Combined Plate-Nail Fixation of Intra-Articular Proximal Third Tibia Fractures

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Purpose: Complex proximal tibia fractures with metadiaphyseal comminution and intra-articular extension commonly have a compromised soft-tissue envelope. Standard management requires resolution of soft-tissue swelling to allow for dual medial and lateral approaches for plate fixation. While combined plate-nail fixation has been described for noncontiguous fractures of the tibial plateau and shaft, an anterolateral plate and intramedullary nail can be placed percutaneously for proximal tibia fractures with intra-articular extension, and bicondylar tibial plateau fractures with a simple articular injury. This technique alleviates the need for a separate medial approach to the proximal tibia. We report a series of patients treated with this technique and outline the steps for implementation.

Methods: We performed a retrospective review of 13 consecutive patients treated with combined lateral locked plating and intramedullary nailing at a single academic institution from 2016 to 2019. Of these, 7 patients had greater than 3-month follow-up and were included in this study. All patients had AO/OTA type 41C2 fractures. Primary outcomes included rate of radiographic union, time to radiographic union, coronal and sagittal alignment at latest follow-up, and knee range of motion and incidence of knee pain at latest follow-up. Secondary outcomes included rate of postoperative infection, implant removal, and articular subsidence.

Results: Of the 7 patients included, average follow-up was 11.1 months (range, 3.3-18.8). All patients presented with closed injuries and achieved radiographic union at an average of 105 days (range, 52-253) from definitive fixation. Coronal alignment ranged from 3.2° of varus to 1.0° of valgus. Sagittal alignment ranged from 0 to 4.5° of procurvatum. Average knee range of motion ranged from 0-5° of extension to 100-135° of flexion. Three patients had mild knee pain at latest follow-up. One patient (14.3%) presented 141 days postoperatively with wound breakdown and infection, and was treated with irrigation and debridement, removal of implants, and medial gastrocnemius flap. One patient elected for removal of symptomatic hardware. There was no radiographic evidence of articular subsidence.

Conclusion: Combination plate-nail fixation is a viable option for treating patients with proximal tibia fractures with metadiaphyseal comminution and simple intra-articular extension. This technique prioritizes articular reduction and lateral tibial plate fixation, which is then followed by placement of an intramedullary nail. This construct allows for minimal soft-tissue disruption to the proximal tibia, accurate restoration of alignment, and stable fixation. This small case series demonstrates acceptable radiographic and clinical outcomes, as well as rates of postoperative infection and implant removal similar to those currently reported in the literature for other techniques used to treat these fractures.