Do Patients with Insertional Achilles Tendinopathy Have Different Morphologic and Radiographic Alignment Features of the Foot?

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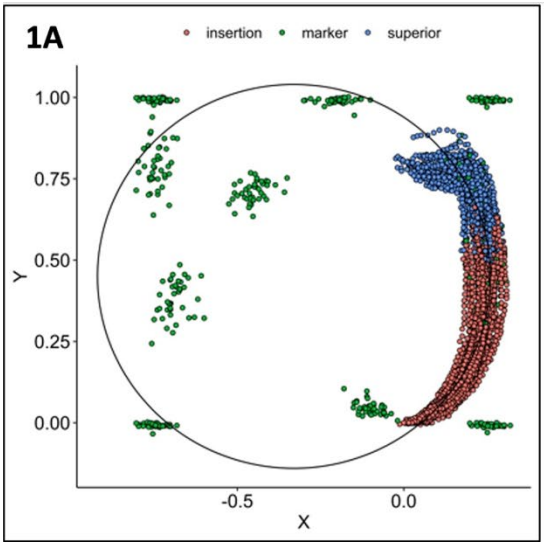
Purpose:
Insertional Achilles Tendinopathy (IAT) is a common change of the Achilles that accounts for (20–24%) of all Achilles tendinopathies. This study aims to describe the normal morphology of the calcaneal tuberosity and assess the variation from normal in IAT. To do this, we will propose a novel angular measurement of the enlarged tuberosity and evaluate the correlation of this morphological change with radiographic alignment features of the hindfoot and arch height.

Methods:
Lateral weightbearing XRs of 40 control feet were used to study normal morphology by mapping the tuberosity onto part of a standard circle (SC) (Figure 1A). From this, a mathematical algorithm for calculating SC was developed. Then, 40 enlarged IAT tuberosities were mapped and compared to their respective SCs to develop the Pathologic Achilles Insertion Angle (PAIA) (Figure 1B). The PAIA represents the optimal rotational angle to fit the enlarged calcaneus in the ideal SC. Lastly, in 83 feet with IAT, the PAIA, the calcaneal Pitch Angle, ratio of the Medial Cuneiform Base Height/Cuboid Height, ratio of the Medial Cuneiform Base Height/Fifth Metatarsal Height were evaluated.

Results:
In the IAT group with 83 feet, there were 46 (55.42%) from females and 37 (44.58%) from males. The average age was 54.61 years (SD= 10.56 years). 41 (49.4%) were left feet and 42 (50.6%) were right feet, with an average PAIA at 12.53° (SD= 5.81°), Pitch Angle at 21.65° (SD= 4.75°), ratio of the Medial Cuneiform Base Height/Cuboid Height at 1.71 (SD= 0.32), ratio of the Medial Cuneiform Base Height/Fifth Metatarsal Height at 2.75 (SD= 1.71). There was a statistically significant correlation between PAIA and Pitch Angle ($P=0.0068$, $R^2=0.087$).

Conclusion:
Evaluating a patient's calcaneus dimension, IAT enlargement, hindfoot and arch height features as well as the correlation between PAIA and Pitch Angle might give us insight into the biomechanical etiology of IAT, which needs to be further investigated with a larger study and control sample size.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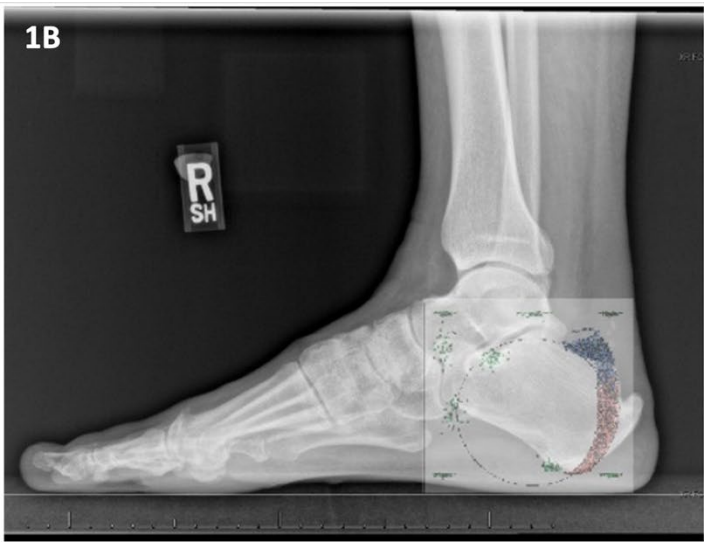
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