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CASE REPORT

Utilizing the Locking Peg Hook Plate for a Comminuted Fracture of the Medial Malleolus

Krystin A. Hidden, MD, Marissa D. Jamieson, MD, and Adam T. Groth, MD

Summary: Internal fixation is considered the standard of care for most unstable medial malleolus fractures. The overall goal of surgery is to restore the congruency of the tibial plafond. Comminuted medial malleolus fractures can be technically challenging injuries given the limited surface area of the small osseous fragment, and multiple fixation techniques have been described. The locking peg hook plate provides a reliable fixation option for medial malleolus fractures. The purpose of this case report is to discuss the use of a locking peg hook plate for a comminuted fracture of the medial malleolus.

Key Words: ankle fractures, medial malleolus fractures, ORIF, hook plates

INTRODUCTION

Ankle fractures involving the medial malleolus are one of the most common orthopaedic lower extremity injuries. Herscovici et al developed a classification system for medial malleolus fractures with type A involving avulsion fractures, type B fractures between the tip of the malleolus and the plafond, type C fractures at the level of the plafond, and type D fractures extending vertical, proximal to the plafond.^{1,2} Indications for open reduction internal fixation (ORIF) of medial malleolus

fractures include unstable mortise injuries with medial malleolus displacement. The overall goal of surgical fixation is to restore ankle mortise position and stability. Multiple surgical techniques and implants have been studied specific to medial malleolus fractures, including single versus double screw fixation, tension band constructs, and hook plates.³ Fixation of medial malleolus fractures can be technically challenging given the risk of further fragmentation of the small osseous fragment with larger implant constructs. Medial malleolus hook plates can provide appropriate fragment compression while minimizing implant surface area

From the Department of Orthopaedic Surgery, The Ohio State University, Columbus, OH.

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Reprints: Adam T. Groth, MD, Department of Orthopaedics, The Ohio State University Wexner Medical Center (e-mail: adam.groth@osumc.edu).

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FIGURE 1. Preoperative anteroposterior (AP) (A) and Lateral (B) ankle radiographs showing a trimalleolar ankle fracture, OTA/AO44B3.2.



FIGURE 2. Postoperative AP (A) and lateral (B) ankle radiographs showing the trimalleolar ankle fracture status post-ORIF. The medial malleolus was fixed with two 4.0-mm partially threaded cancellous screws.

contact with the fracture fragment. The purpose of this case report is to discuss the use of a locking peg hook plate for a comminuted fracture of the medial malleolus.

PATIENT INFORMATION

The patient was a 51-year-old female who presented to the clinic after sustaining a new peri-implant fracture after prior fixation and subsequent limited hardware removal for a right ankle fracture.



FIGURE 3. AP (A) and lateral (B) ankle radiographs after symptomatic hardware removal of the lateral plate and screws at 7 years postoperatively. The medial malleolar screws were left in place.



FIGURE 4. AP (A) and lateral (B) ankle radiographs revealing a new trimalleolar ankle fracture with bent medial malleolar screws and a fractured medial malleolus distal to the retained hardware.

The initial injury in 2003 revealed a Weber B lateral malleolus fracture, a nondisplaced posterior malleolar lip fracture, and a Herscovici type C transverse medial malleolus fracture, OTA/AO44B3.2. The patient underwent ORIF utilizing a standard lag screw and a one-third tubular neutralization plate for the lateral malleolus followed by percutaneous closed reduction and internal fixation utilizing two 4.0-mm partially threaded cancellous screws for the medial malleolus (Fig. 1). Her postoperative course was unremarkable. She presented to the clinic 7 years postoperatively with complaints of painful, prominent lateral hardware and requested removal. Radiographs demonstrated stable fixation and fracture union (Fig. 2). The patient underwent subsequent lateral hardware removal without complication. The medial malleolar screws were found to be stripped at the time of surgery, and the decision was made to keep them in place (Fig. 3).

The patient then sustained a fall approximately 6 years after her hardware removal and presented to our institution. Radiographs demonstrated a trimalleolar ankle fracture with a displaced distal fibula fracture, a posterior malleolar avulsion, and a peri-implant comminuted fracture of the medial malleolus bending the anterior medial malleolar screw (Fig. 4).

SURGICAL TECHNIQUE

The patient was positioned supine on the operating room table under general anesthesia. A preoperative regional block was performed for postoperative pain control. A bump was placed underneath the right hip, and a tourniquet was applied high on the operative thigh. The prior anteromedial curvilinear ankle incision was incised, and the medial malleolar fracture site and anterior joint line were exposed. The posterior column of the medial malleolus was intact and the previously placed posterior medial malleolar screw remained well fixed. This screw head was stripped and buried and we elected to leave it in place. There was a single structural anteromedial articular fragment, which had pulled through and bent the previously placed anteromedial screw. The

bent screw was removed, there was a large articular segment attached, but a significant defect in the outer cortex of this fragment remained, which prevented stable small fragment cortical fixation. The decision was made to proceed with a locking peg hook plate (Acumed, Hillsboro, OR).

Reduction was achieved utilizing a dental pick and a small pointed reduction clamp. A 0.045'' K-wire was placed through the fracture fragment for provisional fixation. The locked peg hook

plate was then placed (Figs. 5A–D). The peg plate was applied and fit the anatomic contour of the medial malleolus. The plate was pinned proximally with the 0.062'' K-wire. The locking guide was applied, and the 2.3-mm locking cortical peg was placed across the fracture fragment. The provisional K-wire was then removed, and a 2.7-mm cortical screw was placed proximally in the plate achieving further compression across the fracture site. One additional 2.7-mm locking screw was placed in the peg plate proximal

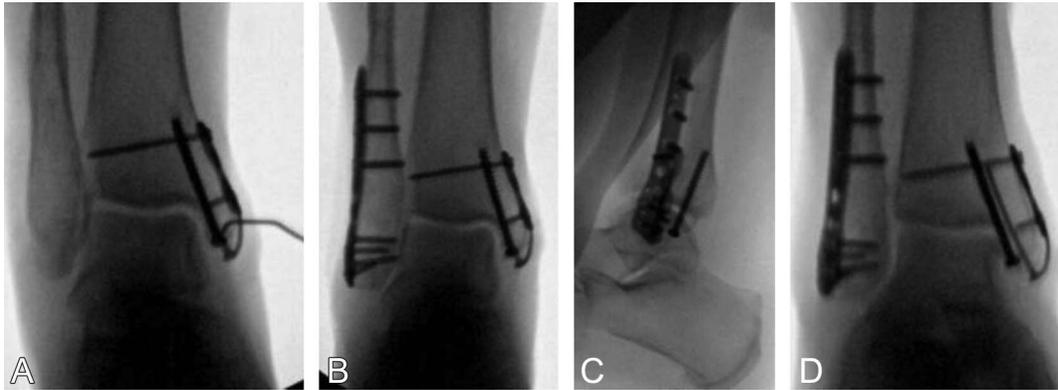


FIGURE 5. A dental pick was utilized to aid reduction of the medial malleolar fragment (A). AP (B), lateral (C), and oblique (D) fluoroscopy views demonstrate appropriate reduction with lateral locking and medial peg plates.

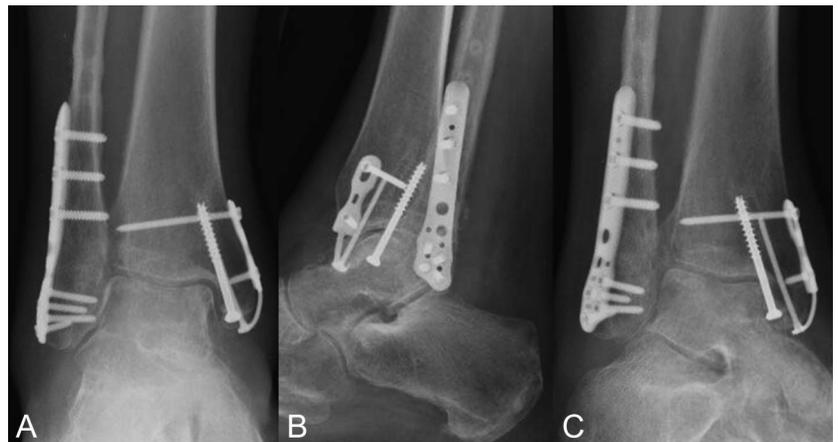


FIGURE 6. AP (A), lateral (B), and oblique (C) radiographs 6 weeks postoperatively demonstrating appropriate ankle alignment and hardware positioning after revision ORIF with a locking lateral plate and a medial peg plate.

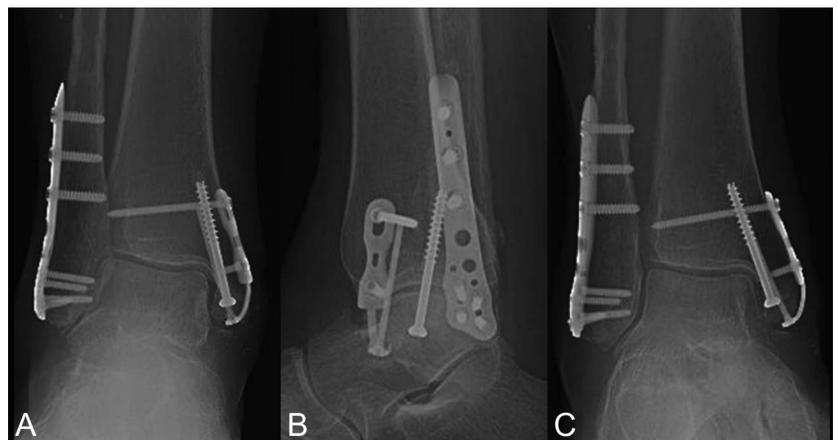


FIGURE 7. AP (A), lateral (B), and oblique (C) radiographs taken 18 months after the revision surgery demonstrate fracture union without complication.

to the fracture fragment. Multiplanar fluoroscopy and direct visualization demonstrated stable anatomic fracture fixation and the plate remained well-contoured over the medial malleolus with a low profile. Anatomic fixation of the distal fibula was achieved with a locking lateral plate. The small posterior lip avulsion fleck was not fixed. The distal tibiofibular syndesmosis was intact with stable intraoperative stress testing. A splint was applied, and the patient was made nonweight bearing for 8 weeks. Postoperative radiographs at 6 weeks (Figs. 6A–C) and 18 months (Figs. 7A–C) reveal stable fixation and fracture union.

DISCUSSION

Displaced medial malleolus fractures are typically treated with ORIF, and multiple implant constructs have been devised for fixation, including screws, hook plates, and locking peg plates. The AO Foundation has traditionally recommended the use of partially threaded cannulated screws or lag screws through a buttress plate.⁴ Comminuted medial malleolus fractures are difficult to treat with screw fixation in the setting of little bone purchase. The medial malleolus locking peg hook plate provides a fixed angle construct that allows fracture fixation in the setting of injuries not amenable to standard screws.

CONCLUSIONS

This case study demonstrates successful use of the locking peg hook plate for a peri-implant medial malleolus fracture. Care must

be taken to avoid fragmentation of the small osseous fragment. Provisional fixation of the avulsion fracture with a K-wire allows application of the plate. The locking peg hook plate is a feasible option for small medial malleolar fractures that are difficult to fix with standard screws.

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