CHAPTER **16**

CONTOURED PLATING: ADJUNCT TO MANAGEMENT OF ANKLE FRACTURES

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INTRODUCTION

Contoured or anatomically-designed plating has been available for management of ankle fractures for approximately 10 years. These plates are designed to be an accurate anatomic fit to the specific fracture site. The contours were gained initially by computed tomography scanning of multiple cadaveric specimens and more recently by digital laser bone scanning techniques thus cataloging the three-dimensional spatial anatomy of common fracture sites and elective fusion and osteotomy locations. This technology decreases the need for intraoperative plate bending, which is often time consuming and frustrating.

Early generation plates offered stabilization of ankle fractures from anterior medial and anterior lateral distal tibia, as well as the anatomic distal lateral and posterior lateral fibular plates. Subsequent generations of these devices have added additional technology such as rolled/chamfered edges to assist in percutaneous application, locking screws for improved stability and less periosteal compromise, and design changes targeted at providing additional support to the subchondral bone plate thus helping prevent subsequent subsidence. These successive design generations have contributed to achieving improved outcomes due to less soft tissue disruption, smaller incisions, and a more anatomic fracture healing environment.

In addition to those iterations, additional designs such as direct anterior and posterior distal tibial plates are now available. Anatomic plates are now available from most all equipment manufacturers with similar features, but each with its own nuances and personality. Variables between manufacturers include screw sizes compatible with the plates (2.4, 2.7, 3.5, 4.0 and 5.0), fixed versus variable angle locking, tabs and hooks. Although adaptation of these devices has been fairly widespread, a relative paucity of literature or studies comparing the use of contoured versus standard plating exists.

Siegel and Tornetta published one of the few studies showing improved outcomes in pronation abduction ankle fractures where the precontoured plate was used as a template and applied over the periostium. This led to better outcomes with diminished nonunion rates and also obviated the need for primary bone grafting, which was frequently required with the traditional technique.

TIBIAL TECHNIQUE

Distal tibial fracture treatment has improved over the years with better appreciation of the soft tissue envelope component of these injuries. The current medial and anterolateral anatomic plates can be readily applied through smaller incisions at the joint level. This allows for anatomic reduction of the articular surface, and definitive fixation by sliding the plate proximally (subcutaneously) and applying proximal screws percutaneously. This reduced dissection results in decreased disruption to the vascularity of the bone and ultimately better outcomes.

FIBULAR TECHNIQUE

The fibular exposure in the majority of fractures continues to be via a traditional lateral fibular approach. As with the tibia, however, in some cases the incision can be minimized and the reduction and fixation performed percutaneously with the aid of fluoroscopy and in some cases arthroscopy.

CLINICALLY ILLUSTRATED TECHNIQUE

Figure 1. Standard lateral fibular approach allowing access to the fracture as well as exposure for talar dome inspection.

Figure 2A. Surgeon's view of fibular fracture reduced and clamped.

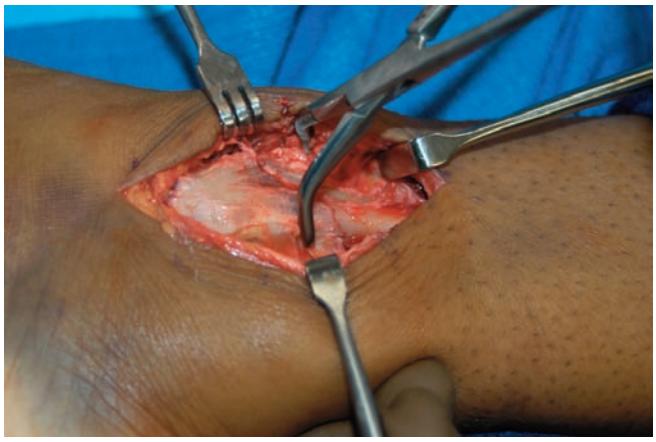

Figure 2B. Posterior lateral view confirming anatomic reduction of the posterior spike of a typical SER fracture.

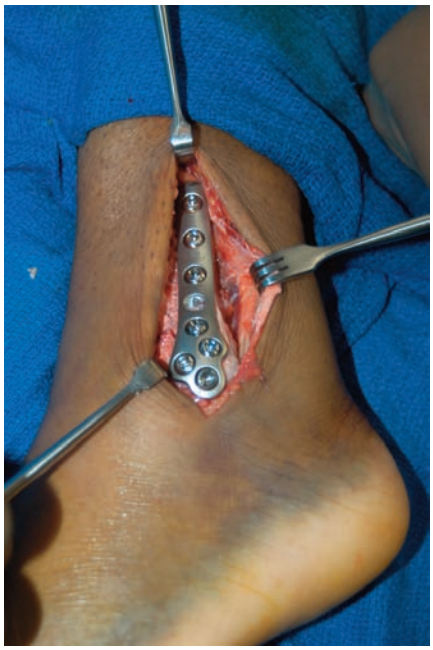

Figure 3. Intraoperative view following placement of anatomic lateral distal fibular plate (Smith-Nephew).

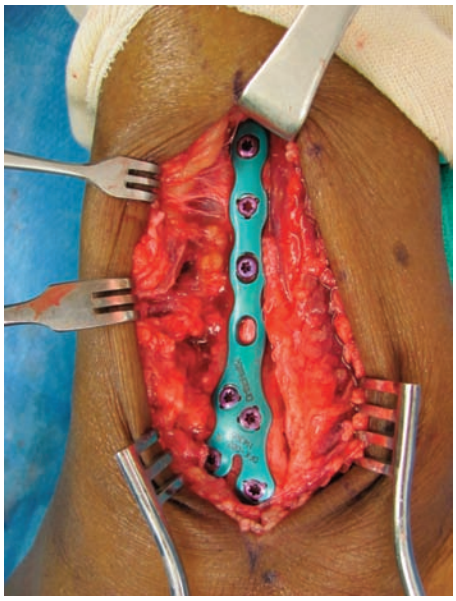

Figure 4. Intraoperative view showing Orthohelix anatomic distal fibular plate in place. Note that both the Smith-Nephew and OrthoHelix plates allow placement of 4 screws in the fibula distal to the fracture. Whereas when using traditional one-third tubular plates, typically only 2 screws are purchasing the distal fibula.

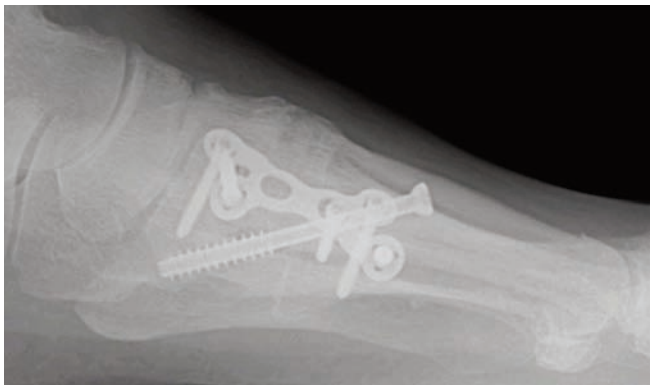

Figure 6. Following completion of fixation the anterior cortical defect is being packed with allograft material.

Figure 5. Intraoperative view showing placement of the Synthes contoured fibular plate. Note the bony defect in the anterior fibula in the open combi hole. Also note that there are 5 holes available in the distal fibula with 2.4 mm and 2.7 mm locking and cortical options as well as multiple temporary fixation holes that will accommodate 2.0 mm wires.

SUMMARY

Anatomically contoured plates are now available for both the tibia and fibula from most all manufacturers. This reduces or completely eliminates the need for bending intraoperatively. More importantly the plate itself can be used as a template in areas where there has been impaction and or severe comminution. Finally the newer designs employ multiple sizes of locking and nonlocking screw options that give the surgeon great flexibility and dramatic enhancement of stability for the patient. This has allowed earlier weight bearing and enhanced recovery for patients in the author's practice.