Introduction/Purpose: The association between tibial shaft fractures and concomitant posterior malleolus fractures has been well-studied; however less is known about tibial shaft fractures and concomitant medial malleolus fractures. Treatment of tibial shaft fractures with a plate or intramedullary nail in the setting of concomitant medial malleolus fracture may pose obstacles to standard medial malleolus fractures fixation due to hardware that impedes optimal screw placement. The purpose of this study is to report the presentation and management strategies used to treat medial malleolus fractures in the setting of concomitant tibial shaft fractures.

Methods: From 2011 to 2015, seven (1.4%) patients were identified with concomitant tibial shaft fractures and isolated medial malleolus fractures. Data was collected through review of patient charts, radiographs, and operative reports including the following variables: demographics, injury patterns, fixation techniques, and outcomes. Five male patients and two female patients with a mean age of 39.1 years (range, 13.9-67.9 years) were included. Three patients reported tobacco use. Mechanisms of injury included motor vehicle accident (n=4), fall from standing (n=2), and pedestrian versus vehicle (n=1). Average medial malleolus fracture fragment length was 19.1 mm (range, 14.3-29.4 mm). Tibial shaft fractures were open in four cases, and included five transverse patterns, one spiral pattern, and one segmental fracture. All patients were treated surgically for tibial shaft and medial malleolus fractures simultaneously. All medial malleolus reductions were anatomic. The average time to union for medial malleolus fractures was 3.12 months (range 1.53 to 5.93 months).

Results: Fixation techniques included screw (n=5) or buttress plate (n=2) fixation for the medial malleolus, and intramedullary nailing (6) or blade plate fixation (n=1, prior TKA) for the tibial shaft. Of the five medial malleolus fractures treated with screw fixation, screws were positioned anteriorly (n=2) or medially (n=2) to tibial shaft fixation implant in four cases; in one case the distal extent of the tibial nail was proximal to the medial malleolar screws. One buttress plate was placed with screws distal to the tibial nail, another was placed angling one proximal screw anterior and one posterior to the tibial nail. Two patients reported complications following surgery: one with chronic pain and one with wound dehiscence and delayed union at the open tibial shaft fracture site.

Conclusion: Seven patients were treated operatively for concomitant tibial shaft and medial malleolus fractures, requiring careful attention to placement of medial malleolar screws or buttress plate due to the presence of implant used to treat the tibial shaft fracture. Medial malleolar screws can safely be redirected anteriorly or medially to accommodate the tibial shaft fracture implant, with acceptable fracture union outcomes in this small case series. Further biomechanical and long-term data may help to validate these adjustments to standard techniques.
Figure 1a – Anteroposterior radiograph of medial malleolar fixation with buttress plate in the presence of tibial nail.

Figure 1b – Lateral radiograph of medial malleolar fixation with buttress plate in the presence of tibial nail.

Figure 2a – Anteroposterior radiograph of medial malleolar fixation with screws in the presence of tibial plate.

Figure 2b – Lateral radiograph of medial malleolar fixation with screws in the presence of tibial plate.