

## **Anatomic Structures at Risk During Posterior to Anterior Percutaneous Screw Fixation of Posterior Malleolar Fractures: A Cadaveric Study**

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**Purpose:** There are no established guidelines for fixation of posterior malleolus fractures (PMFs). However, fixation of PMFs appears to be increasing with growing evidence demonstrating benefits for stability, syndesmotic alignment, and early functional outcomes. Optimal lag screw fixation requires that the screw threads are entirely across the fracture site to allow interfragmentary compression. Poor compression may result from anterior to posterior (AP) percutaneous screw fixation if there is a small fragment. The purpose of this study was to determine the risk to anatomic structures utilizing a percutaneous technique for posterior to anterior (PA) screw fixation of PMFs performed with the patient in the supine position.

**Methods:** Percutaneous PA lag screw placement was carried out on 10 fresh-frozen cadaveric ankles followed by dissection to identify soft tissue and neurovascular structures at risk. The distance from the guidewire to each anatomic structure of interest was measured. The correlation between the mean distances from the guidewire to each structure was calculated.

**Results:** The sural nerve was directly transected in 1 of 10 specimens (10%) and in contact with the wire in a second specimen (10%). There was a significant correlation between the proximity of the guidewire to the apex of Volkmann's tubercle and its proximity to the sural nerve ( $r = 0.705$ ,  $P = 0.034$ ). The flexor hallucis longus (FHL) muscle belly was perforated by the guidewire 40% of the time but was not tethered or entrapped by the screw.

**Conclusion:** Percutaneous PA screw placement for PMF fixation is a safe technique which can be improved with several modifications. A mini-open technique is recommended to protect the sural nerve. There is potential for tethering of the FHL with a washer or large screw head (Fig. 1). Risk to the anterior and posterior neurovascular bundles is minimal. Advantages of this technique include optimal lag screw fixation for small PMFs and supine positioning to facilitate fixation of the other malleoli.