



Mapping Osteochondral Injuries of the Talar Dome Associated with Tibial Pilon Fractures

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Purpose: The two main mechanisms of injury (MOI) for distal tibial pilon fractures are, falling from a height and motor vehicle accident (MVA). This study investigated concurrent talar dome injuries associated with tibial pilon fractures, mapping their distribution across the dome of the talus while comparing the two main MOI's.

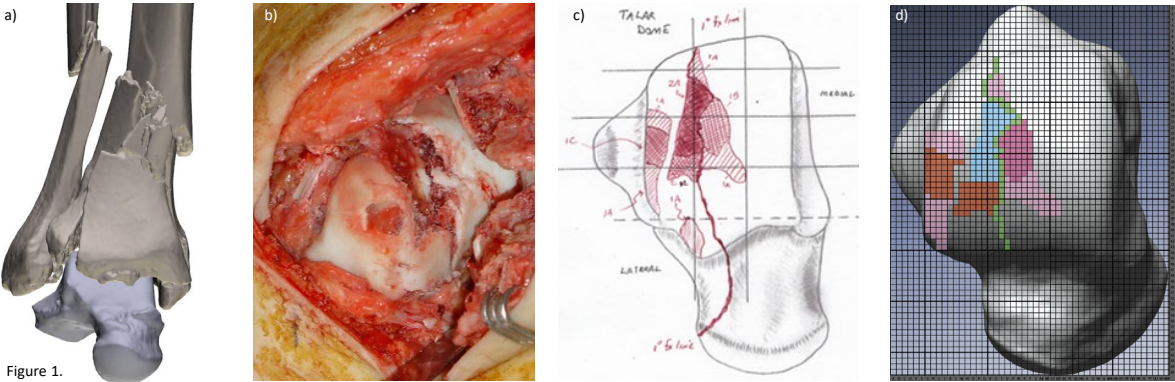


Figure 1. From left to right: a) a 3D model of a tibial pilon fracture; b) an intraoperative photo of a talar fracture; c) map of talar injury drawn by the lead surgeon; d) the digitally transposed injury pattern on a statistical shape model (SSM) of a talar dome.

Methods: From a previously compiled database of acute distal tibial pilon fractures (AO/OTA 43B/C) in adults, 53 cases were identified with a concurrent injury to the talar dome and a known mechanism of injury. Case specific 2D injury maps were grouped by their MOI and then overlayed in an Excel document. Each time an injury was present within a square of the 1x1mm grid overlaying the talar dome, it was tallied and compiled.

Results: Injuries sustained by the talar dome during falls were concentrated in the combined lateral anterior to posterior column (59%) with an 8.3% likelihood that any square on the dome would be injured. MVAs injuries were concentrated in both the lateral anterior to posterior column (50%) and across the superior lateral to medial row (47%) with an 14.2% likelihood that any square on the dome would be injured. A chi square test of independence was performed to determine if there was a significant relationship between MOI and sex. It was found to be significant, with men more likely to injure themselves falling from a height than women X2 (1, N=53) = 5.53, p= .0187.

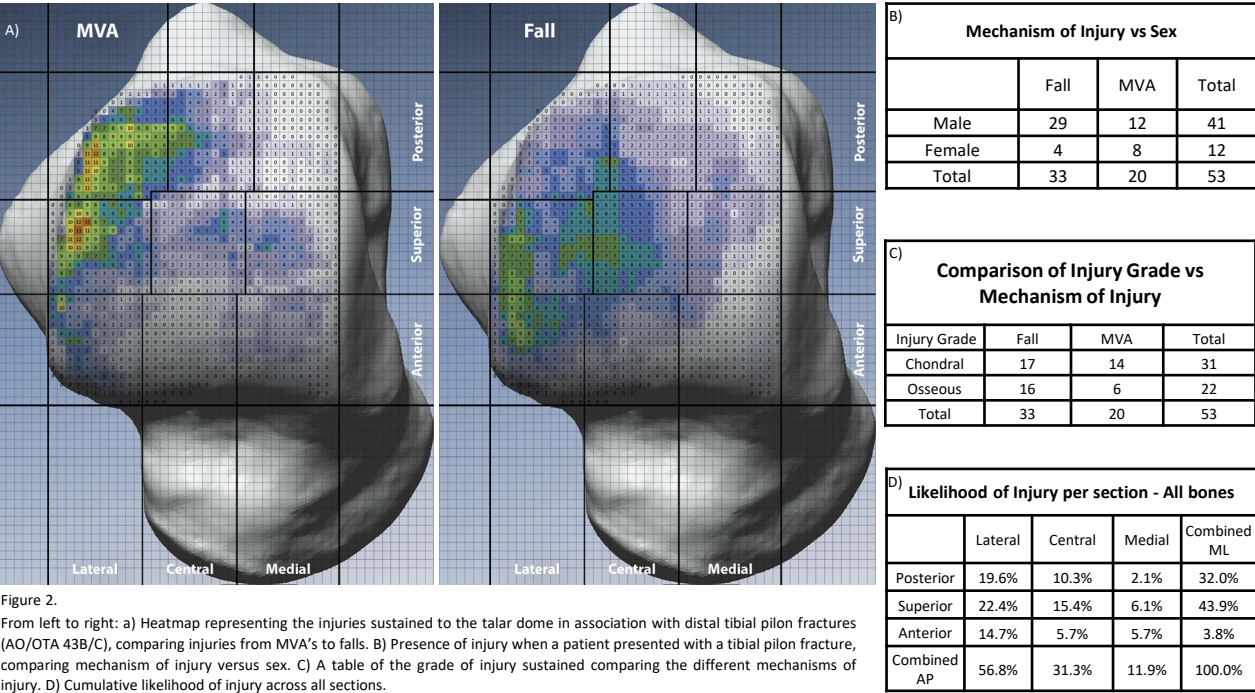


Figure 2. From left to right: a) Heatmap representing the injuries sustained to the talar dome in association with distal tibial pilon fractures (AO/OTA 43B/C), comparing injuries from MVA's to falls. B) Presence of injury when a patient presented with a tibial pilon fracture, comparing mechanism of injury versus sex. C) A table of the grade of injury sustained comparing the different mechanisms of injury. D) Cumulative likelihood of injury across all sections.

Conclusions: The MOI has important implications regarding the resulting pathology, requiring further research.