Ankle Fractures Treated with Locked Fibular Intramedullary Nailing: Description and Outcomes of a Novel Minimally Invasive Open Technique

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Purpose: Most operative ankle fractures are treated with open reduction and internal fixation with plates/screws. Fibular intermedullary (IM) nailing is being increasingly used, especially in patients at risk for wound complications. Reports to date describe percutaneous techniques that may limit reduction quality. We aim to describe and report outcomes of a minimally invasive open IM fibular nailing technique for fixation of ankle fractures.

Methods: This is a retrospective review of adult patients with ankle fractures (OTA 44A-C) treated with locked fibular IM nailing. Lateral malleolus fractures were managed with a 2-cm direct lateral incision for clamp reduction of the fibula, and a second 2-cm anterolateral incision for direct visualization of the "Mercedes Benz sign" at the articulations of the tibia, fibula, and talus. Syndesmotic reduction was held with a 2-mm Kirschner wire. The fibula was then fixed with an intramedullary nail inserted through a distal stab incision. Anterior to posterior locking screws were inserted through the anterolateral incision, and syndesmotic locking screws were inserted through the lateral incision. Posterior malleolus fractures (percutaneous clamp application and posterior to anterior screw), and medial malleolus fractures (open medial approach and screw fixation) were addressed when present. The quality of reduction was assessed according to MclEnnan and Ungersma's criteria ("good", "fair", or "poor").

Results: 58 consecutive ankle fractures from 2021 to 2022 treated at a Level I trauma center were included. The mean age was 58.8 years (range, 21-93), with an average body mass index of 30.9 (standard deviation [SD] 7.4), and a 36.2% incidence of diabetes. 15% of patients had open fractures. The quality of reduction was "good" in 94.8% (55/58) and "fair" in 3 cases. Patients were allowed to weight bear as tolerated at 6 weeks or earlier depending upon injury pattern and bone quality. 58 patients have been followed to union (to date) with no implant failures or loss of reduction. There were 2 superficial wound complications, 2 debridements for deep infection, and 2 asymptomatic broken syndesmotic screws, (3.4% each).

Conclusion: Locked fibular IM nailing of ankle fractures with a novel minimally invasive open technique allows for a good reduction and results in union with low rates of deep infection, wound complications, and implant failure.