

## Case Report

# An illustrative case report emphasizing the biological plating of a comminuted intra-articular fracture

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### ABSTRACT

Comminuted intra-articular fractures are very common in high energy traumas, conventional open reduction and plate fixation has been associated with many complications as they disturb the fracture biology and hence minimally invasive plating came into existence. We are reporting a 17 year old boy who met with road traffic accident sustained an AO type 33C2 injury to left femur with severe metaphyseal comminution treated by minimal invasive plate osteosynthesis technique who achieved full radiological union at the end of 4 months and full functional recovery at 8 months follow-up. This case emphasizes the need for preservation of fracture biology which is of paramount importance in healing of comminuted fractures.

**Keywords:** Comminuted fracture, Biological fixation, Minimal invasive plate osteosynthesis, Supracondylar femoral fracture

### INTRODUCTION

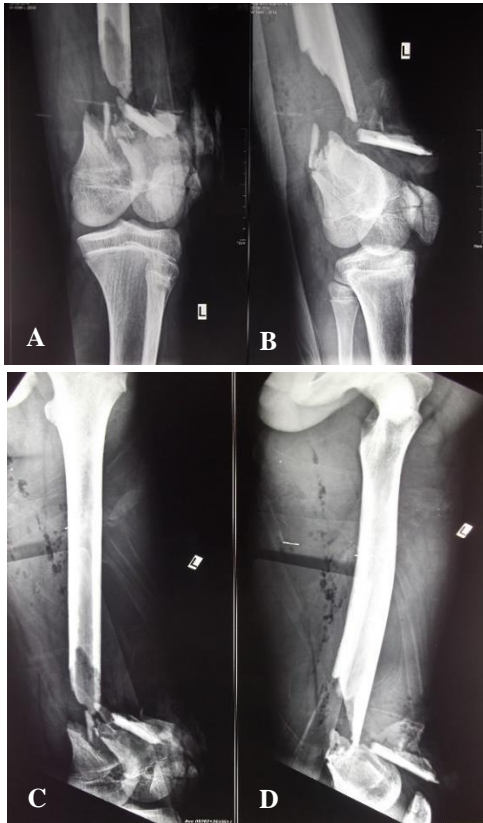
Distal femoral fractures mainly arise from many different injury mechanisms. They are often caused by high energy trauma mainly sustained in traffic accidents. Comminuted fractures of the distal femur have always been difficult to treat. AO recommended the principles of anatomical reduction, stable internal fixation, and early, active, pain-free mobilization for these types of fractures. This had been achieved by open reduction and plate fixation using various fixation devices.<sup>1</sup> In recent years, the technique of surgical stabilization in the distal femur has changed. Minimally invasive surgical techniques with a sub muscular locking plate bridging the fracture site, have replaced the emphasis on anatomical reduction in the metaphyseal area.<sup>2</sup> Reconstruction of complex articular injuries has been simplified by more direct visualization of the articular surface with the lateral para patellar approach.

### CASE REPORT

Our patient is a 17 year old boy who met with a road traffic accident sustaining closed injury to the left thigh, knee and leg. He presented to us 6 hours after the injury with a tender, grossly swollen left lower limb which he was unable to move. After primary survey and assuring hemodynamic stability, Radiographs were taken which showed AO type 33C2 femur fracture with severe metaphyseal comminution (Figure 1), AO type 42C1 tibia fracture and comminuted undisplaced patella fracture. Preoperative computed tomography a done which confirmed the above fractures (Figure 2).

He underwent emergency left lower limb knee spanning external fixation on the day of injury as a damage control surgery (Figure 3). After 3 days the external fixator was removed and definitive fixation was done using minimal

invasive plate osteosynthesis technique for femur (Figure 4) and intramedullary nailing for the tibia.



**Figure 1 (A-D): Preoperative radiograph of the left femur.**

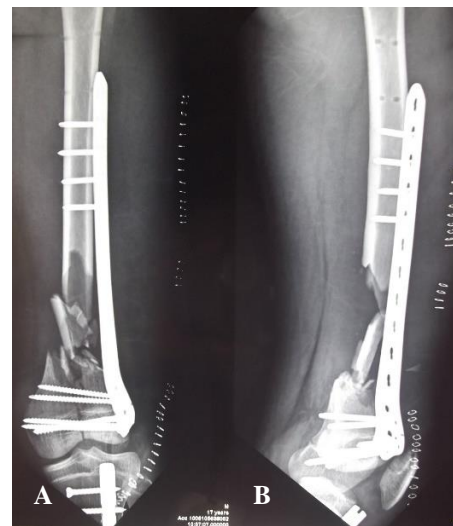


**Figure 2 (A and B): Preoperative CT images.**

Distal femur was approached by the modified swashbuckler approach, Intra-articular fragment was reduced and fixed with a single cancellous screw. Then a distal femur anatomically contoured locking plate was slid across the communitated metaphysis and fixed with 4 locking screws in proximal and distal fragment each. Tibia a fixed by closed reduction and standard intramedullary nailing technique Intra operatively extensor mechanism was found to be intact and hence patella was not fixed.



**Figure 3: Post external fixation radiograph.**



**Figure 4 (A and B): Post internal fixation by minimal invasive plate osteosynthesis technique.**



**Figure 5 (A and B): At 1 month follow up.**



**Figure 6 (A-C): At 3 months follow up.**



**Figure 7 (A-C): At 6 months follow up.**

Post operatively, patient was started on knee isometric and ROM exercises and was to walk Non weight bearing with walker support. Serial radiographs were taken at 1 month, 3 months and 6 months follow up and compared with immediate post op, to assess fracture healing. At 1 month postoperatively, callus formation was appreciated in the comminuted metaphyseal region (Figure 5). At 3 months post op good radiological union was observed and knee ROM was found to be 140 degrees (Figure 6). At 6 months Post op complete radiological union was achieved and full ROM was attained (Figure 7).

## DISCUSSION

The treatment of displaced intraarticular distal femoral fractures with open reduction and internal fixation has traditionally resulted in 70-90% good and excellent results.<sup>3</sup> However, the use of bone grafts is often recommended if medial comminution or bone loss are present, particularly in AO type C2-C3 fractures.<sup>4</sup> Without the addition of bone graft, many studies report an increased incidence of delayed union, non-union, loss of reduction, and implant failure.<sup>4</sup>

Biological fixation of fractures achieved by indirect reduction of fractures are found to improve fracture healing by various mechanisms.<sup>5</sup> The use of locking plates for bridging osteosynthesis and its advantages have been well documented.<sup>6</sup> Minimally invasive techniques have been developed to avoid the potential complications associated with soft tissue stripping in the treatment of intra articular distal femoral fractures.<sup>1</sup> Many recent studies using minimally invasive LCP achieved biological fixation for distal femoral fractures with good union without the use of bone grafting in cases of metaphyseal comminution.<sup>2</sup>

In conclusion, this case illustrates that the preservation of fracture haematoma and minimal dissection in the extra-articular component of a complex fracture pattern is of produces excellent callus formation and bone healing. However, the concept of anatomical reduction and stable fixation is the key in treating intra-articular component of these fractures.

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