

External Fixator-Assisted Reduction of Distal Femur Fractures: Technical Trick

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Purpose: Restoration of anatomical alignment while preserving the soft-tissue envelope around the fracture site remains a challenge during distal femur fracture fixation. Although the lateral distal femoral locking plate allows surgeons to achieve adequate bony stability, their application has been associated with malalignment leading to inferior outcomes. We propose a biologically friendly, percutaneous technique that sequentially reduces and aligns distal femur fractures with an anterior external fixator prior to definitive fixation with a lateral distal femoral locking plate.

Methods: After IRB approval, a retrospective review of all patients with an operative distal femur fracture reduced using an intraoperative external fixator treated at our regional Level-I trauma center was performed from our trauma database. Inclusion criteria included skeletal maturity, age 18-85 years, a complete medical chart related to their injury, complete preoperative and postoperative radiographs, and at least 12 months of follow-up.

Results: The study cohort was made up of 7 patients (5 women and 2 men) with a mean age of 56 ± 14 years (mean \pm standard deviation). Using the OTA/AO classification system, our cohort consisted of one 33-A3, two 33-C1, three 33-C2, and one 33-C3 fractures. Two of the patients suffered open fractures and the rest were closed. Average time until surgery was 3.0 ± 2.2 days. Three patients were temporized with knee-spanning external fixation prior to definitive treatment. All patients were treated with a 4.5-mm distal femoral variable angle locking plate (Synthes). Average clinical follow-up was 28.9 ± 20.3 months. At final follow-up, all patients had achieved bony union without implant failure or infection. No patients had undergone hardware removal or reoperation. Average knee range of motion at last follow-up was full extension and $92 \pm 39^\circ$ of flexion.

Conclusion: Restoration of mechanical alignment of supracondylar femur fractures while preserving biology is crucial in order to achieve bony union and to restore limb function. Despite several intraoperative techniques to restore coronal, sagittal, and axial alignment, mechanical axis malreductions and subsequent nonunions continue to be an issue. To improve the surgeon's ability to restore mechanical alignment in these fractures in a biologically friendly manner, we propose a simple reduction technique using readily available external fixation equipment that restores alignment and temporarily stabilizes these fractures thereby facilitating proper application of a distal femoral locking plate. To the best of our knowledge, there has been no other publication describing the use of an external fixator as a reduction tool for distal femur supracondylar fractures as described in this report.