Pathoanatomy of the Tongue-Type Calcaneus Fracture: A Study Using 2 and 3-Dimensional CT

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Purpose: Tongue-type calcaneus fractures are defined by a secondary fracture line that exits posteriorly though the tuberosity, leading to a plantarflexed fragment that is frequently treated using percutaneous techniques (ie, Essex-Lopresti maneuver). Classically, the Essex-Lopresti maneuver levers the tongue fragment out of the plantarflexed position using 2 pins; however, potential angulation in the axial or coronal plane is not addressed. We sought to better define the pathoanatomy of the tongue-type calcaneus fracture to assess the appropriateness of percutaneous techniques as described in addressing all planes of deformity in this injury.

Methods: We reviewed all 1118 calcaneus fractures treated at our Level I trauma center over the past 16 years, identifying 158 displaced tongue-type calcaneus fractures for study. We reviewed cross-sectional imaging to collect all Sanders 2B and 2C fractures (reported to be most amenable to the Essex-Lopresti maneuver). All CT scans were reformatted to be in plane with the malleolar axis in an effort to maintain consistency in the coronal and axial images. We documented the presence of a varus/valgus (coronal plane) or adduction/abduction (axial plane) position of the tongue fragment in relation to the intact subtalar joint, with >10° of angulation being diagnostic of displacement.

Results: Our study cohort consisted of 56 Sanders 2B and 2C calcaneus fractures that were evaluated for angulation in the axial and coronal plane. We found angulation in the coronal plane was common with 77% (43 of 56) tongue fragments in a position of valgus with a mean angulation of 20.8°. The remaining tongue fragments were either without significant angulation (21%) or in a position of varus (2%). In the axial plane, 64% (37 of 56) tongue pieces were in a position of adduction at an average angulation of 20.2°. In the remaining cases, we found 34% without angulation and 2% in abduction. Sanders 2B fractures were more likely to be in a position of valgus and adduction than 2C fractures.

Conclusion: The tongue-type calcaneus fracture most often displaces into a position of plantar flexion, valgus, and adduction. This study is the first of our knowledge to provide a detailed description of the pathoanatomy of the tongue-type calcaneus fracture. Knowledge of this deformity might aid in reduction and establishment of a better reduced subtalar joint when using the Essex-Lopresti maneuver or other less invasive techniques.