

### Defining the Intramedullary Axis of the Distal Tibia Using CT

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**Purpose:** With the intramedullary (IM) nail constrained by the isthmus, proper nail end position in distal tibia fractures is important in the prevention of malalignment. The purpose of this study was to describe the IM axis of the distal tibia using CT.

**Methods:** An analysis of CT of uninjured tibias was performed. Coronal images were oriented perpendicular to the transmalleolar axis (axial view) to simulate a mortise view. The tibial isthmus was identified and a plumb line from the center of the isthmus was drawn (coronal) with measurements performed to identify the IM axis. Sagittal images were oriented perpendicular to the talar body to simulate a lateral view. The tibial isthmus was identified (axial view) and a plumb line from the center of the isthmus was drawn (sagittal) with measurements performed to identify the IM axis. The measurements were converted to a fraction of plafond width and categorized by quadrant.

**Results:** 85 lower extremity CT scans from 82 patients (pts) were analyzed. In the coronal plane, the mean IM axis as a fraction of plafond width (0-1, lateral to medial) was 0.34 (range, 0.04-0.71). In the sagittal plane, the mean IM axis as a fraction of plafond width (0-1, anterior to posterior) was 0.49 (range, 0.27-0.74). The IM axis in the coronal plane was found to be in the lateral quadrant in 10 pts (12%), lateral-middle quadrant in 74 pts (87%), and medial-middle quadrant in 1 pt (1%). The IM axis in the sagittal plane was found to be in the anterior-middle in 52 pts (61%), and posterior-middle in 33 pts (39%).

**Conclusion:** The IM axis of the distal tibia in the coronal plane most commonly intersects the plafond at a point one-third (0.33) the width of the plafond from the incisura. 87% of the measurements fell into the lateral-middle quadrant in the coronal plane. The IM axis in the sagittal plane fell most commonly in the middle 2 quadrants and was grouped near “center-center,” (0.49). These findings continue to challenge the concept of a “center-center” position for tibial nail end point, especially in the coronal plane.

