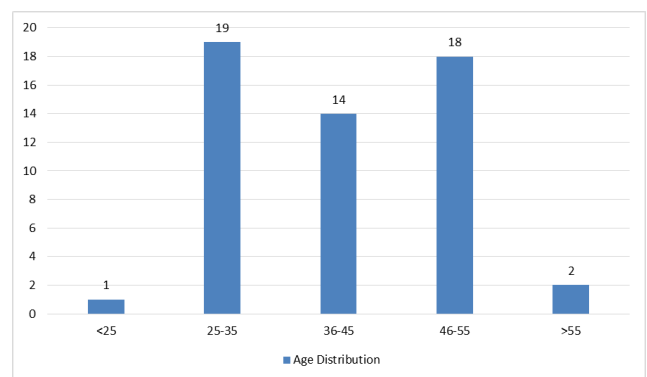
Fig. 25: 4 month lateral



Fig. 26: 6 month final

### 3. Results

A total of 54 cases of tibial plateau fractures were included in our study. The results and our observations are shown in tables and graphs.

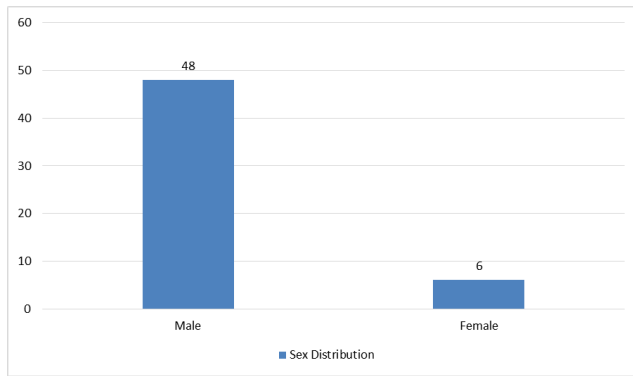


Graph 1: Age distribution

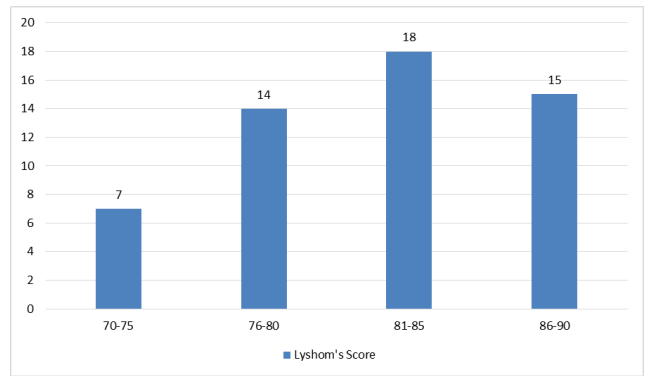
Same surgeon has operated all the cases. In our study maximum patient were male and of age between 25 and 55 years. Mean time for radiological union was 24.37 weeks (15 to 35 weeks). Ilizarov fixator we have removed 21 days after radiological union. Functional score was calculated using two scores: Hohl and Luck score, and Lyshom's score. 12 has excellent, 28 good, 14 were fair and no patient with poor result. Mean Lyshom's score was 81.73. Knee range of movement in maximum patients were 0 to 110 degree. There was few complications, like, Extensor lag which got corrected with physiotherapy. Pin tract infection which healed with few dressings.

### 4. Discussion

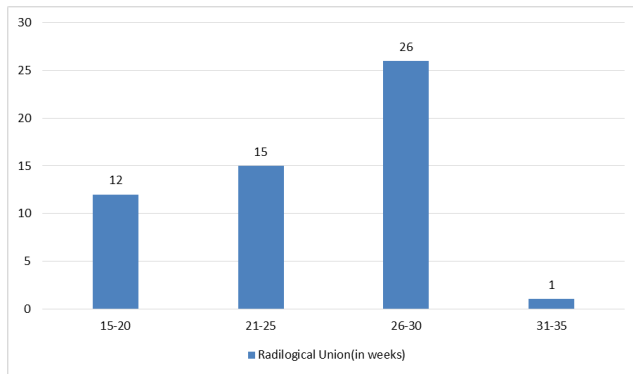
Periarticular fractures need anatomical reduction and early joint range of movement for better results. Ilizarov give both these advantages which has been proven with earlier studies also. George K Dendrinis et al<sup>10</sup> (1996) states that Ilizarov



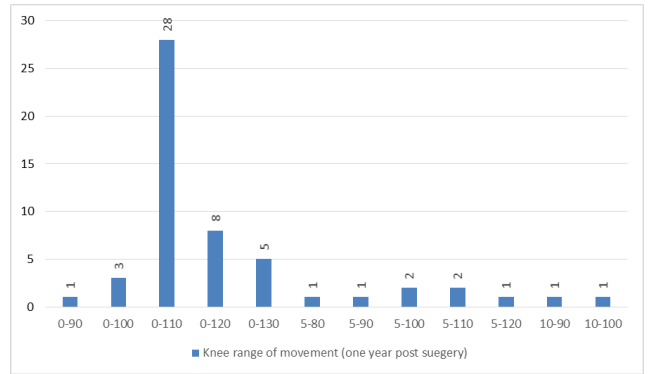
Graph 2: Sex distribution



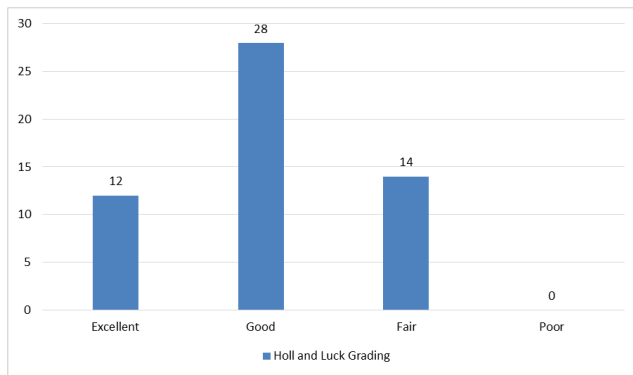
Graph 5: Lyshom's score



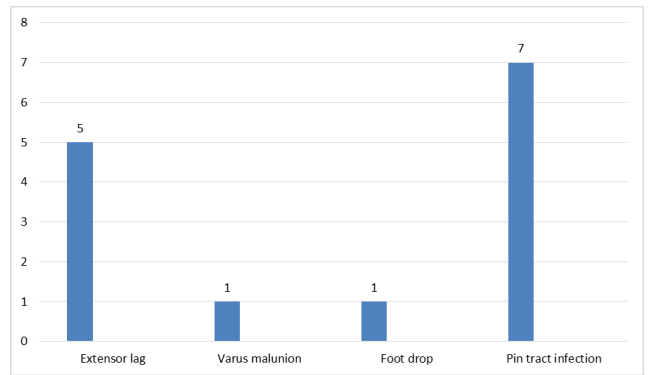
Graph 3: Radiological union(in weeks)



Graph 6: Knee range of movement (one year post surgery)



Graph 4: Holl and luck grading



Graph 7: Complications

is an ideal method of treatment for these fractures when extensive dissection is there, same is stated by Watson J Tracy et al.<sup>11</sup> (1998). Other studies supporting our results are: Barbary H El et al<sup>12</sup> (2005), Ranatunga IR et al<sup>13</sup> (2010), Sandeep Reddy R et al<sup>14</sup> (2014). Studies which show that Ilizarov is better treatment option compared to open reduction internal fixation are: Metcalfe et al<sup>15</sup> (2015), Boutefnouchet et al<sup>16</sup> (2016), and Tahir et al<sup>17</sup>(2019).

Our modification gives excellent result as it provide absolute stability at the periarticular area which heals the

fracture without callus, and restores joint anatomy. At the same time it gives relative stability at the epiphyseo-metaphyseal region and healing the fracture with abundant callus, and thus allowing patient for early weight bearing.

### 5. Conclusions

Ilizarov ring fixator is an excellent option for Tibial Plateau fractures as a definitive surgery especially with damaged soft tissue. And with our modification we can achieve perfect joint alignment and early weight bearing.

## 6. Source of Funding

None.


## 7. Conflict of Interest

None.

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