Sinus Tarsi Volume Changes with Hindfoot Position on Weight-Bearing CT Scan
Michael Hull, MD, Tyler Rutherford, BS, Clifford Jeng, MD, John T. Campbell, MD, Rebecca Cerrato, MD

Category: Basic Sciences/Biologics, Hindfoot

Keywords: Hindfoot varus valgus sinus tarsi impingement

Introduction/Purpose: Sinus Tarsi syndrome is a frequent cause of anterolateral foot pain following injury. Chronic lateral subtalar pain, often referred to as “Sinus Tarsi Syndrome”, is commonly reported to occur following trauma. One hypothetical epidemiological predisposing factor for sinus tarsi syndrome is flatfoot deformity with valgus hind foot alignment. Common conservative treatment includes medial heel posting to attempt to widen the sinus tarsi space and alleviate synovitic pain. Although treatment with operative intervention has been reported, no data exists to evaluate if hindfoot realignment functionally opens the sinus tarsi volume.

Methods: Weight-bearing Computed Tomography (CT) scans were obtained in 5 healthy volunteers standing at rest on slanted platforms, 25 degree valgus and 25 degree varus. The volume of the sinus tarsi was measured on each scan. Cross sectional area of the sinus tarsi was measured in 3.6 mm slices from the most lateral fully enclosed image to the most lateral aspect of the subtalar joint. Area measurements were multiplied by cut depth (3.6 mm) and summed. Critical angle distance was measured as a straight line from the most lateral point of the lateral process of the talus to the base of the critical angle of Gissane. Subfibular distance was then measured from the most distal tip of the fibula in a straight line to the nearest point of the lateral calcaneal wall. Data were compared using a one way ANOVA and Tukey’s multiple comparison test.

Results: The mean sinus tarsi volume in the valgus position was 325.1 mm$^3$ (±88) and 313.3 (±71) for the left and right foot, respectively. In the varus position, the mean sinus tarsi volume increased to 646.8 mm$^3$ (±169) and 599 mm$^3$ (±203). There was a significant difference between the varus and valgus position for both feet (left p<0.01 / right p<0.05). The critical angle distance increased from 28.1 mm (±7.5) to 91.3 mm (±26) for the left foot and 26.3 mm (±7.6) to 87 mm (±27.9) for the right foot when realigned to the varus position (p<0.0001). There was not a significant increase in the subfibular distance when repositioned from valgus to varus (p=0.06 / p=0.35).

Conclusion: This study confirms that moving from a valgus to a varus position significantly increases the volume of the sinus tarsi as well as significantly increases the distance from the lateral process of the talus to the calcaneal angle of Gissane. Interestingly, subfibular distance did not significantly increase, although this may reach significance with increased samples. With confirmation that adjusting hindfoot positioning impacts lateral osseous impingement, future studies are warranted to correlate these findings with clinical symptoms.