TREATMENT OF UNSTABLE ANKLE FRACTURES USING CONTOURED DISTAL FIBULA LOCKING PLATES

Brigham Au, MD

Summary: The treatment of unstable ankle fractures is a common problem for orthopedic surgeons. Multiple components in the treatment of unstable ankle fractures remain controversial. Optimal fixation strategies in neuropathic and osteoporotic patients are not presently well defined. Techniques and implants continue to evolve in an effort to solve these controversies. Anatomically contoured distal fibula plates offer the biomechanical advantage of polyaxial locked fixation with a lower profile than previous implants to mitigate concerns with wound complications. This case demonstrates the use of a contoured distal fibula small fragment locking plate in the treatment of an unstable bimalleolar ankle fracture.

Key Words: ankle fracture, syndesmosis, locking fixation

INTRODUCTION

Ankle fractures are a common injury treated by orthopedic surgeons, and the incidence of geriatric and osteoporotic ankle fractures is increasing. Preoperative evaluation, intraoperative decision making, and postoperative treatment continue to evolve. There are many concepts in the treatment of ankle fractures that are currently debated, but the 2 main concepts that are always present in the decision-making algorithm are congruity and stability of the joint. The goal of nonoperative or operative treatment for ankle fractures is restoration of function by restoring articular congruity and stability to allow early rehabilitation. The following case demonstrates the use of a contoured distal fibula small fragment locking plate for an unstable ankle fracture.

CASE

History of Present Illness

The patient is a 40-year-old woman who presented 6 days after falling on wet cement. The patient was unable to bear weight and was using crutches, but had not been treated by a physician. She is obese, has hypertension, has not had surgery previously, takes medication for her hypertension, and does not smoke.

Clinical Findings

On examination of the left ankle, the patient had nonwrinkleable skin, ecchymosis, and tenderness to palpation of her ankle. Her vascular and gross neurologic examinations were normal; motor examination was intact but limited because of pain. Left ankle AP, mortise, and lateral films were obtained in the emergency department, demonstrating a bimalleolar ankle fracture (Figs. 1A–C). The ankle was immobilized in a splint, and the patient was discharged home for elevation. No deep vein thrombosis prophylaxis was given pre- or postoperatively. Several days later, the patient presented as planned to the day surgery unit and was found to have skin amenable to operative fixation.

Surgical Technique

The patient was identified in the preoperative holding area, and a regional block was performed. The patient was taken to the operating room, and general anesthesia and intravenous antibiotics were administered. The patient was positioned in the right lateral decubitus position to facilitate posterior malleolar exposure. The limb was exsanguinated and tourniquet inflated. A postero-lateral incision was used. A sharp dissection down to the deep fascia was performed, and then an anterior flap was created superficial to the peroneals. The fibula fracture was identified,
mobilized, and reduced with clamps. A 2.7-mm lag screw by technique was placed and clamps were removed.

The interval between the peroneals and the gastroc–soleus complex was identified, and blunt dissection was performed down to the flexor hallucis longus muscle belly. The fascia was incised to allow mobilization and medial retraction of the flexor hallucis longus muscle. The periosteum was intact and incised sharply to allow reduction of the posterior malleolus. Cortical reads were used to reduce the posterior malleolus, and a wire was placed under fluoroscopic guidance for a 4.0-mm cannulated screw. Once the screw was placed across the posterior malleolus fracture, attention was returned to the fibula.

A 3.5-mm distal fibula small fragment locking plate was used in the neutralization mode with 2 cortical screws placed proximal to the lag screw, and 3 unicortical locking screws placed distal to the lag screw.

The syndesmosis was found to be stable on cotton test, but unstable on external rotation and Candal–Couto tests. After anatomic reduction of the syndesmosis, it was stabilized with a tricortical 3.5-mm position screw under fluoroscopic guidance. Intraoperative fluoroscopic views demonstrated restoration of the ankle mortise and articular surface (Figs. 2A–C).

A standard layered closure was performed; a dry dressing and well-padded posterior splint with stirrup were applied. The patient was discharged without complication from the day surgery unit.

Postoperative Course
The patient was seen in the clinic at 2 weeks. Her pain was controlled with Tylenol #3. She complained of numbness when the foot was dependent for prolonged periods of time. She had been compliant with weight-bearing restrictions. The sutures were removed and range of motion was initiated with a 3D boot.

At 6 weeks, the patient was seen in the clinic for routine follow-up. She was compliant with weight-bearing restrictions and had initiated range of motion exercises.

At 10 weeks, weight-bearing was initiated. Weight-bearing radiographs taken at 3 months showed maintained reduction of the ankle mortise and no sign of fixation failure (Figs. 3A–C). The patient then began weight-bearing in a 3D boot and working with physical therapy.

Outcome
The patient did not follow up at her 6-month appointment because of financial reasons. Inquiry over the phone was made, and the patient had returned to full activity and returned to work by 4 months.

DISCUSSION
Surgical management of ankle fractures is variable from surgeon to surgeon because of the wide variety of injury patterns and options available for fixation. An area that deserves further investigation is the use of distal fibula small fragment locking plates. Biomechanical studies suggest that there is an advantage to using locking distal fibula plates. However, locking plates used in distal fibula fractures have shown a higher level of wound complications. Two recent retrospective studies of locking versus nonlocking fixation for distal fibula fractures show no difference in wound complications. The new generation of contoured locking plates with a lower profile may mitigate wound complications while still providing superior biomechanical advantages in patients with osteoporosis and diabetes.

Biomechanical studies have not translated directly into superior clinical outcomes. The same retrospective study showing no

FIGURE 1. Left ankle AP, mortise, and lateral films obtained in the emergency department, demonstrating a bimalleolar ankle fracture (A, B, and C).
difference in wound complications also showed no difference in clinical outcomes. However, selection bias may have resulted in similar results because the locking plate group had more diabetic and elderly patients. Another retrospective study aimed specifically at clinical and radiographic outcomes showed no difference between a locking one-third tubular and anatomical distal fibula locking plate. A wide variety of fixation strategies, fixation options, and postoperative protocols makes it difficult to compare 1 type of plate with another, resulting in a variety of outcomes reported in the literature.

CONCLUSION

New contoured, distal fibula locking plates may provide a biomechanical advantage over previous generations of locking plates. Future randomized studies are needed to elucidate the clinical
advantages and complications seen while using them in unstable ankle fractures.

REFERENCES


Read the rest of the JOT Case Reports online on www.jorthotrauma.com. It’s the Grand Rounds series from the Journal of Orthopaedic Trauma, the official journal of the Orthopaedic Trauma Association.